Environmental Functional Area

Environmental Support and Programmatic Outreach

LLNL-TR-731778

Livermore Site Spill Prevention, Control and Countermeasures (SPCC) Plan

May 2017

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Lawrence Livermore National Laboratory

This work performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract DE-AC52-07NA27344.

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Management Approval (40 CFR 112.7)

This SPCC Plan has been prepared in accordance with good engineering practice and has the full approval of management at a level with authority to commit the necessary resources to fully implement the Plan (40 CFR 112.7). The responsibility for implementing this SPCC Plan rests with each Program Manager who is responsible for facilities with spill potential at LLNL.

____ _______________
Frances Alston, Ph.D. Date
Director
Environment, Safety, & Health

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Professional Engineer Certification (40 CFR 112.3(d))

The undersigned Registered Professional Engineer (P.E.) is familiar with the requirements of 40 CFR Part 112 and has visited and examined the facility, or has supervised examination of the facility by appropriately qualified personnel. The undersigned Registered Professional Engineer attests that this Spill Prevention, Control, and Countermeasure Plan has been prepared in accordance with good engineering practice, including consideration of applicable industry standards and the requirements of 40 CFR Part 112; that the procedures for required inspections and testing have been established; and that the Plan is adequate for the facility. As the Livermore Site is large and complex and due to certain security access restrictions, the inspection of the Livermore Site was limited only to oil storage containers and areas identified by the appropriate LLNL Program personnel. In preparing this Plan, the P.E. has relied upon this information and the certification is valid only to the extent that the inventory information provided at the time of certification was complete and accurate.

This certification in no way relieves the owner or operator of the facility of his/her duty to prepare and fully implement this SPCC Plan in accordance with the requirements of 40 CFR Part 112. Nor does this certification in any way relieve the owner or operator of the facility from compliance with other Federal, State, or local laws. This Plan is valid only to the extent that the facility owner or operator maintains, tests, installs, and inspects equipment, containment, and other devices as prescribed in this Plan.

William W. Moore
Name of Certifying Professional Engineer (signed)

William W. Moore, P.E.
Name of Certifying Professional Engineer (printed)

April 28, 2017
Date

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Spill Prevention, Control, and Countermeasure Plan Certification and Review Log (40 CFR 112.3 and 112.5)

In accordance with 40 CFR 112.5, LLNL will conduct the following:

- Amend the Spill Prevention, Control, and Countermeasure (SPCC) Plan when there is a change in the facility design, construction, operation, or maintenance that materially affects its potential for a discharge.
- Review and evaluate this SPCC Plan at least once every five years.
- Implement any amendments no later than six months following the preparation of the amendment.

In accordance with 40 CFR 112.5(c) and 112.3(d), any technical amendment to the SPCC Plan shall be certified by a Registered Professional Engineer. Administrative changes such as changes to phone numbers or names do not require certification by a Registered Professional Engineer.

In accordance with 40 CFR 112.5(b), I, Diane Griffin, *have completed a review and evaluation of the SPCC Plan for LLNL's* Livermore *Site and will amend the Plan as a result.*

Signature of Reviewer Date

Record of Review

Review Date	Reviewer	Is an Amendment Necessary?
May 12, 2008	Shari Brigdon	☐ No / ☒ Yes
July 1, 2009	William Schwartz	☐ No / ☒ Yes
July 1, 2014	Diane Griffin	☐ No / ☒ Yes
December 22, 2015	Diane Griffin	☐ No / ☒ Yes
September 2016	Diane Griffin	☐ No / ☒ Yes
March 2017	Diane Griffin	☐ No / ☒ Yes

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SPCC Plan Amendment Log

Record of Amendments

Update Number	Document Name	Date	Comments	PE Certification Necessary?
0	Spill Prevention, Control, and Countermeasure Plan	November 1991		☐ No / ☒ Yes
1	Spill Prevention, Control, and Countermeasure Plan	December 1995	Phase II Rule revision	☐ No / ☒ Yes
2	Spill Prevention, Control, and Countermeasure Plan	May 2008	Technical amendments, organization and name changes, updated inventory	☐ No / ☒ Yes
3	Spill Prevention, Control, and Countermeasure Plan	July 2009	July 17, 2002 Rule revision, as further revised on April 1, 2009, organization and name change, updated inventory	☐ No / ☒ Yes
4	Spill Prevention, Control, and Countermeasure Plan	July 2014	Organization and name change, updated inventory	☐ No / ☒ Yes
5	Spill Prevention, Control, and Countermeasure Plan	December 2015	Revised inspection forms and updated inventory	☐ No / ☒ Yes
6	Spill Prevention, Control, and Countermeasure Plan	September 2016	Updated inventory due to tank removals and replacements; added additional information in Section 1.1 to clarify the material and containers subject to regulation; re-ordered SPCC Plan Sections 1 and 5 to better address SPCC Rule requirements and better define spill response procedures; added Section 1.5 to describe non-conformances that require corrective action; divided old Section 3 (added new Section 4.0) to describe general discharge prevention (Part 112.7) and on-shore facility containment requirements (Part 112.8), added Oil Spill Contingency Plan to address qualified equipment, revised figures using GIS	☐ No / ☒ Yes
7	Spill Prevention, Control, and Countermeasure Plan	May, 2017	Updated inventory and map; added additional information in Section 1.1 to clarify the material and containers subject to regulation; updated Section 1.5 for corrections to deficiencies noted in previous Plan; clarified Section 3.7 and added correct training course number; Updated inspection forms.	

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Lawrence Livermore National Laboratory, Livermore Site Spill Prevention, Control, and Countermeasure (SPCC) Plan

1.0 INTRODUCTION

This Spill Prevention, Control, and Countermeasure (SPCC) Plan describes the measures that are taken at Lawrence Livermore National Laboratory's (LLNL) Livermore Site in Livermore, California, to prevent, control, and handle potential spills from aboveground containers that can contain 55 gallons or more of oil. This SPCC Plan complies with the Oil Pollution Prevention regulation in Title 40 of the Code of Federal Regulations (40 CFR), Part 112 (40 CFR 112) and with 40 CFR 761.65(b) and (c), which regulates the temporary storage of polychlorinated biphenyls (PCBs). This Plan has also been prepared in accordance with Division 20, Chapter 6.67 of the California Health and Safety Code (HSC 6.67) requirements for oil pollution prevention (referred to as the Aboveground Petroleum Storage Act [APSA]), and the United States Department of Energy (DOE) Order No. 436.1. This SPCC Plan establishes procedures, methods, equipment, and other requirements to prevent the discharge of oil into or upon the navigable waters of the United States or adjoining shorelines for aboveground oil storage and use at the Livermore Site.

The SPCC Plan is intended for distribution to all LLNL personnel who operate, maintain, and are responsible for containers of oil (oil-handlers). The updated Plan is available online at: https://esh-int.llnl.gov/spcc/spcc-hp.html.

1.1 Applicability

To comply with 40 CFR 112.2, oil means "oil of any kind or in any form, including, but not limited to: fats, oils, or greases of animal, fish, or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and, other oils and greases, including petroleum, fuel oil, sludge, synthetic oils, mineral oils, oil refuse, or oil mixed with wastes other than dredged spoil." APSA defines petroleum as crude oil, or a fraction thereof, that is liquid at 60° Fahrenheit temperature and 14.7 pounds per square inch absolute pressure which includes, but is not limited to: crude oil, petroleum fuels (not 100% biodiesel), heating oils, lamp oils, petroleum solvents, petroleum spirits, hydrocarbon liquids, olefins, alkanes, alkylates, and aromatics. For the purposes of this SPCC Plan, "oil" is used to refer to substances regulated under 40 CFR 112 or APSA.

Only containers with an oil capacity of 55-gallons or greater are considered when calculating site-wide capacity. The types of containers that may contain oil include: bulk storage containers used for storing oil; manufacturing equipment (flow-through process); and oil-filled operational equipment. Examples of bulk storage containers include, but are not limited to, aboveground fuel storage tanks, belly tanks associated with emergency generators, 55-gallon drums, and portable tank trucks. Examples of oil-filled operational equipment include, but are not limited to, hydraulic systems, lubricating systems (*e.g.*, those for pumps, compressors and other rotating equipment, including pumpjack lubrication systems), gear boxes, machining coolant systems, heat transfer systems, transformers, circuit breakers, electrical switches, and other systems containing oil solely to enable the operation of the device.

The federal SPCC rule excludes from the regulation:

- Containers less than 55-gallons in capacity.

- A container that is "permanently closed" defined in 40 CFR 112.2 as "any container or facility for which: (1) all liquid and sludge has been removed from each container and connecting line; and (2) all connecting lines and piping have been disconnected from the container and blanked off, all valves (except for ventilation valves) have been closed and locked, and conspicuous signs have been posted on each container stating that it is a permanently closed container and noting the date of closure."
- Motive power containers defined as any onboard storage containers used primarily to power the movement of a motor vehicle. The motive power container exclusion also applies to the ancillary on-board oil-filled equipment on that vehicle or self-propelled equipment (e.g., the hydraulic system reservoir tank on a self-propelled crane).
- Hot-mix asphalt or any hot-mix asphalt container.
- Pesticide application equipment and related mix containers.
- Any milk and milk product container and associated piping and appurtenances.

The Livermore Site is considered to be a non-transportation-related facility according to the Environmental Protection Agency (EPA). Non- transportation facilities are required to prepare SPCC Plans if they meet the following criteria:

- An aggregate aboveground oil storage capacity of more than 1,320 gallons, or
- A total underground oil storage capacity of 42,000 gallons; and
- Could reasonably be expected to discharge oil in harmful quantities into navigable waters of the United States.

The Livermore Site has an aggregate aboveground storage capacity greater than 1,320 gallons of oil. In addition, because of its location, oil spills at the Livermore Site could reasonably be expected to discharge oil into, or upon, the navigable waters of the United States or adjoining shorelines. This determination was based solely on geographic and locational aspects of the Livermore Site (such as its proximity to navigable waters, adjoining shorelines, land contours, drainage, etc.), and excludes consideration of man-made features, such as dikes, equipment, or other structures that serve to prevent an oil discharge from reaching navigable waters of the United States or adjoining shorelines. Consequently, the Livermore Site is required to develop, implement, and maintain an SPCC Plan under 40 CFR 112.

The Livermore Site is subject to the general SPCC requirements as they apply. It is not an onshore or offshore oil production facility and therefore those regulations that apply to those facilities do not apply (40 CFR 112.9 through 112.11).

Animal fats and oils, and vegetable fats and oils are regulated under 40 CFR 112.12. In this SPCC Plan, the requirements for fats and oils of animal or vegetable origin are the same as those for oils of petroleum origin. The Livermore Site has tallow bins located at Building 471 under a covered awning within a bermed area that has a sanitary sewer drain. There are no storm drains nearby. Also, there are tallow bins located at Building 125. All of the tallow bins at Building 471 and Building 125 have capacities less than 55 gallons and are therefore not subject to SPCC requirements. No SPCC-regulated animal or vegetable oils are present onsite.

A crosswalk of the requirements and their location in this SPCC Plan is included in Appendix A as required by 40 CFR 112.7.

1.2 Location of SPCC Plan – 40 CFR 112.3(e)

An electronic copy of the SPCC Plan is maintained on LLNL's servers. The SPCC Plan is one of the implementing documents described in LLNL's Procedure *Management of Spill Prevention, Control, and Countermeasure Aboveground Storage Tanks and Containers (PRO 2672)),* where a link is provided to download the most current SPCC Plan. After each review and update, an email notification that the SPCC Plan is available online is sent to appropriate personnel at the Livermore Site, including onsite emergency responders in LLNL's Radioactive and Hazardous Waste Management (RHWM) Department; the Fire Department; personnel who handle oil and their supervisors and/or facility managers; and Environmental Support and Programmatic Outreach (ESPO) tank analysts. The website address is also included in the EP3045-R refresher training, which is administered annually to personnel who operate or maintain containers of oil that are 55 gallons or more. A hard copy is maintained by the Environmental Functional Area (EFA) Tank Subject Matter Expert's (SME's) office. Additional hard copies can also be requested from the EFA Tank SME.

1.3 Plan Review and Amendments – 40 CFR 112.3 and 112.5

The following sections describe the general administrative requirements pertaining to maintenance of this SPCC Plan.

1.3.1 Changes in Facility Configuration – 40 CFR 112.5(a)

As set forth in 40 CFR 112.5(a), facility operations are reviewed and evaluated every six months for any change in facility design, construction, operation, or maintenance that materially affects the facility's potential for an oil discharge, including, but not limited to:

- Commissioning or decommissioning of containers;
- Reconstruction, replacement, or movement of containers;
- Reconstruction, replacement, or installation of piping systems;
- Construction or demolition that might alter secondary containment structures;
- Changes of product or service; or
- Revisions to standard operation, modification to testing/inspection procedures, and use of new or modified industry standards or maintenance procedures.

Facility changes of the nature identified above require amendments to the SPCC Plan and are referred to as technical amendments. Technical amendments must be certified by a Professional Engineer (PE).. Non-technical amendments include the following:

- Change in the name or contact information (i.e., telephone numbers) of individuals responsible for implementation of this Plan; or
- Change in the name or contact information of spill response or cleanup contractors.

Non-technical amendments do not require PE re-certification of the Plan.

When required, amendments to the SPCC Plan should be made as soon as possible, but no later than six months after the change occurs.

The amended SPCC Plan should be implemented at The Livermore Site as soon as possible following any technical amendment, but *no later than six months* from the date of the amendment. EFA is responsible for initiating and coordinating revisions to the SPCC Plan.

1.3.2 Scheduled SPCC Plan Review – 40 CFR 112.5(b)

In accordance with 40 CFR 112.5(b), a scheduled review and evaluation of the SPCC Plan is required and completed at least once every 5 years even if no facility modifications or administrative changes have been identified as part of the periodic reviews. As a result of the 5-year review and evaluation, the SPCC Plan is amended as needed to include more effective prevention and control technology. Any time a facility modification or review and evaluation requires SPCC Plan technical amendments as described in the previous section, the SPCC Plan is re-certified by a PE in accordance with 40 CFR 112.3(d).

Unless a technical or administrative change prompts an earlier review of the Plan, the next scheduled review of this Plan must occur before April 2022.

1.3.3 Plan Amendments Requested by Regional Administrator – 40 CFR 112.5(d)

In accordance with 40 CFR 112.5(d), the Plan may be amended and re-certified whenever required or requested by the EPA Regional Administrator (RA) or other regulatory agencies and whenever applicable regulations are revised. If the RA requests an amendment, LLNL will respond within 30 days of receipt of the notice; this SPCC Plan must be amended within 30 days of the RA's response.

1.3.4 SPCC Plan Amendment Documentation

Scheduled reviews and periodic reviews requiring amendment(s) to the Plan are recorded in the Record of Review Log. Information provided includes the date of review and the name of the person(s) completing the review. This log should be completed even if no amendment is made to the Plan as a result of the scheduled five-year review and the "No" box checked for "Is n Amendment Necessary?" If an amendment to the SPCC Plan is necessary as a result of either the scheduled or periodic review, the "Yes" box is checked and the amendment should be logged in the "Record of Amendments." The "PE Certification Necessary" box should be checked "Yes" or "No", depending on the nature of the amendment. Administrative changes do not require recertification of the SPCC Plan. When an amendment is necessary, the date and a summary of the amendment and the identification of the Plan sections(s) affected are included in the log.

1.4 Certification of Substantial Harm Determination Form

The Oil Pollution Prevention regulations of 1990, originally promulgated under the Clean Water Act, direct facilities that could cause substantial harm to the environment by discharging oil into navigable waters of the United States to prepare and submit a Facility Response Plan for responding to a worst-case discharge of oil, and to a substantial threat of such a discharge. Under 40 CFR 112 Appendix C, facilities that do not meet the substantial harm criteria are not required to prepare and submit a Facility Response Plan; however, they must document and maintain their determination as part of their SPCC Plan. The Livermore Site does not meet the substantial harm criteria; therefore, it is not required to prepare and submit a Facility Response Plan. A Substantial Harm Determination Form for the Livermore Site is provided in Appendix B.

1.5 Facilities, Procedures, Methods, or Equipment Not Yet Fully Operational - 40 CFR 112.7

Although the containers at the Livermore Site have been inspected under the previous SPCC Plan, the previous SPCC Plan did not describe integrity testing in accordance with the Steel Tank Institute (STI), SP001, "Standard for Inspection of Aboveground Storage Tanks." Section 4.2 of this Plan describes the required integrity testing program to be implemented at the Livermore Site. The procedures will begin as of the operative date of this Plan.

During preparation of this SPCC Plan, several deficiencies were noted that need to be corrected as soon as possible in order for the Livermore Site to comply with the regulations. In most cases, the deficiencies should be addressed no later than 6-months from the operative date of this Plan. In the case of double-walled tanks that have drains from the primary tank penetrating the secondary wall, it is recognized it may not be possible to address every tank within the 6-month time-frame due to budgetary constraints, possible procurement time and/or associated air permitting issues if new generators are installed. For these tanks, a more rigorous integrity testing protocol has been established (see Section 4.2) and should be followed until such time as corrective actions have been completed. In addition, a schedule of compliance should be established and documented for these tanks in the next revision of the SPCC Plan no later than 6-months from the operative date of this Plan. These deficiencies and the recommended actions, as they relate to the SPCC Plan are noted below:

Previously Identified Deficiencies:

Deficiency	**Equipment ID**	**Regulation Requirement**	**Corrective Actions Completed**
Double-walled tanks have drains from the primary tank penetrating the secondary wall. Double-walled tanks with fittings or openings located below the liquid level of the container may require additional secondary	1. 071TFBD01 2. 132NTFBD01 3. 133TFBD01 4. 151TFAD01 5. 170TFBD01 6. U193TFBD01 7. 235TFBD01 8. U295TFAD01 9. U295TFBD01 10. 313TFBD02 11. 313TFBD01 12. 313TFBD03 13. U325TFBD02	40 CFR 112.8(c)(2)	Tanks were inspected to determine secondary containment status. 26 of the tank designs were found to be non-compliant with secondary containment requirements. Plans were developed to correct secondary containment deficiencies. Each tank will need to be modified on a case-by-case basis to meet secondary containment

Deficiency	**Equipment ID**	**Regulation Requirement**	**Corrective Actions Completed**
containment to conform with industry standards and/or local codes.	14. 332TFBD06 15. 332TFBD08 16. 365TFAD01 17. 378TFBD01 18. 381TFAD02 19. 453TFBD01 20. 490TFBD02 21. 491TFBD01 22. 581TFBD01-P 23. 581TFBD02-P 24. 02TFBD43 25. 02TFBD44 26. 02TFBD45 27. 02TFBD46 28. 02TFBD47 29. 368TFBD01		requirements. 313TFBD01 and 313TFBD02 were determined to be compliant with secondary containment requirements. 313TFBD03 was SPCC permanently closed.
Inadequately sized containment pallets were observed in drum storage areas.	• B231 WAA • B515 WAA	40 CFR 112.8(c)(2)	Adequate secondary containment pallets were installed.
Use of single-walled tanks without secondary containment.	• U325TFBD03 • 02TFBD27 • 02TFBD49 • 02TFBD50 • 02TFBD52	40 CFR 112.8(c)(2)	02TFBD49 and 02TFBD50 have been SPCC permanently closed. Portable berms with sufficient containment capacity were installed for 02TFBD27 and 02TFBD52. U325TFBD03 containment design is in progress.
Outdated Training Course.	NA	40 CFR 112.7(f)	The SPCC training program is in the process of being updated to adequately describe the SPCC Plan.
Equipment that is no longer in use is not maintained or inspected and still contains oil.	• DC Power Supply Type E18400 • DC Power Supply Type E18471	40 CFR 112.2	Custodian has resumed inspections.
Spill response materials are not consolidated into designated storage locations.	• B321C Room 1315B and 1411C • B511 Rm 159 • B383 Rm 100 • B231 Rm 1841 • G433464P • G434023A • G710403L • G710404L • G710430D	40 CFR 112.7(c)	Spill response kits were consolidated and are sized to contain maximum quantity of oil expected for each location.

Deficiency	**Equipment ID**	**Regulation Requirement**	**Corrective Actions Completed**
No anti-siphon valves.	• 381TFAD02 • 519TFAD01 • 295TFAD01 • 491TFAD01	40 CFR 112.7(c)	Anti-siphon valves were installed for 519TFAD01 and 295TFAD01 to prevent accidental release due to siphoning of tanks. 491TFAD01 was evaluated, and it was determined that the tank did not require an anti-siphon valve. An anti-siphon valve for 381TFAD02 was not installed yet.
General secondary containment is present for several pieces of operating equipment, but the capacities were not confirmed due to access restrictions or timing.	• B231 Pacific 1750 Ton Press • T650 • T1652 • T1653 • T1580 • T1763 • T1217 • T1544 • T1708 • T975 • T200 • T900 • T1830 • T1831	40 CFR 112.7(c)	EFA obtained measurements for all secondary containment areas and confirmed the secondary containment capacity is sized to hold at least the most reasonably expected release volume. Calculations are included in Appendix D.

Current SPCC Deficiencies and the Recommended Action:

Deficiency	**Equipment ID**	**Regulation Requirement**	**Corrective Actions Completed**
Double-walled tanks have drains from the primary tank penetrating the secondary wall. Double-walled tanks with fittings or openings located below the liquid level of the container may require additional secondary containment to conform with industry standards and/or local codes.	1. 071TFBD01 2. 132NTFBD01 3. 133TFBD01 4. 151TFAD01 5. 170TFBD01 6. U193TFBD01 7. 235TFBD01 8. U295TFAD01 9. U295TFBD01 10. U325TFBD02 11. 332TFBD06 12. 332TFBD08 13. 365TFAD01 14. 378TFBD01 15. 381TFAD02 16. 453TFBD01 17. 490TFBD02	40 CFR 112.8(c)(2)	Evaluate the listed tanks on a case-by-case basis and issue a plan for each tank to (1) modify secondary containment of tank, (2) install secondary containment around tank, or (3) replace tank. Tanks shall be considered Category 3 ASTs as defined in STI SP001 and inspected as outlined in the standard for such tanks until the corrective action has been implemented.

Deficiency	**Equipment ID**	**Regulation Requirement**	**Corrective Actions Completed**
	18. 491TFBD01 19. 581TFBD01-P 20. 581TFBD02-P 21. 02TFBD43 22. 02TFBD44 23. 02TFBD45 24. 02TFBD46 25. 02TFBD47 26. 368TFBD01		
Use of single-walled tanks without secondary containment.	• U325CPA03	40 CFR 112.8(c)(2)	Install tank to meet both the secondary containment requirements and fire code requirements.
No anti-siphon valve.	• 381TFAD02	40 CFR 112.7(c)	Install anti-siphon valve to prevent accidental release due to siphoning of tank.
The vault under the ELMES 500 Ton Press has collected a substantial amount of oil that appears to have accumulated over a prolonged period of time.	B231 Rm 1000	40 CFR 112.7(c)	Active leaks in the Press should be repaired, and accumulated oil should be removed from the vault.

2.0 FACILITY INFORMATION

This SPCC Plan was completed for the following facility:

Facility Name	Lawrence Livermore National Laboratory
Type of Facility	On-shore research and development facility
Address of Facility	7000 East Avenue Livermore, California
Facility Phone	(925) 422-1100
Name and Address of Owner	U.S. Department of Energy (DOE), National Nuclear Security Administration (NNSA) 7000 East Avenue Livermore, California
Name and Address of Operator	Lawrence Livermore National Security, LLC 7000 East Avenue Livermore, California
Designated Person Accountable for Discharge Prevention at the Facility	Frances Alston

2.1 Facility Description - 40 CFR 112.7(a)(3)

2.1.1 Facility Operations and Location

The mission of LLNL is to serve as a national resource of scientific, technical, and engineering capability, with special focus on national security. LLNL undertakes multi-disciplinary fundamental and applied research and development (R&D) activities necessary to maintain a leading position in the diverse scientific and technical fields required for this mission. Current major programs include advanced defense technologies, energy, environment, biosciences, and basic science to meet important national needs. To support the R&D efforts at the Livermore Site, there are numerous offices, laboratories, support facilities (such as cafeterias, storage yards, small-scale fabrication facilities, a medical building, and fire station), roadways, parking areas, buffer zones, and landscaped areas. Approximately 698 acres (85% of the site) are impervious, including roadways, parking lots, sidewalks and pathways, and building footprints

The Livermore Site is located adjacent to the eastern boundary of the City of Livermore in the southeastern portion of the Livermore Valley, approximately 1-mile south of Interstate-580 and approximately 3 miles northeast of Lake Del Valle (Figure C-1). The facility layout is presented in Figure C-2, which includes all pieces of SPCC-regulated equipment.

2.1.2 Facility Organization and Responsibilities

Each LLNL Directorate owning and operating containers of oil capable of holding 55 gallons or more is responsible for maintaining their SPCC oil container inventory and implementing SPCC Plan requirements, including routine inspections, and operation and maintenance for its own programmatic equipment. Within the Operations and Business Directorate (O&B), the Facilities and Infrastructure (F&I) Group is responsible for institutionally owned aboveground oil storage containers and electrical equipment throughout the site. Aboveground oil storage containers associated with programmatic equipment associated with experiments is the responsibility of the programs which owns the equipment. The Radioactive and Hazardous Waste Management (RHWM) Program Office is responsible for the handling, storage, and/or disposition of all regulated hazardous and radioactive waste generated at LLNL.

Within the Environment, Safety, and Health Directorate, ESPO Group within EFA is responsible for preparing, reviewing, and updating the SPCC Plan and providing technical assistance with its implementation. ESPO relies on information regarding container inventory provided by the LLNL directorates with equipment subject to SPCC-requirements.

Document 22.1 in the LLNL *ES&H Manual* describes LLNL's Environmental Emergency Preparedness and Response actions and responsibilities. Workers can clean up a non-emergency spill (as defined in Document 22.1), using spill cleanup materials if it is safe to do so. If the spill becomes an emergency, workers are to contact the Fire Department either by dialing 911 from a landline or dialing (925) 447-6880 from a cellular telephone. Alameda County has a full-service Fire Department. Fire protection services including coordination and oversight of all emergency calls at LLNL are provided under contract with the Alameda County Fire Department, which operates a dedicated station at the Livermore Site.

Pursuant to 40 CFR 112.5, LLNL must review and evaluate the SPCC Plan at least every 5 years, or whenever there is a change in the facility design, construction, operation, or maintenance that materially affects the Laboratory's potential for discharge. ESPO is responsible for reviewing the SPCC Plan and ensuring that amendments to the Plan are made within 6 months of the review. Organizations in LLNL affected by the amendments have no later than 6 months following preparation of the amendment to implement the changes. A log of SPCC Plan reviews and record of amendments is included at the beginning of this document. A Professional Engineer certifies technical amendments that result from Plan review.

2.1.3 Facility Drainage

The topographic surface at the Livermore Site is of low relief and slopes gently to the northwest. The elevation of the Livermore Site ranges from 172 to 206 feet above mean sea level (msl). On-site drainage for the Livermore Site is segregated, as described below:

- The southeast portion flows through both underground conduits and unlined open channels into siltation traps and then into a lined drainage retention basin referred to as Lake Haussmann. The retention basin level is controlled by a weir that also acts as an overflow mechanism during moderate rainfall periods, releasing water to an underground conduit exiting at the Arroyo Las Positas.
- The westerly, central, and northerly portions flow through both underground conduits and unlined open channels into the Arroyo Las Positas. Arroyo Las Positas is an effluent-dominated stream modified into a storm water conveyance channel that traverses the northern portion of the Livermore Site and carries drainage from the northwest corner in a northerly direction offsite. Just east of Building 591, Arroyo Las Positas receives treated water from the Livermore Site Ground Water Project as part of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities, and water flows year-round in the lower two-thirds reach.
- A small southwest portion flows through both conduits and unlined open channels into the Arroyo Seco. Arroyo Seco is a redirected intermittent stream that traverses the southwest corner of the Livermore Site and carries drainage in a northwesterly direction offsite. The majority of the Arroyo Seco channel remains dry year-round except when rainfall creates drainage runoff. The last 20 feet of the channel onsite and at least a few hundred feet of the channel downstream of the Livermore Site flows year round due to treated groundwater discharge operated under CERCLA

The facility has numerous catch basins, drainage channels, subsurface storm drain lines as shown in Figure C-2. Many of the Livermore Site drainage ditches are unlined and absorb runoff, limiting the amount of storm water that could potentially enter Arroyo Las Positas and Arroyo Seco. The Livermore Site has no storm water effluent treatment system.

Storm water discharges from industrial areas on site are monitored in accordance with the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activities (Order No. CAS000001).

2.1.4 Description of Oil Sources – 40 CFR 112.7(a)(3)(i)

The Livermore Site has the capacity to store approximately the number of gallons of oil listed in Tables C-1a, C-1b, C-2, and C-3 of Appendix C. Containers applicable to the SPCC Plan range in size from 55-gallon drums to 11,300 gallons in the T200 and T900 main substation transformers.

For the purposes of this SPCC Plan, oil storage containers at the Livermore site are divided into four categories: (1) bulk storage containers used to store oil; (2) underground storage tanks (USTs); (3) oil-filled electrical equipment; and (4) oil-filled operating equipment associated with programmatic activities. Each category is discussed further in the sections below.

The SPCC Plan inventory in Appendix C does not include containers with a capacity less than 55-gallons or permanently-closed containers.

2.1.4.1 Bulk Storage Containers

"Bulk storage container" means any container used to store oil. According to 40 CFR 112.2, bulk storage containers are "used for purposes including, but not limited to, the storage of oil prior to use, while being used, or prior to further distribution in commerce. Oil-filled electrical, operating, or manufacturing equipment is not a bulk storage container." Portable storage containers are defined as bulk storage containers under SPCC. Portable storage containers include 55-gallon drums, portable tanks, and totes. With the exception of mobile refuelers, bulk storage containers are required to have secondary containment sized to contain the entire capacity of the largest single container, plus sufficient freeboard to contain precipitation as described in 40 CFR 112.8(c). Mobile refuelers are not subject to the sized secondary containment requirements under 40 CFR 112.8(c), however they are subject to general spill containment requirements and are required to have appropriate containment and/or diversionary structures or equipment to prevent a discharge, as described in 40 CFR 112.7(c). Furthermore, since mobile refuelers are a subset of bulk storage containers, the other provisions of 40 CFR 112.8(c) and 112.12(c) also still apply. The bulk storage containers at the Livermore Site are discussed generally below and identified in Table C-1a (general information) and C-1b (containment information) and shown on the Facility Diagram (Figure C-2) in Appendix C. For portable containers, the locations identified on the table and figure are those where the portable containers are normally stored. For mobile refuelers, the locations identified on the table and figure are those where the mobile refuelers are normally parked.

Bulk Storage Containers Associated with Emergency Generators
Many of the bulk storage containers at the Livermore Site contain diesel fuel and are used for standby emergency generators that provide power to various buildings on site during power outages. Some generators have fuel provided by a belly tank (also called a sub-base tank) whereas others are piped to a separate supply tank. Two ASTs (151TFAD01 and 365TFAD01) are supplied diesel from larger USTs. These ASTs are equipped with an automated control system to prevent the uncontrolled pumping of diesel from the USTs in the event of a leak. Generator tank sizes range from 66 to 2,000 gallons. The

majority of the generators and tanks are installed on concrete pads or asphalt surfaces, although there are several portable generators that are deployed to buildings to provide backup power when needed. Portable generators are stored on concrete or asphalt surfaces and should be deployed on concrete or asphalt surfaces when possible. Any single-walled tanks require secondary containment

Diesel Fueling Station

A 6,000 gallon AST (519TFAD01) used to store diesel is located in the southeast corner of the Livermore Site. This AST is double-walled and is also located within a constructed secondary containment structure. A fuel pump is present inside the containment structure and is used to pump fuel from the AST to government-owned vehicles and heavy equipment.

Resource Conservation and Recovery Act (RCRA) Tank Systems and RCRA Permitted Storage Areas

The Decontamination and Waste Treatment Facility **(**DWTF) Tank Farm consists of nine 5,000-gal, closed-top tanks and associated equipment installed within Building 695 for the storage and treatment of wastewater that may occasionally contain oil. The DWTF Tank Farm is permitted as part of LLNL's RCRA permit. These tanks are not regulated under the Aboveground Petroleum Storage Act (APSA; California Health & Safety Code 25270), but are subject to Part 112.

In addition, several RCRA-permitted container storage areas are located with the RCRA-permitted facilities (DWTF and Area 612) that may contain 55-gallon drums, portable tanks/totes, and vacuum tanker trucks storing hazardous wastes mixed with oil. Similarly, these containers are not regulated under APSA, but are subject to Part 112.

The Radioactive and Hazardous Waste Management (RHWM) Division of LLNL is responsible for work conducted within the RCRA-permitted facilities.

Satellite Accumulation Areas (SAAs) and Waste Accumulation Areas (WAAs)

Satellite accumulations areas (SAAs) and waste accumulation areas (WAAs) are located throughout the Livermore Site. SAAs and WAAs are established based on program needs and follow the procedures outlined in the LLNL Procedure Document *Hazardous, Radioactive and Mixed Waste Management, Satellite and Waste Accumulation Areas* (PRO 2756). SAAs included in this SPCC Plan are designated areas where used oil (or oil-containing liquid) is temporarily collected in 55-gallon drums during programmatic activities. SAAs may accumulate wastes for up to 9-months or until the container is full, whichever occurs first. WAAs are designated storage areas at the Livermore Site that may store hazardous wastes (including used oil) for up to 90-days. Typically, used oil is managed in RCRA-approved containers including 55-gal drums although wastewater with some residual oil may also be stored in larger portable totes. The WAAs at the Livermore Site identified in this SPCC Plan may potentially be used for storage of used oil, but do not necessarily contain used oils.

When an activity at the Livermore Site requires a temporary WAA, the WAA is established following the PRO 2756 document which describes proper secondary containment requirements for the types of waste anticipated. If a temporary WAA will be in use for longer than six months and contains oil storage in 55-gallon (or greater capacity) containers, the WAA is added to the SPCC Plan inventory.

New Product Containers

New oil product in 55-gallon drums is stored in designated storage locations established throughout the Livermore Site based on program requirements. Although portable containers are subject to move on occasion, they are still subject to the sized secondary containment requirements under 40 CFR 112.8(c). When portable containers are actively being moved, it may not be possible to provide secondary containment. During movement of the containers, the containers are checked to ensure container integrity and that they are properly closed. Containers are moved using proper safe handling procedures. If portable containers are moved to another location for extended periods of time (defined as 6-months or greater for the purposes of this SPCC Plan), then the inventory is changed and the SPCC Plan amended. This type of amendment is considered a technical amendment.

The number of drums may vary depending on program activities conducted at any given time, but are stored such that the total quantity of liquid stored does not exceed the designated capacity of the storage areas.

Mobile Refuelers

Mobile refuelers are operated at the Livermore Site. The mobile refuelers have onboard bulk storage containers used to distribute fuel to equipment at the Site. Several mobile refuelers are smaller, 100-gallon tanks installed in the beds of shop trucks. Several larger, 2,000-gallon integrated tank trucks are also located at the Livermore Site.

2.1.4.2 Underground Storage Tanks

There are nine USTs at the Livermore Site with a total capacity of 49,200 gallons. Diesel fuel, gasoline, and E-85 (a blend of 85% ethanol and 15% gasoline) are stored in these tanks. All buried storage tanks are constructed of fiberglass or fiberglass wrapped steel. The associated underground piping is non-steel (fiberglass or some other form of plastic) and is double-walled, with the exception of the single-walled steel piping for the gasoline and diesel tanks at Building 611. The only buried metallic piping is associated with the Building 611 diesel and gasoline tanks. These buried metallic pipes have cathodic protection to mitigate corrosion.

Underground storage tanks regulated under 40 CFR part 280 or a state program approved under 40 CFR part 281 are exempt from SPCC requirements in accordance with 40 CFR 112.1(d)(2)(i). The USTs at the Livermore Site are subject to H&SC Chapter 6.7 and 23 CCR, Division 3, Chapter 16, Article 4 and are therefore exempt. Although these USTs are exempt from the SPCC regulations, the locations of USTs at the Livermore Site are shown on the Facility Diagram (Figure C-2) in Appendix C as required by 40 CFR 112.7(a)(3).

2.1.4.3 Oil-Filled Electrical Equipment

Oil-filled electrical equipment at the Livermore Site includes transformers as well as highly specialized equipment used in programmatic research. Although oil-filled electrical equipment is not considered bulk storage containers and are therefore not subject to the sized secondary containment requirements under 40 CFR 112.8(c), oil-filled electrical equipment that contain 55 gallons or more of oil are subject to general spill containment requirements and are required to have appropriate containment and/or diversionary structures or equipment to prevent a discharge, as described in 40 CFR 112.7(c). For qualified oil-filled electrical equipment, the facility may instead implement an inspection and monitoring program, develop an oil spill contingency plan, and provide a written commitment of resources to control and remove discharged oil in accordance with 40 CFR 112.7(k).

The oil-filled electrical equipment at the Livermore Site are discussed generally below and are identified in Table C-2 and shown on the Facility Diagram (Figure C-2) in Appendix C.

Transformers
Nearly 200 transformers and their associated components are located at the Livermore Site. Transformers subject to Part 112 at the Livermore Site vary in storage capacity, ranging from 80 gallons to 12,810 gallons. The majority of the transformers are located on concrete pads, although some are located within bermed enclosures. Dielectric oil, mineral oil, synthetic oil, and other insulting oils are typically used in the transformers. The majority of the transformers at the Livermore Site have been designated qualified oil-filled electrical equipment.

Oil-Filled Electrical Equipment (Non-Transformers)
Non-transformer oil-filled electrical equipment at the Livermore Site includes charging chokes, Marx generators, power supply units, Klystron modulators, etc. used in programmatic research and experiments. Similar to transformers, the electrical generating equipment is submersed in dielectric oil, mineral oil, synthetic oil, or other types of insulting oils. Fluid reservoirs on the non-transformer oil-filled electrical equipment range from 60 to 1000 gallons.

2.1.4.4 Oil-Filled Operating Equipment

Oil-filled operating equipment are not considered a bulk storage container and therefore are subject to general spill containment requirements and are required to have appropriate containment and/or diversionary structures or equipment to prevent a discharge, as described in 40 CFR 112.7(c).

The majority of the oil-filled operating equipment is stored indoors. If floor drains are present in the rooms, LLNL uses curbing, floor drain plugging, and/or pads/mats at floor drains, or similar measures to prevent discharge through floor drains. Because programmatic activities are continually changing, the SPCC inventory includes experimental equipment as the equipment is identified, and information about the equipment is incorporated into the SPCC Plan no later than 6 months after the change and the SPCC Plan is amended.

The oil-filled operating equipment at the Livermore Site are discussed generally below and identified in Table C-3 and shown on the Facility Diagram in Appendix C.

Hydraulic Elevators
Oil-filled operating equipment at the Livermore Site includes elevators with hydraulic fluid reservoir capacities ranging from 60 to 419 gallons.

Machining Equipment
Oil-filled operating equipment at the Livermore Site includes large machining tools (e.g., hydraulic presses, lathes, and mills) with fluid reservoir capacities ranging 60 to 1,200 gallons, The types of oil found in the operating equipment at the Livermore Site includes hydraulic oil and oil-based machining fluids (used in machining coolant systems).

2.1.4.5 Partially Buried Metallic Tanks

The Livermore Site does not have any partially buried metallic tanks at the facility; therefore, 40 CFR 112.8(c)(5) does not apply.

2.1.4.6 Internal Heating Coils

The Livermore Site does not have any tanks with internal heating coils at the facility; therefore, 40 CFR 112.8(c)(7) does not apply.

2.2 Spill History – 40 CFR 112.4(a)

No spills or discharges of oil, as defined in 40 CFR 112.4(a), have occurred on the Livermore Site since the initial SPCC Plan was issued in November 1991, and no oil spill events fitting this definition have occurred within 12 months prior to the effective date of this SPCC Plan.

3.0 DISCHARGE PREVENTION – GENERAL SPCC PROVISIONS

This section discusses regulatory requirements and measures in use at the Livermore Site to prevent oil discharges during the handling, use, or transfer of oil products at the facility.

3.1 Compliance with Applicable Requirements - 40 CFR 112.7(a)(2)

The Livermore Site uses a variety of means to prevent the discharge of oil from the facility. Secondary containment is provided for many of the tanks, equipment and containers either through berms and other secondary containment structures or through double-walled construction of the tank. The double-walled tanks at the Livermore Site that are not equipped with overfill prevention measures (including both an overfill alarm and an automatic flow restrictor or flow shut-off) are equipped with active secondary containment methods to address the typical failure mode and the most likely quantity of oil that would be discharged from the tank during transfer operations. Fuel transfer activities are always manned, and spill response kits are situated at various locations or on refueling trucks for quick access in the event of a spill during transfer. Maintenance areas and vehicles are equipped with spill response kits. Qualified oil-filled operating equipment are inspected monthly and an Oil Spill Contingency Plan has been prepared (Appendix F).

As discussed in Section 1.5, several non-conformances were noted at the time this plan was prepared. These issues must be addressed to comply with relevant parts of 40 CFR 112 identified in Section 1.5.

3.2 Potential Discharge Volumes and Direction of Flow - 40 CFR 112.7(b)

Tables C-1a, C-1b, C-2, and C-3 present expected volume, discharge rate, general direction of flow in the event of equipment failure, and means of containment for different parts of the facility where oil is stored, used, or handled. The maximum discharge volume is based on professional judgment, operational or equipment design, and industry/operator experience. Maximum discharge volume is based on reasonable potential for equipment failure, not entire capacity of equipment. Accordingly, the maximum discharge volume is much smaller than the actual capacity of the container. For tanks that are of double-walled construction, the likelihood of simultaneous failure of the primary tank and secondary containment is low. The highest risk for discharges is usually during filling tanks or equipment; however, the discharge amount is usually relatively small, compared to the actual container size. Containers that frequently get filled are normally considered to be at a higher risk than equipment that is not refilled or is sealed (such as transformers, for instance). In general, the maximum discharge volume due to tank rupture is estimated at 10% of tank capacity. Drums and totes are estimated at container size. For ruptures, flow rates range from instantaneous to gradual. Max flow rates are estimated at 100% of maximum discharge volume, unless otherwise indicated.

For fuel transfer overflows, the fuel transfer pumps on the mobile refuelers operate at a maximum rate of 20 gallons per minute (gpm) for the smaller (100 gallon) fuel tanks and up to 100 gpm on the larger (2000 gallon) mobile tank trucks. Since fuel transfer operations are continuously manned, it was assumed the response time by the operator to turn off the fuel pump would be quick, conservatively assumed within 10 seconds. Therefore, the most reasonable maximum discharge volume would be limited to approximately 3 gallons for overfill during fuel transfer operations with the smaller trucks and up to 17 gallons for the larger trucks.

For leaks from piping connecting the emergency generators and associated tanks, leaks would only occur while the generators are operating. The generators only operate during periodic required reliability-related testing or when called to service during a power outage. The testing runtime averages approximately 15 minutes a month. Leaks in the pipe or a fitting would result in a small amount of fuel leaking during transfer pump operation. In this case, the maximum discharge volume is estimated at 10% of the expected volume of oil that would be transferred during the 15 minute average monthly operation. Max flow rates are estimated at the generator transfer pump rate at maximum design demand.

For transformers and oil-filled operational equipment, the most reasonable failure mode is considered slow leaks from fittings, connections, bushings, or hoses. Except where noted, the maximum discharge volume is estimated at 10% of capacity for transformers and oil-filled operating equipment.

3.3 Containment and Diversionary Structures - 40 CFR 112.7(c)

Secondary containment can be sized or general. Sized secondary containment, required for bulk storage containers, must be designed to hold the entire contents of the largest container plus sufficient freeboard General secondary containment may be either active or passive in design. Active secondary containment measures (such as deploying booms or sorbent materials) are acceptable provided they can be implemented in time to prevent the spilled oil from reaching navigable waters. Active measures are not necessarily appropriate for equipment that is not often manned. At a minimum, one of the following prevention systems or its equivalent is acceptable to meet the secondary containment requirements:

- Double-walled construction;
- Dikes, berms, or retaining walls sufficiently impervious to contain oil;
- Curbing or drip pans;
- Sumps and collection systems;
- Culverting, gutters, or other drainage systems;
- Weirs, booms, or other barriers;
- Spill diversion ponds;
- Retention ponds; or
- Sorbent materials.

Whatever containment method is used, it must be capable of containing oil and must be designed so that any discharge from a container will not escape the containment before cleanup occurs. In determining the method, design, and capacity, only the typical failure mode and the most likely quantity of oil that would be discharged are addressed.

Methods of secondary containment at Livermore include a combination of structures (passive) and sorbent materials (active) to prevent oil from reaching navigable water and adjoining shorelines. The type of spill containment at each outdoor oil container is described in Appendix C (e.g., constructed secondary containment such as double-wall construction, or active secondary containment such as spill kits and sorbents). Note that some of the elements required by 40 CFR 112.7(c) are superseded by the requirements for bulk storage containers outlined in 40 CFR 112.8(c). Section 40 CFR 112.8(c) states that enough constructed secondary containment must exist for bulk storage containers to contain the entire capacity of the largest single container plus sufficient freeboard for precipitation. The bulk storage requirements are further described in Section 4.2. Oil-filled electrical equipment and oil-filled operating equipment are not required to meet the constructed secondary containment requirements for bulk storage containers under 40 CFR 112.8(c), although they are still required to have general spill prevention, control, and containment practices, except as discussed in Section 3.4.

The following presents an overview of the general secondary containment types in use at the Livermore Site.

3.3.1 Concrete Containment Berms

Tables C-1 and C-2 identify the containers for which concrete containment berms are used as the secondary containment method. Table C-1a also identifies the total secondary containment capacity of the concrete berm (less displacement volumes). Secondary containment calculations for bulk storage containers are provided in Appendix D. Tables C-2 and C-3 also identify the oil-filled electrical and oil-filled operating equipment, respectively, where berms are used. Where applicable, the storm water collected in the secondary containment is discharged following the procedures documented in Appendix E. Berms that are present but permanently valved or cut open are not identified.

3.3.2 Concrete Sumps

Some areas at the Livermore Site have been constructed with concrete sumps at the low point of the storage area so that leaking fluids would be directed towards the containment sump. The areas where these structures are located, as well as the containment capacities are indicated in Table C-1a. Secondary containment calculations for bulk storage containers are provided in Appendix D. Tables C-2 and C-3 also identify the oil-filled electrical and oil-filled operating equipment, respectively where sumps are used. Where applicable, the storm water collected in the secondary containment is discharged following the procedures documented in Appendix E.

3.3.3 Sorbent Materials

Sorbent materials are located strategically throughout the Livermore Site both at dedicated locations in buildings or storage areas and inside the maintenance vehicles. For the purposes of this SPCC Plan, a collection of sorbent materials at dedicated locations that could be used for spill response is referred to as a "spill kit." The spill kits identified in this section are intended for use of containment of the most reasonably expected discharge volume identified as a result of the analysis in Section 3.2. The purpose is to contain the oil discharge upon discovery *before* it reaches navigable waters or adjoining shorelines. Therefore, the spill kit locations are intended to be easily accessed by personnel for quickly responding to relatively small releases. A response trailer containing bulk quantities of equipment is maintained at the OS169 in the event of a large release incident at the Livermore Site, as described in the Oil Contingency Plan in Appendix F.[1]

[1] Note that active containment measures such as sorbent materials are used to meet *secondary containment requirements*, and contingency plans are used to meet *the requirement in §112.7(d) when an impracticability determination is made or to meet the requirements in 112.7(h) for qualified oil-filled equipment*. Active containment measures (as opposed to passive containment measures – i.e., permanent structures) require deployment or other action; they are put in place prior to or immediately upon discovery of an oil discharge. The purpose of active containment measures is to contain an oil discharge *before* it reaches

Designated spill kit locations identified for spill control at the Livermore Site are indicated on the Facility Diagram (Figure C-2). Additional spill kits are found in the maintenance vehicles used at the Livermore Site. The spill kit materials vary, but at a minimum are sized to contain the most reasonably expected volume of oil that would be discharged.

An inventory of designated spill kits for spill control at the Livermore Site is included in Appendix G. Other spill equipment, including absorbent materials, is typically stored in other areas of the Livermore Site, although it is not inventoried for SPCC purposes. Spill kit equipment is maintained by each responsible department. When equipment is used, it is replaced by department personnel.

3.3.4 Pre-Fabricated Storage Units

Pre-fabricated storage units, such as Chemstor units, are modular enclosed storage units with constructed secondary containment as part of the unit's design. The pre-fabricated storage units at the Livermore Site have an integrated secondary containment capacity greater than 55-gallons. Table C-1a identifies the bulk storage containers for which pre-fabricated storage units are used as the secondary containment method. Secondary containment capacity is based upon information available from the manufacturer. Secondary containment calculations have not been completed.

3.3.5 Spill Pallets and Containment Tubs

Spill pallets at the Livermore Site are placed under 55-gallon drums and totes. Containment tubs hold 55-gallon drums. These types of secondary containment are generally used inside buildings or in outdoor areas under cover where drums are protected from rain accumulation. The pallets and tubs are designed with a secondary containment reservoir sized to contain a minimum of the entire capacity of the largest container being stored (a minimum of 55-gallon). If drums are stored outdoors on secondary containment pallets without protection to prevent accumulation of precipitation, the pallet reservoirs are routinely drained after a rain event. Secondary containment capacity is based upon information from the manufacturer.

3.3.6 Double-Walled Tank Construction

Many bulk storage containers at the Livermore Site are shop-fabricated (a welded carbon or stainless steel AST fabricated in a manufacturing facility, or an AST not otherwise identified as field-erected with a volume less than or equal to 50,000 U.S. gallons), double-walled containers. In general, a shop-fabricated double-walled AST will meet secondary containment requirements if fittings or openings are not located below the liquid level of the container and required protective measures are installed. The protective measures required include overfill prevention measures with both an overfill alarm and an automatic flow restrictor or flow shut-off. As an alternative to the overfill prevention measure, the container may be equipped with either active or passive secondary containment methods to address the typical failure mode and the most likely quantity of oil that would be discharged from the tank vents during transfer operations

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navigable waters or adjoining shorelines. These measures should be designed to prevent discharges from leaving the facility boundaries.

A contingency plan, for SPCC purposes, is a detailed oil spill response plan developed when any form of secondary containment is determined to be impracticable. It addresses controlling, containing, and recovering an oil discharge in quantities that may be harmful to navigable waters or adjoining shorelines. The purpose of a contingency plan should be both to outline response capability or countermeasures to limit the quantity of a discharge reaching navigable waters or adjoining shorelines (if possible) and to address *response to a discharge of oil that has reached navigable waters or adjoining shorelines*. Thus, active containment measures can be part of a contingency plan and every effort should be made to control the oil discharge before it reaches navigable waters or adjoining shorelines.

(see Section 3.2). Product transfers are continuously monitored during filling activities. Double-walled tanks with fittings or openings located below the liquid level of the container may require additional secondary containment to conform with industry standards and/or local codes. The bulk storage requirements are further discussed in Section 4.2.

3.3.7 Secondary Containment Provided by Building/Room

To the extent that an existing building structure meets the SPCC performance criteria for secondary containment (i.e., appropriately sized, sufficiently impervious to oil, etc.), such a building is considered as an appropriate containment structure. Where buildings are used as the secondary containment for a storage area, the storage area is not equipped with open floor drains or an automated sump pump unless the drainage system has been purposefully equipped to treat any discharge (e.g., by use of an adequately sized, designed and maintained oil-water separator). Additionally, the storage area proximity to doorways, windows, or other openings that would permit a discharge to flow out of the room or building is taken into consideration when placing equipment. In cases where the building walls are used for secondary containment, the calculation of the capacity of the secondary containment structure considers the displacement by other containers, equipment, and items sharing the containment structure.

The tables in Appendix C identify the containers for which buildings are used as the secondary containment method. For any indoor oil container, depending on the type and amount of oil stored, LLNL uses curbing, floor drain plugging (where present), pads/mats at floor drains, or similar measures to prevent discharge through floor drains.

3.4 Qualified Oil-Filled Operational Equipment - 40 CFR 112.7(k)

For oil filled operational equipment where installing secondary containment structures may be impractical or unsafe, the oil spill regulations provide an alternative to providing secondary containment structures. The facility may instead implement an inspection and monitoring program, develop an oil spill contingency plan, and provide a written commitment of resources to control and remove discharged oil. Oil filled electrical and operational equipment is eligible for this provision if, during the past three years, the following criteria have been met: (1) no single discharge of more than 1,000 gallons, and (2) no more than two discharges exceeding 42 gallons have reached navigable waters within any 12-month period. The Livermore Site has not had any releases of oil meeting the criteria. Based on this release history, the Livermore Site has the option to develop an oil spill contingency plan to address oil-filled operational equipment.

Tables C-2 and C-3 identify qualified oil-filled electrical and operational equipment and where inspection procedures are implemented. Section 3.6 discusses the applicable inspection procedures. An Oil Spill Contingency Plan has been prepared for the Livermore Site and is included in Appendix F and includes a written commitment to manpower, equipment and materials.

3.5 Practicability of Secondary Containment - 40 CFR 112.7(d)

In general, secondary containment is practicable at the Livermore Site. When portable containers are actively being moved (for instance when a drum is moved from a SAA to a WAA), it may not be possible to provide secondary containment on a drum dolly or other method used to safely move the drum(s). Prior to movement of the containers, the containers are checked to ensure container integrity and that they are properly closed. Containers are moved using proper safe handling procedures. In addition, as described in Section 1.5, some double-walled tanks have drains from the primary tank penetrating the secondary wall and as a result do not have adequately sized secondary containment. For those tanks determined to have inadequate secondary containment, it is recognized it may not be practicable to address the secondary containment requirements for every tank within the regulatory required 6-month time-frame due to budgetary constraints, lab operations, possible procurement time and/or associated air permitting issues if new generators are installed. For these reasons, it is determined that providing secondary containment for these tanks is impracticable in the near-term although not impracticable in the long-term. For these tanks, a more rigorous integrity testing protocol has been established (see Section 4.2) and should be followed at each tank until corrective actions have been completed for the specific tank. In addition, a schedule of compliance should be established and documented for these tanks.

To comply with the regulations regarding impracticability, an Oil Spill Contingency Plan has been prepared for the Livermore Site and is included in Appendix F and includes a written commitment to manpower, equipment and materials.

3.6 Inspections, Tests, and Records – 40 CFR 112.7(e)

LLNL performs the inspections and tests required by the SPCC rules and maintains records of these activities. The required inspections and tests are described in the following subsections. Inspections are also performed when a container undergoes a repair, alteration or change in service that might affect the risk of discharge or failure.

3.6.1 Monthly Inspections of non-RCRA Bulk Storage Containers

Appendix H discusses the inspection procedures at the Livermore Site for non-RCRA bulk storage containers. The checklist provided in Appendix H.1 is used for monthly SPCC inspections by facility personnel for bulk storage containers that are not identified as part of a RCRA-permitted facility at the site subject to the SPCC requirements in 40 CFR112. The checklist provided in Appendix H.2 is used for monthly SPCC inspections by facility personnel for portable bulk storage container storage areas at the Livermore Site that are not identified as part of a RCRA-permitted storage area or a WAA or SAA. Inspection records for portable containers such as drums and totes are conducted based on designated storage area (i.e., a separate inspection list is not prepared for each individual drum or tote). The personnel performing these inspections must be knowledgeable about storage facility operations, the type of AST and its associated components, and characteristics of the liquid stored. The personnel performing these inspections must also be familiar with pumping, piping and valve operations of the bulk storage system, as appropriate. The bulk storage containers are also subject to integrity testing which is discussed in Section 4.2.6 of this Plan.

In general, inspection records are maintained for at least 3 years. The exception is formal inspection and leak testing records which should be kept for the life of the tank (see Section 4.2.6.2). Records of inspections and tests are kept under usual and customary business practices.

3.6.2 Inspections of RCRA Tank Systems and RCRA Permitted Storage Areas

Inspections of the DWTF Tank Farm and portable containers within the RCRA-Permitted container storage areas are conducted by appropriately trained RHWM personnel in compliance with requirements of 22 CCR 66264, Article 10 and the procedures established in LLNL's RCRA permit. The inspections are generally conducted a minimum of weekly and include observing various conditions, including container integrity, general housekeeping, integrity of the secondary containment systems, and leaks. Inspection logs (established as part of the RCRA permit) are maintained by RHWM for at least 3 years from the date of the inspection in accordance with 22 CCR 66264.15(d). These inspections under RCRA also serve to fulfill the requirements of 40 CFR 112.7(e) and 112.8(c)(6). The RCRA Tank Systems and containers in the RCRA Permitted Storage Areas are also subject to integrity testing which is discussed in Section 4.2.6 of this Plan.

3.6.3 Inspections of WAAs and SAAs

WAAs and SAAs are inspected in accordance with the LLNL Procedure Document *Hazardous, Radioactive and Mixed Waste Management, Satellite and Waste Accumulation Areas* (PRO 2756). Inspections of WAAs and SAAs are recorded using the inspection checklist provided in the PRO document. In accordance with the PRO document, WAAs are inspected every seven calendar days. The inspections include checking container condition, secondary containment condition, and observing for discharges that could cause or lead to releases of wastes. Records of WAA inspections are retained by the program responsible for the WAA or SAA for a minimum of three years.

3.6.4 Monthly Inspections of Qualified Oil-Filled Operating Equipment

Because the transformers and certain pieces of programmatic oil-filled electrical equipment have been identified as qualified oil-filled operating equipment, an inspection program has been established for these pieces of equipment. The checklist provided in Appendix H.3 is used for monthly SPCC inspections by facility personnel for the qualified oil-filled operating equipment at the site subject to the SPCC requirements in 40CFR112. These inspection records include the name and signature of the inspector responsible for the inspections. The monthly inspections include observing the exterior of equipment for signs of deterioration or leaks and checking for other conditions that should be addressed for continued safe operation of the equipment.

The personnel performing these inspections must be knowledgeable about the equipment operations and its associated components, and characteristics of the liquid stored. Issues regarding leaks or oil discharges are immediately reported to the field Environmental Analyst (EA), who initiates the field response. Visible oil leaks from components must be addressed as soon as possible to prevent a larger spill or a discharge.

Inspection records are maintained for at least 3 years. Records of inspections and tests are kept under usual and customary business practices.

3.6.5 Inspections of Hydraulic Elevators

All elevators are inspected on a routine basis by an outside vendor. Elevator inspection records are retained for at least 3 years commensurate with standard recordkeeping procedures and are available to inspect upon request.

3.6.6 Inspections of Oil-Filled Operational Equipment

Inspections and maintenance of oil-filled operational equipment at the Livermore Site are conducted in accordance with the manufacturer's recommendations for the specific piece of equipment by appropriately trained personnel. For the purposes of the SPCC program, inspections of the specified oil-filled operational equipment are recorded once every six months on the form provided in Appendix H.3. Inspection records are retained for at least 3 years and are available to inspect upon request.

3.6.7 Annual Inspections of non-RCRA Bulk Storage Containers

In addition to monthly inspections of non-RCRA Bulk Storage Containers, facility personnel perform a more thorough inspection of stationary bulk storage containers on an annual basis. This annual inspection complements the monthly inspection described above and is performed each year using the checklist provided in Appendix H.4 of this Plan. These inspection records include the name and signature of the inspector and/or equipment custodian responsible for the inspections. The annual inspection has been developed following the Steel Tank Institute (STI) *Standard for the Inspection of Aboveground Storage Tanks*, SP-001, 2011 5th edition, as described in Section 4.2.6 of this Plan. The personnel performing these inspections must be knowledgeable about storage facility operations, the type of AST and its associated components, and characteristics of the liquid stored. The personnel performing these inspections must also be familiar with pumping, piping and valve operations of the bulk storage system, as appropriate.

Inspection records are maintained for at least 3 years. Records of inspections and tests are kept under usual and customary business practices.

3.7 Personnel Training – 40 CFR 112.7(f)(1),(3)

LLNL provides initial instruction to oil-handling facility personnel in the operation and maintenance of oil pollution prevention equipment, discharge procedure protocols, applicable pollution control laws, rules and regulations, general facility operations, and the content of this SPCC Plan through the initial Spill Prevention, Control, and Countermeasure training course (EP3045-W). All new employees fill out a Training Questionnaire, which determines what training they must complete. Each Directorate has a training administrator who appoints contacts to enter employee information and help employees use the institutional training system. Existing employees review their training questionnaire annually with their supervisor. Employees who handle oil are also identified during the site-wide surveys for oil containers associated with experiments. Any new facility personnel with oil-handling responsibilities are provided with this same training prior to being involved in oil handling.

Annual discharge prevention briefings and SPCC training are provided through the annual Spill Prevention, Control, and Countermeasure Annual Discharge Prevention Briefing (EP3045-RW) for all facility personnel who operate or maintain aboveground oil-filled containers, including oil filled equipment, capable of containing 55 gallons or more of oil. The annual briefing is an online course requiring a test of knowledge at the end. The annual briefing for oil-handling personnel is designed to assure adequate understanding of the SPCC Plan. The briefings highlight and describe known discharges or failures, malfunctioning components, and any recently developed precautionary measures.

Upon request of the equipment custodian, facility manager, or anyone else responsible for inspection or management of an SPCC-regulated container, a practical training (3045-P) can be administered by EFA. This training is not required but is available on demand and as needed.

Training records are kept through the institutional training management system and are retained for a minimum of 3 years.

3.8 Security Design Features – 40 CFR 112.7(g)

3.8.1 Fencing – 40 CFR 112.7(g)(1)

LLNL’s Livermore Site is a high security facility. Access to the site is granted only to employees and escorted visitors who have official business at the site. Access by unauthorized personnel is prohibited by law. All long-term visitors undergo a security background investigation. The entire facility is fenced, and access is granted only through a secure gate, where all vehicles and personnel are subject to search. In addition, the facility has dedicated security and fire departments. The onsite Protective Force Officers patrol and monitor the site 24 hours per day, seven days a week, 52 weeks per year. Access to the Facility is administratively controlled.

3.8.2 Flow Valves, Starter Controls, and Fill Piping Connections – 40 CFR 112.7(g)(2),(3),(4)

Valves and pumps are not locked except in areas of high security. Vehicle refueling is allowed only with a controlled vehicle identification card. When a pump is in a non-operating status, the starter controls are locked. LLNL also uses employee training and a system of limited controlled access to prevent operation of such appurtenances by unauthorized personnel. Starter controls are usually located inside buildings that are either occupied or locked. Pipelines are capped or removed when taken out of service.

3.8.3 Facility Lighting – 40 CFR 112.7(g)(5)

As described in Section 3.8.1, the Livermore Site is a high security facility and is entirely fenced and patrolled by security personnel, prohibiting unauthorized access to the Site with respect to acts of vandalism.

Tank transfer operations, such as re-supplying diesel to emergency generators, can take place during power outages. Therefore, all fuel truck service vehicles involved in fuel transfers are equipped with emergency lights that provide a minimum intensity of 5 foot-candles at transfer connections. (A foot-candle is a measure of light intensity.) If adequate fuel is present in the emergency generators being refueled, lighting may be powered by the emergency generator. Currently, fuel deliveries after dark are made from a service vehicle equipped with two floodlights that exceed the 5-foot-candle lighting requirement. In no instance does refueling occur under conditions of inadequate lighting.

Work areas that are not transfer connection points are provided with a minimum light intensity of 1 foot-candle. This level of lighting allows for visibility of spills by facility personnel or security personnel during rounds. Non-authorized personnel cannot access the Livermore Site.

3.9 Loading Area Design – 40 CFR 112.7(h)

The Livermore Site does not maintain a tank car and tank truck loading/unloading rack; therefore, the engineering design requirement in 40 CFR 112.7(h) does not apply.

Monthly diesel and gasoline deliveries at the Livermore Site average approximately 2,700 and 17,000 gallons, respectively. The operators of commercial tankers that make these deliveries follow strict U.S. Department of Transportation (DOT) procedures (49 CFR 177 subpart B) during the unloading of these fuels. Before the operators fill the underground tanks with diesel or gasoline, an LLNL representative inspects the spill buckets and is present during the fuel delivery process. When fuel delivery is completed, the LLNL representative inspects the spill buckets for any fuel. Automatic interlocking systems installed in these trucks prevent vehicular departure before the transfer lines are properly disconnected. Before the tanker leaves the site, the operator inspects drains and outlets in accordance with the same DOT procedures.

3.10 Brittle Fracture Evaluation - 40 CFR 112.7(i)

There are no field-constructed tanks at the Livermore Site. The tanks are shop-built. Therefore, an evaluation of the containers for risk of discharge or failure due to brittle fracture or other catastrophe is not required.

3.11 Conformance with State and Local Applicable Requirements - 40 CFR 112.7(j)

The locations and quantities of hazardous materials containers and equipment (including those subject to SPCC requirements) are submitted to the Livermore-Pleasanton Fire Department as part of the Hazardous Material Business Plan (HMBP) program. The facility is also subject to the California Aboveground Petroleum Storage Act (APSA).

Storm water discharges from industrial areas on site are monitored in accordance with the NPDES General Permit for Storm Water Discharges Associated with Industrial Activities (Order No. CAS000001).

3.12 Temporary and Long-Term Storage of Polychlorinated Biphenyls (PCBs) for Disposal – 40 CFR 761.65(c)

Some of the oil-filled electrical equipment at the Livermore Site may contain oil with a PCB concentration of 50 ppm or greater. When PCB items with a PCB concentration of 50 ppm or greater are taken out of service, they are regulated in accordance with 40 CFR 761.65(c)(1), which states that the items can be stored temporarily (up to 30 days) at the site if the following conditions are met:

- The PCB item or article is marked or tagged, indicating the date the item was removed from service.
- The PCB item or article is not leaking. If it is leaking, then the PCB item or article is placed in a non-leaking container with absorbent.

This temporary storage allows for sampling and analysis during the time that waste disposal administrative procedures are being completed. The waste is then scheduled for pickup and transported to a LLNL Radioactive and Hazardous Waste Management facility that meets Toxic Substances Control Act (TSCA) requirements or is shipped directly from the WAA to a permitted disposal facility.

In accordance with 40 CFR 761.65(b), a WAA that stores PCBs or PCB items for longer than 30 days (but less than 1 year) must have secondary containment dikes or containment pallets. The containment must either have adequate roof and walls to prevent rainwater from reaching the stored PCBs and PCB items, or adequate floor that has continuous 6-inch minimum height curbing that provides a containment volume equal to at least two times the internal volume of the largest PCB article or PCB container or 25% of the total internal volume of all PCB articles and PCB containers, whichever is greater.

As a best management practice, PCB wastes are normally shipped out for disposal within 9 months of the date when the item was removed from service to ensure the waste is destroyed at an offsite permitted facility within one year from the date it was determined to be PCB waste and the decision was made to dispose of it. Spill cleanup kits are available at the WAAs in the event that there is an accidental spill. PCB waste storage WAAs have a roof and walls to prevent rainwater from reaching PCB-contaminated oils or items. The floors are also impervious to PCBs and have a continuous curb at least 6 inches high. There are no floor drains, drain valves, expansion joints, sewer hookups, or other openings that could allow liquid to flow from the curbed area.

Containers used for storage of liquid PCBs comply with the Shipping Container Specifications of the Department of Transportation (DOT) Hazardous Materials Regulations (49 CFR Subchapter C). Liquid PCBs must be stored within covered secondary containment or on spill pallets and are handled by authorized personnel trained in handling liquid PCBs.

4.0 DISCHARGE PREVENTION – SPCC PROVISIONS FOR ONSHORE FACILITIES (EXCLUDING PRODUCTION FACILITIES)

4.1 Drainage Design - 40 CFR 112.8(b)

Because the Livermore Site encompasses an area of over 1 square mile, it is not practical to dike the entire site or direct discharge from the entire facility to some form of catchment basin. LLNL provides equivalent environmental protection by using double-walled bulk storage containers or by diking (installing berms around) the immediate area where single-walled bulk storage containers are stored, using secondary containment buildings or secondary containment pallets for single-walled drums. For undiked areas with a potential for a discharge (such as where piping is located outside containment walls), secondary containment is provided by means of impervious surfaces and sorbent materials. Mobile/portable containers are positioned to effectively prevent discharges. Secondary containment for these containers is provided by means of spill pallets, impervious surfaces, sorbent materials, or other means.

Due to relatively low precipitation at the Livermore Site, small amounts of storm water within the bermed areas is allowed to evaporate unless the water is in contact with the equipment inside the berm in which case the storm water is released. Should a storm water release be necessary, it would be done through non-flapper-type valves, with the discharge monitored for compliance with the discharge limits in 40 CFR 110.3. 40 CFR 110.3 prohibits discharges of oil that violate applicable water quality standards or cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines. The procedure for addressing these releases is contained in Appendix E.

4.2 Bulk Storage Containers and Secondary Containment – 40 CFR 112.8(c)

Table C-1 identifies the construction, volume, and content of the bulk storage containers located at the Livermore Site.

4.2.1 Tank Compatibility – 40 CFR 112.8(c)(1)

The material and construction of bulk storage containers at the Livermore Site are compatible with both the types of oil and the conditions of oil storage as required by 40 CFR 112.8(c)(1). The LLNL Program used for obtaining new oil storage containers includes a review of manufacturer information to ensure construction compatibility. For aboveground storage tanks (ASTs), both carbon steel and fiberglass are compatible with petroleum fuels and oils. The primary tank walls of electrical equipment are made of carbon steel. The primary walls of tanks containing wastewater with some residual oil are made of carbon steel or oil-compatible plastic materials, such as cross-linked polyethylene or fiberglass-reinforced plastic. New tanks and installations are designed in accordance with current state and federal regulations, manufacturers' specifications, and best management practices.

4.2.2 Secondary Containment Volume for Bulk Storage Containers – 40 CFR 112.8 (c)(2)

With the exception of mobile refuelers and other non-transportation-related tank trucks, the bulk storage containers identified in Table C-1a are subject to the requirements of 40 CFR 112.8(c), which states that constructed secondary means of containment must be provided and able to contain the entire capacity of the largest single container, plus sufficient freeboard to contain precipitation. A shop-fabricated double-walled AST will meet secondary containment requirements if required protective measures are installed. These provisions require overfill prevention measures that include both an overfill alarm and an automatic flow restrictor or flow shut-off. As an alternative to the overfill prevention measures, the container may be equipped with either active or passive secondary containment methods to address the typical failure mode and the most likely quantity of oil that would be discharged from the tank vents during transfer operations (see Section 3.2). However, double-walled tanks with fittings or openings located below the liquid level of the container may require additional secondary containment to conform with industry standards and/or local codes. ASTs that are double-walled and ASTs that are in protected bermed areas are constructed not to accumulate precipitation; therefore, these ASTs are not subject to the freeboard requirement. Bulk storage containers located inside a building may be considered to be secondarily contained provided that there is no potential for discharge outside of the secondary containment system (for example, a floor drain or a sloped doorway).

The methods of secondary containment for the bulk storage containers are identified in Table C-1a. With the exceptions noted in Section 1.5, the existing bulk storage containers are either of double-walled construction or are located within bermed areas that are sized to contain the capacity of the largest single container stored at the location plus sufficient freeboard to contain precipitation (a minimum of 110% of the bulk storage container capacity).

The 55-gallon drums and totes not located within a secondary containment berm or constructed storage unit with secondary containment capacity are placed on spill pallets which are adequately sized to provide suitable containment implicit in their design and specifications.

Newly installed ASTs are provided with a secondary means of containment and have overspill protection, overfill cutoff protection, leak detection, and a remote leak alarm. Where double-walled construction is not practical, berms, dikes, or sumps sufficiently impervious to oil are constructed and designed to contain the capacity of the largest container plus sufficient freeboard to contain precipitation from a 24-hour, 25-year storm event (3.7 inches of freeboard; C.G. Campbell 2005; see Appendix I). When secondary containment pallets are used for 55-gallon drums, the containment pallets must be sufficiently sized to contain the contents of the largest container (55-gallons) plus sufficient freeboard to contain precipitation from a 24-hour, 25-year storm event. Alternatively, the containers and associated containment pallets are placed in protected areas to avoid accumulating precipitation.

4.2.3 Diked Area, Inspection and Drainage of Rainwater – 40 CFR 112.8(c)(3)

Where bypass valves are located, the bypass valves are kept sealed closed except when conducting a discharge of accumulated rainwater. Procedures for discharge of rainwater accumulated in diked areas are described in Appendix E. All bulk oil storage areas are inspected at the frequency described in Sections 3.6 and 4.2.6. The organization that conducts the inspection submits copies of inspection records to EFA, and records are maintained for a minimum of 3 years.

4.2.4 Corrosion Protection for Buried Metallic Tanks – 40 CFR 112.8(c)(4)

The USTs at the Livermore Site are protected from corrosion by coatings compatible with local soil conditions or cathodic protection. USTs are fiberglass or fiberglass-coated steel. F&I ensures that leak detection and monitoring equipment for underground storage tanks are maintained and tested in accordance with their UST permits.

4.2.5 Corrosion Protection of Partially Buried Metallic Tanks – 40 CFR 112.8(c)(5)

There are no partially buried metallic tanks at the Livermore Site.

4.2.6 Bulk Storage Containers Periodic Integrity Testing – 40 CFR 112.8(c)(6)

Integrity testing for bulk storage containers is conducted by appropriate personnel as described in this SPCC Plan.

4.2.6.1 Integrity Testing for RCRA Permitted Tanks and Storage Areas

Inspections of the DWTF Tank Farm and containers within the RCRA permitted units are conducted in accordance with the schedules and procedures established in LLNL's RCRA permit. The integrity of the DWTF waste tanks are checked at least every 5 years. Records are maintained by RHWM for at least 3 years from the date of the inspection in accordance with 22 CCR 66264.l5(d).

4.2.6.2 Periodic Inspections of non-RCRA Bulk Storage Containers

The inspection program for non-RCRA permitted bulk storage containers has been established in general accordance with the procedures described in the Steel Tank Institute (STI), SP001, "Standard for the Inspection of Aboveground Storage Tanks" for in-service, shop-fabricated tanks. As described in 40 CFR 112.8(c)(6), examples of integrity tests include, but are not limited to: visual inspection, hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or other systems of non-destructive testing.

Based on the SP001 standard, the appropriate minimum level of integrity testing for all of the bulk storage tanks are periodic visual inspections conducted by a LLNL-trained inspector a minimum of monthly or when material repairs are made. In addition, a comprehensive annual inspection is also completed for each non-portable bulk storage container every year. Portable storage containers are inspected monthly. The personnel performing these inspections must be knowledgeable about storage facility operations, the type of storage container and its associated components, and characteristics of the liquid stored. The personnel performing these inspections must also be familiar with pumping, piping and valve operations of the bulk storage system, as appropriate.

The inspections are completed using the relevant inspection checklist: “Bulk Storage Container Monthly Inspection Checklist” (Appendix H.1), “Portable Container Storage Area Monthly Inspection Checklist” (Appendix H.2), and/or “Bulk Storage Container Annual Inspection Checklist” (Appendix H.4). The checklists were developed using the SP001 guidance. The checklists are general and some items identified on the checklist may not apply to every bulk storage container at the Livermore Site. When new equipment is brought to the Site (which would require a technical amendment), the inspection checklists and the SP001 standard should be reviewed by the PE certifying the technical amendment to ensure that relevant items from the SP001 standard are included on the checklists and update the checklists/inspection procedure if needed. Copies of the completed inspection checklists are signed by the inspector. Copies of these inspection records are maintained for a minimum of 3 years.

If any of the conditions inspected during the monthly or annual inspections are designated as a non-conformance status as indicated on the checklist, additional action is required to address the problem. If a leak is discovered at any time by an inspector or other container operator, the storage container must be repaired as soon as possible or else replaced or closed and removed from service. Non-conformance items designated on the checklist should be reported to the equipment custodian upon completion of the inspection activity and the appropriate follow-up activities scheduled (for instance, removing debris observed in secondary containment). Non-conforming items identified during inspections that are important to storage container or containment integrity (e.g., major cracks, tank or containment deformation, etc.) require evaluation by an engineer experienced in AST design, a certified inspector, or a tank manufacturer to determine the appropriate corrective action. A certified inspector shall be certified by one or both of the following: American Petroleum Institute (API) Standard 653 *Authorized Inspector Certification with STI SP001 Adjunct Certification*; STI *Certified SP001 AST Tank System Inspector*.

In addition, a tank subjected to damage caused by the following conditions requires evaluation by an engineer experienced in AST design, a certified inspector, or by a tank manufacturer who will jointly with the owner determine if an immediate Formal External or Internal Inspection by a Certified Inspector is required:

- Fire - AST exposed to fire or flame impingement
- Natural disaster - AST exposed to flooding, hurricane force winds, etc. and has been lifted or damaged
- Excessive settlement - AST that has experienced excessive settlement
- Overpressure - AST exposed to excessive internal pressure caused by overfill or failure of venting devices or other reason
- Damage from cracking - AST with evidence of cracking of welds or of an AST surface

4.2.6.3 Formal Inspections and Leak Testing of non-RCRA Bulk Storage Containers

The majority of the bulk storage containers at the Livermore Site are sized and configured as Category 1 or Category 2 containers using the SP001 Standard. Formal inspections by an STI-Certified Inspector and leak testing are not routinely required unless experience, container damage, or other indications suggest that further inspection by a certified inspector and/or physical testing is necessary. The stainless-steel single-walled fuel containers on the mobile refuelers are replaced after 17 years of service in accordance with the SP001 standard.

One tank, 519TFAD01, is a 6,000-gallon diesel storage tank. This tank is double walled, has a constructed secondary containment structure and is identified as a Category 1 Tank under the SP001 standard. However, due to its size, this tank is subjected to additional inspection requirements beyond the periodic visual inspections conducted by a LLNL-trained inspector described in Section 4.2.6.2. This tank must also be subjected to a formal external inspection conducted by a Certified Inspector every 20 years.

In addition, as discussed in Section 1.5, several tanks have had the secondary double-walled construction altered by drain lines through the double-wall below the normal liquid operating level. If these tanks are determined to have inadequate secondary containment upon internal inspection, these tanks will be subjected to additional inspection requirements beyond the periodic visual inspections conducted by a LLNL-trained inspector described in Section 4.2.6.1. These tanks must also be subjected to formal external inspections conducted by a Certified Inspector and Leak Testing by LLNL (or LLNL’s designee) every 10-years.

Formal external inspections must be conducted by a Certified Inspector. A certified inspector shall be certified by one or both of the following: API Standard 653 *Authorized Inspector Certification with STI SP001 Adjunct Certification*; STI *Certified SP001 AST Tank System Inspector*. The formal inspections should be conducted in general accordance with the guidelines established in the SP001 Standard. The external inspection includes ultrasonic testing of the shell, as specified in the standard, or if recommended by the Certified Inspector to assess the integrity of the tank for continued oil storage. Leak testing should be conducted in consultation with the Steel Tank Institute Recommended Practice R912, *Installation*

Instructions for Shop Fabricated Stationary Aboveground Storage Tanks for Flammable, Combustible Liquids. Air shall not be used for a pressure test; an inert gas shall be used instead. The introduction of a gas containing oxygen (such as air) to a tank that has previously held petroleum liquid can pose an explosion hazard.

Records of all certified inspection reports and leak testing should be kept for the life of the tank.

4.2.7 Control Leakage through Internal Heating Coils – 40 CFR 112.8(c)(7)

This section is not applicable because there are no bulk storage containers that are equipped with internal heating coils included in this SPCC Plan for the Livermore Site.

4.2.8 Overfill Prevention Systems – 40 CFR 112.8(c)(8)

Non-portable bulk storage containers at the Livermore Site are provided (or must be retro-fitted) with at least one of the following devices to prevent overfilling:

i. High liquid level alarms with an audible or visual signal.
ii. High liquid level pump cutoff devices set to stop flow at a predetermined container content level.
iii. Direct audible or code signal communication between the container gauger and the pumping station. Because the majority of the bulk storage containers at the Livermore Site are relatively small, refueling vehicles are positioned immediately adjacent to tanks during container refilling. The position of the refueling vehicles allows the operator to observe the bulk storage container from the refueling vehicle pump controls. When tank configuration does not allow for positioning to maintain a line-of-sight, a two-man system is employed: one to man the pump truck and one to man the dispenser.
iv. A fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. In some cases, containers are designed such that the liquid level is easily determined by visual inspection. A person is present to monitor gauges and the overall filling of bulk storage containers. During filling operations, the operator checks the gauge level to confirm the anticipated fill amount, which reduces the risk of overfilling. Tanks are filled until the gauge level reads ¾ to 7/8 full. For tanks without a level gauge, a dipstick method is used. The tank is filled slowly and repeatedly checked until the tank is ¾-7/8 full.

Liquid level sensing devices are tested as part of the annual inspection (Section 4.2.6) to ensure proper operation. Fuel dispensing operations are continuously manned. Unattended fueling operations are not permitted. In the event of a hose rupture or an overfill, the operator can respond quickly to shut off the refueling pump. Furthermore, spill kits are maintained on the fuel trucks to immediately address small spills. In addition, some of the ASTs are equipped with a spill box.

Portable containers at the Livermore Site are carefully filled. Some of the containers allow visual observation of the level of product in these containers and since these tanks are relatively small, the operator can readily determine when the capacity of the container is reached. Prior to filling portable containers, the container is visually inspected to confirm adequate capacity exists. Three-inches of freeboard are maintained in portable storage containers. Unattended transfer operations are not permitted.

Oil storage product drums are not refilled, and therefore overfill prevention systems do not apply. Used oil, if placed in drums, is managed carefully to avoid overfills by conducting filling operations over secondary containment pallets.

4.2.9 Observation of Effluent Discharge – 40 CFR 112.8(c)(9)

The Livermore Site has a Wastewater Discharge/Chemical Storage Permit issued by the City of Livermore. To comply with the requirements of the permit, LLNL routinely monitors the sanitary sewer effluent flowing into the City of Livermore sanitary sewer system, which eventually flows to the Livermore Water Reclamation Plant (LWRP). The effluent is monitored for the presence of oils, and LLNL reports the results of this monitoring to the Livermore Water Reclamation Plant (LWRP) in monthly reports.

The Livermore Site has a storm water permit that requires storm water discharges to be visually monitored and sampled in accordance with the Industrial General Permit (SWRCB 2014). An annual report is submitted electronically to the State Water Quality Control Board by July 15 of each year.

4.2.10 Visible Leak Correction – 40 CFR 112.8(c)(10)

Visible oil leaks of bulk storage containers are identified by the personnel responsible for their routine inspections. Visible oil leaks from bulk storage container seams, gaskets, rivets, and bolts sufficiently large to cause oil to accumulate around oil-containing containers or equipment are promptly contained, cleaned up, and corrected, as appropriate. Oil is disposed of according to the waste disposal method described in Part 5 of this Plan.

4.2.11 Mobile and Portable Containers – 40 CFR 112.8(c)(11)

Small portable oil storage containers, such as 55-gallon drums and totes, are stored on containment pallets, inside storage cabinets (e.g., Safety Store units), or inside designated storage areas with constructed secondary containment. To prevent accumulation of rainwater in the secondary containment pallets, the pallets are placed under cover whenever possible or else rainwater is removed if it accumulates. Portable containers are positioned to prevent a discharge by not locating them adjacent to storm water drains. Drums or totes temporarily moved to areas other than the normal dedicated storage area are placed on adequately sized spill containment pallets, or provided with other means for spill control while in use. When portable containers are actively being moved, it may not be possible to provide secondary containment. During movement of the containers, the containers are checked to ensure container integrity and that they are properly closed prior to transport. Containers are moved using proper safe handling procedures.

Currently the Livermore Site has dedicated mobile refueling vehicles. Mobile refuelers are not subject to the sized secondary containment requirements under 40 CFR 112.8(c), however they are subject to general spill containment requirements and are required to have appropriate containment and/or diversionary structures or equipment to prevent a discharge, as described in 40 CFR 112.7(c). The mobile refueling vehicles are properly equipped with spill response equipment: the smaller trucks with 100-gallon storage tanks are equipped with spill response materials sized to contain up to 10 gallons of fuel and the larger 2000-gallon tanker trucks are equipped with pre-packaged spill kits sized to contain up to 38 gallons of fuel. The tanks and tanker trucks are regularly inspected to verify their integrity. A parking area with secondary containment has been provided for the larger fuel tanker trucks, G90 0017L, G90 0018L, G90 0019L. The three trucks are parked east of Building 519 in a concrete secondary containment area, which measures approximately 31 feet by 30 feet. The containment area has a concrete bottom and is surrounded on three sides by a concrete curb approximately 13 inches high. The fourth side is sloped to provide secondary containment and allow the trucks to enter and exit. The outlet on the northeast corner of the containment area is normally closed. A manually operated valve controls the outlet. This valve is normally sealed closed. See Tables C-1a and C-1b for tank containment information and volumes. The fuel tanker trucks are filled at a diesel fueling station located adjacent to the parking area. The fueling station is appropriately contained in case of a leak or spill.

The Livermore Site has several tanker trucks that are used to pump out and transport liquid wastes. The trucks are normally kept empty. Capacities of the tanker trucks are 1,000 gallons or 5,000 gallons. The tanker trucks may be used to transport wastes that could contain oil. If full, the tank trucks are parked in designated RCRA-permitted storage areas (the DWTF Portable Tank Storage Pad at B696 or the 612 Tank Trailer Storage Unit). See Table C-1a for storage location and a summary of tank and containment volumes.

4.3 Transfer Operations, Pumping, and In-Plant Processes – 40 CFR 112.8(d)

Transfer operations at the Livermore Site include filling or removing liquids from bulk storage containers, the fueling of equipment by facility personnel, and transfer of small amounts of products into equipment during servicing. Used oil is removed by RHWM either via drum pickup or by vacuum truck extraction. Care is taken during these processes to guard against spills and releases, and spill equipment is available on-site or in shop trucks in event of a release.

4.3.1 Underground Piping – 40 CFR 112.8(d)(1)

Underground piping associated with permitted USTs at the Livermore Site is double contained and corrosion resistant, or has cathodic protection, where appropriate, and has leak monitoring and leak detection that is in accordance with the UST permit conditions.

No buried piping exists that was installed after 2002. Buried piping that will be installed or replaced is provided with a protective wrapping and coating. In addition, buried piping installations at Livermore will be cathodically protected or otherwise protected from corrosion to satisfy the corrosion protection standards for piping. If a section of buried line is exposed for any reason, it is carefully inspected for deterioration. If corrosion damage is discovered, additional examination and corrective actions are required based on the magnitude of the damage.

There is no other substantial amount of buried piping at this facility that contains oil on a routine basis.

4.3.2 Provisions for Piping not in Service – 40 CFR 112.8(d)(2)

Since 1982, whenever underground permitted tanks were taken out of service, LLNL removed aboveground piping or capped abandoned aboveground piping or blank-flanged the piping when removal was not practical. Underground and aboveground piping have been removed or abandoned in accordance with an approved closure plan. In the event that facility transfer operations are suspended or not in service or in standby service for an extended time, the terminal connections on piping shall be capped or blank flanged.

4.3.3 Aboveground Piping Support – 40 CFR 112.8(d)(3)

Aboveground piping is properly supported. Pipe supports are designed to minimize abrasion and corrosion and to allow for expansion and contraction. If and when aboveground piping is discovered to have inadequate support, it is upgraded. Design for all new tanks or other systems with aboveground piping includes adequate piping supports.

4.3.4 Inspecting Aboveground Piping Support – 40 CFR 112.8(d)(4)

To prevent the release of oil from aboveground piping, operating personnel examine aboveground valves, pipes, and hoses as part of monthly inspections. Observations are noted on the monthly inspection checklists, as appropriate.

If buried piping is installed or otherwise modified, integrity and leak testing of the buried piping must be conducted at the time of installation, modification, construction, relocation, or replacement.

4.3.5 Warning Signs – 40 CFR 112.8(d)(5)

No aboveground piping is exposed to vehicular traffic. Bollards are placed where needed to prevent vehicular collisions with other equipment. Warning signs or barriers will be provided if aboveground piping could be exposed to vehicular traffic in the future.

5.0 DISCHARGE RESPONSE

This section of the Plan discusses contingency and response protocols in the event of an oil spill at the Livermore Site. The uncontrolled discharge of oil to groundwater, surface water, or soil is prohibited by state and federal laws. Immediate action must be taken to control, contain, and recover discharged product. This information is presented in a summary-level format. More specific information on emergency response and spill cleanup is included in the Oil Spill Contingency Plan, which is incorporated into this SPCC Plan by reference as Appendix F. LLNL policy is also contained in the *ES&H Manual*, Document 22.1, “Emergency Preparedness and Response” which discusses response procedures for all potential emergencies at LLNL.

5.1 Spill Response – 112.7(5)

5.1.1 Release Identification

The first line of response starts with the observer of any spill or accident resulting in a visible sheen or accumulation of oil. For oil spills potentially occurring at the Livermore Site, this person will most likely be a facility employee. If the facility employee is not trained in oil-handling or emergency response, LLNL general employee training (required of all LLNL-employees) dictates that the employee should contact their supervisor, the facility manager, or the Fire Department at 911 or from a cellular phone, 1-(925) 447-6880. If the facility employee is a trained oil-handler, response begins here.

Events are classified as either “non-emergency” or “emergency” as identified in Table 5-1. If an employee is uncertain if the incident is a non-emergency or an emergency, the employee is required to call the Fire Department at 911 from a lab phone or from a cellular phone, 1-925-447-6880.

Table 5-1. Emergency response for "emergency" and "non-emergency" events.

Category	Characteristics	Emergency Response
Non-Emergency	Any unplanned event or abnormal condition that can be controlled and managed at the time of the event by workers in the immediate area is not considered to be an emergency. Likewise, unplanned events or abnormal conditions where there are no potential safety or health hazards, or security conditions, are not considered to be an emergency. When in doubt if the unplanned event or abnormal condition is an emergency or non-emergency, dial 911 from a Laboratory phone or 1-925-447-6880 from a cell phone.	Follow the Ten-Step Approach (see Section 5.1.2)
Emergency	Emergencies are defined as unplanned, significant events, or abnormal conditions that require time-urgent response from outside the immediate area of the incident and that are causing or have the potential to cause serious impact to the safety, health, or security of personnel, facilities, or the environment. If any one of the three conditions listed below is applicable, the unplanned event or abnormal condition is considered to be an emergency. • The nature and potential hazards of the unplanned event or abnormal condition are unknown; • The unplanned event or abnormal condition presents an actual or potential threat to human health, the environment, or property, or • The unplanned event or abnormal condition results in an injury or illness requiring definitive medical treatment (an injury or illness more serious than one requiring basic first aid).	Get away from the spill and immediately call the Fire Department (911 or 2-7595); from a cellular phone, call 1-(925) 447-6880.

All events under this SPCC Plan (non-emergency or emergency) should be reported to the appropriate ES&H EA during working hours or the Environmental Duty Officer (EDO) during off-hours. The EDO may also be contacted through the Fire Department Dispatcher.

5.1.2 Response Procedures for Small Incidents

Non-emergency events are defined in the *ES&H Manual*, Document 22.1. Non-emergency events can be managed by properly trained facility personnel following the ten-step approach identified below. Spill response equipment is identified in Appendices F and G.

1. Identify the spill
2. If safe, shut off the source
3. Eliminate ignition sources
4. Cordon off the area
5. Contact your supervisor and ES&H Team Field EA or EDO, as appropriate. When informing the EA, EDO or fire department of the incident, the following information should be provided:

- – the location, type, and approximate volume of oil released;
- – whether the oil has the potential to reach a waterway or storm drain;
- – whether any injuries have occurred; and
- – whether cleanup assistance is needed.

6. Contain if possible: Contain the spill by surrounding it with absorbent socks or by diking the perimeter with scoops of loose absorbent material compatible with the substance spilled. Begin at the side(s) where release flows toward drains or other conduits to the environment.
7. Absorb and neutralize - Next, cover the spill with loose, compatible absorbent material, working from the perimeter inward toward the center. Use sufficient quantities to completely cover the liquid. Carefully stir the absorbent-covered spill with a non-sparking shovel. Very small spills may be contained and absorbed solely with an absorbent sock. Seal contaminated clothing and absorbent material in a vapor-tight container.
8. Clean up - Use a non-sparking shovel to scoop up the loose absorbent. A chemically resistant broom and dustpan may be used to sweep up absorbent residue. Use wetted absorbent towels or pads to clean surface.
9. Properly dispose of spent cleanup materials such as absorbents and rags. Spent materials should be placed in in impervious bags, drums, or buckets. The EA should coordinate proper characterization of the wastes for proper disposal.
10. Decontaminate equipment and Personal Protective Equipment and restock spill supplies.

Normal operations can be resumed after the ES&H EA or EFA Tank SME, Facility Manager, and the H&S Technician inspect the area. The appropriate EFA SME or EDO will take care of regulatory agency notifications, if any are required.

5.1.3 Response Procedures for Emergency Events

Emergency events are defined in *ES&H Manual*, Document 22.1. For an emergency, the facility employee identifying the incident should conduct the following:

- **From a safe place, dial 911 from a Laboratory phone or dial (925) 447-6880 from a cell phone to reach the Fire Department.**
- **Evacuate facility personnel from the immediate area if necessary.**
- Await the arrival of the Fire Department/Security Organization.

The on-Site fire department has primary responsibility for providing LLNL with emergency response services for fire, technical rescue, hazardous materials, and emergency medical incidents. The on-site fire department is operated and staffed by the Alameda County Fire Department under contract to LLNS.

5.1.4 Responsibilities During an Emergency

The senior fire officer serves as the Incident Commander (IC) during most incidents, including fire, medical, hazardous material, and rescue emergencies. The IC reports directly to the Emergency Coordinator/Laboratory Emergency Duty Officer (LEDO). Select members of LLNL's Laboratory Emergency Duty Officer (LEDO) program fulfill the responsibilities of Emergency Coordinator as required by State and Federal regulations. The Emergency Coordinator/LEDO (Table 1) is authorized to commit LLNL resources necessary to respond to an incident. The Emergency Coordinator/LEDO has access to information on LLNL's facility and operations. The Emergency Coordinator/LEDO is on call for 24-hours per day on a weekly basis. The Alameda County Regional Emergency Communications Center maintains a copy of the emergency call list of Emergency Coordinators/LEDOs. The Emergency Coordinator/LEDO has the authority to commit all LLNL resources and the capability to obtain outside resources needed to implement this Contingency Plan.

Table 5-2 Emergency Coordinator Call List

Name and Title	L-Code	Work Phone	Work Address	24-Hour Phone
Joel Bowers Emergency Coordinator Primary/ Laboratory Emergency Duty Officer	L-447	(925) 423-6877 (925) 423-7705, pager #02601	7000 East Ave. Livermore, CA 94551	(925) 447-6880
Mark Sueksdorf Emergency Coordinator Alternate/ Laboratory Emergency Duty Officer	L-654	(925) 423-8449 (925) 423-7705, pager #06761	7000 East Ave. Livermore, CA 94551	(925) 447-6880

If an emergency escalates to an event that requires additional personnel, the *LLNL Emergency Plan* (UCRL-AM-218588) is implemented in conjunction with the Oil Spill Contingency Plan (Appendix F). The LLNL Onsite Emergency Response Organization becomes operational when the *LLNL Emergency Plan* is implemented. The Incident Command System (ICS) will be established relative to the needs for response resources (e.g., the ES&H Team, EFA, Plant Engineering). The respective Department Operations Center(s) [DOC(s)] or Health Services and Environmental Information Center(s) [HSEIC(s)] may need to be activated, as well as the Emergency Operations Center (EOC). The ES&H Team EA or EDO will follow the regulatory requirements for reporting the incident.

Roles and responsibilities in case of a large incident are further detailed in the *Lawrence Livermore National Laboratory Emergency Plan* (LLNL 2014). The Emergency Plan documents the procedures for preparedness and response to Operational Emergencies. The Emergency Plan provides an overview of roles, responsibilities, and lines of authority for the Livermore Site emergency response organizations.

Livermore Site emergency response organizations maintain the capability to respond to and mitigate the effects of hazards associated with emergencies; to direct protective actions for site personnel; to notify offsite agencies and provide protective action recommendations for the public; to recover from an emergency while limiting damage to facilities and equipment, minimizing impact to onsite operations and security; and to limiting adverse impacts to the environment.

5.2 Waste Disposal – 112.7(a)(3)(v)

Wastes resulting from cleanup of a non-emergency event are containerized in impervious bags, drums, or buckets. An EA coordinates proper characterization of the wastes for proper disposal. Wastes from operations are managed by RHWM in accordance with the LLNL *Environment, Safety and Health (ES&H) Manual*.

5.3 Spill Notification and Reporting Requirements – 112.7(a)(3)(vi) and 112.7(4)

ES&H is notified of all Livermore Site environmental emergencies, including oil spills. A field EA is notified of environmental emergencies that occur at the Livermore Site during working hours and notifies a trained EDO. EDOs are on duty 24 hours a day, 7 days a week and coordinate emergency response with other first responders and environmental specialists. All reportable oil spills at the Livermore Site are reported to the appropriate regulatory agencies as described in the *Environmental Incident Notification and Reporting Procedure* (latest revision). This technical manual includes information and procedures that enable the LLNL staff reporting a discharge to be able to provide the following information:

- Exact address or location and phone number of the facility
- Owner/operator name
- Date and time of discharge
- Type of material discharged
- Estimate of the total quantity discharged
- Description of source and all affected media
- Cause of the discharge, including a failure analysis if the discharge reached navigable waters
- Any damages or injuries caused by the discharge
- Actions (corrective actions and countermeasures) being used to stop, remove, and mitigate the effects of the discharge
- Whether an evacuation may be needed
- Names or individuals and/or organizations that have been contacted
- Maximum storage/handling capacity of the facility and normal daily throughput
- Weather conditions at the incident location
- Adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary
- Additional preventive measures taken or planned to take to minimize discharge reoccurrence
- Other information to help emergency personnel respond to the incident

Federal oil discharge reporting requirements are found in two EPA regulations –40 CFR Part 110 and 40 CFR Part 112. Under Title 40 CFR Part 110, a harmful quantity of oil discharge that reaches navigable waters must be reported to the National Response Center (NRC) at 1-800-424-8802 immediately after knowledge of the discharge. A harmful quantity is any quantity of discharged oil that violates state water quality standards, causes a film or sheen on the water's surface, or leaves sludge or emulsion beneath the surface.

In addition to reporting to NRC, Title 40 CFR Part 112.4 stipulates that a spill shall be reported to the Environmental Protection Agency (EPA) and other local agencies and a report prepared if more than 1,000 gallons of oil are discharged into or upon navigable waters in a single event. The same CFR section mandates preparation of a spill report whenever two spill events (more than 42 gallons each) occur within any 12-month period resulting in "harmful quantities" of oil being discharged into or upon navigable waters." The Region 9 EPA Administrator and the Regional Water Quality Control Board, Central Valley Region, shall receive written notification within 60 days of the event.

Section 25270.8 of the *California Health and Safety Code* (HSC 6.67) requires verbal notification (immediate) and written notification (within 5 working days) to Livermore-Pleasanton Fire Department (the Certified Unified Program Agency [CUPA]) and California Governor's Office of Emergency Services for release of one barrel (42 gallons) or more of oil by direct discharge to a receiving water.

The following **Table 5-3** provides a summary of internal and regulatory notifications.

Table 5-3 Internal and Regulatory Notifications

Discharge Condition [1]	**When to Notify**	**Who to Notify**	**Contact Name/Number**
Internal Notification Requirements			
Non-Emergency	When control of spill/leak is obtained and it is safe	Field Environmental Analyst	Environmental Analysts (working hours) Environmental Duty Officer (rotating position) pager 04097 If unsure of EDO, contact Fire Department who maintains current EDO information
Emergency	As soon as possible (from safe location)	Fire Department	**911 from a Laboratory phone or 1-925-447-6880 from a cell phone**
Response Contractor	If additional response aide is required	Clean Harbors	(707) 747-1528
Regulatory Notification Requirements			
Harmful quantity of oil discharge that reaches	Verbal notification immediately after	NRC	1-800-424-8802

navigable waters	discovery of the discharge		
More than 1,000 gallons of oil are discharged into or upon navigable waters in a single event. – OR – Whenever two spill events (more than 42 gallons each) occur within any 12-month period resulting in "harmful quantities" of oil being discharged into or upon navigable waters.	Written notification within 60 days of the event.	EPA Region 9	75 Hawthorn Street San Francisco, CA 94105
		RWQCB – San Francisco Bay Region	510 622-2300
42 gallons or more of oil by direct discharge to a receiving water	Verbal notification immediately after discovery of the discharge	California Office of Emergency Services Livermore-Pleasanton Fire Department (CUPA)	1-800-852-7550 (925) 454-2361 (8:00-5:00) (925) 447-6880 (off hours)

[1] A harmful quantity is any quantity of discharged oil that violates state water quality standards, causes a film or sheen on the water's surface, or leaves sludge or emulsion beneath the surface.

5.4 Cleanup Personnel and Equipment

A response trailer containing bulk quantities of equipment is maintained by RHWM at OS169 to support the Alameda County Fire Department in the event of an emergency event at the Livermore Site, as described in the Oil Contingency Plan in Appendix F.

6.0 REFERENCES

California Health and Safety Code, Division 20, Chapter 6.67 (HSC 6.67).

Campbell, C. G., (2005), *Calculation of the 24-Hour 25-Year Return Period Storm for the Livermore Site (S200) for Design of Secondary Containment for Tanks,* Lawrence Livermore National Laboratory, Livermore, CA.

Code of Federal Regulations, Title 40, Part 110, Section 110.3, "Discharge of Oil", U.S. Environmental Protection Agency, Washington D.C.

Code of Federal Regulations, Title 40, Part 112, “Oil Pollution Prevention”, U.S. Environmental Protection Agency, Washington D.C.

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Code of Federal Regulations, Title 49, Subchapter C, “Shipping Container Specifications of the DOT Hazardous Materials Regulations”, U.S. Environmental Protection Agency, Washington D.C.

Crawford, Lisa (2009), *Contingency Plan for Waste Accumulation Areas at Site 200 (LLNL-TR-402601).*

Lawrence Livermore National Laboratory, *Emergency Plan*, Lawrence Livermore National Laboratory, Livermore, CA, latest revision.

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Lawrence Livermore National Laboratory, “Hazardous, Radioactive and Mixed Waste Management, Satellite and Waste Accumulation Areas”. PRO-2756. December 2015.

Lawrence Livermore National Laboratory, *Environmental Incident Notification and Reporting Procedures*, Lawrence Livermore National Laboratory, Livermore, CA, January 2013 *(LLNL-TM-617312).*

State Water Resources Control Board (2014). Order 2014-0057-DWQ, NPDES General Permit No. CAS000001: National Pollutant Discharges Elimination System (NPDES) California General Permit for Storm Water Discharge Associated with Industrial Activities. Available on-line at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/industrial.shtml.

Steel Tank Institute, SP001, “Standard for Inspection of Aboveground Storage Tanks”, Steel Tank Institute, 5th Edition Issued September 2011.

7.0 GLOSSARY AND ACRONYMS

API	American Petroleum Institute
AST	Aboveground Storage Tank
Bulk storage container	Any container used to store oil. According to 40 CFR 112.2, bulk storage containers are "used for purposes including, but not limited to, the storage of oil prior to use, while being used, or prior to further distribution in commerce. Oil-filled electrical, operating, or manufacturing equipment is not a bulk storage container."
CFR	Code of Federal Regulations
CUPA	Certified Unified Program Agency
DOE	U.S. Department of Energy
DOT	U.S. Department of Transportation
EA	Environmental Analyst
EDO	Environmental Duty Officer
EOC	Emergency Operations Center
EPA	United States Environmental Protection Agency
EFA	Environmental Functional Area
ES&H	Environment, Safety, and Health
ESPO	Environmental Support and Programmatic Outreach
Event	A problem or emergency that must be mitigated. Events are classified as either "non-emergency" or "emergency."
F&I	Facilities and Infrastructure
HSC	Health and Safety Code
HMBP	Hazardous Material Business Plan
ICS	Incident Command System
LEDO	Laboratory Emergency Duty Officer
LLC	Limited Liability Company
LLNL	Lawrence Livermore National Laboratory
Minor spill	Spill of oil products that can be handled routinely by program personnel with little outside support.
MSL	mean sea level
MSD	Maintenance and Services Department
N/A	Not Applicable
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
O&B	Operations and Business
Oil	Oil is defined by 40 CFR 112 regulation as being "oil of any kind or in any form, including, but not limited to: fats, oils, or greases of animal, fish, or marine mammal origin; vegetable oils, including oils from seeds, nuts, fruits, or kernels; and, other oils and greases, including petroleum, fuel oil, sludge, synthetic oils, mineral oils, oil refuse, or oil mixed with wastes other than dredged spoil." 20

	HSC 6.67 further defines “crude oil or its fractions” to be crude petroleum or all products in liquid form derived from petroleum.
Oil-handling personnel	Employees who are engaged in the operation and maintenance of oil storage containers, such as oil transfers and inspections
PCB	Polychlorinated biphenyl
P.E.	Professional Engineer
PPE	Personal Protection Equipment
Reportable quantities (Federal Regulations)	“…More than 1,000 U.S. gallons of oil into or upon the navigable waters of the United States or adjoining shorelines in a single spill event, or discharged oil in harmful quantities,” as defined in 40 CFR 110.3, a & b, “that violate applicable water quality standards, or cause a film or sheen upon or discoloration of the surface of the water or upon adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines,” in two spill events within any 12-month period.
RA	Regional Administrator
RCRA	Resource Conservation and Recovery Act
RHWM	Radioactive and Hazardous Waste Management
SME	Subject Matter Expert
SPCC	Spill Prevention, Control, and Countermeasure
Spill event	A discharge of oil into or upon the navigable waters of the United States or adjoining shorelines in harmful quantities, as defined in 40 CFR 110, which includes “discharges of oil that violate applicable water quality standards, or cause a film or sheen upon or discoloration of the surface of the water or adjoining shorelines or cause a sludge or emulsion to be deposited beneath the surface of the water or upon adjoining shorelines.”
STI	Steel Tank Institute
TSCA	Toxic Substances Control Act
UST	Underground Storage Tank
WAA	Waste Accumulation Area

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Appendix A

SPCC Plan Requirements as Specified in 40 CFR 112 and Their Location in This SPCC Plan

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Appendix A. SPCC Plan Requirements as Specified in 40 CFR 112 and Their Location in This SPCC Plan

40 CFR SECTION	DESCRIPTION	LOCATION IN THIS SPCC PLAN
Subpart A—Applicability, Definitions, and General Requirements for All Facilities and All Types of Oils		
112.1 through 112.6		
112.3(a) - (c)	Requirements for preparation and implementation of SPCC Plans in accordance with 40 CFR 112.7 and any other applicable section of 40 CFR 112.	Section 1
112.3(d)	Obtain Professional Engineer's review and certification. P.E. certifies the SPCC Plan was prepared in accordance with good engineering practice, including consideration of applicable industry standards, and with the requirements of the SPCC rule.	Page v
112.3(e)	Maintain copy of SPCC Plan on-site if the facility is normally attended at least 4 hours per day; otherwise, maintain it at nearest field office. Also, make Plan available to EPA Regional Administrator or other local agency inspector for on-site review during normal working hours.	Section 1.2
112.4(a) - (c)	When discharge >1,000 gallons of oil in a single discharge as described in 40 CFR 112.1(b), or (2) discharge more than 42 U.S. gallons of oil as described in 40 CFR 112.1(b), in each of two discharges within any 12-month period, submit, within 60 days, a report to regional EPA and to the state agency in charge of oil pollution control activities, and to the State Water Board.	Section 5.3
112.4(d) & (e)	If requested by the EPA RA, respond to request for an amendment within 30 days of the first notice and amend SPCC Plan within 30 days of EPA's final notification following facility's responses.	Section 1.3.3
112.5(a)	Amend SPCC Plan, within 6 months, whenever there is change in facility design, construction, operation or maintenance, which materially affects facility's potential for discharge as described in 40 CFR 112.1(b).	Section 1.3.1
112.5(b)	Perform a review and evaluation of SPCC Plan at least once every five years. The owner/operator must document completion of the review and evaluation, and must sign a statement as to whether he will amend the SPCC Plan. The following will suffice: "I have completed review and evaluation of the SPCC Plan for (name of facility) on (date), and will (will not) amend the Plan as a result."	Section 1.3.2
112.5(c)	Obtain Professional Engineer's certification for any technical amendments in accordance with 40 CFR 112.3(d).	Section 1.3.1, 1.3.2, 1.3.4
112.7 General requirements for Spill Prevention, Control, and Countermeasure Plans		
112.7	The SPCC Plan shall be a carefully thought-out plan, prepared in accordance with good engineering practices. The complete SPCC Plan shall follow the sequence outlined according to 40 CFR 112.7. Obtain full approval of management at a level with authority to commit the necessary resources to fully implement the Plan.	The entire SPCC Plan; see P.E.'s Certification on page v Page iii
112.7	Cross-Reference of Plan Sections to the Requirements of 40 CFR	Appendix A (this table)

40 CFR SECTION	DESCRIPTION	LOCATION IN THIS SPCC PLAN
112.7(a)(1)	Include a discussion of your facility's conformance with the requirements listed in 40 CFR 112.7.	Section 1.5; Section 3.1
112.7(a)(2)	Comply with all applicable requirements listed in 40 CFR 112.7. Your SPCC Plan may deviate with the exception of the secondary containment requirements. Describe any deviations.	Section 1.5; Section 3.1
112.7(a)(3)	Describe the physical layout of the facility and include a facility diagram, which must mark the location and contents of each container. The facility diagram must include completely buried tanks that are otherwise exempted from the requirements of this part under 40 CFR 112.1(d)(4).	Section 2 and Appendix C
112.7(a)(4)	Unless you have submitted a response plan under 40 CFR 112.20, provide information and procedures in your SPCC Plan to enable a person reporting a discharge to relate information on the exact address or location and phone number of the facility.	Section 2.0; Section 5.3
112.7(a)(5)	Unless you have submitted a response plan under 40 CFR 112.20, organize portions of the SPCC Plan describing procedures you will use when a discharge occurs in a way that will make them readily usable in an emergency, and include appropriate supporting material as appendices.	Section 5.0; Appendix G
112.7(b)	Describe a prediction of the direction, rate of flow, and total quantity of oil, which could be discharged from the facility as a result of each type of major equipment failure.	Section 3.2; Appendix C
112.7(c) General Prevention Standards (for onshore facilities)		
112.7(c)(1)	Provide appropriate containment and/or diversionary structures or equipment to prevent discharged oil from reaching navigable water course. The entire containment system, including walls and floor, must be capable of containing oil and must be constructed so that any discharge from a primary containment system, such as a tank or pipe, will not escape the containment system before cleanup occurs. At a minimum, include one of following preventive systems for onshore facilities: (i) Dikes, berms or retaining walls sufficiently impervious to contain oil; (ii) Curbing; (iii) Culverts, gutters or other drainage systems; (iv) Weirs, booms or other barriers; (v) Spill diversion ponds; (vi) Retention ponds; or, (vii) Sorbent materials.	Section 3.3; Appendix C
112.7(d)	When installation of structures or equipment, as outlined in 40 CFR 112.7(c) and (h)(1) and 40 CFR 112.8(c)(2), (c)(11), 112.9(c)(2), 112.10(c), 112.12(c)(2), 112.12(c)(11), 112.13(c)(2) and 112.14(c) is not practicable to prevent discharge as described in 40 CFR 112.b, clearly explain why such measures are not practicable; for bulk storage containers, conduct both periodic integrity testing of the containers and periodic integrity and leak testing of the valves and piping, unless you have submitted a response plan under 40 CFR 112.20 provide the following in your SPCC Plan:	Section 3.5

40 CFR SECTION	DESCRIPTION	LOCATION IN THIS SPCC PLAN
112.7(e) Inspections, tests, and records		
	Conduct inspections and tests required by this part in accordance with written procedures that you or the certifying engineer develop for the facility. You must keep these written procedures and a record of the inspections and tests, signed by the appropriate supervisor or inspector, with the SPCC Plan for a period of three years. Records of inspections and tests kept under usual and customary business practices will suffice for purposes of this paragraph.	Section 3.6
112.7(f) Personnel, training, and discharge prevention procedures		
112.7(f)(1)	At a minimum, train your oil-handling personnel in the operation and maintenance of equipment to prevent discharges; discharge procedure protocols; applicable pollution control laws, rules, and regulations; general facility operations; and, the contents of the facility SPCC Plan.	Section 3.7
112.7(f)(2)	Designate a person at each applicable facility who is accountable for discharge prevention and who reports to facility management.	Section 2.0
112.7(f)(3)	Schedule and conduct discharge prevention briefings for your oil-handling personnel at least once a year to assure adequate understanding of the SPCC Plan for that facility. Such briefings must highlight and describe known discharges as described in 40 CFR 112.1(b) or failures, malfunctioning components, and any recently developed precautionary measures.	Section 3.7
112.7(g) Security (excluding oil production facilities)		
112.7(g)(1)	Fully fence each facility handling, processing, or storing oil, and lock and/or guard entrance gates when the facility is not in production or is unattended.	Section 3.8.1
112.7(g)(2)	Ensure that the master flow and drain valves and any other valves permitting direct outward flow of the container's contents to the surface have adequate security measures so that they remain in the closed position when in non-operating or non-standby status.	Section 3.8.2
112.7(g)(3)	Lock the starter control on each oil pump in the ''off'' position and locate it at a site accessible only to authorized personnel when the pump is in a non-operating or non-standby status.	Section 3.8.2
112.7(g)(4)	Securely cap or blank-flange the loading/unloading connections of oil pipelines or facility piping when not in service or when in standby service for an extended time. This security practice also applies to piping that is emptied of liquid content either by draining or by inert gas pressure.	Section 3.8.2
112.7(g)(5)	Provide facility lighting commensurate with the type and location of the facility that will assist in the: (i) Discovery of discharges occurring during hours of darkness, both by operating personnel, if present, and by non-operating personnel (the general public, local police, etc.); and (ii) Prevention of discharges occurring through acts of vandalism.	Section 3.8.3

40 CFR SECTION	DESCRIPTION	LOCATION IN THIS SPCC PLAN
112.7(h) Facility tank car and tank truck loading/unloading rack (excluding offshore facilities)		
112.7(h)(1)	Where loading/unloading area drainage does not flow into a catchment basin or treatment facility designed to handle discharges, use a quick drainage system for tank car or tank truck loading and unloading areas. You must design any containment system to hold at least the maximum capacity of any single compartment of a tank car or tank truck loaded or unloaded at the facility.	Section 3.9
112.7(h)(2)	Provide an interlocked warning light or physical barrier system, warning signs, wheel chocks, or vehicle break interlock system in loading/unloading areas to prevent vehicles from departing before complete disconnection of flexible or fixed oil transfer lines.	Section 3.9,N/A
112.7(h)(3)	Prior to filling and departure of any tank car or tank truck, closely inspect for discharges the lowermost drain and all outlets of such vehicles, and if necessary, ensure that they are tightened, adjusted, or replaced to prevent liquid discharge while in transit.	Section 3.9, N/A
112.7(i)	If a field-constructed aboveground container undergoes a repair, alteration, reconstruction, or a change in service that might affect the risk of a discharge or failure due to brittle fracture or other catastrophe, or has discharged oil or failed due to brittle fracture failure or other catastrophe, evaluate the container for risk of discharge or failure due to brittle fracture or other catastrophe, and as necessary, take appropriate action.	Section 3.10; N/A
112.7(j)	In addition to the minimal prevention standards listed under this section, include in your Plan a complete discussion of conformance with the applicable requirements and other effective discharge prevention and containment procedures listed in this part or any applicable more stringent State rules, regulations, and guidelines.	Section 3.11 and Seciton 3.12
112.7(k)	Qualification Criteria for Oil Filled Operational Equipment for alternative secondary containment requirements	Section 3.4
Subpart B—Requirements for Petroleum Oils and Non-Petroleum Oils, Except Animal Fats and Oils and Greases, and Fish and Marine Mammal Oils; and Vegetable Oils (Including Oils from Seeds, Nuts, Fruits, and Kernels)		
112.8 Spill Prevention, Control, and Countermeasure Plan requirements for onshore facilities (excluding production facilities).		
112.8(a)	Meet the general requirements for the Plan listed under 40 CFR 112.7, and the specific discharge prevention and containment procedures listed in this section (40 CFR 112.8).	The entire SPCC Plan
112.8(b) Facility Drainage		
112.8(b)	Facility Drainage Design and Control	Section 4.1
112.8(c) Bulk Storage Containers		
112.8(c)(1)	Do not use a container for the storage of oil unless its material and construction are compatible with the material stored and conditions of storage such as pressure and temperature.	Section 4.2.1

40 CFR SECTION	DESCRIPTION	LOCATION IN THIS SPCC PLAN
112.8(c)(2)	Construct all bulk storage container installations so that you provide a secondary means of containment for the entire capacity of the largest single container and sufficient freeboard to contain precipitation. You must ensure that diked areas are sufficiently impervious to contain discharged oil. Dikes, containment curbs, and pits are commonly employed for this purpose. You may also use an alternative system consisting of a drainage trench enclosure that must be arranged so that any discharge will terminate and be safely confined in a facility catchment basin or holding pond.	Section 4.2.2
112.8(c)(3)	Do not allow drainage of uncontaminated rainwater from the diked area into a storm drain or discharge of an effluent into an open watercourse, lake, or pond, bypassing the facility treatment system unless you: (i) Normally keep the bypass valve sealed closed. (ii) Inspect the retained rainwater to ensure that its presence will not cause a discharge as described in 40 CFR 112.1(b). (iii) Open the bypass valve and reseal it following drainage under responsible supervision; and (iv) Keep adequate records of such events, for example, any records required under permits issued in accordance with 40 CFR 122.41(j)(2) and 122.41(m)(3).	Section 4.2.3 and Appendix E
112.8(c)(4)	Protect any completely buried metallic storage tank installed on or after January 10, 1974 from corrosion by coatings or cathodic protection compatible with local soil conditions. You must regularly leak test such completely buried metallic storage tanks.	Section 4.2.4
112.8(c)(5)	Do not use partially buried or bunkered metallic tanks for the storage of oil, unless you protect the buried section of the tank from corrosion. You must protect partially buried and bunkered tanks from corrosion by coatings or cathodic protection compatible with local soil conditions.	Section 4.2.5
112.8(c)(6)	Test each aboveground container for integrity on a regular schedule, and whenever you make material repairs. The frequency of and type of testing must take into account container size and design (such as floating roof, skid-mounted, elevated, or partially buried). You must combine visual inspection with another testing technique such as hydrostatic testing, radiographic testing, ultrasonic testing, acoustic emissions testing, or another system of nondestructive shell testing. You must keep comparison records and you must also inspect the container's supports and foundations. In addition, you must frequently inspect the outside of the container for signs of deterioration, discharges, or accumulation of oil inside diked areas. Records of inspections and tests kept under usual and customary business practices will suffice for purposes of this paragraph.	Section 4.2.6
112.8(c)(7)	Control leakage through defective internal heating coils by monitoring the steam return and exhaust lines for contamination from internal heating coils that discharge into an open watercourse, or pass the steam return or exhaust lines through a settling tank, skimmer, or other separation or retention system.	Section 4.2.7

40 CFR SECTION	DESCRIPTION	LOCATION IN THIS SPCC PLAN
112.8(c)(8)	Engineer or update each container installation in accordance with good engineering practice to avoid discharges. You must provide at least one of the following devices: (i) High liquid level alarms with an audible or visual signal at a constantly attended operation or surveillance station. In smaller facilities an audible air vent may suffice. (ii) High liquid level pump cutoff devices set to stop flow at a predetermined container content level. (iii) Direct audible or code signal communication between the container gauger and the pumping station. (iv) Fast response system for determining the liquid level of each bulk storage container such as digital computers, telepulse, or direct vision gauges. If you use this alternative, a person must be present to monitor gauges and the overall filling of bulk storage containers. (v) You must regularly test liquid level sensing devices to ensure proper operation.	Section 4.2.8
112.8(c)(9)	Observe effluent treatment facilities frequently enough to detect possible system upsets that could cause a discharge as described in 40 CFR 112.1(b).	Section 4.2.9
112.8(c)(10)	Promptly correct visible discharges which result in a loss of oil from the container, including but not limited to seams, gaskets, piping, pumps, valves, rivets, and bolts. You must promptly remove any accumulations of oil in diked areas.	Section 4.2.10
112.8(c)(11)	Position or locate mobile or portable oil storage containers to prevent a discharge as described in 40 CFR 112.1(b). You must furnish a secondary means of containment, such as a dike or catchment basin, sufficient to contain the capacity of the largest single compartment or container with sufficient freeboard to contain precipitation.	Section 4.2.11
112.8(d) Facility Transfer Operations, Pumping, and Facility Process		
112.8(d)(1)	Provide buried piping that is installed or replaced on or after August 16, 2002, with a protective wrapping and coating. You must also cathodically protect such buried piping installations or otherwise satisfy the corrosion protection standards for piping in part 280 of this chapter or a State program approved under part 281 of this chapter. If a section of buried line is exposed for any reason, you must carefully inspect it for deterioration. If you find corrosion damage, you must undertake additional examination and corrective action as indicated by the magnitude of the damage.	Section 4.3.1
112.8(d)(2)	Cap or blank-flange the terminal connection at the transfer point and mark it as to origin when piping is not in service or is in standby service for an extended time.	Section 4.3.2
112.8(d)(3)	Properly design pipe supports to minimize abrasion and corrosion and allow for expansion and contraction.	Section 4.3.3
112.8(d)(4)	Regularly inspect all aboveground valves, piping, and appurtenances. During the inspection you must assess the general condition of items, such as flange joints, expansion joints, valve glands and bodies, catch pans, pipeline supports, locking of valves, and metal surfaces. You must also conduct integrity and leak testing of buried piping at the time of installation, modification, construction, relocation, or replacement.	Section 4.3.4 and Appendix H

40 CFR SECTION	DESCRIPTION	LOCATION IN THIS SPCC PLAN
112.8(d)(5)	Warn all vehicles entering the facility to be sure that no vehicle will endanger aboveground piping or other oil transfer operations.	Section 4.3.5
112.9	Requirements for Onshore Oil Production Facilities	NA
112.10	Requirements for Onshore Oil Drilling and Workover Facilities	NA
112.11	Requirements for Offshore Oil Drilling, Production, and Workover Facilities	NA
Subpart C— Requirements for Animal Fats and Oils and Greases, and Fish and Marine Mammal Oils; and for Vegetable Oils, including Oils from Seeds, Nuts, Fruits, and Kernels		
112.12	Subpart C - Requirements for Animal Fats and Oils and Greases, and Fish and Marine Mammal Oils; and for Vegetable Oils, including Oils from Seeds, Nuts, Fruits, and Kernels	NA
Subpart D— Response Requirements		
112.20-112.21	Subpart D – Response Requirements	NA
Appendix C to Part 112		
Appendix C to Part 112	Substantial Harm Criteria	Appendix B

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Appendix B

Certification of Substantial Harm Determination Form

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Appendix B. Certification of Substantial Harm Determination Form

FACILITY NAME: Lawrence Livermore National Laboratory, Livermore Site

FACILITY ADDRESS: 7000 East Avenue, Livermore, California

U.S. Environmental Protection Agency (EPA) Criterion

1. Does the facility have a total oil storage capacity greater than or equal to 42,000 gallons and do the operations include over water transfers of oil to or from vessels?

   YES __________ NO _____X_____

2. Does the facility have a total oil storage capacity greater than or equal to one million (1,000,000) gallons and is the facility without secondary containment for each aboveground storage area sufficiently large to contain the capacity of the largest aboveground oil storage tank plus sufficient freeboard to allow for precipitation within the storage area?

   YES __________ NO _____X_____

3. Does the facility have a total oil storage capacity greater than or equal to one million (1,000,000) gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III of the 40 CFR 112 Appendix C, or an alternative formula considered acceptable by the EPA RA), such that a discharge from the facility could cause injury to fish and wildlife and sensitive environments?

   YES __________ NO _____X_____

4. Does the facility have a total oil storage capacity greater than or equal to one million (1,000,000) gallons and is the facility located at a distance (as calculated using the appropriate formula in Attachment C-III of 40 CFR 112 Appendix C, or an alternative formula considered acceptable by the EPA RA), such that a discharge from the facility would shut down a public drinking water intake?

   YES __________ NO _____X_____

5. Does the facility have a total oil storage capacity greater than or equal to one million (1,000,000) gallons and within the past five years, has the facility experienced a reportable spill in an amount greater than or equal to 10,000 gallons?

   YES __________ NO _____X_____

If the answer to each of the above questions is "NO", then this facility is not required to prepare and submit a Facility Response Plan to the EPA RA.

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CERTIFICATION

I certify, under penalty of law, that I have personally examined and am familiar with the information submitted in this document, and that based on my inquiry of those individuals responsible for obtaining this information, I believe that the submitted information is true, accurate, and complete.

Signature: ____ Date: __________

Frances Alston, Ph.D.
Director
Environment, Safety, Health & Quality

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Appendix C

Oil Products Inventory and Storage Locations

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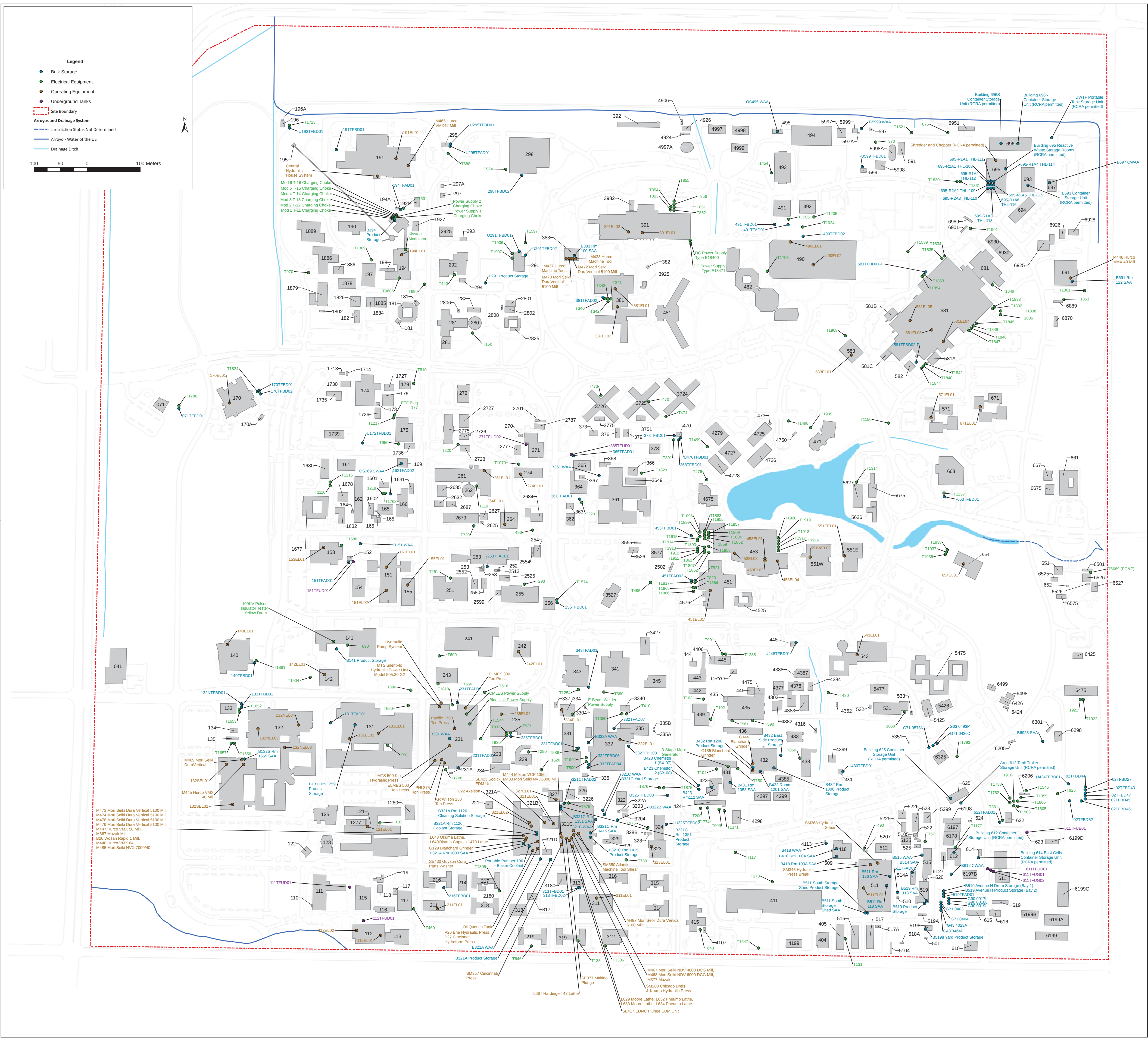
Figure C-1


N
Sacramento
80
99
101
5
Stockton
Lawrence Livermore
National Laboratory
Oakland
680
San Francisco
580
Livermore
Tracy
99
Modesto
880
101
Pacific Ocean
280
San Jose
5
Scale: Miles
0 5 10
0 5 10
Scale: Kilometers
17
Santa Cruz
101



Bulk Storage

ID	Contents
Bulk Storage Containers Associated with Stationary Emergency Generators	
071TFBD01	Diesel
131TFAD01	Diesel
132NTFBD01	Diesel
133TFBD01	Diesel
140TFBD01	Diesel
151TFAD01	Diesel
162TFAD02	Diesel
170TFBD01	Diesel
170TFBD02	Diesel
U172TFBD01	Diesel
191TFBD01	Diesel
U193TFBD01	Diesel
194TFAD01	Diesel
216TFBD01	Diesel
231TFAD01	Diesel
231TFAD02	Diesel
235TFBD01	Diesel
253TFAD01	Diesel
256TFBD01	Diesel
U291TFBD01	Diesel
U291TFBD02	Diesel
U295TFAD01	Diesel
U295TFBD01	Diesel
298TFBD02	Diesel
313TFBD02	Diesel
313TFBD01	Diesel
321CTFAD02	Diesel
U325TFBD02	Diesel
U325TFBD03	Diesel
331TFAD01	Diesel
332TFAD04	Diesel
332TFAD07	Diesel
332TFBD06	Diesel
332TFBD08	Diesel
343TFAD01	Diesel
361TFAD01	Diesel
368TFBD01	Diesel
365TFAD01	Diesel
378TFBD01	Diesel
381TFAD02	Diesel
U424TFBD01	Diesel
U430TFBD01	Diesel
U448TFBD01	Diesel
451TFAD02	Diesel
453TFBD01	Diesel
U470TFBD01	Diesel
491TFAD01	Diesel
490TFBD02	Diesel
491TFBD01	Diesel
511TFAD01	Diesel
581TFBD01-P	Diesel
581TFBD02-P	Diesel
U599TFBD01	Diesel
622TFAD01	Diesel
663TFBD01	Diesel
Bulk Storage Containers Associated with Portable Emergency Generators	
02TFBD27	Diesel
02TFBD43	Diesel
02TFBD44	Diesel
02TFBD45	Diesel
02TFBD46	Diesel
02TFBD47	Diesel
02TFBD52	Diesel
Diesel Fueling Station	
519TFAD01	Diesel
RCRA Tank Systems and Permitted Storage Areas	
Area 612 Tank Trailer Storage Unit (RCRA permitted)	Oily Wastewater, Used Oil
Building 612 Container Storage Unit (RCRA permitted)	Oily Wastewater, Used Oil, Solvents
Building 625 Container Storage Unit (RCRA permitted)	Oily Wastewater, Used Oil
B693 Container Storage Unit (RCRA permitted)	Oily Wastewater, Used Oil
Building 695 Reactive Waste Storage Rooms (RCRA permitted)	Reactive Waste Potentially with Oil, Used Oil
Building 696R Container Storage Unit (RCRA permitted)	Oily Wastewater, Used Oil
695-R1A1 THL-111	Oily Wastewater
695-R1A2 THL-112	Oily Wastewater
695-R1A3 THL-113	Oily Wastewater
695-R1A4 THL-114	Oily Wastewater
695-R1A5 THL-115	Oily Wastewater
695-R1A6 THL-116	Oily Wastewater
695-R2A1 THL-108	Oily Wastewater
695-R2A2 THL-109	Oily Wastewater
695-R2A3 THL-110	Oily Wastewater
Building 696S Container Storage Unit (RCRA permitted)	Oily Wastewater, Used Oil
DWTF Portable Tank Storage Unit (RCRA permitted)	Oily Wastewater, Used Oil

Bulk Storage (continued)

ID	Contents
SAAs and WAAs	
B132S Rm 1559 SAA	Used Oil-Based Machining Coolant
B131 Rm 1259 Product Storage	Oil-Based Machining Coolant
B151 WAA	Used Oil
OS169 CWAA	Used Oil
B231 WAA	Used Oil
B321A Rm 1000 SAA	Used Oil, Used Oil-Based Machining Coolant, Oil-Based Machining Coolant
B321A WAA	Used Oil, Used Oil-Based Machining Coolant
321B WAA	Used Oil, Used Oil-Based Machining Coolant
321C WAA	Used Oil, Used Oil-Based Machining Coolant
B321C Rm 1351 SAA	Used Oil-Based Machining Coolant, Used Oil-Based Machining Coolant Containing Radioactive Materials
321C Rm 1415 SAA	Used Oil-Based Machining Coolant
B322B WAA	Used Oil, Used Oil-Based Machining Coolant
B332A WAA	Used Oil
B361 WAA	Used Oil
B383 Rm 100 SAA	Used Oil-Based Machining Coolant
B418 Rm 100A SAA	Used Lacquer Thinner
B418 Rm 100A SAA	Used Oil Based Paint
B418 WAA	Used Oil, Solvents
B423 Rm 112 SAA	Used Oil-Based Machining Coolant
B431 Rm 1053 SAA	Used Oil
B432 Room 1201 SAA	Used Oil-Based Machining Coolant
OS495 WAA	Used Oil, Oily Wastewater
B511 Rm 118 SAA	Used Oil
B511 Rm 136 SAA	Used Oil
B511 South Storage Shed SAA	Used Oil
B514 SAA	Used Oil
B515 WAA	Used Oil, Oily Wastewater, Used Lacquer Thinner
B519 Rm 118 SAA	Used Oil
T-5999 WAA	Used Oil, Used Oil-Based Machining Coolant, Solvents
B612 CWAA	Oily Wastewater, Used Oil, Solvents
B6298 SAA	Used Lacquer Thinner, Used Solvents
B691 Rm 122 SAA	Used Oil, Used Oil-Based Machining Coolant
B697 CWAA	Oily Wastewater, Used Oil-Based Machining Coolant, Used Oil, Solvents; Oil Overpack
New Product Containers	
Portable Pumper 100 - Blaser Coolant	Oil-Based Machining Coolant
B194 Product Storage	Insulating Oil, Empty Drums
B291 Product Storage	Oil, Food Grade
B321A Product Storage	Oil-Based Machining Coolant, Lubricating Oil, Hydraulic Oil
B321A Rm 1126 Cleaning Solution Storage	Cleaning Solution
B321A Rm 1126 Coolant Storage	Oil-Based Machining Coolant
321C Yard Storage	Oil-Based Machining Coolant; EDM Oil; Hydraulic Oil
B321C Rm 1351 Product Storage	Oil-Based Machining Coolant
321C Rm 1415 Product Storage	Oil-Based Machining Coolant
B423 Chemstor 1 (SX-07)	Insulating Oil, Used Insulating Oil
B423 Chemstor 2 (SX-08)	Insulating Oil, Used Insulating Oil
B432 East Side Product Storage	Mineral Oil
B432 Rm 1200 Product Storage	Cutting Fluid
B432 Rm 1300 Product Storage	Mineral Oil
B511 South Storage Shed Product Storage	Hydraulic Oil
B519 Avenue H Drum Storage (Bay 1)	Empty Drums
B519 Avenue H Product Storage (Bay 2)	Motor Oil, Hydraulic Oil, Transmission Oil, Other Oil
B519 Product Storage	Motor Oil, Hydraulic Oil, Transmission Oil, Other Oil
B5198 Yard Product Storage	Hydraulic Oil, Motor Oil
Mobile Refuelers	
G43 3464P	Diesel
G43 4023A	Diesel
G71 0403L	Diesel
G71 0404L	Diesel
G90 0017L	Diesel
G90 0018L	Diesel
G90 0019L	Diesel
G71 0430D	Diesel
G71 0430D	Diesel
G63 0493P	Diesel
G71 0573N	Diesel

Electrical Equipment

ID	Contents
T1780	Insulating Oil
T460	Insulating Oil
T32	Insulating Oil
T1396	Insulating Oil
T58	Insulating Oil
T650	Insulating Oil
T1652	Insulating Oil
T1653	Insulating Oil
T1881	Insulating Oil
T890	Insulating Oil
T1904	Insulating Oil
T1580	Insulating Oil
T1216	Insulating Oil
T1218	Insulating Oil
T1763	Insulating Oil
T1824	Insulating Oil
ETF Bldg 177	Insulating Oil
T1217	Insulating Oil
T950	Insulating Oil
T810	Insulating Oil
T690	Insulating Oil
T760	Insulating Oil
T1723	Insulating Oil
T1309	Insulating Oil
T1305	Insulating Oil
T646	Insulating Oil
T1544	Insulating Oil
T1708	Insulating Oil
T1819	Insulating Oil
T930	Insulating Oil
T931	Insulating Oil
T932	Insulating Oil
T1520	Insulating Oil
T280	Insulating Oil
T600	Insulating Oil
T516	Insulating Oil
T550	Insulating Oil
T251	Insulating Oil
T290	Insulating Oil
T1574	Insulating Oil
T110	Insulating Oil
T1070	Insulating Oil
T160	Insulating Oil
T1355	Insulating Oil
T1906	Insulating Oil
T1907	Insulating Oil
T440	Insulating Oil
T688	Insulating Oil
T924	Insulating Oil
T1597	Insulating Oil
T1306	Insulating Oil
T730	Insulating Oil
T135	Insulating Oil
T575	Insulating Oil
T975	Insulating Oil
T586	Insulating Oil
T1080	Insulating Oil
T1902	Insulating Oil
T410	Insulating Oil
T500	Insulating Oil
T1254	Insulating Oil
T680	Insulating Oil
T220	Insulating Oil
T1829	Insulating Oil
T891	Insulating Oil
T340	Insulating Oil
T341	Insulating Oil
T342	Insulating Oil
T343	Insulating Oil
T851	Insulating Oil
T852	Insulating Oil
T853	Insulating Oil
T854	Insulating Oil
T855	Insulating Oil
T856	Insulating Oil
T131	Insulating Oil
T1647	Insulating Oil
T170	Insulating Oil
T643	Insulating Oil
T1371	Insulating Oil
T1774	Insulating Oil
T200	Insulating Oil
T900	Insulating Oil
T104	Insulating Oil
T150	Insulating Oil
T561	Insulating Oil
T590	Insulating Oil
T850	Insulating Oil
T102	Insulating Oil
T103	Insulating Oil
T1285	Insulating Oil
T901	Insulating Oil
T1817	Insulating Oil
T1864	Insulating Oil
T1865	Insulating Oil
T1866	Insulating Oil
T821	Insulating Oil
T823	Insulating Oil
T1852	Insulating Oil
T1855	Insulating Oil
T1857	Insulating Oil
T1858	Insulating Oil
T1859	Insulating Oil
T1861	Insulating Oil
T1862	Insulating Oil
T1883	Insulating Oil
T1884	Insulating Oil

Electrical Equipment (continued)

ID	Contents
T1893	Insulating Oil
T1896	Insulating Oil
T1897	Insulating Oil
T1899	Insulating Oil
T1909	Insulating Oil
T1911	Insulating Oil
T1912	Insulating Oil
T1913	Insulating Oil
T1914	Insulating Oil
T1915	Insulating Oil
T1916	Insulating Oil
T1917	Insulating Oil
T1918	Insulating Oil
T1919	Insulating Oil
T1920	Insulating Oil
T1905	Insulating Oil
T1024	Insulating Oil
T1705	Insulating Oil
T1205	Insulating Oil
T1206	Insulating Oil
T1454	Insulating Oil
T490	Insulating Oil
T757	Insulating Oil
T1060	Insulating Oil
T480	Insulating Oil
T1150	Insulating Oil
T1832	Insulating Oil
T1833	Insulating Oil
T1834	Insulating Oil
T1835	Insulating Oil
T1836	Insulating Oil
T1838	Insulating Oil
T1840	Insulating Oil
T1842	Insulating Oil
T1844	Insulating Oil
T1845	Insulating Oil
T1846	Insulating Oil
T1847	Insulating Oil
T1848	Insulating Oil
T1853	Insulating Oil
T1854	Insulating Oil
T1901	Insulating Oil
T1908	Insulating Oil
T370	Insulating Oil
T1521	Insulating Oil
T1177	Insulating Oil
T1545	Insulating Oil
T1782	Insulating Oil
T1788	Insulating Oil
T1805	Insulating Oil
T1806	Insulating Oil
T1903	Insulating Oil
T1910	Insulating Oil
T381	Insulating Oil
T925	Insulating Oil
T1936	Insulating Oil
T1937	Insulating Oil
T1938	Insulating Oil
T1257	Insulating Oil
T1849	Insulating Oil
T1001	Insulating Oil
T1863	Insulating Oil
T1830	Insulating Oil
T1831	Insulating Oil
T1110	Insulating Oil
T970	Insulating Oil
T720	Insulating Oil
T496	Insulating Oil
T820	Insulating Oil
T495	Insulating Oil
T474	Insulating Oil
T470	Insulating Oil
T473	Insulating Oil
T117	Insulating Oil
T476	Insulating Oil
T1498	Insulating Oil
T1499	Insulating Oil
T1314	Insulating Oil
T875	Insulating Oil
T1589	Insulating Oil
T1793	Insulating Oil
T1921	Insulating Oil
T1922	Insulating Oil
T5689 (PG&E Owned)	Insulating Oil
T1656	Insulating Oil
T1657	Insulating Oil
T1875	Insulating Oil
T1876	Insulating Oil
T0686	Insulating Oil
100KV Pulser Insulator Tester - Yellow Drum	Insulating Oil
Klystron Modulator	Insulating Oil
Mod 1 T-11 Charging Choke	Insulating Oil
Mod 2 T-12 Charging Choke	Insulating Oil
Mod 3 T-13 Charging Choke	Insulating Oil
Mod 4 T-14 Charging Choke	Insulating Oil
Mod 5 T-15 Charging Choke	Insulating Oil
Mod 6 T-16 Charging Choke	Insulating Oil
Power Supply 1 Charging Choke	Insulating Oil
Power Supply 2 Charging Choke	Insulating Oil
Blue Unit Power Supply	Insulating Oil
CMLES Power Supply	Insulating Oil
E-Beam Welder Power Supply	Insulating Oil
DC Power Supply Type E18400	Insulating Oil
DC Power Supply Type E18471	Insulating Oil
3-Stage Marx Generator	Insulating Oil

Operating Equipment

ID	Contents
112EL02	Hydraulic Oil
112EL01	Hydraulic Oil
121EL01	Hydraulic Oil
131EL02	Hydraulic Oil
131EL01	Hydraulic Oil
140EL01	Hydraulic Oil
142EL01	Hydraulic Oil
151EL01	Hydraulic Oil
151EL02	Hydraulic Oil
153EL01	Hydraulic Oil
155EL01	Hydraulic Oil
170EL01	Hydraulic Oil
191EL01	Hydraulic Oil
194EL01	Hydraulic Oil
211EL01	Hydraulic Oil
235EL02	Hydraulic Oil
242EL01	Hydraulic Oil
261EL01	Hydraulic Oil
264EL01	Hydraulic Oil
274EL01	Hydraulic Oil
311EL01	Hydraulic Oil
321EL02	Hydraulic Oil
321EL01	Hydraulic Oil
323EL01	Hydraulic Oil
327EL01	Hydraulic Oil
332EL01	Hydraulic Oil
334EL01	Hydraulic Oil
381EL01	Hydraulic Oil
381EL02	Hydraulic Oil
391EL01	Hydraulic Oil
391EL02	Hydraulic Oil
451EL01	Hydraulic Oil
453EL04	Hydraulic Oil
453EL01	Hydraulic Oil
453EL02	Hydraulic Oil
453EL03	Hydraulic Oil
490EL02	Hydraulic Oil
490EL01	Hydraulic Oil
511EL01	Hydraulic Oil
543EL01	Hydraulic Oil
571EL01	Hydraulic Oil
581EL03	Hydraulic Oil
581EL04	Hydraulic Oil
581EL05	Hydraulic Oil
583EL01	Hydraulic Oil
671EL01	Hydraulic Oil
132NEL03	Hydraulic Oil
132NEL04	Hydraulic Oil
132NEL05	Hydraulic Oil
132SEL01	Hydraulic Oil
132SEL02	Hydraulic Oil
551EEL01	Hydraulic Oil
551WEL02	Hydraulic Oil
SE417 EDNC Plunge EDM Unit	Dielectic Oil
SE423 Sodick EDM Unit	Dielectic Oil
G144 Blanchard Grinder	Oil-Based Machining Coolant
G185 Blanchard Grinder	Oil-Based Machining Coolant
G129 Blanchard Grinder	Oil-Based Machining Coolant
MTS SilentFlo Hydraulic Power Unit, Model 505.30 G2	Hydraulic Oil
MTS 500 Kip Hydraulic Press	Hydraulic Oil
Pacific 1750 Ton Press	Hydraulic Oil
PHI 375 Ton Press	Hydraulic Oil
KR Wilson 250 Ton Press	Hydraulic Oil
ELMES 500 Ton Press	Hydraulic Oil
ELMES 300 Ton Press	Hydraulic Oil
SM345 Hydraulic Press Break	Hydraulic Oil
P26 Erie Hydraulic Press	Hydraulic Oil
P27 Cincinnati Hydroform Press	Hydraulic Oil
SM357 Cincinnati Press	Hydraulic Oil
SM200 Chicago Dreis & Krump Hydraulic Press	Hydraulic Oil
Hydraulic Pump System	Hydraulic Oil
SM368 Hydraulic Shear	Hydraulic Oil
SM350 Atlantic Machine Tool Shear	Lubricating Oil and Dielectric Oil
HSU / Hydraulic System for Shredder	Hydraulic Oil
Shredder and Chopper (RCRA permitted)	Hydraulic Oil
L22 Axelson	Oil-Based Machining Coolant
L648 Okuma Lathe	Oil-Based Machining Coolant
L649 Okuma Captain 1470 Lathe	Oil-Based Machining Coolant
L629 Moore Lathe	Oil-Based Machining Coolant
L632 Pneumo Lathe	Oil-Based Machining Coolant
L633 Moore Lathe	Oil-Based Machining Coolant
L634 Pneumo Lathe	Oil-Based Machining Coolant
L667 Hardinge T42 Lathe	Oil-Based Machining Coolant
M465 Hurco VMX42 Mill	Oil-Based Machining Coolant
M437 Hurco Machine Tool	Oil-Based Machining Coolant
M470 Mori Seiki DuraVertical 5100 Mill	Oil-Based Machining Coolant
M472 Mori Seiki DuraVertical 5100 Mill	Oil-Based Machining Coolant
M433 Hurco Machine Tool	Oil-Based Machining Coolant
M446 Hurco VMX 40 Mill	Oil-Based Machining Coolant
M469 Mori Seiki DuraVertical 5100 Mill	Oil-Based Machining Coolant
M445 Hurco VMX 40 Mill	Oil-Based Machining Coolant
M473 Mori Seiki Dura Vertical 5100 Mill	Oil-Based Machining Coolant
M474 Mori Seiki Dura Vertical 5100 Mill	Oil-Based Machining Coolant
M478 Mori Seiki Dura Vertical 5100 Mill	Oil-Based Machining Coolant
M479 Mori Seiki Dura Vertical 5100 Mill	Oil-Based Machining Coolant
M447 Hurco VMX 50 Mill	Oil-Based Machining Coolant
M667 Mazak Mill	Oil-Based Machining Coolant
B26 WoTan Rapid 1 Mill	Oil-Based Machining Coolant
M448 Hurco VMX 64	Oil-Based Machining Coolant
M485 Mori Seiki NVX-7000/40	Oil-Based Machining Coolant
M467 Mori Seiki NDV 4000 DCG Mill	Oil-Based Machining Coolant
M377 Mazak	Oil-Based Machining Coolant
M468 Mori Seiki NDV 6000 DCG Mill	Oil-Based Machining Coolant
M444 Mikron VCP 1350	Oil-Based Machining Coolant
M483 Mori Seiki NVD6000 Mill	Oil-Based Machining Coolant
M487 Mori Seiki Dura Vertical 5100 Mill	Oil-Based Machining Coolant
Oil Quench Tank	Insulating Oil
SE430 Guyson Corp Parts Washer	Cleaning Solution
SE377 Makino Plunge	Oil-Based Machining Coolant
Central Hydraulic House System	Hydraulic Oil
654EL01	Hydraulic Oil

Underground Tanks

ID	Contents
111-D1U2	Diesel
113-D1U2	Diesel
152-D1U2	Diesel
271-D2U1	Diesel
365-D1U2	Diesel
611-D1U1	Diesel
611-G3U1	Gasoline-E85
611-G1U1	Gasoline
611-G2U1	Gasoline

Lawrence Livermore National Laboratory

Lawrence Livermore National Laboratory is operated by Lawrence Livermore National Security, LLC, for the U.S. Department of Energy, National Nuclear Security Administration under Contract DE-AC52-07NA27344.

Date: 5/4/2017
Document Path: C:\Users\mertesdorf1\Desktop\GIS\Maps\S200 SPCC Facility Diagram April 2017 1.mxd

Figure C-2: Facility Diagram

ESH-EFA-TKS-16-14097

Table C-1a Livermore SPCC Inventory -- Bulk Storage Containers, General Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/ Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled
Bulk Storage Containers Associated with Stationary Emergency Generators															
071TFBD01	71	N/A	Outside	Bulk Storage	Belly Tank	Diesel	135	135	Sized	Double-Walled (with drains)	135	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
131TFAD01	131	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
132NTFBD01	132	N/A	Outside	Bulk Storage	Belly Tank	Diesel	300	300	Sized	Double-Walled (with drains)	300	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
133TFBD01	133	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
140TFBD01	140	N/A	Outside	Bulk Storage	Belly Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Phyllis Cox	Steel	Double-Walled
151TFAD01	153	N/A	Outside	Bulk Storage	Day Tank	Diesel	100	100	Sized	Double-Walled (with drains)	100	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
162TFAD02	162	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	1000	1000	Sized	Double-Walled	1000	F&I	Phyllis Cox	Steel	Double-Walled
170TFBD01	170	N/A	Outside	Bulk Storage	Belly Tank	Diesel	135	135	Sized	Double-Walled (with drains)	135	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
170TFBD02	170	N/A	Outside	Bulk Storage	Belly Tank	Diesel	125	125	Sized	Double-Walled	125	F&I	Phyllis Cox	Steel	Double-Walled
U172TFBD01	172	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Phyllis Cox	Steel	Double-Walled
191TFBD01	191	N/A	Outside	Bulk Storage	Belly Tank	Diesel	175	175	Sized	Berm	3926	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
U193TFBD01	193	N/A	Outside	Bulk Storage	Belly Tank	Diesel	125	125	Sized	Double-Walled (with drains)	125	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
194TFAD01	194	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
216TFBD01	216	N/A	Outside	Bulk Storage	Belly Tank	Diesel	500	500	Sized	Double-Walled	500	F&I	Phyllis Cox	Steel	Double-Walled
231TFAD01	231	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	550	550	Sized	Double-Walled	550	F&I	Phyllis Cox	Steel	Double-Walled
231TFAD02	231	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
235TFBD01	235	N/A	Outside	Bulk Storage	Belly Tank	Diesel	175	175	Sized	Double-Walled (with drains)	175	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
253TFAD01	253	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
256TFBD01	256	N/A	Outside	Bulk Storage	Belly Tank	Diesel	160	160	Sized	Berm	663	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
U291TFBD01	291	N/A	Outside	Bulk Storage	Belly Tank	Diesel	660	660	Sized	Double-Walled	660	F&I	Phyllis Cox	Steel	Double-Walled
U291TFBD02	291	N/A	Outside	Bulk Storage	Belly Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Phyllis Cox	Steel	Double-Walled
U295TFAD01	295	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled (with drains)	250	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
U295TFBD01	295	N/A	Outside	Bulk Storage	Belly Tank	Diesel	125	125	Sized	Double-Walled (with drains)	125	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
298TFBD02	298	N/A	Outside	Bulk Storage	Belly Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Phyllis Cox	Steel	Double-Walled
313TFBD02	313	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Double-Walled	140	F&I	Phyllis Cox	Steel	Double-Walled
313TFBD01	313	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Double-Walled	140	F&I	Phyllis Cox	Steel	Double-Walled
321CTFAD02	321	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Phyllis Cox	Steel	Double-Walled
U325TFBD02	325	N/A	Outside	Bulk Storage	Belly Tank	Diesel	120	120	Sized	Double-Walled (with drains)	120	F&I	Phyllis Cox	Steel	Double-Walled (with drains)

Table C-1a Livermore SPCC Inventory -- Bulk Storage Containers, General Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/ Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled
U325TFBD03	325	N/A	Outside	Bulk Storage	Belly Tank	Diesel	245	245	Sized	None	0	F&I	Phyllis Cox	Steel	Single-Walled
331TFAD01	331	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
332TFAD04	332	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	2000	2000	Sized	Double-Walled	2000	F&I	Phyllis Cox	Steel	Double-Walled
332TFAD07	332	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	2000	2000	Sized	Double-Walled	2000	F&I	Phyllis Cox	Steel	Double-Walled
332TFBD06	332	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled (with drains)	66	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
332TFBD08	332	N/A	Outside	Bulk Storage	Belly Tank	Diesel	250	250	Sized	Double-Walled (with drains)	250	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
343TFAD01	343	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
361TFAD01	361	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
365TFAD01	365	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	75	75	Sized	Double-Walled (with drains)	75	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
378TFBD01	378	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Double-Walled (with drains)	140	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
381TFAD02	381	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	500	500	Sized	Double-Walled (with drains)	500	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
U424TFBD01	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Phyllis Cox	Steel	Double-Walled
U430TFBD01	430	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Phyllis Cox	Steel	Double-Walled
U448TFBD01	448	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Phyllis Cox	Steel	Double-Walled
451TFAD02	451	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
453TFBD01	453	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
U470TFBD01	470	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Phyllis Cox	Steel	Double-Walled
491TFAD01	490	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	200	200	Sized	Berm	278	F&I	Phyllis Cox	Steel	Single-Walled
490TFBD02	490	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
491TFBD01	491	N/A	Outside	Bulk Storage	Belly Tank	Diesel	250	250	Sized	Double-Walled (with drains)	250	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
511TFAD01	511	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
519TFAD01	519	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	6000	6000	Sized	Double-Walled	6000	F&I	Phyllis Cox	Steel	Double-Walled
581TFBD01-P	581	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Double-Walled (with drains)	140	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
581TFBD02-P	581	N/A	Outside	Bulk Storage	Belly Tank	Diesel	1000	1000	Sized	Double-Walled (with drains)	1000	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
U599TFBD01	599	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Phyllis Cox	Steel	Double-Walled
622TFAD01	622	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	500	Sized	Double-Walled	250	F&I	Phyllis Cox	Steel	Double-Walled
663TFBD01	663	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Berm	178.1	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
663TFBD01	663	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Berm	178	F&I	Lyle Perry	Steel	Double-Walled (with drains)

Table C-1a Livermore SPCC Inventory -- Bulk Storage Containers, General Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/ Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled
Bulk Storage Containers Associated with Portable Emergency Generators															
02TFBD27	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	350	350	Sized	Portable Berm	1795	F&I	Phyllis Cox	Steel	Single-Walled
02TFBD43	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	250	250	Sized	Double-Walled (with drains)	250	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
02TFBD44	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
02TFBD45	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
02TFBD46	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
02TFBD47	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Phyllis Cox	Steel	Double-Walled (with drains)
02TFBD52	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	175	175	Sized	Portable Berm	1795	F&I	Phyllis Cox	Steel	Single-Walled
Diesel Fueling Station															
519TFAD01	519	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	6000	6000	Sized	Double-Walled	6000	F&I	Phyllis Cox	Steel	Double-Walled
RCRA Tank Systems and Permitted Storage Areas															
Area 612 Tank Trailer Storage Unit (RCRA permitted)	612	N/A	Outside	Portable Bulk Storage	Mobile Truck (E-36592 Tank Trailer)	Oily Wastewater, Used Oil	5000	5000	General	Berm	8320	RHWM	Harold Rogers	Steel	Single-Walled
Building 612 Container Storage Unit (RCRA permitted)	612	Rm 100	Inside	Portable Bulk Storage	Up to one hundred-thirty 55 gallon drums	Oily Wastewater, Used Oil, Solvents	55	7150	Sized	Berm	715	RHWM	Harold Rogers	Steel	Single-Walled
Building 625 Container Storage Unit (RCRA permitted)	625	1000	Inside	Portable Bulk Storage	Drums and/or portable totes	Oily Wastewater, Used Oil	1100	21208	Sized	Berm	14023	RHWM	Harold Rogers	Steel/Poly	Single-Walled
B693 Container Storage Unit (RCRA permitted)	693	Rm 1000, Rm 1004, Rm 1008	Inside	Portable Bulk Storage	Portable Containers	Oily Wastewater, Used Oil	330	132000	Sized	Berm	Cell 1000 - 7828 Cells 1004,1008 - 7897	RHWM	Harold Rogers	Poly	Single-Walled
Building 695 Reactive Waste Storage Rooms (RCRA permitted)	695	Rooms 1019 to 1022	Inside	Portable Bulk Storage	Portable Containers	Reactive Waste Potentially with Oil, Used Oil	110	3800	Sized	Berm	420	RHWM	Craig Loll	Poly	Single-Walled
Building 696R Container Storage Unit (RCRA permitted)	696	Rm 1010, 1011	Inside	Portable Bulk Storage	Portable Containers	Oily Wastewater, Used Oil	330	135705	Sized	Berm	Room 1010 - 11198; Room 1011 - 9492	RHWM	Harold Rogers	Poly	Single-Walled
695-R1A1 THL-111	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
695-R1A2 THL-112	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
695-R1A3 THL-113	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
695-R1A4 THL-114	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
695-R1A5 THL-115	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
695-R1A6 THL-116	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
695-R2A1 THL-108	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
695-R2A2 THL-109	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
695-R2A3 THL-110	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Oily Wastewater	5000	5000	Sized	Berm	16,696	RHWM	Craig Loll	Poly	Single-Walled
Building 696S Container Storage Unit (RCRA permitted)	696	Rm 1001, 1007, 1009	Inside	Portable Bulk Storage	Portable Containers	Oily Wastewater, Used Oil	330	22440	Sized	Berm	13958	RHWM	Harold Rogers	Poly	Single-Walled

Table C-1a Livermore SPCC Inventory -- Bulk Storage Containers, General Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/ Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled
DWTF Portable Tank Storage Unit (RCRA permitted)	696	N/A	Outside	Portable Bulk Storage	Drum(s); portable tote(s); Vacuum truck(s): V-1/E-90053 5000 Gallon Vacuum Tanker Truck; V-2/E-90990 5000 Gallon Vacuum Tanker Truck; V-3/E-36628 5000 Gallon Vacuum Tanker Truck; V-4/E-90993 1000 Gallon Vacuum Tanker Truck-SS; V-6/E-90994 1000 Gallon Vacuum Tanker Truck; V-8/E-201512 5000 Gallon Vacuum Tanker Truck	Oily Wastewater, Used Oil	5000	22000	Sized	Berm	14827	RHWM	Harold Rogers	Steel/Poly	Single-Walled

SAAs and WAAs

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/ Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled
B151 WAA	151	WAA-151C NW of B151	Outside	Portable Bulk Storage	Up to fifty-two 55 gallon drums	Used Oil	55	2860	Sized	Pre-Fabricated Storage Unit (Safety Store Units)	>55	PLS/ST	Doug Higby	Steel	Single-Walled
OS169 CWAA	169	WAA-169/CWAA North of B166	Outside	Portable Bulk Storage	Drums and portable 330 gallon containers	Used Oil	330	10000	Sized	Covered Bermed Area 40'x50'	1659	F&I- RHWM	Jody Drake/Jim Akers	Steel/Poly	Single-Walled
B231 WAA	231	Rm 1000	Inside	Portable Bulk Storage	Up to four 55 gallon drums	Used Oil	55	220	Sized	Containment Pallets	>55	ENG/ST	Wayne Jensen	Steel	Single-Walled
B322B WAA	322	WAA-322B South of B322	Outside	Portable Bulk Storage	Up to forty 55 gallons drums	Used Oil, Used Oil-Based Machining Coolant	55	2200	Sized	Pre-Fabricated Storage Unit (Safety Store Unit) 9'x23'	836	ENG/ST	Blaine Beith	Steel	Single-Walled
B332A WAA	332	WAA-332A West of B332	Outside	Portable Bulk Storage	Up to sixty 55 gallon drums	Used Oil	55	3300	Sized	Covered Area with Sump 14.5'x11.5'	946	WCI	Jeffrey Wilson	Steel	Single-Walled
B361 WAA	361	WAA-361 NW of B361	Outside	Portable Bulk Storage	Up to forty-eight 55 gallon drums	Used Oil	55	2640	Sized	Covered Steel Structure 10'x36' Containment Pallets (6 pallets)	748	PLS/ST	Frank Bailey	Steel	Single-Walled
B383 Rm 100 SAA	383	Rm 100	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil-Based Machining Coolant	55	55	Sized	Building	>55	ENG/ST	John Benedict	Steel	Single-walled
B418 Rm 100A SAA	418	Rm 100A SAA	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Lacquer Thinner	55	55	Sized	Building/Containment Tub	66	F&I	John Haines	Steel	Single-Walled
B418 Rm 100A SAA	418	Rm 100A SAA	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil-Based Paint	55	55	Sized	Building/Containment Tub	66	F&I	John Haines	Steel	Single-Walled
B418 WAA	418	WAA-418 West of B418	Outside	Portable Bulk Storage	Drums and portable 330 gallon containers	Used Oil, Solvents	330	2860	Sized	Bermed Covered Areas 6'x17' and 6'x26' Covered Area 5'x17' with Containment Pallets	Basin 1 = 357 Basin 2 = 236	F&I	Paul Rodriguez	Steel/Poly	Single-Walled
B423 Rm112 SAA	423	Rm 112	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil-Based Machining Coolant	55	55	Sized	Secondary Containment Tub	55	ST	Jim Watson	Steel	Single-Walled
B431 Rm 1053 SAA	431	1053	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Building	400	ST	Jim Watson	Steel	Single-Walled
B432 Room 1201 SAA	432	Rm 1201	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil-Based Machining Coolant	55	55	Sized	Secondary Containment Tub	60	ENG/ST	John Benedict	Steel	Single-Walled
OS495 WAA	495	495 WAA	Outside	Portable Bulk Storage	Drums and/or portable totes	Used Oil, Oily Wastewater	330	5386	Sized	Covered containment berm with trenches	5286	NIF	Tim Fuller	Steel/Poly	Single-Walled

Table C-1a Livermore SPCC Inventory -- Bulk Storage Containers, General Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/ Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled
B511 Rm 118 SAA	511	Rm 118	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Containment Tub	66	F&I	David Hartley	Steel	Single-Walled
B511 Rm 136 SAA	511	Rm 136	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Containment Tub	66	F&I	Phyllis Cox	Steel	Single-Walled
B511 South Storage Shed SAA	511	South Storage Shed	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Used Oil	55	110	Sized	Containment Tub	66	F&I	James Lovegren	Steel	Single-Walled
B514 SAA	514	N/A	Outside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Containment Tub	60	F&I	Dave Lavinsky		Single-walled
B515 WAA	515	515 WAA	Outside	Portable Bulk Storage	Up to eighty-eight 55 gallon drums	Used Oil, Oily Wastewater, Used Lacquer Thinner	55	4840	Sized	Covered Area 23'x60' Containment Pallets	>55	F&I	Travis Crismore	Steel	Single-Walled
B519 Rm 118 SAA	519	Rm 118	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Containment tub	66	F&I	Phyllis Cox	Steel	Single-Walled
T-5999 WAA	597	T-5999 WAA	Outside	Portable Bulk Storage	Up to one hundred-sixty 55 gallon drums	Used Oil, Used Oil-Based Machining Coolant, Solvents	55	8800	Sized	Covered Containment Pallet(s)	66	ERD (O&B)	Scott Kawaguchi	Steel	Single-Walled
B612 CWAA	612	612 WAA/CWAA Cells A, B, C, D, E	Outside	Portable Bulk Storage	Drums and/or portable totes	Oily Wastewater, Used Oil, Solvents	330	11000	Sized	Covered Berm Area	1800	F&I- RHWM	Kim Fugmann	Steel/Poly	
B691 Rm 122 SAA	691	Rm 122	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil, Used Oil-Based Machining Coolant	55	55	Sized	Building	130	F&I	John Benedict	Steel	Single-Walled
B697 CWAA	697	Rm 100	Inside	Portable Bulk Storage	Drums and/or portable totes	Oily Wastewater, Used Oil-Based Machining Coolant, Used Oil, Solvents; Oil Overpack	330	3500	Sized	Building 60'x70' with trench Containment Pallets	3500	F&I- RHWM	Kim Fugmann	Steel/Poly	Single-Walled
B6298 SAA	6298	N/A	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Used Lacquer Thinner, Used Solvents	55	110	Sized	Containment Tub	60	F&I	Dave Lavinsky	Steel	Single-walled
B132S Rm 1559 SAA	132S	Rm 1559	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil-Based Machining Coolant	55	55	Sized	Rolling Containment Tub	60	ENG/ST	John Benedict	Steel	Single-Walled
B321A Rm 1000 SAA	321A	Rm 1000	Inside	Portable Bulk Storage	Up to two 55 gallon drums	Used Oil, Used Oil-Based Machining Coolant, Oil-Based Machining Coolant	55	110	Sized	Secondary Containment Tub-Rolling	55	ENG/ST	Steve Stafford	Steel	Single-Walled
B321A WAA	321A	321A WAA	Outside	Portable Bulk Storage	Drums and/or portable totes	Used Oil, Used Oil-Based Machining Coolant	330	1750	Sized	Covered Bermed Area with Trench	969.7	ENG/ST	Larry Sage	Steel/Poly	Single-Walled
321B WAA	321C	321B WAA	Outside	Portable Bulk Storage	Drums and portable 330 gallon containers	Used Oil, Used Oil-Based Machining Coolant	330	990	Sized	Covered Bermed Area 13'x14'	448	ENG/ST	Larry Sage	Steel/Poly	Single-Walled
321C WAA	321C	321C WAA	Outside	Portable Bulk Storage	Up to forty 55 gallons drums	Used Oil, Used Oil-Based Machining Coolant	55	2200	Sized	Pre-fabricated Storage Unit (Safety Store Unit) 9'x23'	836	ENG/ST	Larry Sage	Steel	Single-Walled
B321C Rm 1351 SAA	321C	Rm 1351	Inside	Portable Bulk Storage	Up to two 55 gallon drums	Used Oil-Based Machining Coolant, Used Oil-Based Machining Coolant Containing Radioactive Materials	55	110	Sized	Containment Tub	60	ENG/ST	Larry Sage	Steel	Single-Walled
321C Rm 1415 SAA	321C	Rm 1415	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil-Based Machining Coolant	55	55	Sized	Rolling Containment Tub	66	ENG/ST	Paul Alexander	Steel	Single-Walled

Table C-1a Livermore SPCC Inventory -- Bulk Storage Containers, General Information

New Product Containers

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/ Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled
B131 HiBay Product Storage	131HB	Rm. 1259	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Oil-Based Machining Coolant	55	55	Sized	Secondary Containment Tub	60	WCI	Doug Morettini	Steel	Single-Walled
B141 Product Storage	141	Chemstor	Outside	Portable Bulk Storage	Up to six 55 gallon drums	Insulating Oil	55	330	Sized	Pre-Fabricated Storage Unit (Chemstor)	220	ST	Ron Speers		Single-Walled
B194 Product Storage	194	Outside Mod Building	Outside	Portable Bulk Storage	Up to twelve 55 gallon drums	Insulating Oil, Empty Drums	55	660	Sized	Three containment berms under covered patio	55.1	PLS/ST	Gerald Anderson	Steel	Single-Walled
B291 Product Storage	291	N/A	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Oil, Food Grade	55	110	Sized	Pre-Fabricated Storage Unit (Safety Store Unit) 6'x6'	120	F&I	Terry Cunningham	Steel	Single-walled
B423 Chemstor 1 (SX-07)	423	N/A	Outside	Portable Bulk Storage	Up to forty-eight 55 gallon drums	Insulating Oil, Used Insulating Oil	55	2640	Sized	Pre-fabricated Storage Unit (ChemStor Unit) 24'x9'	700	ST	Jim Watson	Steel	Single-Walled
B423 Chemstor 2 (SX-08)	423	N/A	Outside	Portable Bulk Storage	Up to thirty-two 55 gallon drums	Insulating Oil, Used Insulating Oil	55	1760	Sized	Pre-fabricated Storage Unit (ChemStor Unit) 16'x9'	480	ST	Jim Watson	Steel	Single-Walled
B432 East Side Product Storage	432	Transportainer East Side of Building	Outside	Portable Bulk Storage	Up to ten 55 gallon drums	Mineral Oil	55	550	Sized	85-gallon overpack drum	85	ENG/ST	Nathaniel Bowden	Steel	Single-Walled
B432 Rm 1200 Product Storage	432	Rm 1200	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Cutting Fluid	55	55	Sized	Secondary Containment Tub	60	ENG/ST	John Benedict	Steel	Single-Walled
B432 Rm 1300 Product Storage	432	Rm 1300	Inside	Portable Bulk Storage	Up to six 55 gallon drums	Mineral Oil	55	330	Sized	85 gallon overpack drum	85	ENG/ST	Nathaniel Bowden	Steel	Single-Walled
B511 South Storage Shed Product Storage	511	South Storage Shed	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Hydraulic Oil	55	110	Sized	Containment Tub	66	F&I	James Lovegren	Steel	Single-Walled
B519 Avenue H Drum Storage (Bay 1)	519	N/A	Outside	Portable Bulk Storage	Up to thirty-five 55 gallon drums	Empty Drums	55	1925	Sized	Berm	907.2	F&I	Phyllis Cox	Steel	Single-Walled
B519 Avenue H Product Storage (Bay 2)	519	N/A	Outside	Portable Bulk Storage	Up to thirty-five 55 gallon drums	Motor Oil, Hydraulic Oil, Transmission Oil, Other Oil	55	1925	Sized	Berm	794	F&I	Phyllis Cox	Steel	Single-Walled
B519 Product Storage	519	N/A	Outside	Portable Bulk Storage	Up to forty 55 gallons drums	Motor Oil, Hydraulic Oil, Transmission Oil, Other Oil	55	2200	Sized	Berm	600	F&I	Phyllis Cox	Steel	Single-Walled
B5198 Yard Product Storage	5198	N/A	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Hydraulic Oil, Motor Oil	55	110	Sized	Containment Tub	60	F&I	Richard Buskey	steel	Single-walled
B321A Product Storage	321A	N/A	Outside	Portable Bulk Storage	Up to thirty-two 55 gallon drums	Oil-Based Machining Coolant, Lubricating Oil, Hydraulic Oil	55	1760	Sized	Covered Bermed Area with Trench	969.7	ENG/ST	Pete DuPuy	Steel	Single-Walled
B321A Rm 1126 Cleaning Solution Storage	321A	Rm 1126	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Cleaning Solution	55	55	Sized	Secondary Containment Tub- Fixed	60	ENG/ST	Steve Stafford	Steel	Single-Walled
B321A Rm 1126 Coolant Storage	321A	Rm 1126	Inside	Portable Bulk Storage	Up to five 55 gallon drums	Oil-Based Machining Coolant	55	275	Sized	Building	199	ENG/ST	Steve Stafford	Steel	Single-Walled
Portable Pumper 100 - Blaser Coolant	321A	Rm 1000	Inside	Portable Bulk Storage	Portable Tank on Pumper	Oil-Based Machining Coolant	120	120	Sized	Building	2500	ENG/ST	Steve Stafford	Plastic	Single-Walled
321C Yard Storage	321C	N/A	Outside	Portable Bulk Storage	Up to twenty-eight 55 gallon drums	Oil-Based Machining Coolant; EDM Oil; Hydraulic Oil	55	1540	Sized	Pre-fabricated Storage Unit (Safety Storage Unit)	420	ENG/ST	Larry Sage	Steel	Single-Walled
B321C Rm 1351 Product Storage	321C	Rm 1351	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Oil-Based Machining Coolant	55	55	Sized	Rolling Containment Tub	60	ENG/ST	Larry Sage	Steel	Single-Walled
321C Rm 1415 Product Storage	321C	Rm 1415	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Oil-Based Machining Coolant	55	55	Sized	Rolling Containment Tub	66	ENG/ST	Paul Alexander	Steel	Single-Walled

Table C-1a Livermore SPCC Inventory -- Bulk Storage Containers, General Information

Mobile Refuelers

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/ Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled
G43 3464P	519	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	100	100	General	Spill Kit	10	F&I	Phyllis Cox	Steel	Single-Walled
G43 4023A	519	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	100	100	General	Spill Kit	10	F&I	Phyllis Cox	Steel	Single-Walled
G71 0403L	519	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	100	100	General	Spill Kit	10	F&I	Phyllis Cox	Steel	Single-Walled
G71 0404L	519	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	100	100	General	Spill Kit	10	F&I	Phyllis Cox	Steel	Single-Walled
G90 0017L	519	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	2000	2000	General	Bermed Parking Area/ Spill Kit	3252	F&I	Phyllis Cox	Steel	Single-Walled
G90 0018L	519	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	2000	2000	General	Bermed Parking Area/ Spill Kit	3252	F&I	Phyllis Cox	Steel	Single-Walled
G90 0019L	519	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	2000	2000	General	Bermed Parking Area/ Spill Kit	3252	F&I	Phyllis Cox	Steel	Single-Walled
G71 0430D	6325	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	100	100	General	Spill Kit	10	F&I	George Corriea	Steel	Single-Walled
G63 0493P	6325	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	100	100	General	Spill Kit	10	F&I	George Corriea	Steel	Single-Walled
G71 0573N	6325	N/A	Outside	Portable Bulk Storage	Mobile Truck Bulk Storage	Diesel	100	100	General	Spill Kit	10	F&I	George Corriea	Steel	Single-Walled

Table C-1b Livermore SPCC Inventory -- Bulk Storage Containers, Containment Information

Bulk Storage Containers Associated with Stationary Emergency Generators

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	UL (or other) Listing	Instrumentation Controls Alarms	Overfill Prevention Method	Liquid Level Sensing Devices	STI Category	Monthly Inspection	Semi-Annual Inspection	Annual Inspection	Other Inspections
071TFBD01	71	N/A	Outside	Bulk Storage	Belly Tank	Diesel	135	135	Sized	Double-Walled (with drains)	135	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	14; 0.4; 17	14; 0.3; 100	Southwest	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	High level alarm	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
131TFAD01	131	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	West	Double-Walled; Inspections & Spill kit; Procedure	SWRI	High level alarm	Procedure; 10-gal spill bucket	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
132NTFBD01	132	N/A	Outside	Bulk Storage	Belly Tank	Diesel	300	300	Sized	Double-Walled (with drains)	300	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	30; 0.9; 17	30; 0.6; 100	North	Double-Walled (with drains); Inspections & Spill kit; Procedure	UL 142	High level alarm	Procedure; 5-gal spill bucket	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
133TFBD01	133	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	40; 1; 17	40; 0.8; 100	Northwest	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
140TFBD01	140	N/A	Outside	Bulk Storage	Belly Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	20; 0.6; 17	20; 0.4; 100	South	Double-Walled; Inspections & Spill kit; Procedure	UL	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
151TFAD01	153	N/A	Outside	Bulk Storage	Day Tank	Diesel	100	100	Sized	Double-Walled (with drains)	100	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	10; 3; 1	10; 2; 7	Southwest	Double-Walled (with drains); Inspections & Spill kit; Automated valve and spill kit	UL	High level alarm	Procedure	Electronic gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
162TFAD02	162	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	1000	1000	Sized	Double-Walled	1000	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	100; 3; 17	100; 2; 100	North	Double-Walled; Inspections & Spill kit; Procedure	Unknown	High level alarm	Procedure; 2-gal spill bucket	Dipstick	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
170TFBD01	170	N/A	Outside	Bulk Storage	Belly Tank	Diesel	135	135	Sized	Double-Walled (with drains)	135	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	14; 0.4; 17	14; 0.3; 100	North	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
170TFBD02	170	N/A	Outside	Bulk Storage	Belly Tank	Diesel	125	125	Sized	Double-Walled	125	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	13; 0.4; 17	13; 0.3; 100	South	Double-Walled; Inspections & Spill kit; Procedure	UL	None	Procedure	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
U172TFBD01	172	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	7; 0.2; 17	7; 0.1; 100	Southwest	Double-Walled; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
191TFBD01	191	N/A	Outside	Bulk Storage	Belly Tank	Diesel	175	175	Sized	Berm	3926	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	18; 0.5; 17	18; 0.4; 100	South	Berm; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
U193TFBD01	193	N/A	Outside	Bulk Storage	Belly Tank	Diesel	125	125	Sized	Double-Walled (with drains)	125	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	13; 0.4; 17	0.5; 100; 50	West	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	High level alarm	Procedure	Electronic gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
194TFAD01	194	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	Northeast	Double-Walled; Inspections & Spill kit; Procedure	SWRI	High level alarm	Procedure; 10-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
216TFBD01	216	N/A	Outside	Bulk Storage	Belly Tank	Diesel	500	500	Sized	Double-Walled	500	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	50; 2; 17	50; 1; 100	Southwest	Double-Walled; Inspections & Spill kit; Procedure	UL	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
231TFAD01	231	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	550	550	Sized	Double-Walled	550	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	55; 2; 17	55; 1; 100	Southeast	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	High level alarm	Procedure; 10-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
231TFAD02	231	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	North	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
235TFBD01	235	N/A	Outside	Bulk Storage	Belly Tank	Diesel	175	175	Sized	Double-Walled (with drains)	175	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	18; 0.5; 17	18; 0.4; 100	Southeast	Double-Walled (with drains); Inspections & Spill kit; Procedure	UL	None	Procedure	Dipstick	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
253TFAD01	253	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	South	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
256TFBD01	256	N/A	Outside	Bulk Storage	Belly Tank	Diesel	160	160	Sized	Berm	663	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	16; 0.5; 17	16; 0.3; 100	North	Berm; Inspections & Spill kit; Procedure	Unknown	High level alarm	Procedure	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
U291TFBD01	291	N/A	Outside	Bulk Storage	Belly Tank	Diesel	660	660	Sized	Double-Walled	660	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	66; 2; 17	66; 1; 100	Northeast	Double-Walled; Inspections & Spill kit; Procedure	UL 142	High level alarm	Procedure; 5-gal spill bucket	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
U291TFBD02	291	N/A	Outside	Bulk Storage	Belly Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Mike Niemi	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	20; 0.6; 17	20; 0.4; 100	Northwest	Double-Walled; Inspections & Spill kit; Procedure	UL 142	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
U295TFAD01	295	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled (with drains)	250	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	Northwest	Double-Walled (with drains); Inspections & Spill kit; Procedure	UL 142	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
U295TFBD01	295	N/A	Outside	Bulk Storage	Belly Tank	Diesel	125	125	Sized	Double-Walled (with drains)	125	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	13; 0.4; 17	13; 0.3; 100	North	Double-Walled (with drains); Inspections & Spill kit; Procedure	UL	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
298TFBD02	298	N/A	Outside	Bulk Storage	Belly Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	20; 0.6; 17	20; 0.4; 100	Southwest	Double-Walled; Inspections & Spill kit; Procedure	UL 142	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A

Table C-1b Livermore SPCC Inventory -- Bulk Storage Containers, Containment Information

Bulk Storage Containers Associated with Stationary Emergency Generators

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	UL (or other) Listing	Instrumentation Controls Alarms	Overfill Prevention Method	Liquid Level Sensing Devices	STI Category	Monthly Inspection	Semi-Annual Inspection	Annual Inspection	Other Inspections
313TFBD02	313	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Double-Walled (with drains)	140	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	14; 0.4; 17	14; 0.3; 100	South	Double-Walled; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Dipstick	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	N/A
313TFBD01	313	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Double-Walled (with drains)	140	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	14; 0.4; 17	14; 0.3; 100	South	Double-Walled; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Dipstick	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	N/A
321CTFAD02	321	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	20; 0.6; 17	20; 0.4; 100	East	Double-Walled; Inspections & Spill kit; Procedure	UL 142	High level alarm	Procedure; 10-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
U325TFBD02	325	N/A	Outside	Bulk Storage	Belly Tank	Diesel	120	120	Sized	Double-Walled (with drains)	120	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	12; 0.4; 17	12; 0.3; 100	East	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
U325TFBD03	325	N/A	Outside	Bulk Storage	Belly Tank	Diesel	245	245	Sized	None	0	F&I	Lyle Perry	Steel	Single-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	North	None; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	N/A
331TFAD01	331	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	East	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	High level alarm	Procedure; 10-gal spill bucket	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
332TFAD04	332	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	2000	2000	Sized	Double-Walled	2000	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	200; 6; 17	200; 4; 100	North	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	High level alarm	Procedure; 5-gal spill bucket	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
332TFAD07	332	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	2000	2000	Sized	Double-Walled	2000	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	200; 6; 17	200; 4; 100	North	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	High level alarm	Procedure; 5-gal spill bucket	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
332TFBD06	332	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled (with drains)	66	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	7; 0.2; 17	7; 0.1; 100	East	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
332TFBD08	332	N/A	Outside	Bulk Storage	Belly Tank	Diesel	250	250	Sized	Double-Walled (with drains)	250	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	North	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	High level alarm	Procedure; 5-gal spill bucket	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
343TFAD01	343	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	West	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	High level alarm	Procedure; 5-gal spill bucket	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
361TFAD01	361	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	West	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	None	Procedure; 5-gal spill bucket	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
368TFBD01	368	N/A	Outside	Bulk Storage	Belly Tank	Diesel	350	350	Sized	Double-Walled (with drains)	350	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	35; 1; 17	35; 0.7; 100	West	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
365TFAD01	365	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	75	75	Sized	Double-Walled (with drains)	75	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	8; 0.2; 17	8; 0.2; 100	South	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	High level alarm	Electronic	Electronic gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
378TFBD01	378	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Double-Walled (with drains)	140	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	14; 0.4; 17	14; 0.3; 100	Southwest	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
381TFAD02	381	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	500	500	Sized	Double-Walled (with drains)	500	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	50; 2; 17	50; 1; 100	North	Double-Walled (with drains); Inspections & Spill kit; Procedure	UL	High level alarm	Procedure; 5-gal spill bucket	Dipstick	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
U424TFBD01	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	200	200	Sized	Double-Walled	200	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	20; 0.6; 17	20; 0.4; 100	North	Double-Walled; Inspections & Spill kit; Procedure	Unknown	None	Procedure; 5-gal spill bucket	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
U430TFBD01	430	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	7; 0.2; 17	7; 0.1; 100	East	Double-Walled; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
U448TFBD01	448	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	7; 0.2; 17	7; 0.1; 100	East	Double-Walled; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
451TFAD02	451	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	West	Double-Walled; Inspections & Spill kit; Procedure	N/A	N/A	N/A	N/A	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
453TFBD01	453	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	40; 1; 17	40; 0.8; 100	West	Double-Walled (with drains); Inspections & Spill kit; Procedure	UL	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
U470TFBD01	470	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	7; 0.2; 17	7; 0.1; 100	West	Double-Walled; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
491TFAD01	490	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	200	200	Sized	Berm	278	F&I	Lyle Perry	Steel	Single-Walled	Rupture/leak; piping or valve failure; transfer overflow	20; 0.6; 17	20; 0.4; 100	North	Berm; Inspections & Spill kit; Procedure	UL	High level alarm	Procedure	Dipstick	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A

Table C-1b Livermore SPCC Inventory -- Bulk Storage Containers, Containment Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	UL (or other) Listing	Instrumentation Controls Alarms	Overfill Prevention Method	Liquid Level Sensing Devices	STI Category	Monthly Inspection	Semi-Annual Inspection	Annual Inspection	Other Inspections
Bulk Storage Containers Associated with Stationary Emergency Generators																													
490TFBD02	490	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	40; 1; 17	40; 0.8; 100	North	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	High level alarm	Procedure	Electronic gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
491TFBD01	491	N/A	Outside	Bulk Storage	Belly Tank	Diesel	250	250	Sized	Double-Walled (with drains)	250	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	South	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	High level alarm	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
511TFAD01	511	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	250	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	West	Double-Walled; Inspections & Spill kit; Procedure	UL 142	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
581TFBD01-P	581	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Double-Walled (with drains)	140	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	14; 0.4; 17	14; 0.3; 100	North	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	None	Procedure; 5-gal spill bucket	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
581TFBD02-P	581	N/A	Outside	Bulk Storage	Belly Tank	Diesel	1000	1000	Sized	Double-Walled (with drains)	1000	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	100; 3; 17	100; 2; 100	East	Double-Walled (with drains); Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Category 3	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection and Leak Test Every 10 Years
U599TFBD01	599	N/A	Outside	Bulk Storage	Belly Tank	Diesel	66	66	Sized	Double-Walled	66	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	7; 0.2; 17	7; 0.1; 100	West	Double-Walled; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
622TFAD01	622	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	250	500	Sized	Double-Walled	250	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	West	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	High level alarm	Procedure; 5-gal spill bucket	Electronic gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
663TFBD01	663	N/A	Outside	Bulk Storage	Belly Tank	Diesel	140	140	Sized	Berm	178	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	14; 0.4; 17	14; 0.3; 100	North	Inspections & Spill kit; Procedure;	Unknown	None	Procedure	Gauge	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	N/A
Bulk Storage Containers Associated with Portable Emergency Generators																													
02TFBD27	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	350	350	Sized	None	0	F&I	Lyle Perry	Steel	Single-Walled	Rupture/leak; piping or valve failure; transfer overflow	35; 1; 17	35; 0.7; 100	West	Portable Berm; Inspections & Spill kit; Procedure	Unknown	None	Procedure	Gauge	Portable	Required (Form H.1)	N/A	N/A	N/A
02TFBD43	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	250	250	Sized	Double-Walled (with drains)	250	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	25; 0.8; 17	25; 0.5; 100	West	Double-Walled (with drains); Inspections & Spill kit; Procedure	N/A	N/A	N/A	N/A	Portable	Required (Form H.1)	N/A	N/A	Formal External Inspection and Leak Test Every 10 Years
02TFBD44	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	40; 1; 17	40; 0.8; 100	West	Double-Walled (with drains); Inspections & Spill kit; Procedure	N/A	N/A	N/A	N/A	Portable	Required (Form H.1)	N/A	N/A	Formal External Inspection and Leak Test Every 10 Years
02TFBD45	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	40; 1; 17	40; 0.8; 100	West	Double-Walled (with drains); Inspections & Spill kit; Procedure	N/A	N/A	N/A	N/A	Portable	Required (Form H.1)	N/A	N/A	Formal External Inspection and Leak Test Every 10 Years
02TFBD46	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	40; 1; 17	40; 0.8; 100	West	Double-Walled (with drains); Inspections & Spill kit; Procedure	N/A	N/A	N/A	N/A	Portable	Required (Form H.1)	N/A	N/A	Formal External Inspection and Leak Test Every 10 Years
02TFBD47	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	400	400	Sized	Double-Walled (with drains)	400	F&I	Lyle Perry	Steel	Double-Walled (with drains)	Rupture/leak; piping or valve failure; transfer overflow	40; 1; 17	40; 0.8; 100	West	Double-Walled (with drains); Inspections & Spill kit; Procedure	N/A	N/A	N/A	N/A	Portable	Required (Form H.1)	N/A	N/A	Formal External Inspection and Leak Test Every 10 Years
02TFBD52	622	N/A	Outside	Bulk Storage	Belly Tank	Diesel	175	175	Sized	None	0	F&I	Lyle Perry	Steel	Single-Walled	Rupture/leak; piping or valve failure; transfer overflow	18; 0.5; 17	18; 0.4; 100	West	Portable Berm; Inspections & Spill kit; Procedure	N/A	N/A	N/A	N/A	Portable	Required (Form H.1)	N/A	N/A	N/A

Table C-1b Livermore SPCC Inventory -- Bulk Storage Containers, Containment Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	UL (or other) Listing	Instrumentation Controls Alarms	Overfill Prevention Method	Liquid Level Sensing Devices	STI Category	Monthly Inspection	Semi-Annual Inspection	Annual Inspection	Other Inspections
Diesel Fueling Station																													
519TFAD01	519	N/A	Outside	Bulk Storage	Aboveground Storage Tank	Diesel	6000	6000	Sized	Double-Walled	6000	F&I	Lyle Perry	Steel	Double-Walled	Rupture/leak; piping or valve failure; transfer overflow	600; 19; 17	600; 13; 100	East	Double-Walled; Inspections & Spill kit; Procedure	UL 2085	None	Procedure; 5-gal spill bucket; concrete berm	Tank gauge; dipstick and chart	Category 1	Required (Form H.1)	N/A	Required (Form H.4)	Formal External Inspection every 20 years (due 2017)
RCRA Tank Systems and Permitted Storage Areas																													
Area 612 Tank Trailer Storage Unit (RCRA permitted)	612	N/A	Outside	Portable Bulk Storage	Mobile Truck (E-36592 Tank Trailer)	Wastewater Potentially with Oil, Used Oil	5000	5000	General	Berm	8320	RHWM	Harold Rogers	Steel	Single-Walled	Rupture; leak	500	500		Berm	N/A	N/A	N/A	N/A	Portable	RCRA	N/A	N/A	N/A
Building 612 Container Storage Unit (RCRA permitted)	612	Rm 100	Inside	Portable Bulk Storage	Up to one hundred-thirty 55 gallon drums	Wastewater Potentially with Oil, Used Oil, Solvents	55	7150	Sized	Berm	715	RHWM	Harold Rogers	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Berm	N/A	N/A	N/A	N/A	Portable	RCRA	N/A	N/A	N/A
Building 625 Container Storage Unit (RCRA permitted)	625	1000	Inside	Portable Bulk Storage	Drums and/or portable totes	Wastewater Potentially with Oil, Used Oil	1100	21208	Sized	Berm	14023	RHWM	Harold Rogers	Steel/Poly	Single-Walled	Rupture; leak; transfer overflow	110	110	Inside Room	Berm	N/A	N/A	N/A	N/A	Portable	RCRA	N/A	N/A	N/A
B693 Container Storage Unit (RCRA permitted)	693	Rm 1000, Rm 1004, Rm 1008	Inside	Portable Bulk Storage	Portable Containers	Wastewater Potentially with Oil, Used Oil	330	132000	Sized	Berm	Cell 1000 - 7828 Cells 1004,1008 - 7897	RHWM	Harold Rogers	Poly	Single-Walled	Rupture; leak; transfer overflow	330	330	Inside Rooms	Berm	N/A	N/A	N/A	N/A	Portable	N/A	N/A	N/A	N/A
Building 695 Reactive Waste Storage Rooms (RCRA permitted)	695	Rooms 1019 to 1022	Inside	Portable Bulk Storage	Portable Containers	Reactive Waste Potentially with Oil, Waste Oil	110	3800	Sized	Berm	420	RHWM	John Bowers	Poly	Single-Walled	Rupture; leak; transfer overflow	110	110	Inside	Berm	N/A	N/A	N/A	N/A	Portable	N/A	N/A	N/A	N/A
Building 696R Container Storage Unit (RCRA permitted)	696	Rm 1010, 1011	Inside	Portable Bulk Storage	Portable Containers	Wastewater Potentially with Oil, Used Oil	330	135705	Sized	Berm	Room 1010 - 11198; Room 1011 - 9492	RHWM	Harold Rogers	Poly	Single-Walled	Rupture; leak; transfer overflow	330	330	Inside Rooms	Berm	N/A	N/A	N/A	N/A	Portable	RCRA	N/A	N/A	N/A
695-R1A1 THL-111	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Mixed Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
695-R1A2 THL-112	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Mixed Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
695-R1A3 THL-113	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Mixed Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
695-R1A4 THL-114	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Mixed Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
695-R1A5 THL-115	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Mixed Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
695-R1A6 THL-116	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Mixed Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
695-R2A1 THL-108	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Hazardous Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
695-R2A2 THL-109	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Hazardous Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
695-R2A3 THL-110	695	Tank Farm	Inside	Bulk Storage	Aboveground Storage Tank - RCRA Permitted	Hazardous Wastewater Potentially with Oil	5000	5000	Sized	Berm	16,696	RHWM	John Bowers	Poly	Single-Walled	Rupture; Leak	500	500	Inside Room	Berm	N/A	N/A	N/A	N/A	N/A	RCRA	N/A	N/A	N/A
Building 696S Container Storage Unit (RCRA permitted)	696	Rm 1001, 1007, 1009	Inside	Portable Bulk Storage	Portable Containers	Wastewater Potentially with Oil, Used Oil	330	22440	Sized	Berm	13958	RHWM	Harold Rogers	Poly	Single-Walled	Rupture; leak; transfer overflow	330	330	Inside Rooms	Berm	N/A	N/A	N/A	N/A	Portable	RCRA	N/A	N/A	N/A
DWTF Portable Tank Storage Unit (RCRA permitted)	696	N/A	Outside	Portable Bulk Storage	Drum(s); portable tote(s); Vacuum truck(s): V-1/E-90053 5000 Gallon Vacuum Tanker Truck; V-2/E-90990 5000 Gallon Vacuum Tanker Truck; V-3/E-36628 5000 Gallon Vacuum Tanker Truck; V-4/E-90993 1000 Gallon Vacuum Tanker Truck-SS; V-6/E-90994 1000 Gallon Vacuum Tanker Truck; V-8/E-201512 5000 Gallon Vacuum Tanker Truck	Wastewater Potentially with Oil, Used Oil	5000	22000	Sized	Berm	14827	RHWM	Harold Rogers	Steel/Poly	Single-Walled	Rupture; leak; transfer overflow	500	500	North	Berm	N/A	N/A	N/A	N/A	Portable	RCRA	N/A	N/A	N/A

Table C-1b Livermore SPCC Inventory -- Bulk Storage Containers, Containment Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	UL (or other) Listing	Instrumentation Controls Alarms	Overfill Prevention Method	Liquid Level Sensing Devices	STI Category	Monthly Inspection	Semi-Annual Inspection	Annual Inspection	Other Inspections
SAAs and WAAs																													
B151 WAA	151	WAA-151C NW of B151	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Coolant	55	55	Sized	Rolling Containment Tub	60	ENG/ST	John Benedict/ Insp=J. Thissen	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Northwest	Pre-Fabricated Storage Unit (Safety Store Units)	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
OS169 CWAA	169	WAA-169/CWAA North of B166	Outside	Portable Bulk Storage	Up to fifty-two 55 gallon drums	Used oil	55	2860	Sized	Pre-Fabricated Storage Unit (Safety Store Units)	>55	PLS/ST	Doug Higby	Steel	Single-Walled	Rupture; leak; transfer overflow	330	330	North towards sump	Covered Bermed Area 40'x50'	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B231 WAA	231	Rm 1000	Outside	Portable Bulk Storage	Drums and portable 330 gallon containers	Used Oil	330	10000	Sized	Covered Bermed Area 40'x50'	1659	F&I - RHWM	Jody Drake/Jim Akers	Steel/Poly	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Containment Pallets	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B322B WAA	322	WAA-322B South of B322	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Machining Coolant	55	55	Sized	Containment tub	55	PLS/ST		Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	North	Pre-Fabricated Storage Unit (Safety Store Unit) 9'x23'	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B332A WAA	332	WAA-332A West of B332	Inside	Portable Bulk Storage	Up to four 55 gallon drums	Used Oil	55	220	Sized	Containment Pallets	>55	ENG/ST	Anselmo Duenas	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Towards sump	Covered Area with Sump 14.5'x11.5'	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B361 WAA	361	WAA-361 NW of B361	Inside	Portable Bulk Storage	Up to two 55 gallon drums	Used Oil/Used Machining Coolant, Cimstar Metal Working Fluid	55	110	Sized	Secondary Containment Tub-Rolling	55	ENG/ST	Steve Stafford/ Insp=J. Thissen	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	East	Covered Steel Structure 10'x36' Containment Pallets (6 pallets)	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B383 Rm 100 SAA	383	Rm 100	Outside	Portable Bulk Storage	Drums and/or portable totes	Used Oil, Used Machining Coolant	330	1750	Sized	Covered Bermed Area with Trench	970	ENG/ST	Jack Lima-WAA Coord.	Steel/Poly	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Building	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A
B418 Rm 100A SAA	418	Rm 100A SAA	Outside	Portable Bulk Storage	Drums and portable 330 gallon containers	Used Oil, Used Machining Coolant	330	990	Sized	Covered Bermed Area 13'x14'	448	ENG/ST	Jack Lima-WAA Coord.	Steel/Poly	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Building/Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A
B418 Rm 100A SAA	418	Rm 100A SAA	Outside	Portable Bulk Storage	Up to forty 55 gallons drums	Used Oil, Used Machining Coolant	55	2200	Sized	Pre-fabricated Storage Unit (Safety Store Unit) 9'x23'	836	ENG/ST	Jack Lima-WAA Coord.	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Building/Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A
B418 WAA	418	WAA-418 West of B418	Inside	Portable Bulk Storage	Up to two 55 gallon drums	Used Machining coolant (1 drum); Used Machining Coolant Containing Radioactive Materials (1 drum)	55	110	Sized	Containment Tub	60	ENG/ST	Larry Sage/ Insp=Rib Spence	Steel	Single-Walled	Rupture; leak; transfer overflow	330	330	Northeast	Bermed Covered Areas 6'x17' and 6'x26' Covered Area 5'x17' with Containment Pallets	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B423 Rm112 SAA	423	Rm 112	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Machining Coolant	55	55	Sized	Rolling Containment Tub	66	ENG/ST	Steve Stafford/ Insp=J. Thissen	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Secondary Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A
B431 Rm 1053 SAA	431	1053	Outside	Portable Bulk Storage	Up to forty 55 gallons drums	Used Oil; Used Machining Coolant	55	2200	Sized	Pre-Fabricated Storage Unit (Safety Store Unit) 9'x23'	836	ENG/ST	Jack Lima-WAA Coord.	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Building	Building	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B432 Room 1201 SAA	432	Rm 1201	Outside	Portable Bulk Storage	Up to sixty 55 gallon drums	Used Oil	55	3300	Sized	Covered Area with Sump 14.5'x11.5'	946	WCI	Jeffrey Wilson	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Secondary Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
OS495 WAA	495	495 WAA	Outside	Portable Bulk Storage	Up to forty-eight 55 gallon drums	Used Oil	55	2640	Sized	Covered Steel Structure 10'x36' Containment Pallets (6 pallets)	748	PLS/ST	Frank Bailey-WAA Coord.	Steel	Single-Walled	Rupture; leak; transfer overflow	330	330	North towards trench	Covered containment berm with trenches	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B511 Rm 118 SAA	511	Rm 118	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used machining coolant	55	55	Sized	Building	>55	ENG/ST	John Benedict	Steel	Single-walled	Rupture; leak; transfer overflow	55	55	Inside Building/Level	Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A
B511 Rm 136 SAA	511	Rm 136	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Lacquer Thinner	55	55	Sized	Building/Containment Tub	66	F&I	Bruce Strohman	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Building/Level	Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A

Table C-1b Livermore SPCC Inventory -- Bulk Storage Containers, Containment Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	UL (or other) Listing	Instrumentation Controls Alarms	Overfill Prevention Method	Liquid Level Sensing Devices	STI Category	Monthly Inspection	Semi-Annual Inspection	Annual Inspection	Other Inspections
B511 South Storage Shed SAA	511	South Storage Shed														Rupture; leak; transfer overflow	55	55	South (into parking lot)	Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA		N/A	
B514 SAA	514	N/A	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil Based Paint	55	55	Sized	Building/Containment Tub	66	F&I	Bruce Strohman	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	North	Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B515 WAA	515	515 WAA	Outside	Portable Bulk Storage	Drums and portable 330 gallon containers	Used Oil, Solvents	330	2860	Sized	Bermed Covered Areas 6'x17' and 6'x26' Covered Area 5'x17' with Containment Pallets	Basin 1 = 357 Basin 2 = 236	F&I	Paul Rodriguez-WAA Coord.	Steel/Poly	Single-Walled	Rupture; leak; transfer overflow	55	55	West	Covered Area 23'x60' Containment Pallets	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B519 Rm 118 SAA	519	Rm 118	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Machining Coolant-Trimsol & Water	55	55	Sized	Secondary Containment Tub	55	ST	Jim Watson	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Building	Containment tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A
T-5999 WAA	597	T-5999 WAA	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Building	400	ST	Jim Watson	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	North (towards arroyo)	Covered Containment Pallet(s)	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B612 CWAA	612	612 WAA/CWAA Cells A, B, C, D, E	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Machining Coolant	55	55	Sized	Secondary Containment Tub	60	ENG/ST	Pete DuPuy/ Insp=Peter Thelin	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	West	Covered Berm Area	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B691 Rm 122 SAA	691	Rm 122	Outside	Portable Bulk Storage	Drums and/or portable totes	Used Oil, Oily Wastewater	330	5386	Sized	Covered containment berm with trenches	5286	NIF	Tim Fuller (WAA Coordinator)	Steel/Poly	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Building	N/A				Portable	Required (Form H.2)	N/A	N/A	N/A
B697 CWAA	697	Rm 100	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Containment Tub	66	F&I	Rich Austin	Steel	Single-Walled	Rupture; leak; transfer overflow	330	330	North (towards trench)	Building 60'x70' with trench Containment Pallets	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B6298 SAA	6298	N/A	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Containment Tub	66	F&I	Lyle Perry	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	North	Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B132S Rm 1559 SAA	132S	Rm 1559	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Used Oil	55	110	Sized	Containment Tub	66	F&I	James Lovegren	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Rolling Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A
B321A Rm 1000 SAA	321A	Rm 1000	Outside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Containment Tub	60	F&I	Dave Lavinsky		Single-walled	Rupture; leak; transfer overflow	55	55	Inside Room	Secondary Containment Tub-Rolling	N/A	N/A	Visual	N/A	Portable	SAA	N/A	N/A	N/A
B321A WAA	321A	321A WAA	Outside	Portable Bulk Storage	Up to eighty-eight 55 gallon drums	Used Oil, Oily Wastewater; Used Lacquer	55	4840	Sized	Covered Area 23'x60' Containment Pallets	>55	F&I	Travis Crismore-WAA Coord.	Steel	Single-Walled	Rupture; leak; transfer overflow	330	330	North	Covered Bermed Area with Trench	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
321B WAA	321C	321B WAA	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Used Oil	55	55	Sized	Containment tub	66	F&I	Lyle Perry	Steel	Single-Walled	Rupture; leak; transfer overflow	330	330	North	Covered Bermed Area 13'x14'	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
321C WAA	321C	321C WAA	Outside	Portable Bulk Storage	Up to one hundred-sixty 55 gallon drums	Used Oil, Used Coolant, Solvents	55	8800	Sized	Covered Containment Pallet(s)	66	ERD (O&B)	Scott Kawaguchi	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	North	Pre-fabricated Storage Unit (Safety Store Unit) 9'x23'	N/A	N/A	N/A	N/A	Portable	WAA	N/A	N/A	N/A
B321C Rm 1351 SAA	321C	Rm 1351	Outside	Portable Bulk Storage	Drums and/or portable totes	Wastewater Potentially with Oil, Used Oil, Solvents	330	11000	Sized	Covered Berm Area	1800	F&I- RHWM	Joe Byrne-WAA Coord./Jim Anson	Steel/Poly		Rupture; leak; transfer overflow	55	55	Inside Room	Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A
321C Rm 1415 SAA	321C	Rm 1415	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Used Lacquer Thinner (1 drum); Used Mineral Spirits (1 drum)	55	110	Sized	Containment Tub	60	F&I	Dave Lavinsky	Steel	Single-walled	Rupture; leak; transfer overflow	55	55	Inside Room	Rolling Containment Tub	N/A	N/A	N/A	N/A	Portable	SAA	N/A	N/A	N/A

Table C-1b Livermore SPCC Inventory -- Bulk Storage Containers, Containment Information

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	UL (or other) Listing	Instrumentation Controls Alarms	Overfill Prevention Method	Liquid Level Sensing Devices	STI Category	Monthly Inspection	Semi-Annual Inspection	Annual Inspection	Other Inspections
New Product Containers																													
B131 HiBay Product Storage	131HB	Rm. 1259	Outside	Portable Bulk Storage	Up to six 55 gallon drums	Insulating Oil	55	330	Sized	Pre-Fabricated Storage Unit (Chemstor)	220	ST	Ron Speers		Single-Walled	Rupture; leak	55	55	Inside Room	Secondary Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B141 Product Storage	141	Chemstor	Outside	Portable Bulk Storage	Up to six 55 gallon drums	Insulating Oil	55	330	Sized	Pre-Fabricated Storage Unit (Chemstor)	220	ST	Ron Speers		Single-Walled	Rupture; leak	55	55	South/southwest	Pre-Fabricated Storage Unit (Chemstor)	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B194 Product Storage	194	Outside Mod Building	Outside	Portable Bulk Storage	Up to twelve 55 gallon drums	Transformer Oil/Empty Drums	55	660	Sized	Three containment berms under covered patio	55.1	PLS/ST	Gerald 'Gerry' Anderson	Steel	Single-Walled	Rupture; leak	55	55	Northwest	Three containment berms under covered patio	N/A	N/A	Procedure	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B291 Product Storage	291	N/A	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Oil, Food Grade	55	110	Sized	Pre-Fabricated Storage Unit (Safety Store Unit) 6'x6'	120	F&I	Terry Cunningham	Steel	Single-walled	Rupture; leak	55	55	West	Pre-Fabricated Storage Unit (Safety Store Unit) 6'x6'	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B423 Chemstor 1 (SX-07)	423	N/A	Outside	Portable Bulk Storage	Up to thirty-two 55 gallon drums	Machining Coolant, Lubricating Oil, hydraulic oil	55	1760	Sized	Covered Bermed Area with Trench	969.7	ENG/ST	John deJonge/ Insp=Terry Smith	Steel	Single-Walled	Rupture; leak	55	55	West	Pre-fabricated Storage Unit (ChemStor Unit) 24'x9'	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B423 Chemstor 2 (SX-08)	423	N/A	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Cleaning Solution	55	55	Sized	Secondary Containment Tub-Fixed	60	ENG/ST	Steve Stafford/ Insp=J. Thissen	Steel	Single-Walled	Rupture; leak	55	55	West	Pre-fabricated Storage Unit (ChemStor Unit) 16'x9'	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B432 East Side Product Storage	432	Transportainer East Side of Building	Inside	Portable Bulk Storage	Up to five 55 gallon drums	Mineral Oil Based Machining Coolant	55	275	Sized	Building	199	ENG/ST	Steve Stafford/ Insp=J. Thissen	Steel	Single-Walled	Rupture; leak	55	55	Inside transportainer	85-gallon overpack drum	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B432 Rm 1200 Product Storage	432	Rm 1200	Inside	Portable Bulk Storage	Portable Tank on Pumper	Machining coolant	120	120	Sized	Building	2500	ENG/ST	Steve Stafford/ Insp=J. Thissen	Plastic	Single-Walled	Rupture; leak	55	55	Inside Room	Secondary Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B432 Rm 1300 Product Storage	432	Rm 1300	Outside	Portable Bulk Storage	Up to twenty-eight 55 gallon drums	Machining Coolant; EDM Oil; Hydraulic Oil	55	1540	Sized	Pre-fabricated Storage Unit (Safety Storage Unit)	420	ENG/ST	Larry Sage/ Insp=Rib Spence	Steel	Single-Walled	Rupture; leak	55	55	Inside Room	85 gallon overpack drum	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B511 South Storage Shed Product Storage	511	South Storage Shed	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Machining Coolant (Blasocut BC 35 SW - Blaser Swiss Lube)	55	55	Sized	Rolling Containment Tub	60	ENG/ST	Larry Sage/ Insp=Rib Spence	Steel	Single-Walled	Rupture; leak	55	55	South (into parking lot)	Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B519 Avenue H Drum Storage (Bay 1)	519	N/A	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Mineral Oil-Based Machining Coolant	55	55	Sized	Rolling Containment Tub	66	ENG/ST	Steve Stafford/ Insp=J. Thissen	Steel	Single-Walled	Rupture; leak	55	55	East	Berm	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B519 Avenue H Product Storage (Bay 2)	519	N/A	Outside	Portable Bulk Storage	Up to forty-eight 55 gallon drums	Silicone Transformer Oil, Transformer Oil, Used Transformer Oil	55	2640	Sized	Pre-fabricated Storage Unit (ChemStor Unit) 24'x9'	700	ST	Jim Watson	Steel	Single-Walled	Rupture; leak	55	55	East	Berm	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B519 Product Storage	519	N/A	Outside	Portable Bulk Storage	Up to thirty-two 55 gallon drums	Silicone Transformer Oil, Transformer Oil, Used Transformer Oil	55	1760	Sized	Pre-fabricated Storage Unit (ChemStor Unit) 16'x9'	480	ST	Jim Watson	Steel	Single-Walled	Rupture; leak	55	55	South (into yard)	Berm	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B5198 Yard Product Storage	5198	N/A	Outside	Portable Bulk Storage	Up to ten 55 gallon drums	Mineral Oil	55	550	Sized	85-gallon overpack drum	85	ENG/ST	Nathaniel Bowden/ Insp = Tim Classen	Steel	Single-Walled	Rupture; leak	55	55	Northwest	Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B321A Product Storage	321A	N/A	Inside	Portable Bulk Storage	Up to one 55 gallon drum	Cutting Fluid	55	55	Sized	Secondary Containment Tub	60	ENG/ST	Pete DuPuy/ Insp=Peter Thelin	Steel	Single-Walled	Rupture; Leak	55	55	North (towards trench)	Covered Bermed Area with Trench	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B321A Rm 1126 Cleaning Solution Storage	321A	Rm 1126	Inside	Portable Bulk Storage	Up to six 55 gallon drums	BC-525 Scintillation Fluid (65% Mineral Oil)	55	330	Sized	85 gallon overpack drum	85	ENG/ST	Nathaniel Bowden/ Insp = Tim Classen	Steel	Single-Walled	Rupture; leak; transfer overflow	55	55	Inside Room	Secondary Containment Tub-Fixed	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B321A Rm 1126 Coolant Storage	321A	Rm 1126	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Hydraulic Oil	55	110	Sized	Containment Tub	66	F&I	James Lovegren	Steel	Single-Walled	Rupture; leak	55	55	Inside Room	Building	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
Portable Pumper 100 - Blaser Coolant	321A	Rm 1000	Outside	Portable Bulk Storage	Up to thirty-five 55 gallon drums	Empty Drums	55	1925	Sized	Berm	907.2	F&I	Lyle Perry	Steel	Single-Walled	Rupture; leak; transfer overflow	120	120	Inside Room	Building	N/A	N/A	Visual	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
321C Yard Storage	321C	N/A	Outside	Portable Bulk Storage	Up to thirty-five 55 gallon drums	Motor Oil, Hydraulic Oil, Transmission Oil, Other Oil	55	1925	Sized	Berm	794	F&I	Lyle Perry	Steel	Single-Walled	Rupture; leak	55	55	North	Pre-fabricated Storage Unit (Safety Storage Unit)	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
B321C Rm 1351 Product Storage	321C	Rm 1351	Outside	Portable Bulk Storage	Up to forty 55 gallons drums	Motor Oil, Hydraulic Oil, Transmission Oil, Other Oil	55	2200	Sized	Berm	600	F&I	Lyle Perry	Steel	Single-Walled	Rupture; leak	55	55	Inside Room	Rolling Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
321C Rm 1415 Product Storage	321C	Rm 1415	Outside	Portable Bulk Storage	Up to two 55 gallon drums	Hydraulic Oil, Motor Oil	55	110	Sized	Containment Tub	60	F&I	Richard Buskey	steel	Single-walled	Rupture; leak	55	55	Inside Room	Rolling Containment Tub	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A

Table C-1b Livermore SPCC Inventory -- Bulk Storage Containers, Containment Information

Mobile Refuelers

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Material	Single-Walled/ Double-Walled	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	UL (or other) Listing	Instrumentation Controls Alarms	Overfill Prevention Method	Liquid Level Sensing Devices	STI Category	Monthly Inspection	Semi-Annual Inspection	Annual Inspection	Other Inspections
G43 3464P	519	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G43 4023A	519	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G71 0403L	519	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G71 0404L	519	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G90 0017L	519	N/A	Rupture; leak; transfer overflow	200	200	East towards sump	Bermed Parking Area/ Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	200	200	East towards sump	Bermed Parking Area/ Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G90 0018L	519	N/A	Rupture; leak; transfer overflow	200	200	East towards sump	Bermed Parking Area/ Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	200	200	East towards sump	Bermed Parking Area/ Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G90 0019L	519	N/A	Rupture; leak; transfer overflow	200	200	East towards sump	Bermed Parking Area/ Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	200	200	East towards sump	Bermed Parking Area/ Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G71 0430D	6325	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G63 0493P	6325	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A
G71 0573N	6325	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	Rupture; leak; transfer overflow	10	10	Varies when deployed	Spill Kit	N/A	N/A	N/A	N/A	Portable	Required (Form H.2)	N/A	N/A	N/A

Table C-2 Livermore SPCC Inventory -- Electrical Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Monthly Inspection	Semi-Annual Inspection
Transformers																				
T1780	71	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	139	139	General	Berm	286	F&I	Keith Pitcock	Leak	13.9	13.9	West	Berm	N/A	Required (Form H.3)
T460	117	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	586	586	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	58.6	58.6	East	None	Required (Form H.3)	N/A
T32	121	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	460	460	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	46	46	East	None	Required (Form H.3)	N/A
T1396	131	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	515	515	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51.5	51.5	Northwest	None	Required (Form H.3)	N/A
T58	131	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	590	590	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	59	59	North	None	Required (Form H.3)	N/A
T650	131	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	593	593	General	Sump	NR	F&I	Keith Pitcock	Leak	59.3	59.3	East	Sump	N/A	Required (Form H.3)
T1652	133	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	520	520	General	Berm	NR	F&I	Keith Pitcock	Leak	52	52	Northwest	Berm	N/A	Required (Form H.3)
T1653	133	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	520	520	General	Berm	NR	F&I	Keith Pitcock	Leak	52	52	Northwest	Berm	N/A	Required (Form H.3)
T1881	140	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	460	460	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	46	46	South	None	Required (Form H.3)	N/A
T890	141	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	632	632	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	63.2	63.2	South	None	Required (Form H.3)	N/A
T1904	142	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	274	274	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	27.4	27.4	North	None	Required (Form H.3)	N/A
T1580	153	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	360	360	General	Berm	NR	F&I	Keith Pitcock	Leak	36	36	North	Berm	N/A	Required (Form H.3)
T1216	161	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	480	480	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	48	48	East	None	Required (Form H.3)	N/A
T1218	165	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	309	309	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	30.9	30.9	North	None	Required (Form H.3)	N/A
T1763	165	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	354	354	General	Berm	NR	F&I	Keith Pitcock	Leak	35.4	35.4	North	Berm	N/A	Required (Form H.3)
T1824	170	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	542	542	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	54.2	54.2	North	None	Required (Form H.3)	N/A
ETF Bldg 177	175	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	2000	2000	Qualified Operating Equipment	None	N/A	F&I	Scott Kidd	Leak	200	200	North	None	Required (Form H.3)	N/A
T1217	175	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	480	480	General	Berm	NR	F&I	Keith Pitcock	Leak	48	48	West	Berm	N/A	Required (Form H.3)
T950	175	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	300	300	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	30	30	West	None	Required (Form H.3)	N/A
T810	179	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	570	570	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	57	57	Northeast	None	Required (Form H.3)	N/A
T690	194	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	397	397	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	39.7	39.7	East	None	Required (Form H.3)	N/A
T760	194	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	570	570	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	57	57	Northeast	None	Required (Form H.3)	N/A
T1723	196	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	163	163	General	Berm	201	F&I	Keith Pitcock	Leak	16.3	16.3	West	Berm	N/A	Required (Form H.3)
T1309	197	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	440	440	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	44	44	Northwest	None	Required (Form H.3)	N/A
T1305	217	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	586	586	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	58.6	58.6	West	None	Required (Form H.3)	N/A
T646	219	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	153	153	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	15.3	15.3	South	None	Required (Form H.3)	N/A
T1544	231	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	213	213	General	Berm	NR	F&I	Keith Pitcock	Leak	21.3	21.3	Southeast	Berm	N/A	Required (Form H.3)
T1708	231	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	184	184	General	Berm	NR	F&I	Keith Pitcock	Leak	18.4	18.4	North	Berm	N/A	Required (Form H.3)
T1819	231	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	333	333	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	33.3	33.3	North	None	Required (Form H.3)	N/A
T930	235	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	515	515	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51.5	51.5	Northwest	None	Required (Form H.3)	N/A
T931	235	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	515	515	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51.5	51.5	Northwest	None	Required (Form H.3)	N/A
T932	235	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	187	187	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	18.7	18.7	Northwest	None	Required (Form H.3)	N/A
T1520	239	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	659	659	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	65.9	65.9	North	None	Required (Form H.3)	N/A
T280	239	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	165	165	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	16.5	16.5	East	None	Required (Form H.3)	N/A

Table C-2 Livermore SPCC Inventory -- Electrical Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Monthly Inspection	Semi-Annual Inspection
T600	241	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	902	902	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	90.2	90.2	North	None	Required (Form H.3)	N/A
T516	243	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	568	568	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	56.8	56.8	North	None	Required (Form H.3)	N/A
T550	243	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	263	263	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	26.3	26.3	South	None	Required (Form H.3)	N/A
T251	251	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	177	177	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	17.7	17.7	North	None	Required (Form H.3)	N/A
T290	255	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	404	404	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	40.4	40.4	Northeast	None	Required (Form H.3)	N/A
T1574	256	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	180	180	General	Berm	214	F&I	Keith Pitcock	Leak	18	18	Northeast	Berm	N/A	Required (Form H.3)
T110	261	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	310	310	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	31	31	Southeast	None	Required (Form H.3)	N/A
T1070	271	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	223	223	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	22.3	22.3	Northwest	None	Required (Form H.3)	N/A
T160	281	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	405	405	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	40.5	40.5	Southeast	None	Required (Form H.3)	N/A
T1355	291	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	440	440	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	44	44	Northwest	None	Required (Form H.3)	N/A
T1906	291	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	767	767	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	76.7	76.7	Northwest	None	Required (Form H.3)	N/A
T1907	291	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	767	767	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	76.7	76.7	Northwest	None	Required (Form H.3)	N/A
T440	292	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	314	314	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	31.4	31.4	Southeast	None	Required (Form H.3)	N/A
T688	295	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	343	343	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	34.3	34.3	Southeast	None	Required (Form H.3)	N/A
T924	298	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	427	427	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	42.7	42.7	Southeast	None	Required (Form H.3)	N/A
T1597	299	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	150	150	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	15	15	North	None	Required (Form H.3)	N/A
T1306	312	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	153	153	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	15.3	15.3	Southwest	None	Required (Form H.3)	N/A
T730	316	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	457	457	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	45.7	45.7	North	None	Required (Form H.3)	N/A
T135	319	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	153	153	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	15.3	15.3	East	None	Required (Form H.3)	N/A
T575	321	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	719	719	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	71.9	71.9	Northeast	None	Required (Form H.3)	N/A
T975	325	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	605	605	General	Sump	NR	F&I	Keith Pitcock	Leak	60.5	60.5	West	Sump	N/A	Required (Form H.3)
T586	331	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	503	503	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	50.3	50.3	Northwest	None	Required (Form H.3)	N/A
T1080	332	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	622	622	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	62.2	62.2	Northwest	None	Required (Form H.3)	N/A
T1902	332	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	335	335	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	33.5	33.5	North	None	Required (Form H.3)	N/A
T410	332	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	622	622	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	62.2	62.2	West	None	Required (Form H.3)	N/A
T500	332	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	385	385	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	38.5	38.5	Northwest	None	Required (Form H.3)	N/A
T1254	334	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	535	535	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	53.5	53.5	Southeast	None	Required (Form H.3)	N/A
T680	341	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	535	535	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	53.5	53.5	South	None	Required (Form H.3)	N/A
T220	361	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	439	439	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	43.9	43.9	Northwest	None	Required (Form H.3)	N/A
T1829	366	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	339	339	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	33.9	33.9	East	None	Required (Form H.3)	N/A
T891	378	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	469	469	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	46.9	46.9	North	None	Required (Form H.3)	N/A
T340	381	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	393	393	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	39.3	39.3	North	None	Required (Form H.3)	N/A
T341	381	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	393	393	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	39.3	39.3	North	None	Required (Form H.3)	N/A
T342	381	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	227	227	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	22.7	22.7	North	None	Required (Form H.3)	N/A
T343	381	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	275	275	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	27.5	27.5	North	None	Required (Form H.3)	N/A

Table C-2 Livermore SPCC Inventory -- Electrical Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Monthly Inspection	Semi-Annual Inspection
T851	391	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	370	370	alified Operating Equipm	None	N/A	F&I	Keith Pitcock	Leak	37	37	North	None	Required (Form H.3)	N/A
T852	391	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	370	370	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	37	37	North	None	Required (Form H.3)	N/A
T853	391	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	269	269	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	26.9	26.9	North	None	Required (Form H.3)	N/A
T854	391	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	269	269	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	26.9	26.9	North	None	Required (Form H.3)	N/A
T855	391	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	269	269	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	26.9	26.9	North	None	Required (Form H.3)	N/A
T856	391	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	269	269	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	26.9	26.9	North	None	Required (Form H.3)	N/A
T131	405	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	314	314	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	31.4	31.4	North	None	Required (Form H.3)	N/A
T1647	406	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	168	168	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	16.8	16.8	North	None	Required (Form H.3)	N/A
T170	411	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	319	319	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	31.9	31.9	Northeast	None	Required (Form H.3)	N/A
T643	415	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	167	167	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	16.7	16.7	Northeast	None	Required (Form H.3)	N/A
T1371	424	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	220	220	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	22	22	North	None	Required (Form H.3)	N/A
T1774	424	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	245	245	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	24.5	24.5	West	None	Required (Form H.3)	N/A
T200	424	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	11960	11960	General	Sump	NR	F&I	Keith Pitcock	Leak	1196	1196	N/A	Sump	N/A	Required (Form H.3)
T900	424	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	12810	12810	General	Sump	NR	F&I	Keith Pitcock	Leak	1281	1281	N/A	Sump	N/A	Required (Form H.3)
T104	431	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	313	313	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	31.3	31.3	West	None	Required (Form H.3)	N/A
T150	431	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	550	550	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	55	55	East	None	Required (Form H.3)	N/A
T561	435	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	1130	1130	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	113	113	North	None	Required (Form H.3)	N/A
T590	435	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	1450	1450	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	145	145	West	None	Required (Form H.3)	N/A
T850	438	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	153	153	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	15.3	15.3	Southwest	None	Required (Form H.3)	N/A
T102	439	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	457	457	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	45.7	45.7	East	None	Required (Form H.3)	N/A
T103	442	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	355	355	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	35.5	35.5	West	None	Required (Form H.3)	N/A
T1285	445	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	245	245	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	24.5	24.5	North	None	Required (Form H.3)	N/A
T901	445	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	240	240	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	24	24	North	None	Required (Form H.3)	N/A
T1817	451	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	501	501	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	50.1	50.1	West	None	Required (Form H.3)	N/A
T1864	451	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	396	396	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	39.6	39.6	Northwest	None	Required (Form H.3)	N/A
T1865	451	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	396	396	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	39.6	39.6	Northwest	None	Required (Form H.3)	N/A
T1866	451	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	333	333	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	33.3	33.3	Northwest	None	Required (Form H.3)	N/A
T821	451	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	227	227	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	22.7	22.7	Northwest	None	Required (Form H.3)	N/A
T823	451	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	227	227	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	22.7	22.7	Northwest	None	Required (Form H.3)	N/A
T1852	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1855	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1857	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1858	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1859	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1861	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	550	550	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	55	55	West	None	Required (Form H.3)	N/A

Table C-2 Livermore SPCC Inventory -- Electrical Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Monthly Inspection	Semi-Annual Inspection
T1862	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1883	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1884	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1893	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1896	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	561	561	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	56.1	56.1	West	None	Required (Form H.3)	N/A
T1897	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1899	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	561	561	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	56.1	56.1	West	None	Required (Form H.3)	N/A
T1909	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1911	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1912	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1913	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1914	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1915	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1916	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1917	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1918	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1919	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1920	453	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	708	708	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	70.8	70.8	West	None	Required (Form H.3)	N/A
T1905	471	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	155	155	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	15.5	15.5	North	None	Required (Form H.3)	N/A
T1024	490	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	237	237	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	23.7	23.7	North	None	Required (Form H.3)	N/A
T1705	490	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	135	135	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	13.5	13.5	West	None	Required (Form H.3)	N/A
T1205	491	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	580	580	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	58	58	North	None	Required (Form H.3)	N/A
T1206	492	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	515	515	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51.5	51.5	North	None	Required (Form H.3)	N/A
T1454	493	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	361	361	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	36.1	36.1	West	None	Required (Form H.3)	N/A
T490	511	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	503	503	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	50.3	50.3	Northwest	None	Required (Form H.3)	N/A
T757	515	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	235	235	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	23.5	23.5	Northwest	None	Required (Form H.3)	N/A
T1060	531	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	316	316	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	31.6	31.6	West	None	Required (Form H.3)	N/A
T480	543	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	202	202	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	20.2	20.2	East	None	Required (Form H.3)	N/A
T1150	571	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	294	294	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	29.4	29.4	North	None	Required (Form H.3)	N/A
T1832	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	540	540	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	54	54	South	None	Required (Form H.3)	N/A
T1833	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	540	540	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	54	54	South	None	Required (Form H.3)	N/A
T1834	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	540	540	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	54	54	Northwest	None	Required (Form H.3)	N/A
T1835	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	540	540	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	54	54	Northwest	None	Required (Form H.3)	N/A
T1836	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	530	530	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	53	53	South	None	Required (Form H.3)	N/A
T1838	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	435	435	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	43.5	43.5	South	None	Required (Form H.3)	N/A
T1840	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	440	440	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	44	44	East	None	Required (Form H.3)	N/A
T1842	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	540	540	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	54	54	East	None	Required (Form H.3)	N/A
T1844	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	440	440	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	44	44	East	None	Required (Form H.3)	N/A
T1845	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	632	632	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	63.2	63.2	East	None	Required (Form H.3)	N/A

Table C-2 Livermore SPCC Inventory -- Electrical Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Monthly Inspection	Semi-Annual Inspection
T1846	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	355	355	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	35.5	35.5	East	None	Required (Form H.3)	N/A
T1847	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	490	490	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	49	49	East	None	Required (Form H.3)	N/A
T1848	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	355	355	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	35.5	35.5	East	None	Required (Form H.3)	N/A
T1853	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	540	540	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	54	54	Northwest	None	Required (Form H.3)	N/A
T1854	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	490	490	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	49	49	Northwest	None	Required (Form H.3)	N/A
T1901	581	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	200	200	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	20	20	North	None	Required (Form H.3)	N/A
T1908	583	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	235	235	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	23.5	23.5	Northwest	None	Required (Form H.3)	N/A
T370	591	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	285	285	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	28.5	28.5	North	None	Required (Form H.3)	N/A
T1521	593	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	250	250	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	25	25	North	None	Required (Form H.3)	N/A
T1177	612	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	318	318	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	31.8	31.8	Northwest	None	Required (Form H.3)	N/A
T1545	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	235	235	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	23.5	23.5	Northwest	None	Required (Form H.3)	N/A
T1782	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	112	112	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	11.2	11.2	Northwest, Mobile	None	Required (Form H.3)	N/A
T1788	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	124	124	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	12.4	12.4	Northwest, Mobile	None	Required (Form H.3)	N/A
T1805	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	435	435	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	43.5	43.5	Northwest, Mobile	None	Required (Form H.3)	N/A
T1806	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	225	225	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	22.5	22.5	Northwest, Mobile	None	Required (Form H.3)	N/A
T1903	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	274	274	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	27.4	27.4	Northwest, Mobile	None	Required (Form H.3)	N/A
T1910	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	235	235	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	23.5	23.5	Northwest, Mobile	None	Required (Form H.3)	N/A
T381	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	297	297	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	29.7	29.7	Northwest	None	Required (Form H.3)	N/A
T925	622	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	170	170	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	17	17	Northwest	None	Required (Form H.3)	N/A
T1936	654	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	550	550	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	55	55	West	None	Required (Form H.3)	N/A
T1937	654	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	510	510	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	51	51	West	None	Required (Form H.3)	N/A
T1938	654	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	550	550	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	55	55	West	None	Required (Form H.3)	N/A
T1257	663	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	270	270	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	27	27	Northwest	None	Required (Form H.3)	N/A
T1849	681	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	540	540	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	54	54	East	None	Required (Form H.3)	N/A
T1001	691	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	155	155	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	15.5	15.5	West	None	Required (Form H.3)	N/A
T1863	691	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	170	170	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	17	17	West	None	Required (Form H.3)	N/A
T1830	695	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	440	440	General	Sump	NR	F&I	Keith Pitcock	Leak	44	44	South	Sump	N/A	Required (Form H.3)
T1831	695	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	440	440	General	Sump	NR	F&I	Keith Pitcock	Leak	44	44	South	Sump	N/A	Required (Form H.3)
T1110	1677	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	162	162	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	16.2	16.2	North	None	Required (Form H.3)	N/A
T970	1879	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	600	600	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	60	60	Northeast	None	Required (Form H.3)	N/A
T720	2625	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	446	446	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	44.6	44.6	South	None	Required (Form H.3)	N/A

Table C-2 Livermore SPCC Inventory -- Electrical Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Monthly Inspection	Semi-Annual Inspection
T496	2684	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	245	245	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	24.5	24.5	South	None	Required (Form H.3)	N/A
T820	2775	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	331	331	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	33.1	33.1	North	None	Required (Form H.3)	N/A
T495	3520	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	232	232	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	23.2	23.2	East	None	Required (Form H.3)	N/A
T474	3724	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	250	250	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	25	25	West	None	Required (Form H.3)	N/A
T470	3725	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	180	180	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	18	18	South	None	Required (Form H.3)	N/A
T473	3726	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	120	120	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	12	12	North	None	Required (Form H.3)	N/A
T117	4182	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	163	163	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	16.3	16.3	South	None	Required (Form H.3)	N/A
T476	4675	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	297	297	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	29.7	29.7	North	None	Required (Form H.3)	N/A
T1498	4725	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	150	150	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	15	15	West	None	Required (Form H.3)	N/A
T1499	4728	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	110	110	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	11	11	West	None	Required (Form H.3)	N/A
T1314	5627	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	285	285	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	28.5	28.5	North	None	Required (Form H.3)	N/A
T875	5961	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	211	211	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	21.1	21.1	Southwest	None	Required (Form H.3)	N/A
T1589	5982	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	112	112	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	11.2	11.2	Northwest	None	Required (Form H.3)	N/A
T1793	6325	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	148	148	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	14.8	14.8	Northeast	None	Required (Form H.3)	N/A
T1921	6475	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	228	228	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	22.8	22.8	West	None	Required (Form H.3)	N/A
T1922	6475	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	228	228	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	22.8	22.8	West	None	Required (Form H.3)	N/A
T5689 (PG&E Owned)	6501	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	102	102	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	10.2	10.2	Northwest	None	Required (Form H.3)	N/A
T1656	132S	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	520	520	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	52	52	West	None	Required (Form H.3)	N/A
T1657	132S	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	520	520	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	52	52	West	None	Required (Form H.3)	N/A
T1875	U235	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	366	366	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	36.6	36.6	West	None	Required (Form H.3)	N/A
T1876	U235	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	366	366	Qualified Operating Equipment	None	N/A	F&I	Keith Pitcock	Leak	36.6	36.6	West	None	Required (Form H.3)	N/A
T0686	194	N/A	Outside	Electrical Equipment	Transformer	Insulating Oil	80	80	Qualified Operating Equipment	None	N/A	PLS/ST	Mark Sutton	Leak	8	8	South	None	Required (Form H.3)	N/A

Table C-2 Livermore SPCC Inventory -- Electrical Equipment

Other Oil-Filled Electrical Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Monthly Inspection	Semi-Annual Inspection
100KV Pulser Insulator Tester - Yellow Drum	141	Rm 162	Inside	Electrical Equipment	Insulator Tester - Yellow Drum	Insulating Oil	60	60	General	Sorbent	15	ST	Ron Speers	Rupture; leak; transfer overflow	6	6	Inside Building	Sorbent	N/A	Required (Form H.3)
Klystron Modulator	194	Rm B132	Inside	Electrical Equipment	Modulator	Insulating Oil	211	211	General	Spill Pan	25	PLS/ST	Gerald Anderson	Rupture; leak	21.1	21.1	Inside Room	Spill Pan	N/A	Required (Form H.3)
Mod 1 T-11 Charging Choke	194	Rm 1211	Inside	Electrical Equipment	Charging Choke	Insulating Oil	200	200	General	Building	199	PLS/ST	Gerald Anderson	Rupture; leak	20	20	Inside Room	Building	N/A	Required (Form H.3)
Mod 2 T-12 Charging Choke	194	Rm 1211	Inside	Electrical Equipment	Charging Choke	Insulating Oil	200	200	General	Building	199	PLS/ST	Gerald Anderson	Rupture; leak	20	20	Inside Room	Building	N/A	Required (Form H.3)
Mod 3 T-13 Charging Choke	194	Rm 1211	Inside	Electrical Equipment	Charging Choke	Insulating Oil	200	200	General	Building	199	PLS/ST	Gerald Anderson	Rupture; leak	20	20	Inside Room	Building	N/A	Required (Form H.3)
Mod 4 T-14 Charging Choke	194	Rm 1211	Inside	Electrical Equipment	Charging Choke	Insulating Oil	200	200	General	Building	199	PLS/ST	Gerald Anderson	Rupture; leak	20	20	Inside Room	Building	N/A	Required (Form H.3)
Mod 5 T-15 Charging Choke	194	Rm 1211	Inside	Electrical Equipment	Charging Choke	Insulating Oil	200	200	General	Building	199	PLS/ST	Gerald Anderson	Rupture; leak	20	20	Inside Room	Building	N/A	Required (Form H.3)
Mod 6 T-16 Charging Choke	194	Rm 1211	Inside	Electrical Equipment	Charging Choke	Insulating Oil	200	200	General	Building	199	PLS/ST	Gerald Anderson	Rupture; leak	20	20	Inside Room	Building	N/A	Required (Form H.3)
Power Supply 1 Charging Choke	194	Rm 1211	Inside	Electrical Equipment	Charging Choke	Insulating Oil	525	525	General	Building	199	PLS/ST	Gerald Anderson	Rupture; leak	52.5	52.5	Inside Room	Building	N/A	Required (Form H.3)
Power Supply 2 Charging Choke	194	Rm 1211	Inside	Electrical Equipment	Charging Choke	Insulating Oil	525	525	General	Building	199	PLS/ST	Gerald Anderson	Rupture; leak	52.5	52.5	Inside Room	Building	N/A	Required (Form H.3)
Blue Unit Power Supply	231	Rm 1737	Inside	Electrical Equipment	Power Supply	Insulating Oil	360	360	General	Building	110	ENG/ST	Gordon Gibbs	Rupture; leak	36	36	Inside Room	Building	N/A	Required (Form H.3)
CMLES Power Supply	231	Rm 1900	Inside	Electrical Equipment	Power Supply	Insulating Oil	360	360	General	Building	262	ENG/ST	Dione Ancheta	Rupture; leak	36	36	Inside Room	Building	N/A	Required (Form H.3)
E-Beam Welder Power Supply	334	Rm 1008	Inside	Electrical Equipment	Power Supply	Insulating Oil	370	370	General	Double-Walled	370	F&I	Randy Pong	Rupture; leak	37	37	Inside Room	Double-Walled	N/A	Required (Form H.3)
DC Power Supply Type E18400	391	N/A	Outside	Electrical Equipment	Power Supply	Insulating Oil	315	315	Qualified Operating Equipment	None	N/A	NIF	Matt Robison	Leak	31.5	31.5	East	None	Required (Form H.3)	N/A
DC Power Supply Type E18471	391	N/A	Outside	Electrical Equipment	Power Supply	Insulating Oil	320	320	Qualified Operating Equipment	None	N/A	NIF	Matt Robison	Leak	32	32	South	None	Required (Form H.3)	N/A
3-Stage Marx Generator	431	1051B	Inside	Electrical Equipment	Electrical Equipment	Insulating Oil	90	90	General	Building	25	ST	Jim Watson	Rupture; leak; transfer overflow	9	9	Inside Room	Building	N/A	Required (Form H.3)

Table C-3 Livermore SPCC Inventory -- Operating Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Semi-Annual Inspection	Other Inspections
Hydraulic Elevators																				
112EL02	112	Rm B128	Inside	Operating Equipment	Elevator	Hydraulic Oil	120	120	General	Building	NR	F&I	Dan Klein	Rupture; leak	12	12	Inside	Building	N/A	Outside Contractor
112EL01	112	Rm B165	Inside	Operating Equipment	Elevator	Hydraulic Oil	63	63	General	Building	NR	F&I	Dan Klein	Rupture; leak	6.3	6.3	Inside	Building	N/A	Outside Contractor
121EL01	121	Rm 1004A	Inside	Operating Equipment	Elevator	Hydraulic Oil	131	131	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.1	13.1	Inside	Building	N/A	Outside Contractor
131EL02	131	Rm 1236 Hi Bay	Inside	Operating Equipment	Elevator	Hydraulic Oil	60	60	General	Building	NR	F&I	Dan Klein	Rupture; leak	6	6	Inside	Building	N/A	Outside Contractor
131EL01	131	Rm 1265	Inside	Operating Equipment	Elevator	Hydraulic Oil	199	199	General	Building	NR	F&I	Dan Klein	Rupture; leak	19.9	19.9	Inside	Building	N/A	Outside Contractor
140EL01	140	Rm 1086	Inside	Operating Equipment	Elevator		128	128	General	Building	NR	F&I	Dan Klein	Rupture; leak	12.8	12.8	Inside	Building	N/A	Outside Contractor
142EL01	142	Rm 1303	Inside	Operating Equipment	Elevator	Hydraulic Oil	132	132	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.2	13.2	Inside	Building	N/A	Outside Contractor
151EL01	151	Rm B117B	Inside	Operating Equipment	Elevator	Hydraulic Oil	138	138	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.8	13.8	Inside	Building	N/A	Outside Contractor
151EL02	151	Rm B137A	Inside	Operating Equipment	Elevator	Hydraulic Oil	134	134	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.4	13.4	Inside	Building	N/A	Outside Contractor
153EL01	153	Rm 2001	Inside	Operating Equipment	Elevator	Hydraulic Oil	124	124	General	Building	NR	F&I	Dan Klein	Rupture; leak	12.4	12.4	Inside	Building	N/A	Outside Contractor
155EL01	155	Rm 2207	Inside	Operating Equipment	Elevator	Hydraulic Oil	160	160	General	Building	NR	F&I	Dan Klein	Rupture; leak	16	16	Inside	Building	N/A	Outside Contractor
170EL01	170	Rm 1001	Inside	Operating Equipment	Elevator	Hydraulic Oil	90	90	General	Building	NR	F&I	Dan Klein	Rupture; leak	9	9	Inside	Building	N/A	Outside Contractor
191EL01	191	Rm 1100B	Inside	Operating Equipment	Elevator	Hydraulic Oil	176	176	General	Building	NR	F&I	Dan Klein	Rupture; leak	17.6	17.6	Inside	Building	N/A	Outside Contractor
194EL01	194	Rm B110	Inside	Operating Equipment	Elevator	Hydraulic Oil	217	217	General	Building	NR	F&I	Dan Klein	Rupture; leak	21.7	21.7	Inside	Building	N/A	Outside Contractor
211EL01	211	Rm 102	Inside	Operating Equipment	Elevator	Hydraulic Oil	135	135	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.5	13.5	Inside	Building	N/A	Outside Contractor
235EL02	235	Rm B254	Inside	Operating Equipment	Elevator	Hydraulic Oil	168	168	General	Building	NR	F&I	Dan Klein	Rupture; leak	16.8	16.8	Inside	Building	N/A	Outside Contractor
242EL01	242	Rm 1203	Inside	Operating Equipment	Elevator	Hydraulic Oil	125	125	General	Building	NR	F&I	Dan Klein	Rupture; leak	12.5	12.5	Inside	Building	N/A	Outside Contractor
261EL01	261	Rm 1450	Inside	Operating Equipment	Elevator	Hydraulic Oil	131	131	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.1	13.1	Inside	Building	N/A	Outside Contractor
264EL01	264	Rm 1203	Inside	Operating Equipment	Elevator	Hydraulic Oil	125	125	General	Building	NR	F&I	Dan Klein	Rupture; leak	12.5	12.5	Inside	Building	N/A	Outside Contractor
274EL01	274	Rm 1011A	Inside	Operating Equipment	Elevator	Hydraulic Oil	105	105	General	Building	NR	F&I	Dan Klein	Rupture; leak	10.5	10.5	Inside	Building	N/A	Outside Contractor
311EL01	311	Rm 1230	Inside	Operating Equipment	Elevator	Hydraulic Oil	141	141	General	Building	NR	F&I	Dan Klein	Rupture; leak	14.1	14.1	Inside	Building	N/A	Outside Contractor
321EL02	321	Rm 1134	Inside	Operating Equipment	Elevator	Hydraulic Oil	157	157	General	Building	NR	F&I	Dan Klein	Rupture; leak	15.7	15.7	Inside	Building	N/A	Outside Contractor
321EL01	321	Rm 2347B	Inside	Operating Equipment	Elevator	Hydraulic Oil	165	165	General	Building	NR	F&I	Dan Klein	Rupture; leak	16.5	16.5	Inside	Building	N/A	Outside Contractor
323EL01	323	Rm 1012	Inside	Operating Equipment	Elevator	Hydraulic Oil	90	90	General	Building	NR	F&I	Dan Klein	Rupture; leak	9	9	Inside	Building	N/A	Outside Contractor
327EL01	327	Rm B272	Inside	Operating Equipment	Elevator	Hydraulic Oil	419	419	General	Building	NR	F&I	Dan Klein	Rupture; leak	41.9	41.9	Inside	Building	N/A	Outside Contractor
332EL01	332	Rm B100	Inside	Operating Equipment	Elevator	Hydraulic Oil	99	99	General	Building	NR	F&I	Dan Klein	Rupture; leak	9.9	9.9	Inside	Building	N/A	Outside Contractor
334EL01	334	Rm 3003	Inside	Operating Equipment	Elevator	Hydraulic Oil	112	112	General	Building	NR	F&I	Dan Klein	Rupture; leak	11.2	11.2	Inside	Building	N/A	Outside Contractor
381EL01	381	Rm 1404	Inside	Operating Equipment	Elevator	Hydraulic Oil	131	131	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.1	13.1	Inside	Building	N/A	Outside Contractor
381EL02	381	Rm B160A	Inside	Operating Equipment	Elevator	Hydraulic Oil	131	131	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.1	13.1	Inside	Building	N/A	Outside Contractor
391EL01	391	Rm B133	Inside	Operating Equipment	Elevator	Hydraulic Oil	94	94	General	Building	NR	F&I	Dan Klein	Rupture; leak	9.4	9.4	Inside	Building	N/A	Outside Contractor
391EL02	391	Rm B133	Inside	Operating Equipment	Elevator	Hydraulic Oil	131	131	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.1	13.1	Inside	Building	N/A	Outside Contractor
451EL01	451	Rm 1100	Inside	Operating Equipment	Elevator	Hydraulic Oil	103	103	General	Building	NR	F&I	Dan Klein	Rupture; leak	10.3	10.3	Inside	Building	N/A	Outside Contractor
453EL04	453	Rm 1137	Inside	Operating Equipment	Elevator	Hydraulic Oil	233	233	General	Building	NR	F&I	Dan Klein	Rupture; leak	23.3	23.3	Inside	Building	N/A	Outside Contractor
453EL01	453	Rm 1156	Inside	Operating Equipment	Elevator	Hydraulic Oil	288	288	General	Building	NR	F&I	Dan Klein	Rupture; leak	28.8	28.8	Inside	Building	N/A	Outside Contractor
453EL02	453	Rm 1156	Inside	Operating Equipment	Elevator	Hydraulic Oil	288	288	General	Building	NR	F&I	Dan Klein	Rupture; leak	28.8	28.8	Inside	Building	N/A	Outside Contractor
453EL03	453	Rm 1225	Inside	Operating Equipment	Elevator	Hydraulic Oil	233	233	General	Building	NR	F&I	Dan Klein	Rupture; leak	23.3	23.3	Inside	Building	N/A	Outside Contractor
490EL02	490	Rm 1037A	Inside	Operating Equipment	Elevator	Hydraulic Oil	184	184	General	Building	NR	F&I	Dan Klein	Rupture; leak	18.4	18.4	Inside	Building	N/A	Outside Contractor
490EL01	490	Rm 162	Inside	Operating Equipment	Elevator	Hydraulic Oil	171	171	General	Building	NR	F&I	Dan Klein	Rupture; leak	17.1	17.1	Inside	Building	N/A	Outside Contractor

Table C-3 Livermore SPCC Inventory -- Operating Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Semi-Annual Inspection	Other Inspections
511EL01	511	Rm 113A	Inside	Operating Equipment	Elevator	Hydraulic Oil	149	149	General	Building	NR	F&I	Dan Klein	Rupture; leak	14.9	14.9	Inside	Building	N/A	Outside Contractor
543EL01	543	Rm 1201A	Inside	Operating Equipment	Elevator	Hydraulic Oil	105	105	General	Building	NR	F&I	Dan Klein	Rupture; leak	10.5	10.5	Inside	Building	N/A	Outside Contractor
571EL01	571	Rm 1232	Inside	Operating Equipment	Elevator	Hydraulic Oil	132	132	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.2	13.2	Inside	Building	N/A	Outside Contractor
581EL03	581	Rm 1010	Inside	Operating Equipment	Elevator	Hydraulic Oil	100	100	General	Building	NR	F&I	Dan Klein	Rupture; leak	10	10	Inside	Building	N/A	Outside Contractor
581EL04	581	Rm 1061B	Inside	Operating Equipment	Elevator	Hydraulic Oil	100	100	General	Building	NR	F&I	Dan Klein	Rupture; leak	10	10	Inside	Building	N/A	Outside Contractor
581EL05	581	Rm 3018	Inside	Operating Equipment	Elevator	Hydraulic Oil	100	100	General	Building	NR	F&I	Dan Klein	Rupture; leak	10	10	Inside	Building	N/A	Outside Contractor
583EL01	583	Rm 1006	Inside	Operating Equipment	Elevator	Hydraulic Oil	132	132	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.2	13.2	Inside	Building	N/A	Outside Contractor
654EL01	654	Rm 1004	Inside	Operating Equipment	Elevator	Hydraulic Oil	100	100	General	Building	NR	F&I	Dan Klein	Rupture; leak	10	10	Inside	Building	N/A	Outside Contractor
671EL01	671	Rm 1232	Inside	Operating Equipment	Elevator	Hydraulic Oil	132	132	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.2	13.2	Inside	Building	N/A	Outside Contractor
132NEL03	132N	Rm 1472	Inside	Operating Equipment	Elevator	Hydraulic Oil	94	94	General	Building	NR	F&I	Dan Klein	Rupture; leak	9.4	9.4	Inside	Building	N/A	Outside Contractor
132NEL04	132N	Rm 1800	Inside	Operating Equipment	Elevator	Hydraulic Oil	135	135	General	Building	NR	F&I	Dan Klein	Rupture; leak	13.5	13.5	Inside	Building	N/A	Outside Contractor
132NEL05	132N	Rm 1858	Inside	Operating Equipment	Elevator	Hydraulic Oil	116	116	General	Building	NR	F&I	Dan Klein	Rupture; leak	11.6	11.6	Inside	Building	N/A	Outside Contractor
132SEL01	132S	Rm 1550	Inside	Operating Equipment	Elevator	Hydraulic Oil	126	126	General	Building	NR	F&I	Dan Klein	Rupture; leak	12.6	12.6	Inside	Building	N/A	Outside Contractor
132SEL02	132S	Rm 1700	Inside	Operating Equipment	Elevator	Hydraulic Oil	110	110	General	Building	8	F&I	Dan Klein	Rupture; leak	11	11	Inside	Building	N/A	Outside Contractor
551EEL01	551E	Rm 1096A	Inside	Operating Equipment	Elevator	Hydraulic Oil	202	202	General	Building	NR	F&I	Dan Klein	Rupture; leak	20.2	20.2	Inside	Building	N/A	Outside Contractor
551WEL02	551W	Rm 1595	Inside	Operating Equipment	Elevator	Hydraulic Oil	199	199	General	Building	NR	F&I	Dan Klein	Rupture; leak	19.9	19.9	Inside	Building	N/A	Outside Contractor

Machining Equipment

M465 Hurco VMX42 Mill	191	Rm 1147	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	90	90	General	Building	50	WCI	Joe Ruth	Leak	9	9	Inside Building	Building	Required (Form H.3)	N/A
Central Hydraulic House System	191	Rm 1750	Inside	Operating Equipment	Pump	Hydraulic Oil	80	80	General	Spill Pan	15	ENG/ST	Joe Ruth	Rupture; leak; transfer overflow	8	8	Southwest	Building; spill pan	Required (Form H.3)	
MTS SilentFlo Hydraulic Power Unit, Model 505.30 G2	231	Rm 1841	Inside	Operating Equipment	Hydraulic Power Unit	Hydraulic Oil	90	90	General	Spill Kit	>90	ENG/ST	Walt Grundler	Rupture; leak	9	9	NA, indoors	Spill Kit	Required (Form H.3)	N/A
Hydraulic Pump System	231	Outside, North, Equipment Pit	Outside	Operating Equipment	Hydraulic Pump	Hydraulic Oil	200	200	General	Equipment Pit	>200	ENG/ST	Walt Grundler	Rupture; leak	20	20	Secondarily Contained	Equipment Pit	Required (Form H.3)	N/A
MTS 500 Kip Hydraulic Press	231	Rm 1000	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	120	120	General	Equipment Pit	>120	ENG/ST	Walt Grundler	Rupture; leak	12	12	NA, indoors	Equipment Pit	Required (Form H.3)	N/A
Pacific 1750 Ton Press	231	Rm 1000, North End	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	1200	1200	General	Equipment Pit	>1200	ENG/ST	Walt Grundler	Rupture; leak	120	120	NA, indoors	Equipment Pit	Required (Form H.3)	N/A
PHI 375 Ton Press	231	Rm 1010	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	130	130	General	Equipment Pit	>130	ENG/ST	Wayne Jensen	Rupture; leak	13	13	NA, indoors	Equipment Pit	Required (Form H.3)	N/A
KR Wilson 250 Ton Press	231	Rm 1010	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	200	200	General	Equipment Pit	>200	ENG/ST	Wayne Jensen	Rupture; leak	20	20	NA, indoors	Equipment Pit	Required (Form H.3)	N/A
ELMES 500 Ton Press	231	Rm 1010	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	532	532	General	Equipment Pit	>532	ENG/ST	Wayne Jensen	Rupture; leak	53.2	53.2	NA, indoors	Equipment Pit	Required (Form H.3)	N/A
ELMES 300 Ton Press	231	Rm 1944	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	834	834	General	Equipment Pit	>834	PLS	Dione Ancheta	Rupture; leak	83.4	83.4	NA, indoors	Equipment Pit	Required (Form H.3)	N/A
M437 Hurco Machine Tool	383	Rm 100	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	60	60	General	Spill kit	8	ENG/ST	John Benedict	Rupture; leak	6	6	Inside Room	Spill kit	Required (Form H.3)	N/A
M470 Mori Seiki DuraVertical 5100 Mill	383	Rm 100	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	79	79	General	Spill kit	8	ENG/ST	John Benedict	Rupture; leak	7.9	7.9	Inside Room	Spill kit	Required (Form H.3)	N/A
M472 Mori Seiki DuraVertical 5100 Mill	383	Rm 100	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	79	79	General	Spill kit	8	ENG/ST	John Benedict	Rupture; leak	7.9	7.9	Inside Room	Spill kit	Required (Form H.3)	N/A
M433 Hurco Machine Tool	383	Rm 100	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	80	80	General	Spill kit	8	ENG/ST	John Benedict	Rupture; leak	8	8	Inside Room	Spill kit	Required (Form H.3)	N/A
G144 Blanchard Grinder	432	Rm 1200	Inside	Operating Equipment	Grinder	Oil-Based Machining Coolant	60	60	General	Building	150	ENG/ST	John Benedict	Rupture; leak	6	6	Inside Room	Building	Required (Form H.3)	N/A
G185 Blanchard Grinder	432	Rm 1200	Inside	Operating Equipment	Grinder	Oil-Based Machining Coolant	80	80	General	Building	150	ENG/ST	John Benedict	Rupture; leak	8	8	Inside Room	Building	Required (Form H.3)	N/A
SM345 Hydraulic Press Break	511	Rm 159	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	100	100	General	Sorbent	30	F&I	Greg Healy	Rupture; leak	10	10	Inside Building/Level	Sorbent	Required (Form H.3)	N/A
SM368 Hydraulic Shear	511	Rm 159	Inside	Operating Equipment	Hydraulic Shear	Hydraulic Oil	89	89	General	Sorbent	30	F&I	Lyle Perry	Rupture; leak	8.9	8.9	Inside Building/Flows north out roll-up door 15ft away	Sorbent	Required (Form H.3)	N/A
M446 Hurco VMX 40 Mill	691	Rm 122	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	80	80	General	Building	130	ENG/ST	John Benedict	Rupture; leak	8	8	Inside Room	Building	Required (Form H.3)	N/A
HSU / Hydraulic System for Shredder	695	Rm 1040	Inside	Operating Equipment	Hydraulic Shredder	Hydraulic Oil	84	84	General	Berm	1121	RHWM	Craig Loll	Rupture; leak	8.4	8.4	NA, indoors	Berm	Required (Form H.3)	N/A
Shredder and chopper (RCRA permitted)	695	Rm 1040	Inside	Operating Equipment	Hydraulic Shredder	Hydraulic Oil	84	84	General	Berm	3167	RHWM	Craig Loll	Rupture; leak	8.4	8.4	NA, indoors	Berm	Required (Form H.3)	N/A
M469 Mori Seiki DuraVertical 5100 Mill	132S	Rm 1559	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	79	79	General	Spill Kit	8	ENG/ST	John Benedict	Rupture; leak	7.9	7.9	Inside Room	Spill Kit	Required (Form H.3)	N/A
M445 Hurco VMX 40 Mill	132S	Rm 1559	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	80	80	General	Spill Kit	8	ENG/ST	John Benedict	Rupture; leak	8	8	Inside Room	Spill Kit	Required (Form H.3)	N/A
G129 Blanchard Grinder	321A	Rm 1000	Inside	Operating Equipment	Grinder	Oil-Based Machining Coolant	220	220	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	22	22	Inside Room	Spill Kit	Required (Form H.3)	N/A

Table C-3 Livermore SPCC Inventory -- Operating Equipment

Equipment ID	Building	Room	Inside/ Outside	Equipment Type	Storage Type	Container Contents	Largest Container Capacity (gal)	Total Capacity (gal)	General Containment/Sized Containment	Secondary Containment Type	Secondary Containment Capacity (gal)	Organization ID	Program Contact	Potential Failure Type	Reasonably Expected Maximum Release (gal)	Maximum Release Rate (gal/min)	Flow Direction	Containment	Semi-Annual Inspection	Other Inspections
L22 Axelson	321A	Rm 1000	Inside	Operating Equipment	Lathe	Oil-Based Machining Coolant	60	60	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	6	6	Inside Room	Spill Kit	Required (Form H.3)	N/A
L648 Okuma Lathe	321A	Rm 1000	Inside	Operating Equipment	Lathe	Oil-Based Machining Coolant	80	80	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	8	8	Inside Room	Spill Kit	Required (Form H.3)	N/A
L649 Okuma Captain 1470 Lathe	321A	Rm 1000	Inside	Operating Equipment	Lathe	Oil-Based Machining Coolant	100	100	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	10	10	Inside Room	Spill Kit	Required (Form H.3)	N/A
M473 Mori Seiki Dura Vertical 5100 Mill	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	79	79	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	7.9	7.9	Inside Room	Spill Kit	Required (Form H.3)	N/A
M474 Mori Seiki Dura Vertical 5100 Mill	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	79	79	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	7.9	7.9	Inside Room	Spill Kit	Required (Form H.3)	N/A
M478 Mori Seiki Dura Vertical 5100 Mill	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	79	79	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	7.9	7.9	Inside Room	Spill Kit	Required (Form H.3)	N/A
M479 Mori Seiki Dura Vertical 5100 Mill	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	79	79	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	7.9	7.9	Inside Room	Spill Kit	Required (Form H.3)	N/A
M487 Mori Seiki Dura Vertical 5100 Mill	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	79	79	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	7.9	7.9	Inside Room	Spill Kit	Required (Form H.3)	N/A
M447 Hurco VMX 50 Mill	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	100	100	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	10	10	Inside Room	Spill Kit	Required (Form H.3)	N/A
M667 Mazak Mill	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	105.7	105.7	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	10.57	10.57	Inside Room	Spill Kit	Required (Form H.3)	N/A
B26 WoTan Rapid 1 Mill	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	120	120	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	12	12	Inside Room	Spill Kit	Required (Form H.3)	N/A
M448 Hurco VMX 64	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	120	120	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	12	12	Inside Room	Spill Kit	Required (Form H.3)	N/A
M485 Mori Seiki NVX-7000/40	321A	Rm 1000	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	237.6	237.6	General	Spill Kit	60	ENG/ST	Steve Stafford	Leak	23.76	23.76	Inside Room	Spill Kit	Required (Form H.3)	N/A
Oil Quench Tank	321A	Rm 1001A	Inside	Operating Equipment	Oil Quench Tank	Insulating Oil	1000	1000	General	Building	3874	ENG/ST	Steve Stafford	Leak	100	100	Inside Building	Building	Required (Form H.3)	N/A
SE430 Guyson Corp Parts Washer	321A	Rm 1126	Inside	Operating Equipment	Parts Washer	Cleaning Solution	92	92	General	Building	199	ENG/ST	Steve Stafford	Rupture; leak	9.2	9.2	Inside Room	Building	Required (Form H.3)	N/A
P26 Erie Hydraulic Press	321A	Rm 1153	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	140	140	General	Sump	2840	ENG/ST	Steve Stafford	Rupture; leak	14	14	NA, indoors	Sump	Required (Form H.3)	N/A
P27 Cincinnati Hydroform Press	321A	Rm 1153	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	220	220	General	Sump	2840	ENG/ST	Steve Stafford	Rupture; leak	22	22	NA, indoors	Sump	Required (Form H.3)	N/A
SM357 Cincinnati Press	321C	Rm 1315B	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	125	125	General	Spill Kit	13	ENG/ST	Blaine Beith	Rupture; leak	12.5	12.5	Inside Room	Spill Kit	Required (Form H.3)	N/A
L629 Moore Lathe	321C	Rm 1351	Inside	Operating Equipment	Lathe	Oil-Based Machining Coolant	88	88	General	Building	312	ENG/ST	Larry Sage	Leak	8.8	8.8	Inside Room	Building	Required (Form H.3)	N/A
L632 Pneumo Lathe	321C	Rm 1351	Inside	Operating Equipment	Lathe	Oil-Based Machining Coolant	88	88	General	Building	312	ENG/ST	Larry Sage	Leak	8.8	8.8	Inside Room	Building	Required (Form H.3)	N/A
L633 Moore Lathe	321C	Rm 1351	Inside	Operating Equipment	Lathe	Oil-Based Machining Coolant	88	88	General	Building	312	ENG/ST	Larry Sage	Leak	8.8	8.8	Inside Room	Building	Required (Form H.3)	N/A
L634 Pneumo Lathe	321C	Rm 1351	Inside	Operating Equipment	Lathe	Oil-Based Machining Coolant	88	88	General	Building	312	ENG/ST	Larry Sage	Leak	8.8	8.8	Inside Room	Building	Required (Form H.3)	N/A
SM200 Chicago Dreis & Krump Hydraulic Press	321C	Rm 1411C	Inside	Operating Equipment	Hydraulic Press	Hydraulic Oil	170	170	General	Spill Kit	17	ENG/ST	Blaine Beith	Rupture; leak	17	17	Inside Room	Spill Kit	Required (Form H.3)	N/A
SM350 Atlantic Machine Tool Shear	321C	Rm 1411C	Inside	Operating Equipment	Hydraulic Shear	Lubricating Oil and Dielectric Oil	80	80	General	Spill Kit	17	ENG/ST	Blaine Beith	Rupture; leak	8	8	Inside Room	Spill Kit	Required (Form H.3)	N/A
M467 Mori Seiki NDV 4000 DCG Mill	321C	Rm 1415	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	89.76	89.76	General	Spill Kit	60	ENG/ST	Paul Alexander	Rupture; leak	8.976	8.976	Inside Room	Spill Kit	Required (Form H.3)	N/A
M377 Mazak	321C	Rm 1415	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	100	100	General	Spill Kit	60	ENG/ST	Paul Alexander	Rupture; leak	10	10	Inside Room	Spill Kit	Required (Form H.3)	N/A
M468 Mori Seiki NDV 6000 DCG Mill	321C	Rm 1415	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	158.4	158.4	General	Spill Kit	60	ENG/ST	Paul Alexander	Rupture; leak	15.84	15.84	Inside Room	Spill Kit	Required (Form H.3)	N/A
L667 Hardinge T42 Lathe	321C	Rm 1437A	Inside	Operating Equipment	Lathe	Oil-Based Machining Coolant	85	85	General	Building	374	ENG/ST	Larry Sage	Leak	8.5	8.5	Inside Room	Building	Required (Form H.3)	N/A
M444 Mikron VCP 1350	321C	Rm 1437A	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	75	75	General	Building	374	ENG/ST	Larry Sage	Leak	7.5	7.5	Inside Room	Building	Required (Form H.3)	N/A
M483 Mori Seiki NVD6000 Mill	321C	Rm 1437A	Inside	Operating Equipment	Mill	Oil-Based Machining Coolant	90	90	General	Building	374	ENG/ST	Larry Sage	Leak	9	9	Inside Room	Building	Required (Form H.3)	N/A
SE417 EDNC Plunge EDM Unit	321C	Rm 1437S	Inside	Operating Equipment	EDM Unit	Dielectric Oil	270	270	General	Building	299	ENG/ST	Larry Sage	Rupture; leak	27	27	Inside Room	Building	Required (Form H.3)	N/A
SE377 Makino Plunge	321C	Rm 1437S	Inside	Operating Equipment	Plunge	Oil-Based Machining Coolant	86	86	General	Building	299	ENG/ST	Larry Sage	Leak	8.6	8.6	Inside Room	Building	Required (Form H.3)	N/A
SE423 Sodick EDM Unit	321C	Rm 1441	Inside	Operating Equipment	EDM Unit	Dielectric Oil	145	145	General	Building	196	ENG/ST	Larry Sage	Leak	14.5	14.5	Inside Room	Building	Required (Form H.3)	N/A

Appendix D

Secondary Containment Calculations

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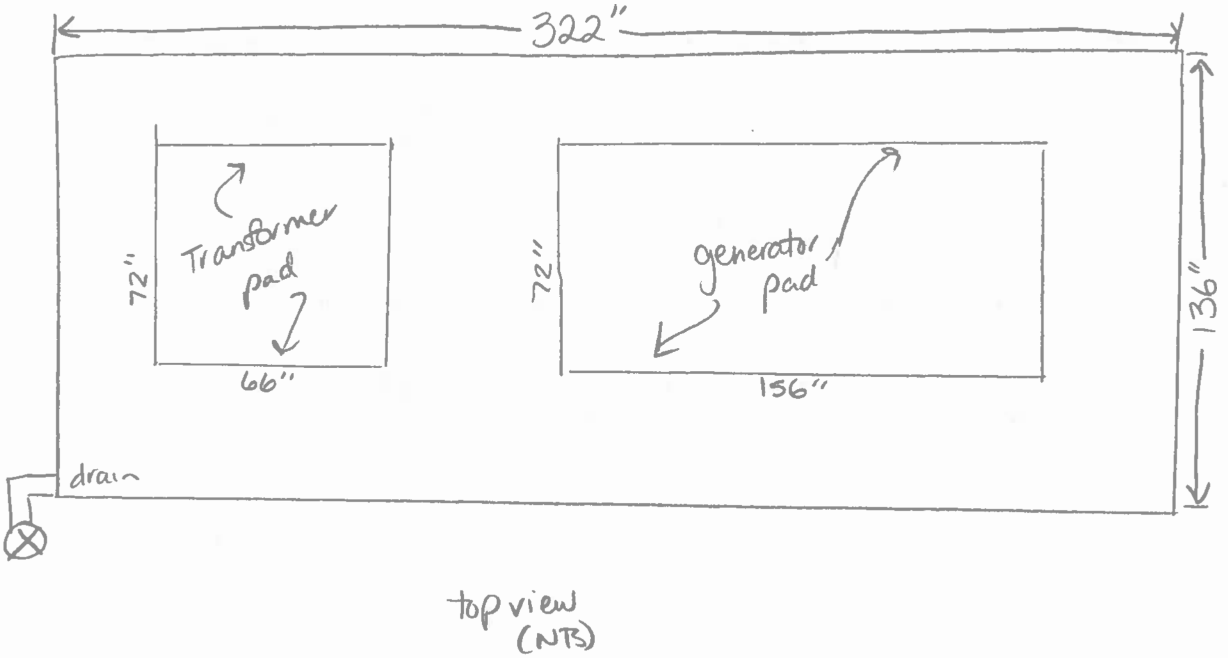
Appendix D, Secondary Containment Calculations Table of Contents

256-01 Secondary Containment Calculations



256-01 Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

The total secondary containment volume is the volume of the rectangular bermed area.

V_T= L*W*H = 136 in * 322 in * 5.5 in = 240856 in^3 * 0.004329 gal/in^3 = 1043 gallons

B. Calculation of Displacement Inside Secondary Containment (V_D)

There are two concrete pads on which the transformer and the generator sit.

V_{D1} = 72 in * 66 in * 5.5 in = 26136 in^3 * 0.004329 gal/in^3 = 113 gallons
V_{D2} = 72 in * 156 in * 5.5 in = 3072 in^3 * 0.004329 gal/in^3 = 267 gallons
V_{DT} = V_{D1} + V_{D2} = 113 gallons + 267 gallons = 380 gallons

C. Precipitation Volume (V_P)

D = 25-year, 24-hour storm event = 3.7-inches

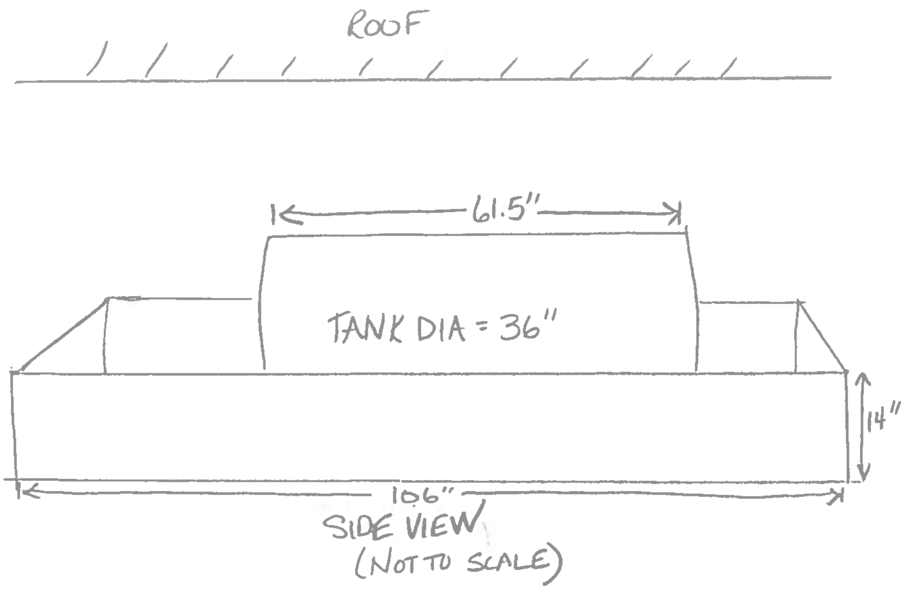
Total surface area of secondary containment for one bay (both bays will have same rainfall volume):
A = 136 in * 322 in = 43792 in^2
V_P = A*D = 43792 in^2 *3.7 in = 162030 in^3*0.004329 gal/in^3 = 701 gallons

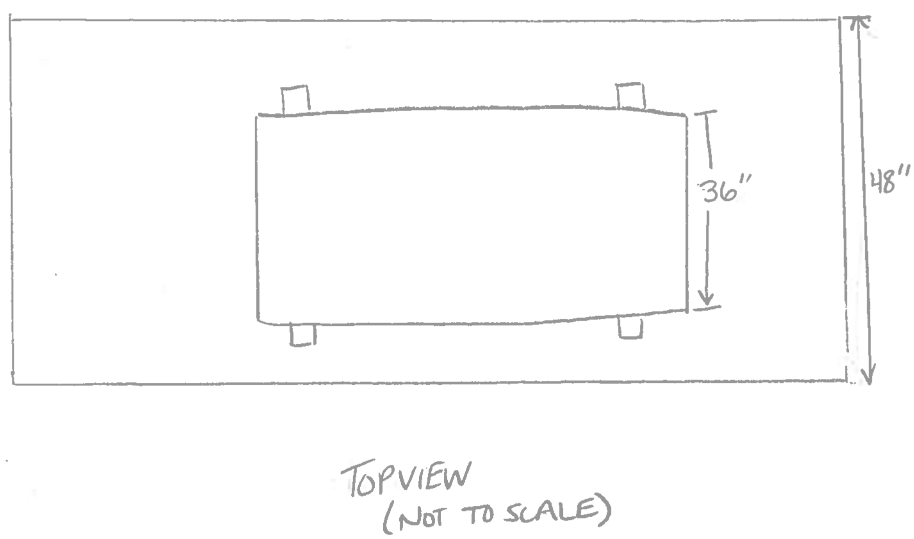
D. Net Total Secondary Spill Containment Capacity (V_N)

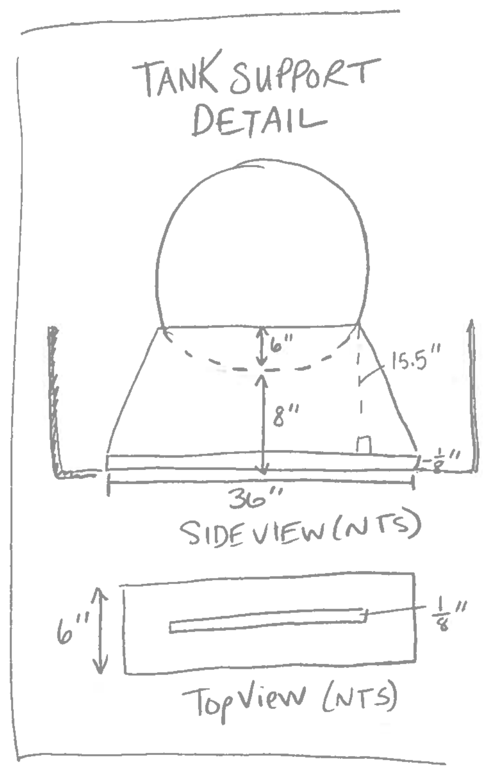
V_N = V_T – V_D - V_P = 1043 gallons – 380 gallons – 701 gallons = -39 gallons

The largest volume of oil contained at this location is 160 gallons. Therefore, the net containment capacity of the secondary containment system at this location is NOT sufficiently sized to contain the contents of the largest container plus sufficient freeboard to contain the 25-year, 24-hour storm event. The net secondary containment volume without precipitation is 663 gallons which is sized to contain 110% of the largest container volume.

Tank 490-D2A1 Secondary Containment Calculations







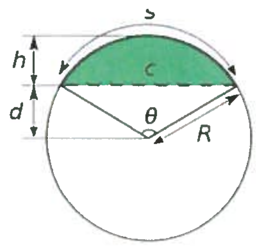
Tank 490-D2A1 Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

Total volume of secondary containment (V_T = LxWxH):
V_T = 48 in x 106 in x 14 in = 71,232 in^3 x 0.004329 gal/in^3 = 308.4 gallons

B. Calculation of Displacement from Equipment and Pads (V_{DT})

V_1: Fraction of tank volume within secondary containment plane is the area of the circular segment:



R = 18 inches
h = 6 inches

$V_1 = R^2$*arccos((R-h)/R)-(R-h)*SQRT(2Rh-h^2) * L = 18^2*arccos((18-6)/18)-(18-6)*SQRT(2*18*6-(6^2)) *61.5 = 6857.8 in^3 = 6857.8 in^3 x 0.004329 gal/in^3 = 29.7 gallons

V_2: Volume of tank supports (calculated as rectangles):

V_2 = 2 x (36 in x 6 in x 0.125 in) + 2 x (36 in x 14 in x 0.125 in) = 180 in^3 x 0.004329 gal/in^3 = 0.8 gallons

$V_{DT} = V_1 + V_2$ = 29.7 gallons + 0.8 gallons = 30.5 gallons

C. Precipitation Volume (V_P)

No freeboard because tank is under cover.

V_P = 0 ft^3

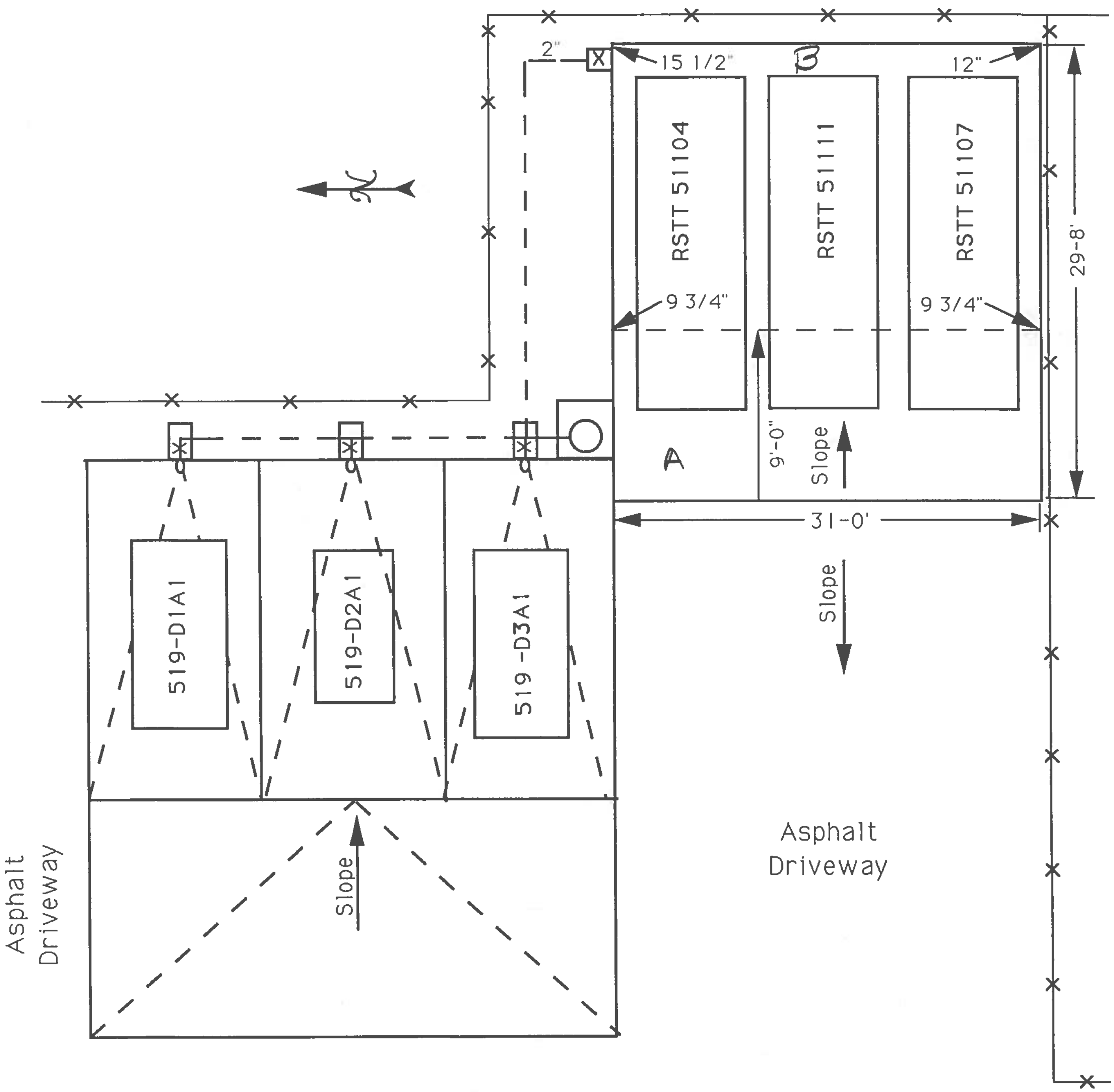
D. Net Total Secondary Spill Containment Capacity (V_N)

$V_N = V_T - V_{DT} - V_{PT}$ = 308.4 gallons -30.5 gallons – 0 gallons = 277.9 gallons

The largest volume of oil contained in equipment at this location is 200 gallons. Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container.

Building 519 Tanker Parking Secondary Containment Calculations

The Building 519 Tank Truck Parking area is approximately 31' x 29'8". The floor is sloped to the northeast towards a drainpipe. The drainpipe is provided with a valve that is kept in the closed position.



Building 519 Tanker Parking Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

The total secondary containment volume for the parking area is calculated by adding the volume of a rectangular prism indicated by an A on the Figure (V_A) and a rectangular prism indicated by B on the figure (V_B).

V_A = 9ft x 0.5*(31ft x 0.813ft) = 113.4 ft^3 *7.48 gallons/ft^3= 848.3 gallons

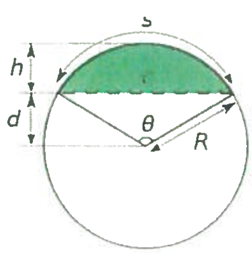
The average height of the rectangular prism is 11.75 inches = 0.979 ft,

V_B = 31'*20'8"*0.979' = 31ft*20.67ft*0.979ft = 627.2 ft^3*7.48 gallons/ft^3= 4691.5 gallons

$V_T = V_A + V_B$ = <u>5540 gallons</u>

B. Calculation of Displacement from Equipment and Pads (V_D)

Assuming 3 tanker trucks (12 tires) are parked in secondary containment and only wheels (41.5-inch diameter, 9.5-inches wide) are partially within the berm (worst case trucks parked all the way at back):



R = 20.75 inches
h = 11.75 inches

V_D = 12*[R^2*arccos((R-h)/R)-(R-h)*SQRT(2Rh-h^2) * L] = 12* [20.75^2*arccos((20.75-11.75)/20.75)-(20.75-11.75)*SQRT(2*20.75*11.75-(11.75^2)) *9.5] = 35897.7 in^3 = 35897.7 in^3 x 0.004329 gal/in^3 = <u>155.4 gallons</u>

C. Precipitation Volume (V_P)
D = 25-year, 24-hour storm event = 3.7-inches (0.31 ft)

Total surface area of secondary containment

A = 31"*29'8" = 31 ft*29.67 ft = 919.7 ft^2

V_P = A*D = 919.7 ft^2 *0.31 ft = 285.1 ft^3*7.48 gallons/ft^3= <u>2132.8 gallons</u>

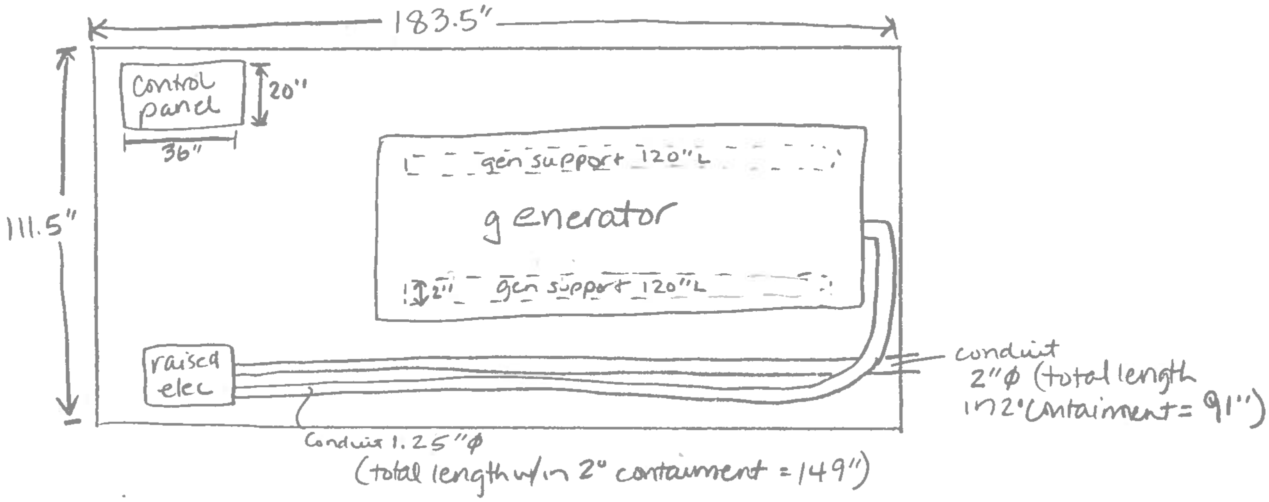
D. Net Total Secondary Spill Containment Capacity (V_N)

Building 519 Tanker Parking Secondary Containment Calculations

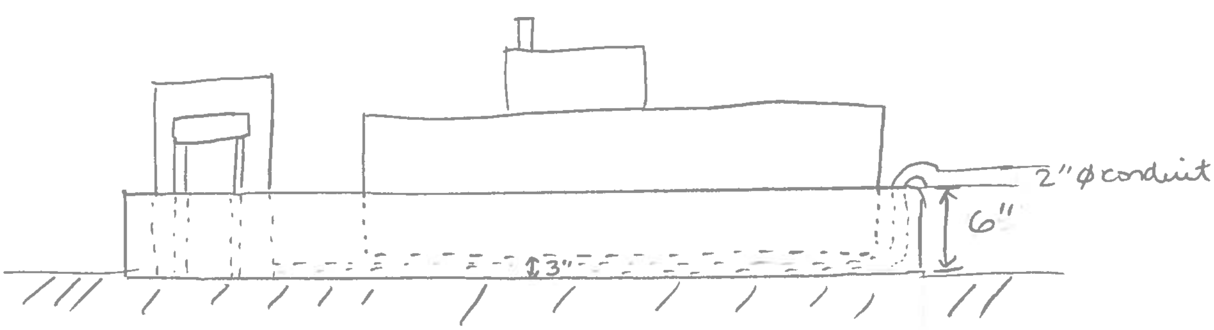
$V_N = V_T - V_D - V_P$ =5540 gallons -155.4 gallons – 2132.8 gallons = 3251.6 gallons

The largest volume of oil contained in equipment at this location is 2200 gallons. Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container plus freeboard for precipitation from the 25-year, 24-hour storm event.

GDE-663-01 Secondary Containment Calculations



top view (NTS)



side view (NTS)

GDE-663-01 Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

The total secondary containment volume for the berm is the volume of the rectangular prism.

V_T = L*W*H = 183.5 in * 111.5 in * 6 in = 122,761.5 in^3 * 0.004329 gal/in^3 = <u>531.4 gallons</u>

B. Calculation of Displacement from Other Equipment Inside Secondary Containment (V_D)

V_{D1}: Fraction of Electrical control panel within secondary containment

V_{D1} = L*W*H = 20inches * 36 inches * 6 inches = 4,320in^3 * 0.004329 gal/in^3 = 18.7 gallons

V_{D2}: Volume of conduits:

V_{D2} = (112 in+37in)* π * $(1.25 \text{ in}/2)^2$ + 91 in* π * $(2\text{in}/2)^2$ = 468.7 in^3 * 0.004329 gal/in^3 = 2 gallons

V_{D3}: Volume of generator foot supports:

V_{D3} = 2*(3 in*120in*2in) = 1,440 in^3 x 0.004329 gal/in^3 = 6.2 gallons

$V_D = V_{D1} + V_{D2} + V_{D3}$ = 17.1 gallons + 2 gallons + 6.2 gallons = <u>25.3 gallons</u>

C. Precipitation Volume (V_P)

D = 25-year, 24-hour storm event = 3.7-inches

Total surface area of secondary containment

A = 183.5 in*111.5 in = 20460.25 in^2

V_P = A*D = 20460.25 in^2*3.7 in = 75703 in^3*0.004329 gal/in^3 = <u>328 gallons</u>

D. Net Total Secondary Spill Containment Capacity (V_N)

$V_N = V_T - V_D - V_P$ = 531.4 gallons – 25.3 gallons – 328 gallons = <u>178.1 gallons</u>

The largest volume of oil contained in equipment at this location is <u>140 gallons.</u> Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container plus freeboard for precipitation from the 25-year, 24-hour storm event.

Appendix XIV.1-D.1

Secondary Containment Report for Area 612 Tank Trailer Storage Unit

Secondary Containment Report
for
Building 612 Facility (Building 612 Complex)
Area 612 Tank Trailer Storage Unit

October 18, 1991

By:

Kamran M. Nemati
&
John S. Bowers

REGISTERED PROFESSIONAL ENGINEER
KAMRAN MOSTASHAR NEMATI
C 35183
Expires 4-98
CIVIL
STATE OF CALIFORNIA

University of California
Lawrence Livermore National Laboratory

Certification for Area 612 Tank Trailer Storage Unit

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

[signature] OCTOBER 22, 1991

Name Date

Table of Contents

Executive Summary

This report was prepared to meet the requirements of Title 40 of the Code of Federal Regulations, Section 270.15 (a) (1-4) [40 CFR 270.15] (a) (1-4)] and Title 22 of the California Code of Regulations, Section 66270.15 (a) (1-4) [22 CCR Section 66270.15 (a) (1-4)] as the requirements pertain to the design and capacity of the containment system (i.e., secondary containment system) for the waste management unit: Area 612 Tank Trailer Storage Unit.

The report presents an evaluation of the unit's containment system. The evaluation is based on the criteria in 40 CFR 264.175 and 22 CCR Section 66264.175.

This unit has a total storage capacity of 5,000 gallons of regulated waste. The regulatory secondary containment capacity is 8320 gallons. The largest container used to store liquid waste is 5000 gallons.

The secondary containment for this unit is free from defects which could result in leaks, it is sloped to provide for easy and timely removal of accumulated liquids and to provide for protection of elevated wastes coming into contact with accumulated liquids.

Run-on and precipitation is managed by personnel. This unit has no roof and only minor structural protection from rain. It can collect precipitation. Run-on is prevented by a grade, and a swale.

Subject:

This is a report on the adequacy of containment within the Area 612 Tank Trailer Storage Unit.

Scope:

The scope of this report is to evaluate secondary containment criteria based on the regulations found in 40 CFR 264 subpart I (264.175) and 22 CCR Article 9 (66264.175). This report is intended to cover all aspects of the secondary containment criteria. This report does not cover structural criteria that is not related to secondary containment.

Reference Drawings :	Civil	PLC 83 625 002DA
	Civil	PLC 83 625 003DA

Slope or Drainage:

Secondary containment area for this container storage unit consists a loading dock. The dock slopes to the west (with varying grade). The usable floor space is that of a rectangle. The containment area is sloped from east to west an is about 4' deep to the north (with a blind sump). This provides for drainage of accumulated liquids. This drainage allows personnel to remove these liquids in a timely manner by pumping or some other means. The drainage in conjunction with elevated storage (like drums on pallets, portables on skids, or a tanker on a trailer) allows for prevention of containers coming into contact with accumulated liquids.

Prevention of Migration:

The floor of this unit is constructed of 6" of reinforced concrete. There are no leaks cracks or gaps which can provide for liquid channeling through the containment area. The berm area is painted with a high solids epoxy, latex, or acrylic enamel These "coatings" along with the concrete itself, make the containment area substantially impervious to the wastes stored in this unit.

Run-on and Precipitation

Precipitation accumulation is managed by personnel. This unit can contain all of the waste stored as well as the projected rainfall (25 hr-25 yr worst rainstorm). A swale, ramps, and berms provide prevention of run-on. The rain catchment is calculated below.

Secondary Containment Calculations

This containment area is a loading dock. There is varying grade, a frustum, and a sump in this containment. The sump is 3' by 2' by 2' or 12 cubic feet. The frustum appears on a "flat" plan in space with a height from the sump to the edge of the flat frustum of (637.90 FAS - 637.86 FAS) .04 feet. The sump area is 2' by 2' or 4 square feet. The span of this frustum is 32' while the width is 9', so the large area of the frustum is 32•9 = 288 square feet. The volume of this frustrum is given below:

$$V \equiv \frac{h}{3} \bullet (B + b + \sqrt{B \bullet b})$$

V ≡ Volume of the (ft^3)

h ≡ Height of the Frustum = 0.167 ft^3

B ≡ Area of the Large Base = 960 ft^2 east and 1350 ft^2 west

b ≡ Area of the Small Base = 4 ft^2

$$V \equiv \frac{.04}{3} \bullet (288 + 4 + \sqrt{288 \bullet 4}) = 4.35 \text{ ft}^3 \text{ or 33 gallons}$$

The next volume up behaves like a triangular prism where:

$$V \equiv \frac{1}{2} \bullet A \bullet h$$

V ≡ Total Containment Volume (ft^3)

A ≡ Effective Containment Area = 288 ft^2

h ≡ Vertical Depth of the Prism = (638.53 ft - 637.86 ft) = 0.670 ft

$$V = \frac{1}{2} \bullet 288 \bullet .670 = 192.96 \text{ ft}^3 \text{ or 1443 gallons}$$

The next volume up behaves like a rectangular width where:

$$V \equiv A \bullet h$$

V ≡ Total Containment Volume (ft^3)

A ≡ Effective Containment Area = 288 ft^2

h ≡ Vertical Depth of the Prism = (638.53 ft - 641.90 ft) = 3.37 ft

$$V = 288 \bullet 3.37 = 970.56 \text{ ft}^3 \text{ or 7260 gallons}$$

Similarly the rest of the volumes behave as triangular prisms and rectangle with width (the top elevation will remain 641.9, "lowest top")

$$V = \frac{1}{2} \bullet A \bullet h + A \bullet H = A \bullet (\frac{1}{2} \bullet h + H)$$

V ≡ Total Containment Volume (ft^3)
A ≡ Effective Containment Area = 288 ft^2
h ≡ Vertical Depth of the Prism
H ≡ Vertical Depth of the rectangle

The next grade the equations and calculations are as follows:

639.24 - 638.53 = h = .710, and 641.9 - 638.53 = H = 3.37, and 6.75•9 = A = 60.75

$$V = 60.75 \bullet (\frac{1}{2} \bullet .71 + 3.37) = 226.29 \text{ ft}^3 \text{ or } 1693 \text{ gallons}$$

The next grade the equations and calculations are as follows:

641.84 - 639.24 = h = 2.60, and 641.9 - 641.84 = H = .06, and 12.82•9 = A = 115.38

$$V = 115.38 \bullet (\frac{1}{2} \bullet 2.60 + .06) = 156.92 \text{ ft}^3 \text{ or } 1174 \text{ gallons}$$

So that the total volume = V = 33 + 1443 + 7260 + 1693 + 1174 = 11603

The displacement caused by elevating devices can be conservatively estimated by using a tank trailer dimensions. The tank itself is above grade. The trailer parts are below grade. A trailer is assumed to be 50 ft by 8 ft by 8 in thick with 10 wheels 3 ft by 8.25" , 3 axles 6" diameter, and suspension and braking included in trailer displacement.

Wheels:	$10 \bullet \pi \bullet (\frac{1}{4} \bullet 3^2 \bullet (8.25/12)$	= 48.60 ft^3
Axles:	$3 \bullet \pi \bullet (\frac{1}{4} \bullet 0.5^2 \bullet 5.25$	= 3.09 ft^3
Other Structures:	50•8•(8/12)	= 266.67 ft^3
Total		= 318.36 ft^3 or 2381 gallons say 2383 gal.

The worst case rainfall direction is any direction (no rain projection from any structures any way). The rainfall is as follows:

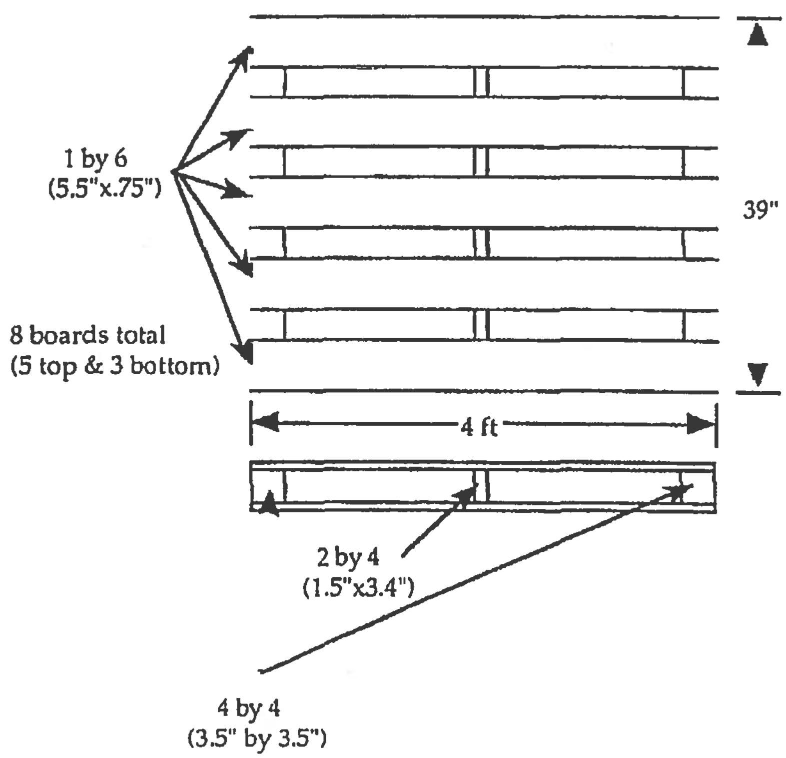
(32 + 6.75 + 12.82)•9)•(3.11/12) = 120.29 cubic feet or 900 gallons

Value description	*Value*
total secondary containment:	11603 gallons
total displacement:	2383 gallons
total rainfall accumulation:	900 gallons
regulatory containment (net):	8320 gallons
largest container to store liquids:	5000 gallons
maximum storage capacity:	5000 gallons
adequate secondary containment:	YES

Appendix A

Displacement due to container storage devices:

Containers will not cause displacement since they will be stored elevated by some means such as pallets, skids, stanchions or legs, dollies, and trucks. This not only gives efficient use of containment, it also provides for ease in container handling and prevention of wastes coming into contact with standing liquids. It provides enhanced segregation and quick access in case of an emergency. These devices which do elevate the containers will cause some displacement of liquids such as rainwater. The conservative approach is to estimate the volume per area of floor space consumed by displacement of the more common large elevating device. The device to estimate displacement is the wooden pallet. The wooden pallet is used throughout the facilities to elevate wastes. This type of device also displaces volume greater than our portable tank skids, wooden and metal box legs, and galvanized steel pallets. The wooden pallet displacement volume per unit area is somewhat comparable to our secondary containment pallet, dolly, and truck displacements. The common pallet is 4 feet by 39 inches and is constructed of 1" by 6" (top and bottom platform), 4" by 4" (end platform supports), and 2" by 4" (center platform support). The diagram below depicts a wooden pallet.



These pallets consume the following volume per square foot:

$$DF = \frac{2 \bullet 3.25 \bullet (\frac{3.5}{12})^2 + 3.25 \bullet (\frac{1.5 \bullet 3.5}{12^2}) + 8 \bullet 4 (\frac{.75 \bullet 5.5}{12^2})}{4 \bullet 3.25} = 0.122 \frac{ft^3}{ft^2}$$

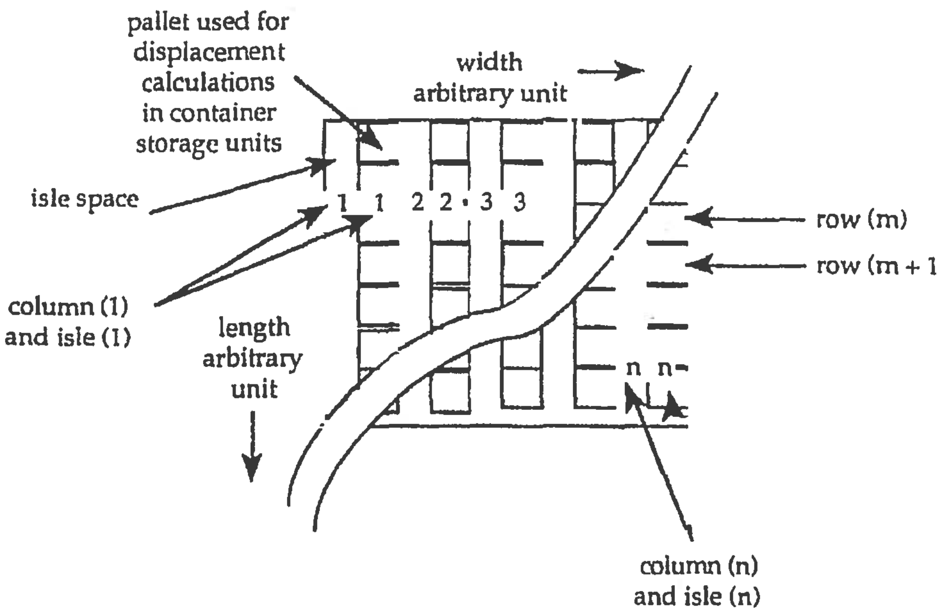
DF ≡ The displacement factor (ft)

note: standard wood dimensions are used

This impact is quite small, but does have significance when combined. We will take it into consideration in our calculations. Many containment areas have maximum depths of less than that of the pallet height which is 5″. In these instances we will take the fraction of the containment height with 5″ to develop a new displacement factor.

Since all secondary containment areas are not rectangular, and there may be a multitude of storage arrangements in each container storage unit, we must develop a mathematical expression to estimate the displacement volume taken up by the various equipment. The pallet displacement factor is used for all equipment displacements for container storage units (see above discussion which justifies this as the conservative approach).

The amount of pallet area which can be stored on a containment floor varies for each unit. Isle space is required in between columns of waste. There will be one more isle than there will be columns for a given area. The amount of displacement volume can be estimated without defining a particular pattern. This can be done by first calculating the "effective area" for storage then calculation a geometric average characteristic length of the floor by taking the square root of the effective area. See figure below for schematic representation.



The equation which will be used to calculate displacement is developed below:

The widths and lengths to define an area as containment can be specified in any manner which is convenient. The only fixed parameter is the effective area. It is important to define the number of displacement volumes that can be placed on the effective area. These displacement volumes must be defined as a function of only Isle space, and effective area. The equations below express this mathematically by first defining arbitrary lengths and widths, then eliminating these arbitrary dimensions by including the effective area. Note that the Displacement volume was discussed above. This displacement volume was derived from the dimensions of a 4′ by 3.25′ pallet.

$$W = n \bullet (4 + IS)$$

$$L = 3.25 \bullet z$$

$$A = L \bullet W = (3.25 \bullet z) \bullet n \bullet (4 + IS) = n \bullet z \bullet (13 + 3.25 \bullet IS)$$

$$n \bullet z = \frac{A}{13 + 3.25 \bullet IS}$$

$n \equiv$ The number of displacement volumes across arbitrary width W

$IS \equiv$ Isle Space of specified width

$z \equiv$ The number of displacement volumes across arbitrary Length L

$A \equiv$ The area defined by arbitrary dimensions L & W

Now that the area is defined in terms of the number of displacement volumes, we can develop our equation for the number of displacement volumes and hence to total displacement caused by these volumes. This development is given below:

$$n \bullet z = \frac{A}{13 + 3.25 \bullet IS} = \text{total number of displacement volumes}$$

$$d_v = 3.25 \bullet 4 \bullet n \bullet z \bullet DF = 13 \bullet \frac{A}{13 + 3.25 \bullet IS} \bullet DF$$

$d_v \equiv$ Displacement Volume (ft^3)

$A \equiv$ Containment Area (ft^2)

$IS \equiv$ Isle Space (ft)

$DF \equiv$ Displacement Factor (ft)

Displacement due to ancillary equipment:

All efforts will be made in this evaluation to subtract away ineffective areas in containment units. The materials (ancillary equipment) taking away from volume due to displacement will be subtracted out of the total volume or subtracted from the total area. This method will give us "effective volumes" or "effective areas" to calculate volumes.

Appendix B

Rainfall As It Relates to Secondary Containment Calculations:

Rainfall Vertical Angle:

Rain is assumed to fall at a 30° angle from the vertical. This is a conservative angle and it will be demonstrated as such in the following discussion. If rain did fall vertically (A 0° angle from the vertical) then roofs which cover many of our containment areas (Hazardous and Mixed Waste Management Units) would provide complete protection from rain. If a 45° angle was chosen, most containment area calculations would show much more rain than they would really collect, and thus show a non-realistic collection of rainfall. Some containment areas would show actually less rainfall than they would actually receive due to the allowance of protection from surrounding structures.

The value of 30° was chosen as a more realistic rainfall angle as well as a conservative one. It is actually more than double the calculated value based on drag coefficient calculations, yet it is still more realistic based on wind speeds and frequencies. The calculation demonstrating the evaluation of this angle is given below.

Rainfall Geographical Direction:

The direction of rainfall will be assumed to be in the direction of greatest impact to the secondary containment area. The direction is also assumed to be the same throughout the duration of the rainfall period. The directions will given as south, southwest, north, northeast, etc. There will be no more refinement of direction (no more than 4 singly split quadrants, 45°). There will be no directions given like "south southwest". This is not necessary to evaluate the greatest impact of rainfall.

Rainfall Amount:

The rainfall will be considered to be 3.11 inches. This "integral rate" of 3.11 inches is the estimated worst case of 24 hour rain storm in 25 years.

References (Engineering and Scientific literature):

Data which support these assumptions are given in the following references:

"Environmental Report For 1989" Lawrence Livermore National Laboratory UCRL - 50027 - 89, Editors John M. Simms et al., 1989 (Limited distribution)

- Discussions of the climate (page 23)
- The wind rose (page 24)
- The frequency of rainfall (page 25)
- Ground elevation contour (page 26)

"Rainfall Depth Duration Frequency Data For California", Department Of Water Resources, July 1988

- Integral Rate of 3.11 inches (25 year, 24 hour worst rainstorm)

"Unit Operations", Published by Krieger 2nd edition, 1990, Written by Foust et al.

- Drag coefficient principles and correlations (chapter 22, correlations on page 612)

"Handbook of Chemistry and Physics", Published by CRC press 68th edition, 1988, Edited by Weast et al.

- Physical properties were obtained air viscosity and density at 640 ft, by interpolation (page F-144)
- Air-Water surface tensions, estimate relative droplet diameter (F-34)

"Perry's Chemical Engineering Handbook", Published by McGraw Hill 50th edition, 1984, Edited by Don W. Green et al.

- Discussion of liquid drops in gases, maximum diameter of droplets along with their prospective velocity (page 5-66)

Prevailing Conditions at LLNL:

The winds are calm and the climate is mild. The most frequent winds occur in a range of 1.0 to 2.9 meters per second (over 30 % of the time). The conservative wind in this range to use will be 2.9 meters per second. This will produce our largest vertical angle. Since the wind direction varies so much in the area, we will use the worst case wind direction. This direction will be "picked" for each containment area in the direction of the maximum rain collection. The direction is determined by examination of the surrounding structures in the area as well as the ancillary equipment associated with the unit(s).

Calculation of the Vertical Angle:

To determine the vertical angle we perform the following:

- Obtain the rain drop "effective" diameter from the typical water drop volume
- Obtain the drag coefficient from correlation
- Determine the Reynolds number from the related drag coefficient
- Calculated the terminal velocity based on the value of the Reynolds number and associated physical properties
- Obtain prevailing wind speeds
- Calculate the vertical angle based on the terminal velocity and the prevailing wind speeds

A typical water droplet "settles" to a volume of 20 to 50 μ-liters in volume. The effective diameter is then (based on a sphere):

$$D_p = \sqrt[3]{\frac{6}{\pi} \bullet V} \qquad D_p = \sqrt[3]{\frac{6}{\pi} \bullet 50 \bullet 10^{-6} \bullet 0.353} = 0.015 \text{ ft}$$

D_p ≡ Rain Drop Effective Diameter

V ≡ Rain Drop Volume

The shape of a drop is not a sphere but is actually shaped by the wind resistance to form a shape of minimum drag. The "sphericity" of the droplet allows for the lowest possible drag coefficient with the effective diameter of the one calculated above. Thus the minimum drag is 0.38 by correlation. With this drag coefficient we can calculate the terminal velocity via Reynolds number as a function of drag coefficient.

The Reynolds number is given by the following:

$$[Re] \equiv \frac{D_p \bullet \rho_g \bullet u_t}{\mu} = \varnothing[C_d] \qquad u_t = \frac{3000 \bullet 1.2 \bullet 10^{-5}}{15 \bullet 10^{-3} \bullet .075} = 40\,\frac{\text{ft}}{\text{s}}$$

$[Re]$ ≡ Reynolds Number =3000

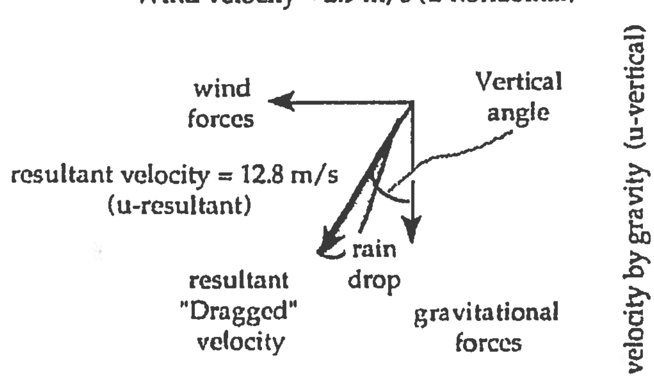
D_p ≡ Rain Drop Effective Diameter = .015 ft

ρ_g ≡ Air Density = .075 $\frac{lb_m}{ft^3}$

u_t ≡ Terminal Velocity \F ((ft,s))

$\mu \equiv$ Air Viscosity $= 1.2 \bullet 10^{-5} \frac{lb_m}{ft \bullet s}$

The resultant velocity is due to drag forces of air resistance. This resistance is caused by wind and gravitational forces. From the resultant velocity and the horizontal velocity of the frequent wind, we can calculate the vertical angle by the arcsine (or inverse sine) of the ratio of horizontal velocity to resultant velocity.
The schematic below along with the associated equation show the relationships:



$$\theta \equiv \sin^{-1}(\frac{u_k}{u_r})$$

$$\theta = \sin^{-1}(\frac{2.9}{12.7}) = 13°$$

The vertical angle is 13°

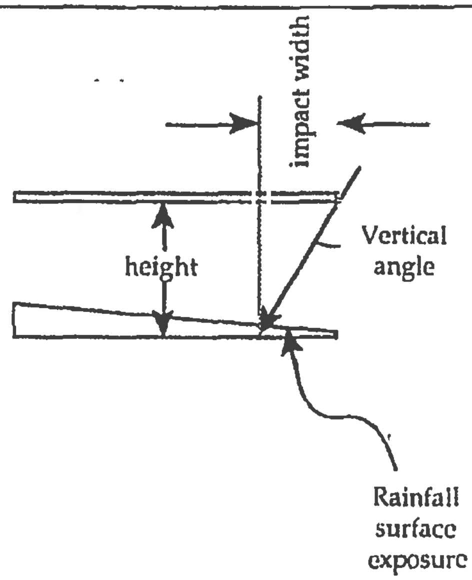
vertical angle = arsine (u-horizontal/u-resultant)

This angle was calculated using various approximations all with sound judgment and engineering validity. But, since the methods used are approximations, we will use a more conservative angle of 30° which is more than double our approximation. This will provide sound estimates of rainwater catchment without the use of an unrealistic vertical angle such as 45°.

Why is the vertical angle needed? As mentioned above many of our containment areas have only limited protection from the rain. This protection is afforded by roofs, slatted fences, adjacent buildings and structures, and other ancillary equipment (Beams, Berms, and Working platforms).

The direction of rainfall will be chosen at the worst direction. The choice is done on the bases of the configurations of the limited protection mentioned above. The direction is chosen such that the protection from rainfall will be at a minimum. This is done since the prevailing wind patterns do not have a unidirectional dominance.

The Rainfall catchment can now be calculated using the height of the major protecting structure such as a roof or working platform, and the tangent of the vertical angle (30°). See the figure and associated equation below:



$$\theta \equiv \text{tangent}(\theta) = \left(\frac{\text{impact width}}{\text{height}}\right)$$

$$\text{height} \bullet \text{tangent}(\theta) = \text{impact width}$$

Lawrence Livermore National Laboratory

HWM 612 Facility
Revised Secondary Containment Calculations
For room 612-100

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Introduction:

In order to comply with 22 CCR 66264.175, facilities that store hazardous liquid wastes must provide adequate secondary containment in order to contain spills that may occur during the course of normal waste handling and storage activities. Lawrence Livermore National Laboratory (LLNL) Hazardous Waste Management (HWM) has recently installed a Size Reduction Unit in the Building 612 Container Storage Unit. The addition of the concrete support footing for the B612 Size Reduction Unit has altered the available secondary containment volume previously available for the storage of liquid waste as calculated by the engineering firm Kellor & Gannon. The secondary containment calculations performed by Kellor & Gannon in June 1996 for the Interim Status Modification for Hazardous Waste Treatment and Storage Facilities, Volume 3, *Building 612 Size Reduction Unit,* assumed a shape and placement of the footing that is different from that which was eventually constructed. The objective of this report is to provide calculations that more accurately reflect the existing containment capacity. The certification documentation for these calculations are included as Attachment 1 of this report. A copy of the original Kellor & Gannon report is included as Attachment 2.

As in the Kellor & Gannon report, the storage floor is divided into six different regions for the purpose of administratively restricting waste volumes. These are referred to as the following:

LLNL HWM Designation	*Kellor & Gannon Designation*
Zone A	North -West Quadrant
Zone B	North -Central Quadrant
Zone C	North -East Quadrant
Zone D	South -West Quadrant
Zone E	South -Central Quadrant
Zone F	South -East Quadrant

Zones C and F share a common sump area. All other zones are independent of each other. Waste volumes are restricted to prevent overflow from one zone to another and to areas outside the B612 Container Storage Unit.

Calculations:

Zone A:

Zone A is modeled as the Frustum of a Pyramid. The maximum depth of the containment volume is 2 in (0.1667 ft) and the low point of the volume is a flat circular region approximately 1 foot in diameter. Please refer to zone dimensions on the attached zone map.

A_1 – 400 sq. ft

A_2 – 0.785 sq. ft

Depth (h) – 0.1667 ft (2 inch)

Equation for Frustum of a Pyramid: $V=h/3[A_1 + A_2 + (A_1 A_2)^{1/2}]$

$V = 0.1667\text{ft}/3[400 \text{ sq. ft} + 0.785 \text{ sq. ft} + 17.72 \text{ sq. ft}]$

V = 23.25 cubic feet or 173 gallons

Denied Volume in Zone A:

The volume excluded from secondary containment is modeled conservatively as the sum of two rectangular wedges. Volume 1 is the west most part of the equipment pad and is 1.125 inches deep. Volume 2 is 3/8 inches deep. There is a compressor permanently installed in zone A. This equipment occupies floor space but denies negligible containment volume. Dimensions can be found on attached zone maps.

$V_1 = 1/2(82 \text{ in})(78 \text{ in})(1.125 \text{ in}) = 3598$ cubic in or 15.6 gallons

$V_2 = 1/2(64 \text{ in})(109 \text{ in})(0.375 \text{ in}) = 1308$ cubic in or 5.7 gallons

$V_1 + V_2 =$ **21.3 gallons**

Net Secondary Containment Zone A:

$V_{zone\ A} = 173$ gal – 22 gal = **151 gallon** containment volume

<u>Zone B:</u>

Due to the position of the Size Reduction Unit equipment pad relative to the, north wall of the 612 facility there is minimal area that can be used to store wastes. The volume corresponding to this area can be approximated conservatively assuming an array of 6 wedges oriented north - south. The deepest point measured in Zone B is 3/4 inches below the datum plane (the level at which a theoretical plane corresponds to the bases of the frusta). The length of zone B from east to west is 30 feet long. For a length of 18 feet, the pad is 72 inches from the wall. The remaining 12 feet of the pad is 121 inches from the wall. Using the law of similar triangles, the depth 5 feet from the deepest point is 1/2 inches deep and 10 feet away is 1/4 inches deep.

Assume 1 wedge near the center is 1/2 inch deep, 5 feet wide, and 72 inches long.

$V_1 = 1/2(0.5 \text{ inches})(60 \text{ inches})(72 \text{ inches}) = 1080$ cubic inches or 4.7 gallons

A portion of the second wedge near the deepest region of the frustum is 72 inches from the wall, The other part is 121 inches from the wall. To simplify conservatively, assume the entire wedge is 72 inches long. The volume for the second wedge is then identical to the first wedge calculated or 4.7 gallons.

Assume the third wedge, located on the west side of Zone B, is 1/4 inch deep, 5 feet wide, and 72 inches long.

$V_3 = 1/2(0.25 \text{ inches})(60 \text{ inches})(72 \text{ inches}) = 540$ cubic inches or 2.3 gallons

The fourth wedge, located on the east side of Zone B, is 1/4 inches deep, 5 feet wide, and 121 inches long.

$V_4 = 1/2(0.25 \text{ inches})(60 \text{ inches})(121 \text{ inches}) = 907$ cubic inches or 3.9 gallons.

Assume the remaining 2 wedges to not contribute to capacity of Zone B.

$V_{zone\,B} = 4.7 + 4.7 + 2.3 + 3.9 = 15.6$ **gallon** containment volume

__Zones C and F:__

Zones C and F share the same collection area and are subdivided only to facilitate this discussion. Zone C and F combined is modeled as a Frustum of a Pyramid. The maximum depth of the containment volume is 2 in (0.1667 ft) and the low point of the volume is a flat rectangular region approximately 4 square feet. Please refer to zone dimensions on the attached zone map.

A_1 – 1350 sq. ft

A_2 – 4 sq. ft

Depth (h) – 0.1667 ft (2 inch)

Equation for Frustum of a Pyramid: $V = h/3[A_1 + A_2 + (A_1 A_2)^{1/2}]$

$V_{total} = 0.1667\text{ft}/3[1350 \text{ sq. ft} + 4 \text{ sq. ft} + 73.5 \text{ sq. ft}]$

$V_{total} = 79.3$ **cubic feet or 593.4 gallons**

Denied Volume in Zone C:

The volume excluded from equipment pad is modeled as a single rectangular shaped wedge. The pad at the deepest point is 3/4 inches from the datum plane for the containment area. Additionally the walls of the Baler/Compactor room (Room 110) exclude a small volume from effective secondary containment. The deepest part of the room is approximately 1.2 inches from the highest point of the containment area. Walls are represented as wedges (east wall and west walls) and as rectangular prisms (south wall). The south and west walls are 5 1/2 inches thick. The east wall projects into the room approximately 13 inches. Dimensions can be found on attached zone maps. An allowance is made to accommodate rainwater that may blow in and any items that may be placed in the area.

Footing Displacement:

$V_1 = 1/2(0.75 \text{ inch})(42 \text{ inches})(63 \text{ inches}) = 992$ cubic inches or 4.3 gallons

Room 110 Displacement:

$V_2 = 1/2(1.2 \text{ in})(5.5 \text{ in})(12.5 \text{ in}) = 41.2$ cu in or 2.1 gallons

$V3 = (1.2 \text{ in})(5.5 \text{ in})(52 \text{ in} + 52 \text{ in}) = 686$ cu in or 3.0 gallons

$V4 = (1/2)(1.2 \text{ in})(13 \text{ in})(89 \text{ in}) = 694$ cu in or 3.0 gallons

$V_{total} = 4.3 + 2.1 + 3.0 + 3.0 = 12.4$ gallons

Denied Volume in Zone F:

10 gallons is disallowed because of the scale.

Other Allowances

30 gallons is disallowed to accommodate rain and items that may be placed in Zones C and F.

Net Combined Secondary Containment for Zones C and F:

$V_{zone\ C\&F} = 593.4$ gal – 12.4 gal – 10 gal - 30 gal = **541 gallon** containment volume

<u>**Zone D:**</u>

Zone D is modeled as the Frustum of a Pyramid. The maximum depth of the containment volume is 2 in (0.1667 ft) and the low point of the volume is a flat circular region approximately 1 foot in diameter. Please refer to zone dimensions on the attached zone map.

$A_1 – 860$ sq. ft

A_2 – 0.785 sq. ft

Depth (h) – 0.1667 ft (2 inch)

Equation for Frustum of a Pyramid: $V = h/3[A_1 + A_2 + (A_1 A_2)^{1/2}]$

V_{total} = 0.1667ft/3[860 sq. ft + 0.785 sq. ft + 25.98 sq. ft]

V_{total} = 49.3 cubic feet or 368 gallons

Denied Volume in Zone D:

The volume excluded from secondary containment is modeled conservatively as the sum of two rectangular wedges. Both wedges are up to 1 inch deep. Dimensions can be found on attached zone maps.

V_1 = 1/2(1 in)(71 in)(78 in) = 2769 cubic inches or **12.0 gallons**

V_2 = 1/2(1 in)(104 in)(64 in) = 3328 cubic in or **14.4 gallons**

$V_1 + V_2$ = 26.4 gallons

Other Allowances

30 gallons is disallowed to accommodate rain and items that may be placed in Zone D.

Net Secondary Containment Zone D:

$V_{zone\ D}$ = 368 gal – 26.4 gal - 30 gal = **311 gallon** containment volume

Zone E:

The containment volume in Zone E is represented by 6 wedges. The maximum depth measure in Zone E was measured at 2 inches. The east west distance is 30 feet across. Assume this 30-foot span is divided into 5-foot wide wedges. The depth of the 2 center wedges is up to 1.3 inches deep. The depth of the wedges on either side is calculated at 0.6 inches each. However, the depth of these wedges will assume to be 1 inch and 0.5 inches each. The wedges at each of the far ends of the span will assume to have zero capacity. From east to west the four wedges used in calculating the volume are numbered 1 through 4.

Wedges 1, 2, and 3 are each 15'3" deep. Wedge 4 is 18'6".

V_1 = 1/2(0.50 inches)(60 inches)(183 inches) = 2,745 cubic inches or 11.9 gallons

V_2 = 1/2(1 inch)(60 inches)(183 inches) = 5,490 cubic inches or 23.8 gallons

$V_3 = V_2$

V_4 = 1/2(0.5 inches)(60 inches)(222 inches) = 3,330 cubic inches or 14.4 gallons

Net Secondary Containment Zone E:

$V_{zone\ E}$ = 11.9 gal + 23.8 gal + 23.8 gal + 14.4 gal = 73.9 gallon containment volume

Summary of Gross Containment Volumes:

Secondary Containment Zones	*Gross Containment Capacity**
612-100 zone A	151 gallons
612-100 zone B	15.6 gallons
612-100 zones C&F	541 gallons
612-100 zone D	311 gallons
612-100 zone E	73.9. gallons

- Does not include pallet displacement

Spill Pallet Displacement:

LLNL Hazardous Waste Management uses one primary type of spill pallet for activities conducted within the HWM Waste Storage yards. These are 48 inch by 48 inch by 5 3/4-inch deep pallets designed to contain approximately 12 gallons of liquid material. For the purposes of this analysis the volume of these pallets will be represented by the sum of 16 individual pyramidal frustum volumes. The contact surface of the individual cells is 25 sq. in. The depth is 2 in *(this is the maximum depth that these cells can displace prior to secondary containment overflow).* The additional capacity provided by these pallets is not added to the calculated capacity for the B612 Container Storage Unit.

A_1 – 25 sq. in or 0.174 sq. ft.

A_2 – 30.25 sq. in or 0.210 sq. ft

Depth (h) - 0.1667 ft (2 inch)

$$V=h/3[A_1 + A_2 + (A_1 A_2)^{1/2}]$$

V = 0.1667ft/3[0.174 sq. ft + 0.210 sq. ft +0.036 sq. ft] = 0.023 cubic ft

Total Volume = 16(0.023 cubic ft) = 0.373 cu ft per or 2.8 gallons per pallet

This number is a conservative value given that the maximum depth of any zone is 2 inches and the area in which the maximum depth is located cannot be fully occupied by a pallet. In practice all pallets will displace less volume.

Each pallet can support four 55-gallon drums or three 85-gallon drums. The number of pallets in a given zone assumes double stacking. Regulations require that each zone must be able to contain 10% of the aggregate volume or the volume of the largest container.

Allowed Waste Volumes Calculations:

Zone A:

Gross Containment Volume: **151 gallons**
Largest Allowed Waste Container: **55-gallon drum**
Assume 4 pallets in Zone A: Pallet displacement is **11 gallons**
Net Containment Volume: 151 - 11 = **140 gallons**
Maximum Allowed Waste Volume: **1,400 gallons**

Zone B:

Gross Containment Volume: **15.6 gallons**
Largest Allowed Waste Container: **85 gallon drum**
Assume 1 pallet in Zone B: Pallet displacement is **2.8 gallons**
Net Containment Volume: 15.6 - 2.8 = **12.8 gallons**
Maximum Allowed Waste Volume: **128 gallons**

Zones C & F Combined:

Effective Containment Volume: **541 gallons**
Largest Allowed Waste Container: **85-gallon drum**
Assume 14 pallets in Zones C & F: Pallet displacement is **39 gallons**
Net Containment Volume: 541 - 39 = **502 gallons**
Maximum Allowed Waste Volume: **5,020 gallons**

Zone D:

Effective Containment Volume: **311 gallons**
Largest Allowed Waste Container: **85-gallon drum**
Assume 8 pallets in Zone D: Pallet displacement is **22 gallons**
Net Containment Volume: 311 - 22 = **289 gallons**
Maximum Allowed Waste Volume: **2,890 gallons**

Zone E:

Effective Containment Volume: **73.9 gallons**
Largest Allowed Waste Container: **55-gallon drum**
Assume 2 pallets in Zone E: Pallet displacement is **5.6 gallons**
Net Containment Volume: 73.9 – 5.6 = **68.3 gallons**
Maximum Allowed Waste Volume: **683 gallons**

Summary of Containment Capacity by Zone

The capacity of each containment zone and volume of liquid waste allowed for storage is as follows:

Zone	Gross Containment Capacity (gallons)	Calculated Waste Storage Quantity (gallons)
A (northwest basin)	140	1,400
B (north central basin)	12.8	128
C & F (east basin)	502	5,020
D (southwest basin)	289	2,890
E (south central basin)	68.3	683
TOTAL	1,012	10,121

Discussion of Allowable Waste Storage Quantity

Zones B and E may be used by LLNL to store more than the calculated maximum of liquid waste provided that there is sufficient capacity available in adjacent Zones C&F and A or C&F and D located to either side respectively. Should there be a catastrophic spill that exceeds the allowed containment volume in these zones, the liquid would migrate to other containment zones. If allowances are made through administrative controls to insure that the amounts stored in Zones C&F and A, or C&F and D account for this, environment is still protected.

Example: Assume LLNL plans to store up to 1,683 gallons liquid waste in Zone E, which is 1000 gallons more than the designed capacity. This can be accommodated by limiting the allowed storage volume in Zones C&F and Zone D to 4,020 gallons and 1,890 gallons respectively. The volume of both zones are reduced 1000 gallons to allow the entire excess to spill into one zone preferentially. This enhances operational flexibility while assuring that secondary containment for the facility is not exceeded.

Attachment 1

U&A Uribe & Associates
2930 Lakeshore Avenue,
Suite Two Hundred
Oakland, California 94610-3614
☎ 510-832-2233 Fax 510-832-2237

Engineering and Environmental Services

Certification of Building 612 Container Storage Unit Secondary Containment Design

I have performed the calculations for and inspected Building 612 secondary containment at Lawrence Livermore National Laboratory to determine if the construction is suitably designed to achieve the requirements of the California Code of Regulations (CCR) Title 26 Division 22 Section 66264.175.

To the best of my knowledge and belief, the containment has the following features:

(1) condition of surfaces: The floor and berms in B612 are free of cracks or gaps and is sufficiently impervious to contain leaks, spills, and precipitation until the material is collected. The floors and berms have been coated with high solids epoxy, latex, or acrylic enamel.

(2) containment area slopes: The floors are sloped which promotes collecting any leaks or spills. In addition containers containing liquid are stored on pallets to protect them from contact with accumulated liquids.

(3) containment volume: There are a total of five independent collection basins in the facility. The containment volume is sufficient to hold an amount equal to the largest container or 10% of the aggregate volume of all the containers stored in the facility, whichever is greater. The facility is enclosed by four walls and a roof and therefore is protected from the full impact of storms. However, when the roll up doors on the east or south end are open, rain can blow in. Containment capacity is sufficient to accommodate this precipitation. Attached is a summary of containment capacity and maximum allowable volume of liquid waste that can be stored in each of the collection areas.

(4) run-on into the containment system: Run-on is minimized by the surrounding grade, swales, weather stripping and ramps. There is sufficient capacity to accommodate rain that is blown into the facility.

I certify under penalty of law that the B612 Container Storage Unit meets the secondary containment requirements of 22 CCR 66264.175. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Diane Spencer

Diane Spencer, P.E., C.H.M.M.
Ch005181

October 25, 1999

Date

REGISTERED PROFESSIONAL ENGINEER
DIANE SPENCER
6/30/01
No. CH005181
Diane Spencer
CHEMICAL
STATE OF CALIFORNIA

The capacity of each containment zone (defined by LLNL) and calculated waste storage capacity is as follows:

Zone	Containment Capacity (gallons)	Calculated Waste Storage Quantity (gallons)
A (northwest basin)	140	1,400
B (north central basin)	12.8	128
C & F (east basin)	502	5,020
D (southwest basin)	289	2,890
E (south central basin)	68.3	683
TOTAL	1,012	10,121

Attachment 2

LAWRENCE LIVERMORE NATIONAL LABORATORY

LIVERMORE, CALIFORNIA

SECONDARY CONTAINMENT CALCULATIONS

BUILDING 412

FINAL REPORT

Submitted by

[illegible]
[illegible]
2600 [illegible]
[illegible]

21 June 199[illegible]

KELLER & GANNON
Engineers & Architects
Quality Services Since 1941

21 June 1996

Ms. Barbara Quivey, P.E.
Mechanical Group Leader
Lawrence Livermore National Laboratories
P.O. Box 5502
Livermore, CA 94551

Subject: Secondary Containment Report
Building 612 Container Storage Unit
Calculations for Building 612

Enclosure: (A) Final Report

Dear Ms. Quivey:

Keller and Gannon has completed the subject report (Enclosure A).

Per Lawrence Livermore National Laboratories direction, we have not considered fire protection water discharge in these calculation.

Please review and comment on subject report.

Yours very truly,

James R. Cranston
Vice President

JRC:cga
16-194-18K

F /PROJ/1619418K/WORD/L0620LT1.JRC
960620-1

2600 Kitty Hawk Road, Suite 103, Livermore, CA 94550-9625
Phone: (510) 455-1480 FAX: (510) 455-1509

TABLE OF CONTENTS

Executive Summary

This report was prepared to meet the requirements of Title 40 of the Code of Federal Regulations, Section 270.15 (a) (1-4) and Title 22 of the California Code of Regulations, Section 66270.15 (1) (1-4) as the requirements pertain to the Building 612 containment system (i.e., secondary containment system) for the waste management unit: Building 612 Container Storage Unit.

The report presents a re-evaluation of the secondary containment system for Building 612 on the Lawrence Livermore National Laboratory site. This re-evaluation was necessary due to the inclusion of the Size reduction Unit into Room 100 of the facility. The evaluation is based on the criteria in 40 CDR 264.175 and 22 CCR Section 66264.175.

This building has a total allowable operating capacity of 7,150 gallons of regulated liquid waste. The regulatory secondary containment capacity is 715 gallons. However, each of the four basins (6 quadrants) within the building are limited to liquid capacities as listed herein. The largest container used to store liquid waste in any basin is 55 gallons.

The secondary containment for this building is free from defects which could result in leaks. It is sloped to provide for easy and timely removal of accumulated liquids and to provide for protection of elevated wastes coming into contact with accumulated liquids.

Run-on and precipitation is managed by prevention. The building is enclosed by four walls and a roof. Run-on is prevented by a berm, grades, and weather stripping. This condition is acceptable.

Subject

This is a report on the adequacy of containment within the four basins (six quadrants) in Building 612 Container Storage Unit incorporating a (future) Size Reduction Unit, scale, and pallets containing the maximum capacity of storage containers.

Scope

The purpose of this report is to evaluate secondary containment criteria based on the regulations found in 40 CFR 264 subpart I (264.175) and 22 CCR Article 9 (66264.175). Specifically the task is to determine adequacy of containment within the four floor basins (frustrums) in Building 612 Container Storage Unit incorporating a (future) Size Reduction Unit, and pallets containing the maximum capacity of storage containers. This report is intended to cover all aspects of the secondary containment criteria. This report does not cover structural criteria that is not related to secondary containment.

The report includes appropriate displacements using the maximum number of allowable storage containers, double stacked with adequate aisle space, and stored on pallets which are assumed to have maximum volume displacement.

A typical arrangement for the storage container pallets and the treatment units in the six containment basins within Building 612 is shown in Appendix B and Appendix C. The secondary containment analyses are based on the use of conservative displacement 4' x 4' wood pallets. To obtain the allowable secondary containment volume for each basin, it was assumed that the indicated quantity of pallets were placed in the building, while maintaining adequate aisle space and allowing room for the treatment units, as indicated. The containers on some of these pallets will be double stacked as necessary up to the maximum capacity of each of the six basins (7,150 gallons total for all six frustrums).G6

Reference Drawings

Structural	PLZ 65 612 002 JA
Key Plan	PKB 84 612 001 BC
Structural	PKB 84 612 002 BC
Vendor Drawing	Container Product Corporation

Drawing number 18-8071-2-02, Revision B, dated 4/2/96 (except location of "floor-anchoring system" is assumed to be as shown in SKM-2)

Existing Conditions

There are four secondary containment basins (frustrums) inside Building 612 which are illustrated in SKM-1. For calculation purposes, the four frustrums are designated as six basins (or quadrants), in order to facilitate mathematical calculations. These frustrums are located in Rooms 100 (high bay) and 110 (see Key Plan drawing). The east Frustrum contains all of Room 110, waste storage pallets, one end of the Size Reduction Unit, and a scale. The central Frustrum is identical to the east Frustrum and contains most of the Size Reduction Unit and additional waste storage pallets. The northwest Frustrum is the smallest and contains only waste storage pallets. The southwest frustrum contains waste storage pallets. As shown in the Structural drawing all the frustrums slope towards the center of each basin except for the northwest Frustrum which slopes to a point which is off center. The low points of all four basins are 2" below their perimeters. This provides for drainage of accumulated liquids towards the low point of each frustrum and allows personnel tc remove these liquids in a timely manner by pumping or some other means. The drainage in conjunction with elevated wastes (e.g. pallets) allows for prevention of wastes coming into contact with accumulated liquids.

Prevention of Migration

The floor of this building is constructed of reinforced concrete. All exterior walls are steel and concrete. There are no apparent leaks, cracks, or gaps which can provide for liquid channeling through the containment areas. The floor areas are painted with a high solids epoxy, latex, or acrylic enamel.

Run-on and Precipitation

Run-on and precipitation is managed by prevention. These basins are enclosed within four walls and a roof. Therefore, there is no rain catchment. Run-on is prevented by the surrounding grade, swales, weather stripping and ramps.

Secondary Containment Calculations

Each of the basins (frustrums) is independent from the others. Therefore. the allowable secondary containment capacity will be calculated separately for each one.

East Frustrum:

This Frustrum covers an areas of 30' by 45' and contains a bailer room (Room 110), a scale (7'-6" by 9'-6"), and part of the Size Reduction Unit which provide displacement for this Frustrum. The effective containment area of this Frustrum is given below:

$$A_e = (30 \bullet 45) = 1350 \text{ ft}^2$$

The small area at the low point of the Frustrum is estimated to be a 2' x 2' square.

$$a_e = 4 \text{ ft}^2$$

The volume can be calculated as a Frustrum using the two surface areas and the depth of 2". The relationship and calculation is given below:

$$V_e = \frac{h}{3}\left(A_e + a_e + \sqrt{A_e a_e}\right)$$

V_e = Total East Frustrum Containment Volume (ft^3)
A_e = Effective Containment Area = 1,350 ft^2
a_e = Frustrum Low Point Area = 4 ft^2
h = Vertical Depth of the Secondary Containment = 2 in. = .1667 ft

$$V_e = \frac{.1667}{3}\left(1350 + 4 + \sqrt{1350 \cdot 4}\right) 7.4805 = 593 \textit{ gallons}$$

Pallet displacement can be estimated by using the pallet displacement factor determined in Appendix A. Since the secondary containment is so shallow, we can only conservatively displace 2" of the pallet volume which has an overall height of 5" (3.5" + 2x 0.75") Therefore, the pallet displacement factor is :

$$DF = \frac{2''}{5''} \cdot 0.116 = 0.0464 \frac{ft^3}{ft^2}$$

Northeast Quadrant

Based on the diagram shown on "SKM-2," and Sections A and B, the maximum - allowable secondary volume in the Northeast quadrant of the Frustrum is 296.5 (593/2 gallons).

From section B-B, the "Size Reduction Unit" removes some of the available storage capacity in the northeast quadrant and results in the following "available" storage volume:

(maximum - available storage volume in Northeast quadrant) =

$$\left(\frac{1.393}{12}\right)(15)\left(\frac{1}{2}\right)(16.422)(7.4805) = 106.95\ gallons$$

This value is the volume of a prism measuring 1.3953 inches by 15 feet, by 16.4 feet long, which is the (approximate) volume of the available storage capacity in the Northeast quadrant.

Assuming a 10% spill rate, the maximum allowable gallons of storage is 1,069.5 (106.95/0.10) gallons. This translates into 19.4 (1069.5/55) - 55 gallon containers. Further assuming that all pallets are full (4 - 55 gallon containers), the maximum allowable number of pallets is 4 (19.4/4>4).

Assuming that the pallets are stacked 2-high, a maximum of 2 pallets are mounted on-grade; these 2 pallets reduce the available storage volume, as follows:

$$(2\text{-}pallet\ reduction - available\ storage\ volume) = 4ft \cdot 4ft \cdot 0.0464\frac{ft^3}{ft^2} \cdot 2pallets \cdot 7.48\ \frac{gallons}{ft^3} = 11.11\ gallons$$

Summarizing the results for the Northeast quadrant. (gross volume = 296.5 gallons)

- maximum available storage volume, after removing "size - reduction unit" = 106.95 gallons
- (Less) 2 - pallets displacement volume = 11.11 gallons
- Net available storage volume = 95.85 (106.95-11.11) gallons
- Volume of 4 pallets of 55 gallon drums at 4-drums-per-pallet = 880 (4x55x4) gallons
- 10% allowable spillage = 88 (880 • 0.1) gallons

This is acceptable, since allowable spillage is less than net-available storage volume.

Southeast Quadrant

Based on the diagram shown on "SKM-2", and Sections A and B the maximum-allowable secondary volume in the quadrant of the frustrum is 296.5 (593/2) gallons.

From Section B-B, the "Size-reduction Unit" removes some of the available storage capacity in the quadrant, and results in the following available storage volume:

$$(maximum - available\ storage\ volume) = \left(\frac{0.6386}{12}\right) \cdot (6.865) \cdot \left(\frac{1}{2}\right) \cdot (16.422) \cdot (7.4805) = 22.44\ gallons.$$

This value is the volume of a prism measuring 0.6386 inches by 6.865 feet by 16.4 feet lor

The scale (7'6" by 9'-6") also removes available volume, as follows:

$$(Volume) = (7.5ft)\cdot(9.5ft)\cdot(\frac{0.5}{\frac{12\ inches}{ft}})\cdot(7.4805\frac{gal}{ft^3}) = 22.2\,gallons$$

Net available storage capacity is therefore 0.20 (22.4-22.2) gallons.

No waste can be stored in this area.

North Central Quadrant

Based on the diagram shown on "SKM-2," and Sections A and B, the maximum - allowable secondary volume in the Northeast quadrant of the Frustrum is 296.5 (593/2 gallons).

From section B-B, the "Size Reduction Unit" removes some of the available storage capacity in the quadrant and results in the following "available" storage volume:

(maximum - available storage volume in North Central quadrant) =

$$(\frac{1.393}{12})\cdot(15)\cdot(\frac{1}{2})\cdot(28.25)\cdot(7.4805) = 183.98\,gallons$$

This value is the volume of a prism measuring 1.3953 inches by 15 feet, by 28.25 feet long, which is the (approximate) volume of the available storage capacity in the North Central quadrant.

Assuming a 10% spill rate, the maximum allowable gallons of storage is 1,839.8 (183.98/0.1) gallons. This translates into 33.4 (1839/55) - 55 gallon containers. Further assuming that all pallets are full (4 - 55 gallon containers), the maximum allowable number of pallets is 8 (33.4/4 > 8). (Seven pallets are finally selected.)

Assuming that the pallets are stacked 2-high, a maximum of 4 pallets are mounted on-grade; these 4 pallets reduce the available storage volume, as follows:

$$(2\text{-}pallet\ reduction - available\ storage\ volume) = 4ft\cdot 4ft\ 0.0464\frac{ft^3}{ft^2}\ 4\,pallets\ 7.48\frac{gallons}{ft^3} = 22.22\,gallons$$

Summarizing the results for the North Central quadrant, (gross volume = 296.5 gallons)

- maximum available storage volume, after removing "size - reduction unit" = 183.98 gallons
- (Less) 2 - pallets displacement volume = 22.22 gallons
- Net available storage volume = 161.76 (183.98-22.22) gallons
- Volume of 7 pallets of 55 gallon drums at 4-drums-per-pallet = 1540 (4x55x7) gallons
- 10% allowable spillage = 154 (1540 • 0.1) gallons

This is acceptable, since allowable spillage is less than net-available storage volume.

South Central Quadrant

Based on the diagram shown on "SKM-2," and Sections A and B, the maximum - allowable secondary volume in the South Central quadrant of the frustrum is 296.5 (593/2 gallons).

From section B-B, the "Size Reduction Unit" removes some of the available storage capacity in the South Central quadrant and results in the following "available" storage volume:

(maximum - available storage volume in South Central quadrant) =

$$\left(\frac{0.6386}{12}\right)\cdot(6.865)\cdot\left(\frac{1}{2}\right)\cdot(28.25)\cdot(7.4805) = 38.60\, gallons$$

This value is the volume of a prism measuring 0.6386 inches by 6.865 feet, by 28.25 feet long, which is the (approximate) volume of the available storage capacity in the South Central quadrant.

Assuming a 10% spill rate, the maximum allowable gallons of storage is 386 (38.60/0.1) gallons. This translates into 7 (386/55) - 55 gallon containers. Further assuming that all pallets are full (4 - 55 gallon containers), the maximum allowable number of pallets is 2 (7/4<2).

Assuming that the pallets are stacked 2-high, a maximum of 1 pallet is mounted on-grade; this 1 pallet reduce the available storage volume, as follows:

$$(1{-}pallet\ reduction\ -\ available\ storage\ volume) = 4ft\ 4ft\ 0.0464\frac{ft^3}{ft^2}1pallet\,7.48\frac{gallons}{ft^3} = 5.06 gallons$$

Summarizing the results for the South Central quadrant. (gross volume = 296.5 gallons)

- maximum available storage volume, after removing "size - reduction unit" = 38.60 gallons
- (Less) 2 - pallets displacement volume = 5.06 gallons
- Net available storage volume = 33.54 (38.60-5.06) gallons
- Volume of 2 pallets of 55 gallon drums at 3-drums-per-pallet = 330 (3x55x2) gallons
- 10% allowable spillage = 33 (330 • 0.1) gallons

This is acceptable, since allowable spillage is less than net-available storage volume.

Northwest Frustrum:

This Frustrum covers an areas of 20' by 20' and contains no displacement other than storage pallets. The area of this Frustrum is given below:

$$A_{nw} = 20 \cdot 20 = 400 ft^2$$

The small area at the low point of the Frustrum is estimated as a one foot diameter circle, whose area is 0.79 ft^2.

The volume can be calculated as a Frustrum using the two surface areas and the depth of 2". The relationship and calculation is given below:

$$V_{nw} = \frac{h}{3} (A_{nw} + a_{nw} + \sqrt{A_{nw} \cdot a_{nw}})$$

V_{nw} = Total North Central Frustrum Containment Volume (ft^3)
A_{nw} = Effective Containment Area = 400 ft^2
a_{nw} = Frustrum Low Point Area = 79 ft^2
h = Vertical Depth of the Secondary Containment = 2 in. = .1667 ft

$$V_{nw} = \frac{.1667}{3} (400 + .79 + \sqrt{400 \cdot .79} \cdot 7.4805 = 174 \text{ gallons}$$

Pallet displacement can be estimated by using the pallet displacement factor determined above:

$$DF = \frac{2''}{5''} \cdot 0.116 = 0.0464 \frac{ft^3}{ft^2}$$

If we assume 6 pallets (2-high) are installed, the total pallet displacement volume is:

$$= 4\ ft \cdot 4\ ft \cdot 0.0464\ \frac{ft^3}{ft^2} \cdot 3\ pallets \cdot 7.4805\ \frac{gal}{ft^3} = 16.67\ gallons$$

$$(Net available storage volume) = 174 - 16.67 = 157.33\ gallons$$

$$(Maximum - allowable\ quantity\ of storage) = \frac{(157.33)}{(0.1)} = 1{,}573\ gallons$$

-(24) 55 gallon drums on 6 pallets results in a storage volume of 1,320 (24 • 55) gallons, which is less than the maximum allowable quantity of 1,573 gallons.

Southwest Quadrant

This Frustrum covers an areas of 20' by 43' and contains no displacement other than storage pallets. The area of this Frustrum is given below:

$$A_{nw} = 20 \cdot 43 = 860 ft^2$$

The small area at the low point of the Frustrum is estimated as a one foot diameter circle, whose area is 0.79 ft^2.

The volume can be calculated as a Frustrum using the two surface areas and the depth of 2". The relationship and calculation is given below:

$$V_{nw} = \frac{h}{3}\left(A_{nw} + a_{nw} + \sqrt{A_{nw} \cdot a_{nw}}\right)$$

V_{nw} = Total Southwest Frustrum Containment Volume (ft^3)
A_{nw} = Effective Containment Area = 860 ft^2
a_{nw} = Frustrum Low Point Area = 79 ft^2
h = Vertical Depth of the Secondary Containment = 2 in. = .1667 ft

$$V_e = \frac{.1667}{3}(860 + .79 + \sqrt{860 \cdot .79} \cdot 7.4805 = 368.6\ gallons$$

Pallet displacement can be estimated by using the pallet displacement factor determined above:

$$DF = \frac{2''}{5''} \cdot 0.116 = 0.0464\ \frac{ft^3}{ft^2}$$

If we assume 14 pallets (2-high) are installed, the total pallet displacement volume is:

$$= 4\ ft \cdot 4\ ft \cdot 0.0464\ \frac{ft^3}{ft^2} \cdot 7\ pallets \cdot 7.4805\ \frac{gal}{ft^3} = 38.87 gallons$$

$$(Net available storage volume) = 368.6 - 38.87 = 329.87\ gallons$$

$$(Maximum - allowable\ quantity\ of storage) = \frac{(329.87}{(0.1)} = 3{,}298\ gallons$$

-(14) pallets of 55 gallon drums (4 drums per pallet) result in a storage volume of 3,080 (14 x 55 x 4) gallons, which is less than the maximum allowable quantity of 3,298 gallons.

Summary

A summary of the calculations are shown in the following table. The containment is adequate to handle up to 7,150 total gallons of liquid waste including storage containers holding up to 55 gallons. However, each individual basin (frustrum) within the building is limited to the maximum stored amount of liquid as listed below.

		Northwest	Southwest	North Cent	South Cent	Northeast	Southeast	TOTALS
	Total secondary containment (gross)	174	368	296.5	296.5	296.5	296.5	
	Net available storage	174	368	183.98	38.6	106.95	0.2	(Note (X))
	Pallet displacement	16.6605696	38.8746624	22.2140928	5.5535232	11.1070484	0	
	Total Rainfall	0	0	0	0	0	0	
(B)	Net containment available, gallons	157.33943	329.125338	161.765907	33.0464768	95.8429536	0.2	777.320106 (gallons)(Y)
(A)	Regulatory containment required (10%)	132	308	154	33	88	0.	
	Largest liquid contain	55	55	55	55	55	0	
	Maximum stored liquid	1320	3080	1540	330	880	0	7150 (gallons)
Is (B) > (A)?	Adequate secondary containment?	YES	YES	YES	YES	YES	YES	
	A maximum of 7,150 gallons can be stored in building.							
	Actual # of pallets	6	14	7	2	4	0	33
	Actual # of 55-gallon drums per pallet	4	4	4	3	4	0	19
	Actual gallons stored per area	1320	3080	1540	330	880	0	7150

(X)After subtracting volume of "size reduction unit" and other units
(Y)Since pallets and 55-gallon drums are availabe only in finite increments, (say) net containment available is 715 gallons

Certification:
Technical Certification of the Building 612 Container Storage Unit Containment Design

Keller and Gannon has performed the calculations for and inspected the Building 612 secondary containment at Lawrence Livermore National Laboratory to determine if the facility is suitably designed to meet the requirements of the California Code of Regulations (CCR) Title 22 Section 66264.175. To the best of our knowledge, based upon review of the facility and information provided, the proposed design has the following features:

1. The storage facility has secondary containment basins or bermed areas beneath the containers of waste and the various treatment units which are free of cracks or gaps.

2. The base of the containment area is designed to be sloped so that any leaks or spills will be directed to the low point of the containment area and not allowed to accumulate and come into contract with the waste containers.

3. Each of the six containment basins in Building 612 has sufficient capacity to hold 10% of the aggregate volume of all containers in that basin or the volume of the largest container in that basin, whichever is greater. The design criteria used to evaluate the adequacy of the containment basins were based on the maximum allowable amount of liquid waste stored in the containers in each basin plus the allowable gallons of secondary containment capacity in each basin.

   The total secondary containment capacity is equal to 10% of the volume of stored waste in each of the six basins in the building.

AREA DESCRIPTION	ALLOWABLE STORED WASTE QUANTITY
Northwest Basin	1,320 gallons
Southwest Basin	3,080 gallons
North Central Basin	1,540 gallons
South-Central Basin	330 gallons
Northeast Basin	880 gallons
Southeast Basin	0 gallons
Total	7,150 gallons

4. Run-on and precipitation is managed by prevention. This building is enclosed within 4 walls and a roof. There is no rain catchment. Run-on is prevented by grade and weather striping.

I certify that the design of the Building 612 Container Storage Unit secondary containment, including the (future) Size Reduction Unit, the bailer room, the large scale, and waste storage pallets, meets the requirements of 22 CCR 66264.175.

6/21/96

Donald Lawrence Nurisso
California Registered Professional Engineer
Keller & Gannon

Date

REGISTERED PROFESSIONAL ENGINEER
DONALD L. NURISSO
16111
Exp 2/31/99
MECHANICAL
STATE OF CALIFORNIA

Appendix A

Displacement Due to Container or Equipment Supporting Devices

Containers will be elevated by some means such as pallets, skids, stanchions or legs, dollies, and trucks. This not only gives efficient use o containment, it also provided for ease in container handling and prevention of wastes coming into contact with standing liquids. It provides enhanced segregation and quick access in case of an emergency. these devices which do elevate the containers will cause some displacement of liquids. The conservative approach is to estimate the volume per area of floor space consumed by displacement of the more common large elevating device. The device to estimate displacement is the wooden pallet. The wooden pallet is used throughout the facilities to elevate wastes. This type of device also displaces volume greater than our portable tank skids, wooden and metal box legs, and galvanized steel pallets. The wooden pallet displacement volume per unit area is somewhat comparable to our secondary containment pallet, dolly, and truck displacements.

To be conservative, it will be assumed that each pallet is 4' by 4' and is constructed of nine 1" by 6" (5 top and 4 bottom) slats, two 4" by 4" end platform supports, and one 2" by 4" center platform support. The diagram below depicts this conservative wooden pallet.

These pallets consume the following volume per square foot:

$$DF = \frac{2 \cdot 4 \cdot (\frac{3.5}{12})^2 + 4 \cdot (\frac{1.5 \cdot 3.5}{12^2})\ 9 \cdot 4 \cdot (\frac{0.75 \cdot 5.5}{12^2})}{4 \cdot 4} = 0.116 \frac{ft^3}{ft^2}$$

DF = The displacement factor (ft)
Note: standard wood dimensions are used

This impact is quite small, but does have significance when combined. We will take it into consideration in our calculations. Many containment areas have maximum depths of less than that of the pallet height which is 5". In these instances we will take the fraction of the containment height with 5" to develop a new displacement factor.

Appendix B

Assumptions

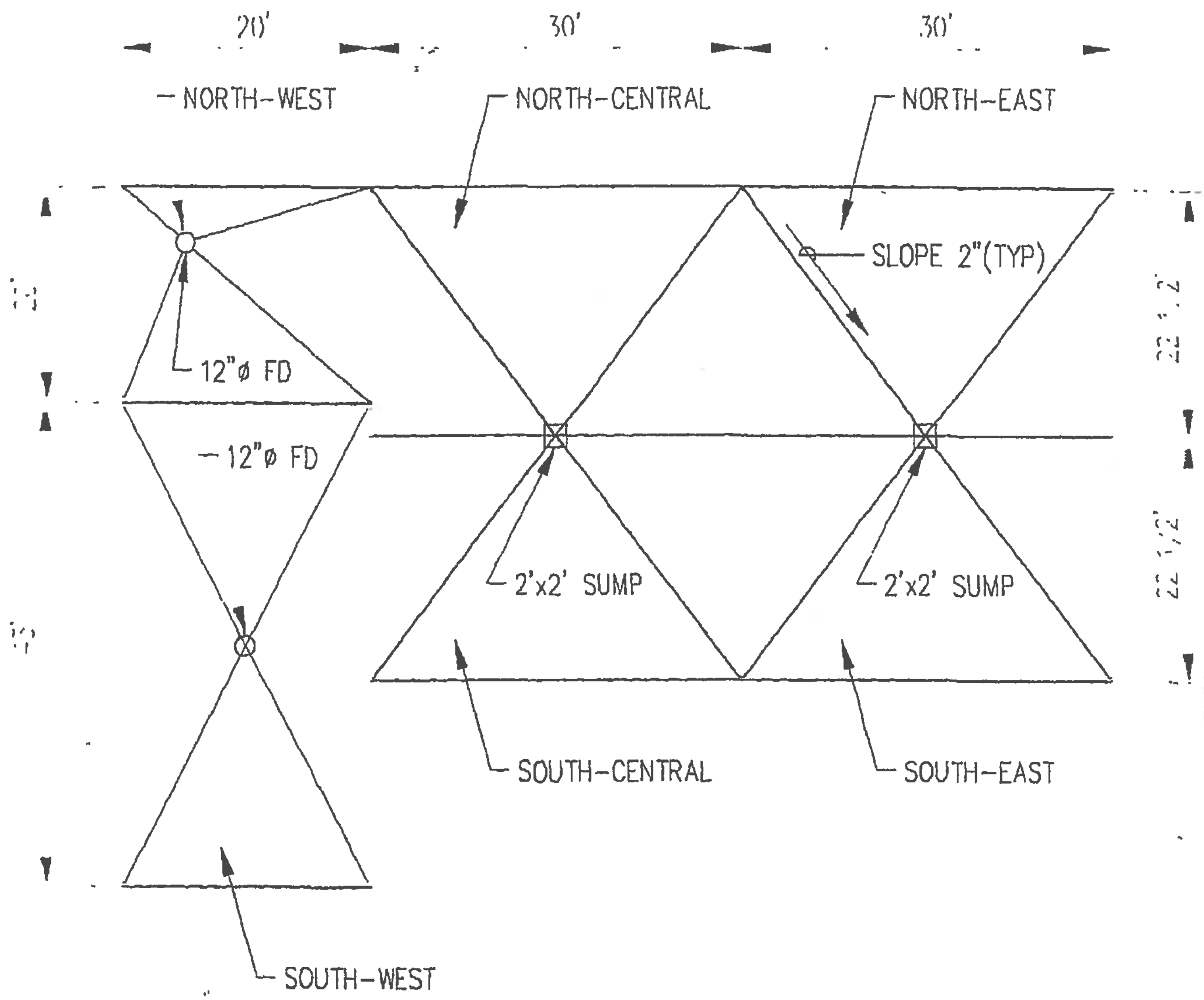
1. The "Size Reduction Unit" will be installed as shown in sketches, SKM-1, SKM-2, and SKM-3.

2. Calculation of volumes in the frustrums is an estimate. Final selection of allowable storage volume includes a margin of safety to account for unknowns.

3. Other than data shown on sketches, it is assumed that no other devices are floor-mounted, which would subtract from the available containment volume.

Appendix C

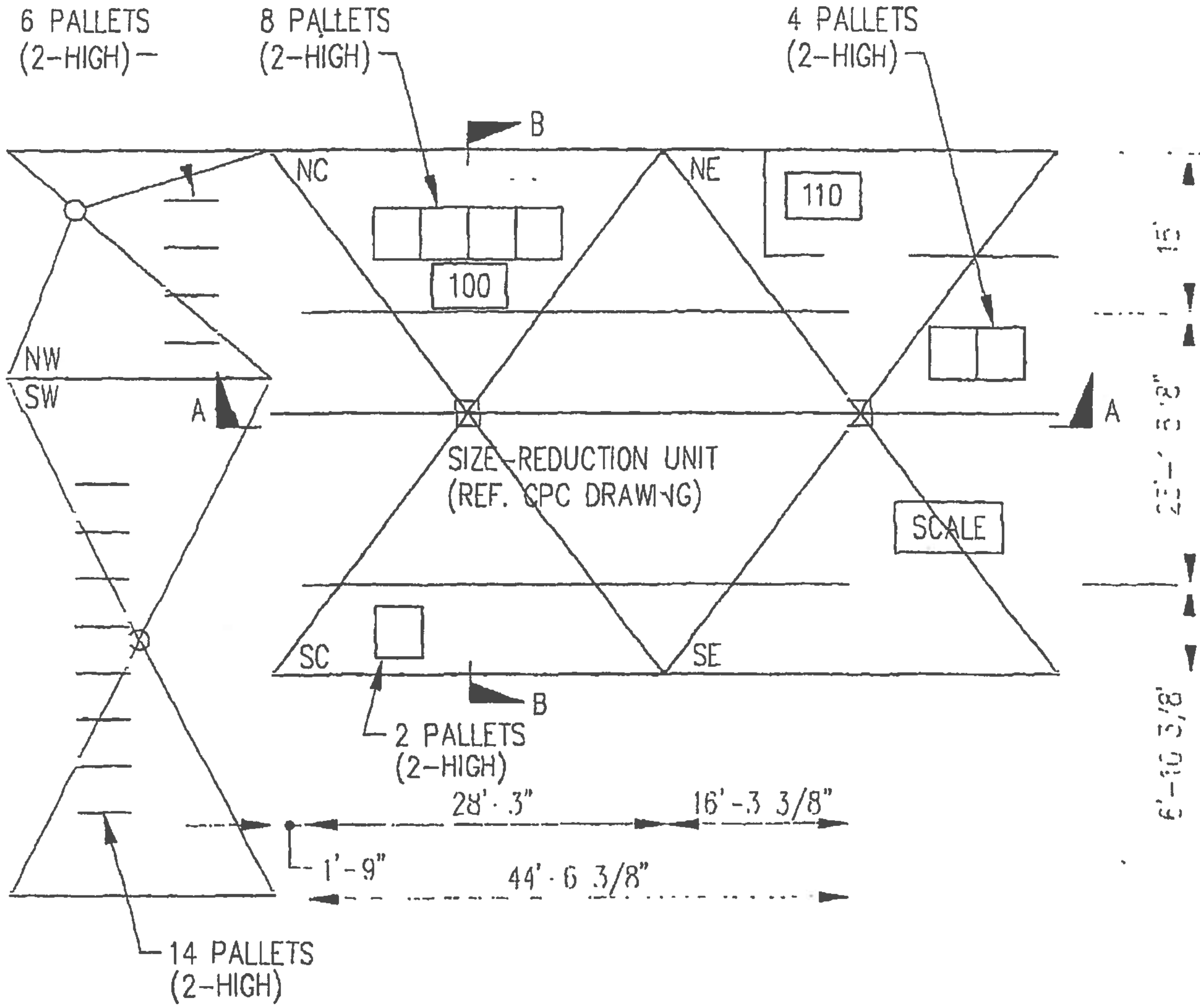
Sketches
SKM-1, SKM-2, SKM-3



SKM-1

N.T.S.

BLDG. 612 FLOOR PLAN - DRAINAGE SYSTEM
(REF. DWG.: PLZ-65-002JA, SHT 2)

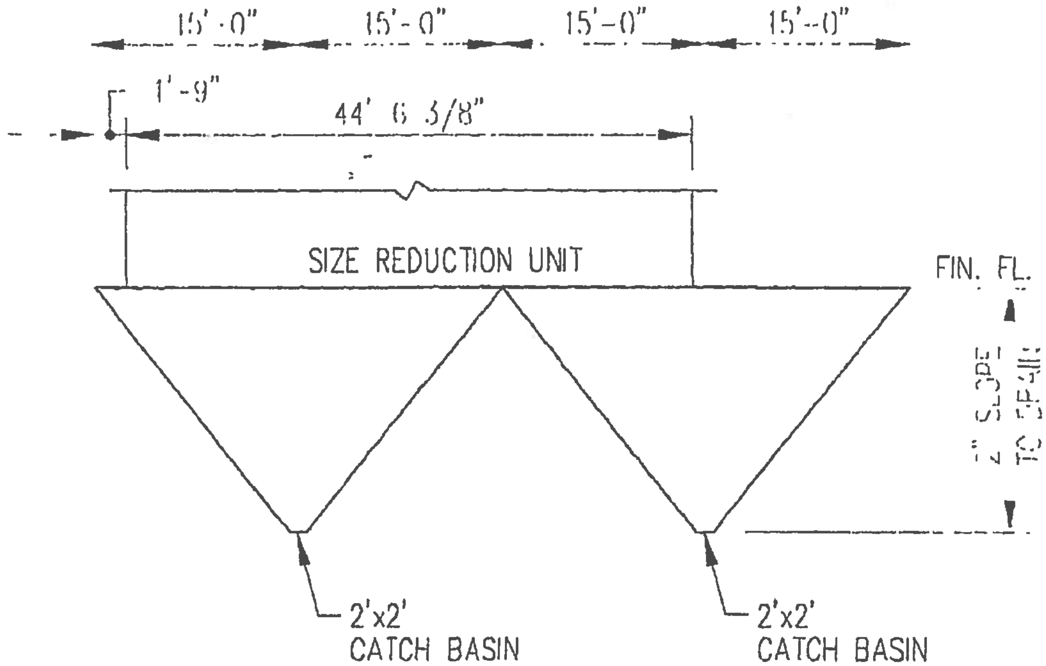


(SECTIONS A-A AND B-B ARE SHOWN ON SKM-3)

SKM-2

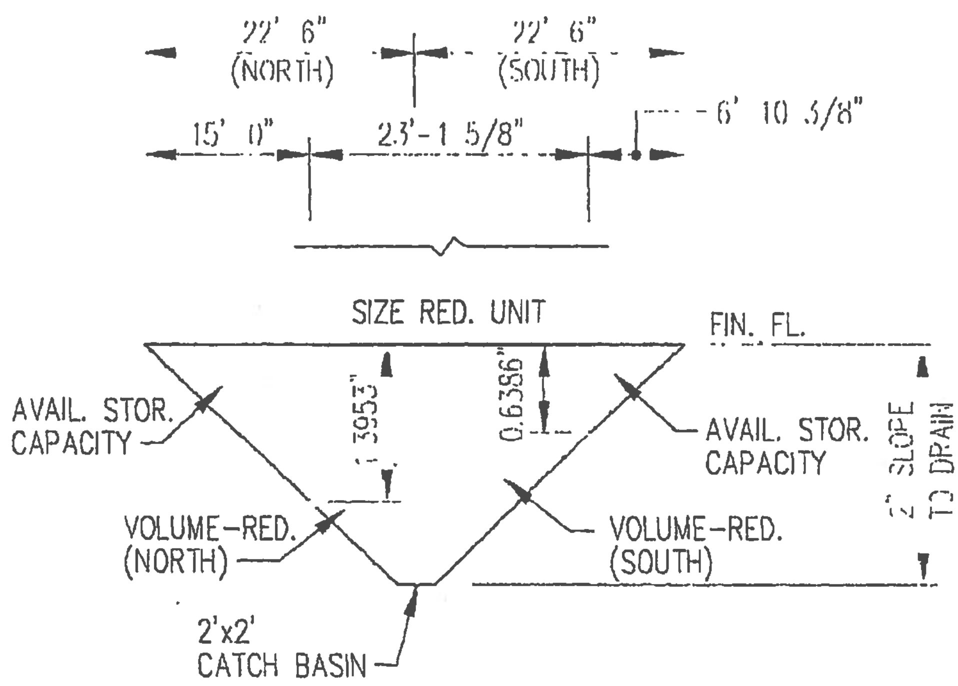
N.T.S.

BLDG. 612 PALLET LAYOUT AND
SIZE - REDUCTION UNIT LAYOUT



SECTION A-A

N.T.S.

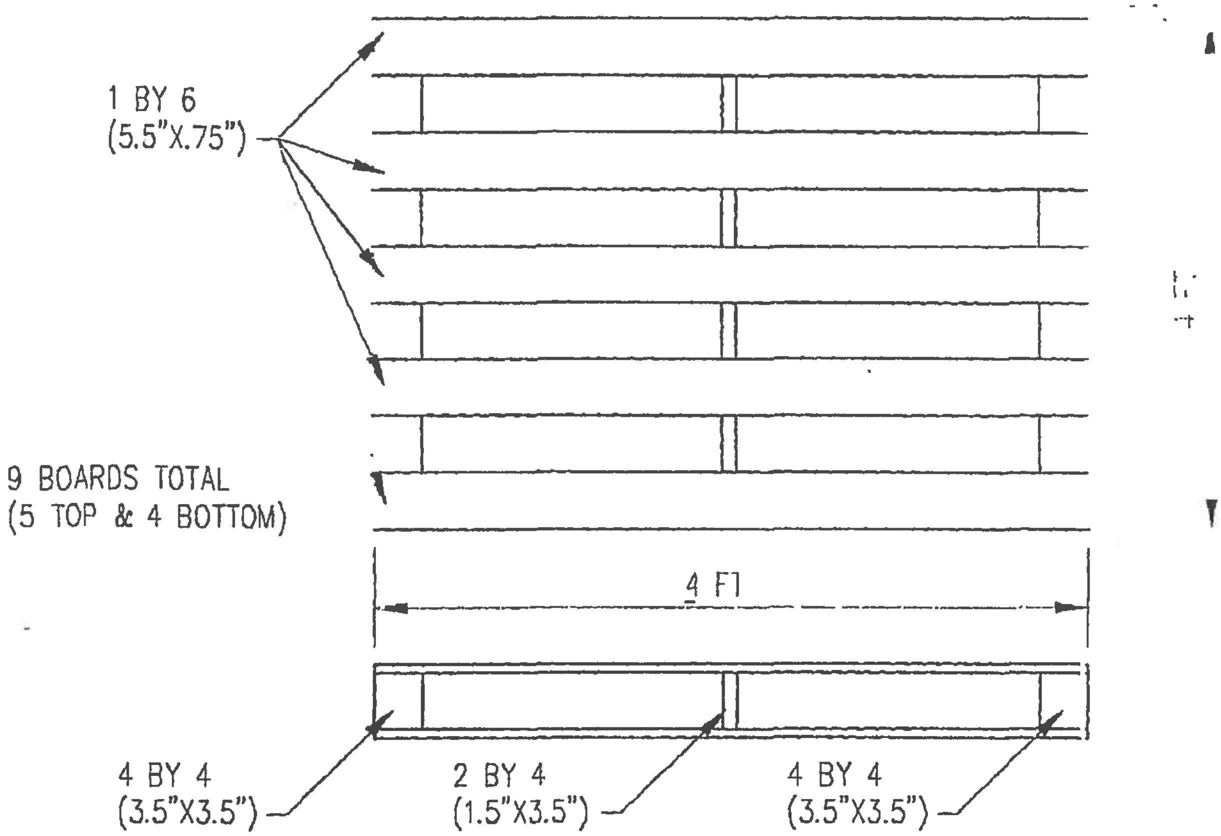


SECTION B-B

N.T.S.

SKM-3

BLDG. 612 SECTIONS



PALLET SKETCH

N.T.S.

Appendix XIV.3-C

Secondary Containment Calculations

APPENDIX XIV.3-C SECONDARY CONTAINMENT CALCULATIONS

This appendix contains the following reports in the pdf version:

- *Technical Certifications of the Building 693 Container Storage Unit Containment Design,* signed by Roger Zandi, CRPE, and dated 3/12/97.
- *Technical Certification of the Building 693 Container Storage Unit Containment Design,* signed by Barbara A. Quivey, CRME, and dated 2.26/97
- *Secondary Containment Report Building 693 Container Storage Unit Group,* from Parsons Infrastructure and Technology Group and undated.
- *Technical Certification of the Secondary Containment Plan Design for Building 693 Freezer Storage Area,* signed by Reuben H. Chow, P.E., and dated March 3, 1997.

Technical Certification of the Building 693 Container Storage Unit Containment Design

I have reviewed the calculations and design of Building 693 Container Storage Unit at Lawrence Livermore National Laboratory to determine if the facility is suitably designed to meet the requirements of the California Code of Regulations (CCR) Title 22 Section 66264.175. The original report (henceforth referred to as the LLNL Report) was written and certified by Barbara A. Quivey of LLNL's Plant Engineering Department. To the best of my knowledge, based upon the review of the above report and information provided, the proposed design has the following features:

1. The storage facility has a secondary containment basin or bermed area beneath the containers of waste which should be free of cracks or gaps given proper construction techniques.

2. The base of the containment area is designed to be sloped so that leaks or spills will be directed to the low point of the containment area (a sump) from where it will be pumped out.

3. The containment system design has sufficient capacity to hold 10% of the aggregate volume of all containers or the volume of the largest container. Also, since Building 693 is covered, additional containment capacity is not provided to contain precipitation from a 24-hour, 25-year storm. The design criteria used to evaluate the adequacy of the containment was based on the maximum allowable amount of liquid waste stored in the containers (35,640 or 34,980 gallons of waste, depending on the applicable room). The containment volumes given in the LLNL Report are conservative, and the actual containment volume is substantially more than that required by 22 CCR 66264.175.

4. Run-on into the containment area will be prevented all around the storage facility by the containment berm wall.

I certify that the design of the Building 693 Container Storage Unit Containment is capable of meeting the requirements of 22 CCR 66264.175.

Roger Zandi 3/12/97
California Registered Professional Engineer Date
Parsons

Exp. 3/31/00
MECHANICAL
STATE OF CALIFORNIA

Table of Contents

Building 693

Secondary Containment Calculations

Lawrence Livermore National Laboratory

Plant Engineering

February 26, 1996

University of California
Lawrence Livermore
National Laboratory

Building 693
Secondary Containment Calculations

I. Conclusions:

Building 693 meets secondary containment requirements as required by the Uniform Building Code, 1994, and the California Code of Regulations, CCR Title 22,. Following is a summary of those requirements and the calculated values applicable for Building 693.

II. 1994 Uniform Building Code Secondary Containment Requirements:

Building 693 meets the 1994 Uniform Building code requirements for secondary containment in a H-7 occupancy.

The 1994 Uniform Building Code (UBC), Section 307.2.5, requires that secondary containment be provided, in Group H-7 occupancies. The secondary containment must provide adequate volume to contain twenty minutes of the design flow rate of the sprinkler system (for the area of the room or area in which the storage is located or the sprinkler system design area, whichever is smaller) in addition to a spill from the largest single container.

Building 693 is separated into four rooms, Rooms 1012, 1008, 1004, and 1000. Rooms 1012, 1008, and 1004 are provided with a wet-pipe sprinkler system. Room 1000 is provided with a foam system and a wet-pipe sprinkler system. Please refer to page 8 of the calculations for detailed sprinkler water calculations.

Building 693 is proposed to have maximum single container sizes of 330 gallons.

LLNL Hazardous Waste Management (HWM), volumes have been provided by secondary containment in Building 693 is provided by the slope, bermed foundation. For calculations of the foundation holding capacity, please refer to pages 2 and 3 of the calculations for summary calculations and pages 4 through 7 for detailed calculations.

UBC Secondary Containment Requirements:

Containment Required = Fire Sprinkler Water (20 minutes) + maximum single container size

Room	Fire Sprinkler Containment Required	Max. Container Size Required	Containment Required	Containment Available
1012	7120 gallons	330 gallons	7450 gallons	7828 gallons
1008	7120 gallons	330 gallons	7450 gallons	7897 gallons
1004	7120 gallons	330 gallons	7450 gallons	7897 gallons
1000	2500 gallons	330 gallons	2830 gallons	7828 gallons

In each room, the containment available exceeds the containment required.

CCR Title 22 Section 66264.175 Secondary Containment Requirements:

Building 693 meets the CCR Title 22 requirements for secondary containment.

Title 22 requires that secondary containment be provided in hazardous waste facilities that transfer or store containers of hazardous waste. The secondary containment must provide adequate volume to contain rainfall from a 24-hour, twenty-five year storm in addition to ten percent of the maximum total liquid volume stored. As Building 693 is an enclosed building, the rainfall storage capacity requirement is zero. Maximum liquid volume stored quantities have been provided by HWM.

Technical Certification of the Building 693 Container Storage Unit Containment Design

I have reviewed the calculations for and inspected the Building 693 Container Storage Unit at Lawrence Livermore National Laboratory to determine if the facility is suitably designed to meet the requirements of the California Code of Regulations (CCR) Title 22 Section 66264.175. To the best of my knowledge, based upon review of the facility and information provided, the proposed design has the following features:

1. The storage facility has a secondary containment basin or bermed area beneath the containers of waste and the various treatment units which is free of cracks or gaps.

2. The base of the containment area is sloped so that leaks or spills will be directed to the low point of the containment area.

3. The containment system design has sufficient capacity to hold 10% of the aggregate volume of all containers plus additional capacity to contain precipitation from a 24-hour, 25-year storm. The design criteria used to evaluate the adequacy of the containment was based on the maximum allowable amount of liquid waste stored in the containers (35,640 or 34,980 gallons of waste, depending on the applicable room). No secondary containment capacity is required for rainfall; the building is entirely enclosed.

   The secondary containment capacity is equal to 10% of the volume of stored waste (35,640 or 34,980 gallons) plus rainfall accumulation (which is zero).

4. Run-on into the containment area is prevented on all sides by the containment berm wall.

I certify that the design of the Building 693 Container Storage Unit meets the requirements of 22 CCR 66264.175.

Barbara A. Quivey
Barbara A. Quivey
California Registered Mechanical Engineer
Lawrence Livermore National Laboratory

2/26/96
Date

REGISTERED PROFESSIONAL ENGINEER
BARBARA A. QUIVEY
NO. M025088
EXP 9.30.99
MECHANICAL
STATE OF CALIFORNIA

Storage Unit Containment Designbao/paw/W001

University of California
Lawrence Livermore National Laboratory

Plant Engineering Calculation Sheet	B693 Secondary Containment	Summary	Page Number 1 of 10
Barb Quivey 2/2/96	Title . Building 693 Containment Calculations		

	Room 1012	1008	1004	1000
A. Available secondary containment volume	9714	9753	9753	9714 gal.
B. Pallet displacement	(808)	(778)	(778)	(808) gal.
C. Container displacement	(1078)	(1078)	(1078)	(1078) gal.
D. Rain fall accumulation	-0-	-0-	-0-	-0-
E. Net secondary containment volume (A-B-C)	7828	7897	7897	7828 gal.
F. Fire sprinkler water containment required See page 8.	7120	7120	7120	2500 gal.
G. Largest liquid storage container	330	330	330	330 gal.
H. Maximum liquid stored	35,640	34,980	34,980	35,640 gal.
I. 1994 UBC Section 307.2.5 Required Containment = (F + G)	7450	7450	7450	2830 gal.
Complies with 1994 UBC Sec. 307.2.5 (I ≤ E)	Yes	Yes	Yes	Yes
J. CCR Title 22 Section 66264.175 required containment = 24 hr/25 yr storm + 10% H				
24 hr/25 yr storm = 0.0 due to enclosed bldg				
CCR containment = 0.1H	3564	3564	3564	3564 gal.
Complies with CCR Title 22 Sec. 66264.175 (J ≤ E)	Yes	Yes	Yes	Yes

Title

Building 693
Containment Calculations

1. See page 8 for fire protection water requirements in accordance with design densities and areas per Bill Gall, LLNL Fire Protection Engineer.

2. Calculate available storage capacity of existing structure.

Notes:

1 All cells are identical with exception of ramps.

2. Available storage capacity of exisitng structure = A + B + C - D

A = Sloped floor volume (frustum shape)
B = Curb area
C = Sump volumes
D = Ramp volumes

A. Room 1012:
A = 1877.21 gal.
B = 8168.16 gal.
C = 59.84 gal.
D = 2 67.91 gal. + 122.972 gal. = 390.882 gal.

Room 1012 available containment capacity = A + B + C - D
1877.21 + 8168.16 + 59.84 - 390.882 = 9714.33 gal.

Plant Engineering Calculation Sheet	B693 Sec. Containment	Storage Capacity	Page Number 3 of 10
Barb Quivey 2/2/96	Title: Building 693 Containment Calculations		

2. Calculate available storage capacity of existing structure (cont'd.):

B. Room 1008:

A = 1877.21 gal.
B = 8168.16 gal.
C = 59.84 gal.
D = 228.41 + 122.972 = 351.382 gal.

Room 1008 available containment capacity = A + B + C - D

= 1877.21 + 8168.16 + 59.84 - 351.38
= <u>9753.83 gal.</u>

C. Room 1004:

A = 1877.21 gal.
B = 8168.16 gal.
C = 59.84 gal.
D = 228.14 + 122.97 = 351.38 gal.

Room 1004 available containment capacity

= Room 1008 = <u>9753.83 gal.</u>

D. Room 1000:

A = 1877.21 gal.
B = 8168.16 gal.
C = 59.84 gal.
D = 228.14 + 162.5 = 390.64 gal.

Room 1000 available containment capacity = A + B + C - D

= 1877.21 + 8168.16 + 59.84 - 390.64
= <u>9714.57 gal.</u>

Plant Engineering Calculation Sheet	B693 Secondary Containment	Pallets Displacement	Page Number 4 of 10
Barb Quivey 2/2/96	Title: Building 693 Containment Calculations		

Pallet displacement:

Pallet made up of 2 layers of 5 ea. 5 1/2" x 3/4" wood strips separated by 3 ea. 3 1/2" x 3 1/2" wood strips.

Overall pallet dims: 48" x 39"

Volume = (2 x 5 x (5 1/2" x 3/4" x 48")) + (3 x 3 1/2" x 3 1/2" x 39")

Volume/pallet = 3413.25 in^3 / 1728 in^3/ft^3 = 1.975 ft^3
Use 2 ft^3

Reference: LLNL Hazardous Waste Management.

Cell	# Pallets on Floor per cell*	Total displaced Vol. Ft^3	gal.
1012	54	108	807.84
1008	52	104	777.92
1004	52	104	777.92
1000	54	108	807.84

* Max # pallet possible per cell per LLNL HWM

Overall height of pallet = 3 1/2" + 2 (3/4") = 5" > 6" berm area

Plant Engineering Calculation Sheet	B693 Sec. Containment		Page Number 5 of 10
Barb Quivey 2/2/96	Title: Building 693 Containment Calculations		

Volume available for containment is a inverted frustum (truncated pyamid) with deductions for ramps and addition of sump volume and addition of the curb area:

A. Volume of frustum

B = Large base of pyramid = 78'0" x 28'0" = 2184 $ft.^2$

B' = Small base of pyramid = 2'0" x 2'0" = 4 $ft.^2$

h = Height, pyramid = LP - HP = .33' - 0.0' = 0.33' per LLNL Drawing PLS 86-693 - 001D

$$\text{Volume} = \frac{h}{3}\left(B + \sqrt{BB^1} + B^1\right)$$

$$\text{Volume} = \frac{.33}{3}\left(2184 + \sqrt{2184\ (4)} + 4\right)$$

$$\text{Volume} = 250.96\ ft.^3 \times 7.48\ \frac{gal.}{ft.^3} = 1877.21\ gal.$$

B. Volume of curb area:

$$\text{Volume} = 2184\ ft.^2 \times 0.5\ ft.\ \text{curb} = 1092\ ft.^3 \times 7.48\ \frac{gal}{ft.^3} = 8168.16\ gal.$$

C. Volume Sump:

$$\text{Volume} = 2' \times 2' \times 2' = 8\ ft.^3 \times 7.48\ \frac{gal.}{ft.^3} = 59.84\ gal.$$

D. Volume Ramps:

1) West ramps (Rooms 1008, 1004, and 1000):

$$\text{Volume} = \frac{bh}{3}$$

ramp slope = 1/12 1"/ft. x 6'0" = 6" or 0.5'

Plant Engineering Calculation Sheet	B693 Sec. Containment	Ramp Volumes	Page Number 6 of 10
Barb Quivey 2/2/96	Title: Building 693 Containment Calculations		

D. Volume of ramps (cont'd.)

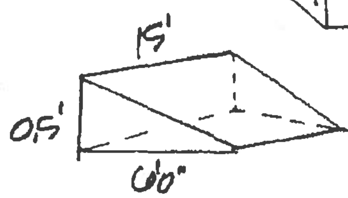
Refer to PLS86-693-001D for ramps.

Refer to key plan for room numbers.

Refer to Mark's Handbook, 9th edition, pg. 2-9, - 10 for volume formulas.

d. Volume of west ramp, rooms 1008/1004/1000:

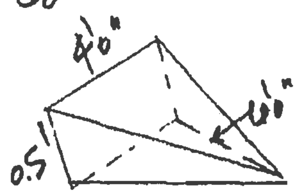
C:



prism: volume = 1/2 nrah = Bh
volume = 1/2 (0.5)(6)(15) = 22.5ft.^{3} x 7.48

= 168.3 gal.

$B_1 = B_2$:



pyramid: 1/3 bh
volume = 1/3 (4' x 0.5) 6'0 = 4ft.^{3} x 7.48
= 29.92 gal.

Volume = 22.5 + 2 (4) = 30.5 ft.^{3} = 228.14 gal.

2. Volume of west ramp, Room 1012: (same ramp as above but length = 6'6" instead of 6'0")

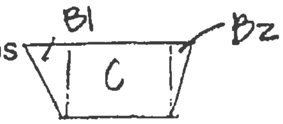
C: prism: volume = 1/2 nrah = Bh
volume = 1/2 (0.542) (6.5) (15) = 26.423 ft.^{3} x 7.48 = 197.64 gal.

$B_1 = B_2$:

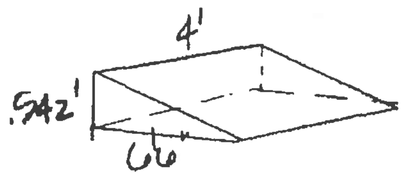
pyramid: volume = 1/3 bh
volume = 1/3 (4' x 0.542) 6.5' = 4.697ft.^{3} x 7.48
= 35.136 gal.
total/ramp = 197.64 + 2 (35.136) = 267.91 gal.

D. Ramp volumue (cont'd.)

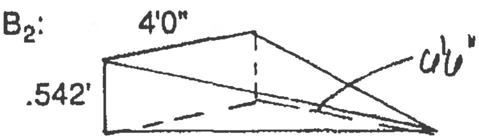
3. Rooms 1012, 1008, and 1004:

East ramps 

6.5 ft. (1"/ft.) = .542'

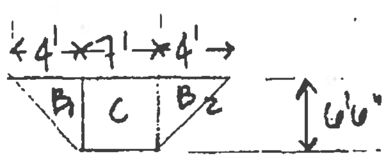
C: 

Volume = 1/2 (.542' x 4') 6.5 = 7.046 ft.^{3} x 7.48 = 52.7 gal.

$B_1 = B_2$: 

Volume = 1/3 (4'0" x .542") 6.5 = 4.697 ft.^{3} x 7.48 = 35.136 gal.

total per ramp = 52.7 + 2 (35.136) = <u>122.972 gal.</u>

4. Room 1000:
East ramp 

C: volume = 1/2 (.542' x 7') 6.5' = 12.331 ft.3 x 7.48 = 92.23 gal.
$B_1 = B_2$: volume = 1/3 (.542 x 4) 6.5 = 4.697 ft.^{3} x 7.48 = 35.136

total/ramp = 92.23 + 35.136 (2) = 162.5 gal.

Plant Engineering Calculation Sheet	B693 Sec. Containment	Ramp Volumes	Page Number 8 of 10
Barbara Quivey 2/2/96	Title: Building 693 Containment Calculations		

Per Bill Gall, LLNL Fire Protection Engineer, following are design densities and required calculation areas for B693:

Bays 2, 3, 4 (Rooms 1004, 1008, 1012): 0.178 gpm/2000ft^2

Bay 1 (Room 1000): 0.25 gpm/2400ft^2 sprinkler discharge
125 gpm foam system discharge.

For 20 minutes holding capacity per UBC section 307.5:

Rooms 1004, 1008, 1012:

Required holding capacity = 0.178 gpm/ft.^{2} x 2000 ft.^{2} x 20 minutes
= 7,120 gal.

Room 1000:

Required holding capacity = 125 gpm* x 20 minutes = 2500 gal.

*Refer to Attachment IV, memorandum from Bill Gall, February 12, 1996, regarding fire water containment, Building 693.

Barb Quivey 2/26/96

Title

Building Containment Calculations

For calculation, the room will be divided into four quadrants: north, south, east, and west to match floor slopes. Tanks sloping in each direction will be calculated for displaced volumes. See next page for sketches of tank displacement heights and tank arrangement. Use Room 1012 as base case for tank arrangement and apply to other rooms as similar.

North Tanks:
First Row: (curb + slope avg. + pallet ht) = 6" + 0.923" - 5" = 1.923" displ. depth for 10 tanks
42" x 42" is approx base 330 gal tank on 48" square pallet
Vol. tank displ. = (1.923 x 42 x 42)/ 1728 in3/CF = 1.963 CF/tank x 10 tanks = 19.63 CF
Second Row: (curb + slope avg. + pallet ht) = 6" + 2.154" - 5" = 3.154" displ for 6 tanks
Vol. tank displ. = (3.154 x 42 x 42)/1728 in3/CF = 3.22 CF/tank x 6 tanks = 19.32 CF
Third Row: (curb + slope avg. + pallet ht) = 6" + 3.385" - 5" = 4.385" displ for 1 tank
Vol. tank displ. = (4.385 x 42 x 42)/1728 = 4.476 CF/tank x 1 tank = 4.48 CF
North tank displacement volume = (19.63 + 19.32 + 4.48)x 7.48 gal/CF = 324.86 gal use 325 gal

South Tanks:
First Row:
Vol. tank displ. = (1.923 x 42 x 42)/1728 = 1.963 CF/tank x 10 tanks = 19.63 CF
Second Row:
Vol. tank displ. = (3.154 x 42 x 42)/1728 in3/CF = 3.22 CF/tank x 6 tanks = 19.32 CF
South tank displacement volume = (19.63 + 19.32) x 7.48 = 291.35 gal. use 291 gal.

East Tanks:
First row: (curb + slope avg. + pallet ht) = 6" + 1.37" - 5" = 2.37"
Vol. tank displ. = ((2.37 x 42 x 42)/1728 = 2.4 CF/tank x 6 tanks = 14.5 CF
Second row: (curb + slope avg. + pallet ht) = 6" + 2.47" - 5" = 3.47"
Vol. tank displ. = (3.47 x 42 x 42)/7.48 = 3.54 CF/tank x 4 tanks = 14.17 CF
Third row: (curb + slope avg. + pallet ht) = 6" +3.58" -5" = 4.58"
Vol. tank displ. = (4.58 x 42 x 42)/7.48 = 4.68 CF/tank x 2 tanks = 9.35 CF
East tank displacement volume = (14.5 + 14.17 + 9.35) x 7.48 = 284 gal.

West Tanks:
First row: (curb + slope avg. + pallet ht) = 6" + 1.37" - 5" = 2.37"
Vol. tank displ. = (2.37" x 42 x 42)/1728 = 2.4 CF/tank x 5 tanks = 12 CF
Second row: (curb + slope avg. + pallet ht) = 6" + 2.47" - 5" = 3.47"
Vol. tank displ. = (3.47 x 42 x 42)/7.48 = 3.54 CF/tank x 2 tanks = 7.08 CF
Third row: (curb + slope avg. + pallet ht) = 6" +3.58" -5" = 4.58"
Vol. tank displ. = (4.58 x 42 x 42)/7.48 = 4.68 CF/tank x 1 tank = 4.68 CF
West tank displacement volume = (12 + 7.08 + 4.68) x 7.48 = 177.72 gal use 178 gal.

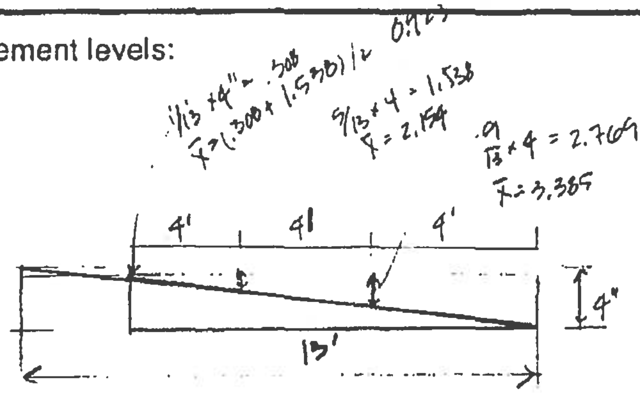
Total tank displacement volume = 325 + 291 + 284 + 178 = 1078 gal.

Barb Quivey 2/26/96

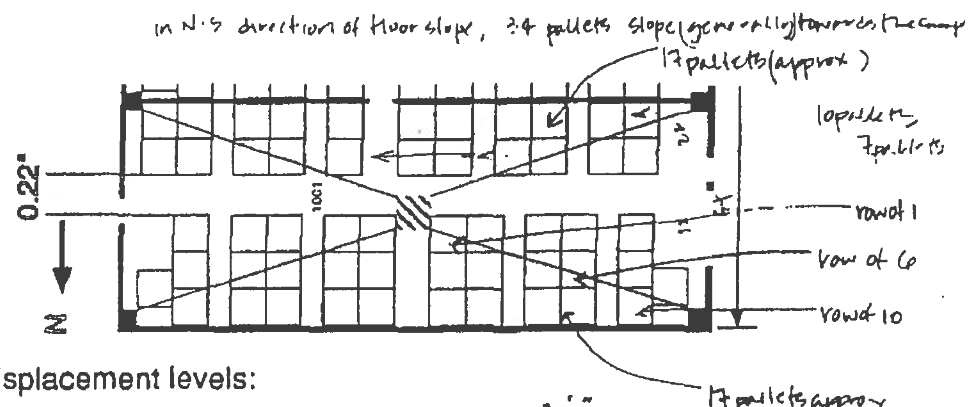
Title

Building Containment Calculations

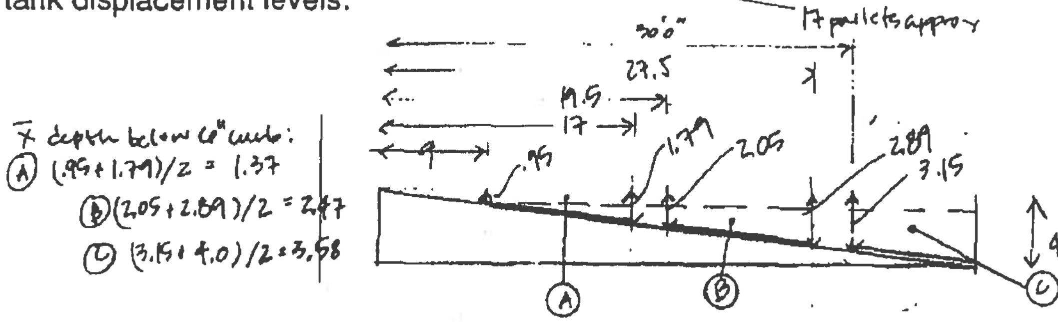
North-south slope, tank displacement levels:



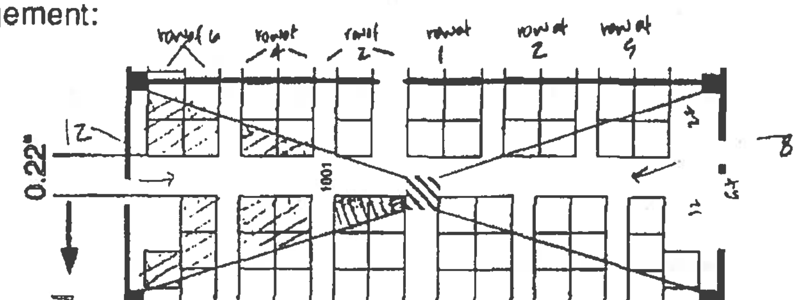
North-south tank arrangement:



East-west slope, tank displacement levels:



East-west tank arrangement:



Attachments

I.	California Code of Regulations	CCR Title 22 Section 66264.175
II.	1994 Uniform Building Code	1994 UBC Section 307.2.5

III. Lawrence Livermore National Laboratory Drawings:

Drawing Number	Drawing Title
PLS86-693-001D	Building 693 Chemical Waste Storage - Foundation Plan
PLS86-693-002D	Building 693 Chemical Waste Storage - Foundation Sections

LLNL Key Plan - Building 693

IV. Memorandum from Bill Gall, February 12, 1996, regarding Fire Water Containment, Building 693.

From: Glenn May (1/23/96) 29508
To: Mohammad Abri, Kerry Cadwell, Charlie Patterson, Judy Steenhoven, Charlotte VanWarmerdam
CC: John Bowers, Steve Cerruti, Jim Judge, Frank Sizemore, Heather Walsh
Regarding: B693 Storage

HWM Operations has requested that I determine the maximum storage capacity for the B693 Container Storage Building. I do not know exactly why the B693 Container Storage Building has not been maximized already, but I speculate the current capacity of 21,117 gallons for each cell is an outcome of DTSC's agreement to allow LLNL to build B693 in replace of 612-3 provided HWM's entire storage capacity was not increased.

Enclosed is the pallet configuration for maximum storage. The figure is in Canvas 3.5. The pallets are 4 ft. x 4 ft. with the minimum aisle space of 2.5 feet. The center aisle space is 4.5 feet.

In B693, the maximum number of pallets allowed in Cells 1012 and 1000 is 108 double stacked pallets (each pallet can also represent a 330 gallon portable tank, thus the maximum liquid storage is 35,640 gallons in each cell). In Cells 1008 and 1004, the maximum number of pallets is 106 double stacked pallets (the maximum liquid storage using 330 gallon portable tanks is 34,980 gallons in each cell.) The maximum liquid storage capacity for the entire building is 141,240 gallons.

Based on the current secondary containment calculations, these storage capacities do not exceed the regulatory containment capabilities. For example, the regulatory containment capacity is cell 1012 is 9130 gallons, which is greater than 10% of the maximum storage capacity of 35,640 gallons. NOTE: The secondary containment calculations do not account for the sprinkler water displacement.

A requested change in B693 storage capacity will require the Part A and Part B to be revised. The secondary containment calculations do not require revision with the except of a table showing the old maximum liquid storage capability in each cell of 21,117 gallons.

==

21,000 change to 34,980

regulated capacited

cell could hold ~~91,000~~ 9,100

Glenn May 1/23/9?

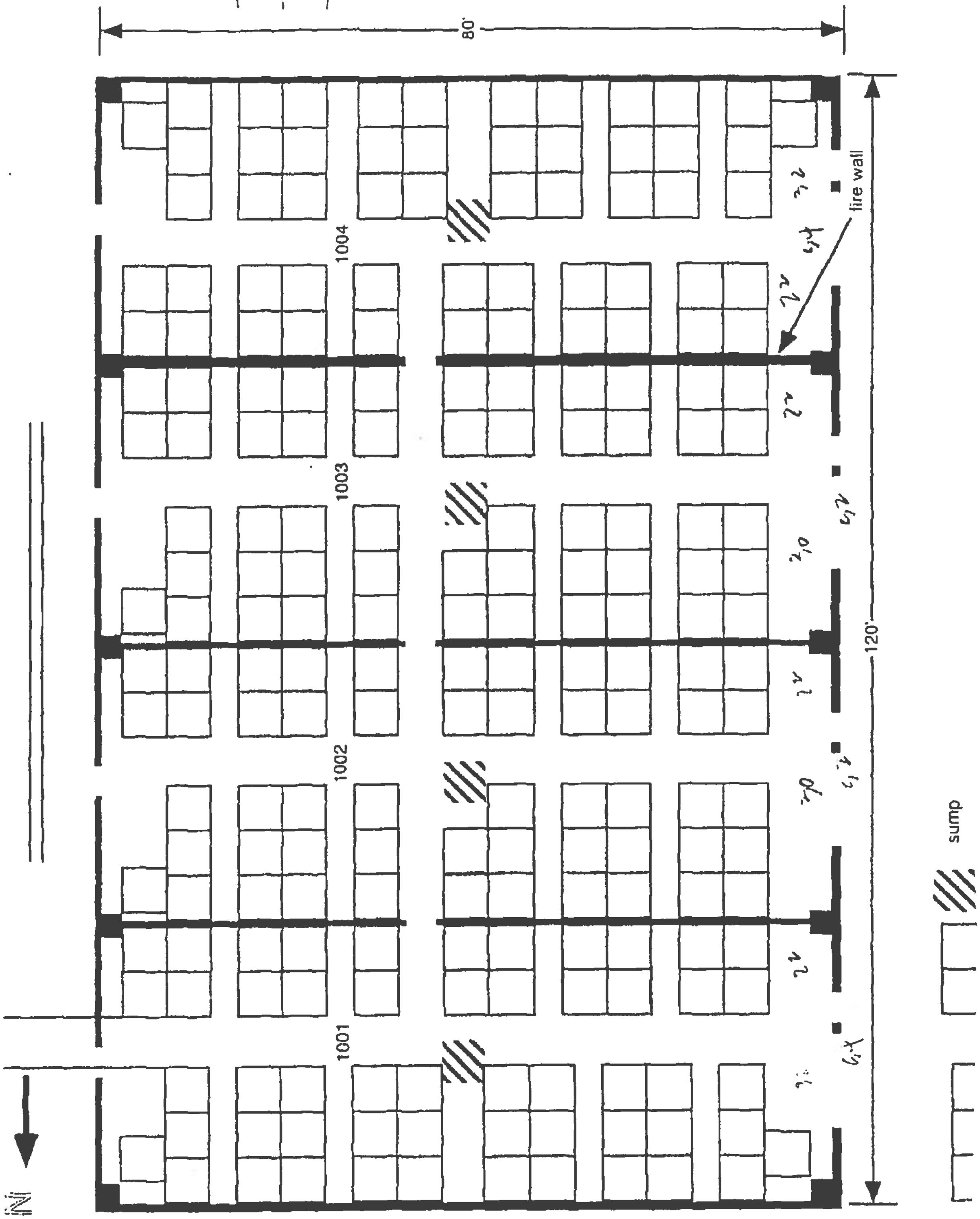


Figure XIII - 21. Bldg. 693 Storage

Attachment I

CCR Title 22 Section 66264.175

(A) certainty of the availability of funds for the required liability coverage; and

(B) the amount of funds that will be made available;

(C) the Department may also consider other factors deemed to be appropriate, and may require the owner or operator to submit additional information as is deemed necessary to make the determination.

(2) The owner or operator shall submit to the Department the proposed mechanism together with a letter requesting that the alternate mechanism be considered acceptable for meeting the requirements of subsections (a) and (b) of this section. The submission shall include the following information:

(A) the name, address and phone number of the issuing institution; and

(B) hazardous waste facility identification number, name, address and the amount of liability coverage to be provided for each facility; and

(C) the terms of the proposed mechanism (period of coverage, renewal/extension, cancellation).

(3) The Department shall notify the owner or operator in writing of the determination made regarding the proposed mechanism's acceptability in lieu of the other mechanisms specified in subsections (f), (g), (h), (i), (j) and (k) of this section.

(4) If a proposed mechanism is found acceptable, the owner or operator shall submit a fully executed document to the Department. The document shall contain original signatures and shall be accompanied by a formal certification of acknowledgment.

(5) If a proposed mechanism is found acceptable except for the amount of coverage, the owner or operator shall either increase the coverage or obtain other liability coverage as specified in subsections (a) and (b) of this section. The amount of coverage available through the combination of mechanisms shall at least equal the amounts required by subsections (a) and (b) of this section.

NOTE: Authority cited: Sections 208, 25150, 25159, 25159.5 and 25245, Health and Safety Code. Reference: Section 25245, Health and Safety Code; 40 CFR Section 264.147.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.148. Incapacity of Owners or Operators, Guarantors, or Financial Institutions.

(a) An owner or operator shall notify the Department by certified mail of the commencement of a voluntary or involuntary proceeding under Title 11 (Bankruptcy), U.S. Code, naming the owner or operator as debtor, within 10 days after commencement of the proceeding. A guarantor of a corporate guarantee as specified in section 66264.143(f) and section 66264.145(f) shall make such a notification if named as debtor, as required under the terms of the corporate guarantee (section 66264.151(h)).

(b) An owner or operator who fulfills the financial assurance or liability coverage requirements by obtaining a trust fund, surety bond, letter of credit, or insurance policy shall be deemed to be without the required financial assurance or liability coverage in the event of bankruptcy of the trustee or issuing institution, or a suspension or revocation of the authority of the trustee institution to act as trustee or of the institution issuing the surety bond, letter of credit, or insurance policy to issue such instruments. The owner or operator shall establish other financial assurance or liability coverage within 60 days after such an event.

NOTE: Authority cited: Sections 208, 25150, 25159, 25159.5 and 25245, Health and Safety Code. Reference: Section 25245, Health and Safety Code; 40 CFR Section 264.148.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

Article 9. Use and Management of Containers

§ 66264.170. Applicability.

The regulations in this article apply to owners and operators of all hazardous waste facilities that transfer or store containers of hazardous waste, except as section 66264.1 provides otherwise.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25159 and 25159.5, Health and Safety Code; 40 CFR Section 264.170.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.171. Use and Management of Containers.

If a container holding hazardous waste is not in good condition (e.g. severe rusting, apparent structural defects) or if it begins to leak, the owner or operator shall transfer the hazardous waste from this container to a container that is in good condition or manage the waste in some other way that complies with the requirements of this chapter.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25159 and 25159.5, Health and Safety Code; 40 CFR Section 264.171.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.172. Compatibility of Waste with Containers.

The owner or operator shall use a container made of or lined with materials which will not react with, and are otherwise compatible with, the hazardous waste to be transferred or stored, so that the ability of the container to contain the waste is not impaired.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25159 and 25159.5, Health and Safety Code; 40 CFR Section 264.172.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.173. Management of Containers.

(a) A container holding hazardous waste shall always be closed during transfer and storage, except when it is necessary to add or remove waste.

(b) A container holding hazardous waste shall not be opened, handled, transferred or stored in a manner which may rupture the container or cause it to leak. Reuse of containers for transportation shall comply with the requirements of the U.S. Department of Transportation regulations including those set forth in 49 CFR section 173.28.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25159 and 25159.5, Health and Safety Code; 40 CFR Section 264.173.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.174. Inspections.

At least weekly, the owner or operator shall inspect areas used for container storage or transfer, looking for leaking containers and for deterioration of containers and the containment system caused by corrosion or other factors.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25159 and 25195.5, Health and Safety Code; 40 CFR Section 264.174.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.175. Containment.

(a) Container transfer and storage areas shall have a containment system that is designed and operated in accordance with subsection (b) of this section.

(b) A containment system shall be designed and operated as follows:

(1) a base shall underlie the containers which is free of cracks or gaps and is sufficiently impervious to contain leaks, spills, and accumulated precipitation until the collected material is detected and removed;

(2) the base shall be sloped or the containment system shall be otherwise designed and operated to drain and remove liquids resulting from leaks, spills, or precipitation, unless the containers are elevated or are otherwise protected from contact with accumulated liquids;

(3) the containment system shall have sufficient capacity to contain precipitation from at least a 24-hour, 25-year storm plus 10% of the aggregate volume of all containers or the volume of the largest container, whichever is greater. Containers that do not contain free liquids need not be considered in this determination;

(4) run-on into the containment system shall be prevented unless the collection system has sufficient excess capacity in addition to that

quired in subsection (b)(3) of this section to contain any run-on which might enter the system; and

(5) spilled or leaked waste and accumulated precipitation shall be removed from the sump or collection area in as timely a manner as is necessary to prevent overflow of the collection system. If the collected material is a hazardous waste under chapter 11 of this division, it shall be managed as a hazardous waste in accordance with all applicable requirements of chapters 12 through 16 of this division. If the collected material is discharged through a point source to waters of the United States, it is subject to the requirements of section 402 of the Federal Clean Water Act, as amended (33 U.S.C. section 1342).

(c) The owner or operator shall submit to the Department with the application for a hazardous waste facility permit a written statement signed by an independent, qualified professional engineer, registered in California, that indicates that the containment system is suitably designed to achieve the requirements of this section.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25150(a), 25159 and 25159.5, Health and Safety Code; 40 CFR Section 264.175.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.176. Special Requirements for Ignitable or Reactive Waste.

Containers holding ignitable or reactive waste shall be located at least 15 meters (50 feet) from the facility's property line.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25159 and 25159.5, Health and Safety Code; 40 CFR Section 264.176.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.177. Special Requirements for Incompatible Wastes.

(a) Incompatible wastes, or incompatible wastes and materials (see Appendix V for examples), shall not be placed in the same container, unless section 66264.17(b) is complied with.

(b) Hazardous waste shall not be placed in an unwashed container that previously held an incompatible waste or material.

(c) A container holding a hazardous waste that is incompatible with any waste or other materials transferred or stored nearby in other containers, piles, open tanks, or surface impoundments shall be separated from the other materials or protected from them by means of a dike, berm, wall, or other device.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25159 and 25159.5, Health and Safety Code; 40 CFR Section 264.177.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

§ 66264.178. Closure.

At closure, all hazardous waste and hazardous waste residues shall be removed from the containment system. Remaining containers, liners, bases, and soil containing or contaminated with hazardous waste or hazardous waste residues shall be decontaminated or removed. At closure, as throughout the operating period, unless the owner or operator can demonstrate in accordance with section 66261.3(e) of this division that the solid waste removed from the containment system is not a hazardous waste, the owner or operator becomes a generator of hazardous waste and shall manage it in accordance with all applicable requirements of chapters 12 through 16 of this division.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25159, 25159.5 and 25245, Health and Safety Code; 40 CFR Section 264.178.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).

Article 10. Tank Systems

§ 66264.190. Applicability.

The requirements of this article apply to owners and operators of facilities that use tank systems for transferring, storing or treating hazardous waste except as otherwise provided in subsections (a), (b) and (c) of this section or in section 66264.1 of this chapter.

(a) Tank systems that are used to transfer, store or treat hazardous waste which contains no free liquids and are situated inside a building with an impermeable floor are exempted from the requirements in section 66264.193. To demonstrate the absence or presence of free liquids in the transferred/stored/treated waste, EPA Method 9095 (Paint Filter Liquids Test) as described in "Test Methods for Evaluating Solid Wastes, Physical/Chemical Methods" (EPA Publication No. SW-846 Third Edition, November 1986) shall be used.

(b) Tank systems, including sumps, as defined in section 66260.10, that serve as part of a secondary containment system to collect or contain releases of hazardous wastes are exempted from the requirements in section 66264.193(a) of this article.

(c) Tanks, sumps, and other such collection devices or systems used in conjunction with drip pads, as defined in 66260.10 of this chapter and regulated under Chapter 14, Article 20, shall meet the requirements of this article.

NOTE: Authority cited: Sections 208, 25150 and 25159, Health and Safety Code. Reference: Sections 25150, 25159 and 25159.5, Health and Safety Code; 40 CFR Section 264.190.

HISTORY

1. New section filed 5-24-91; operative 7-1-91 (Register 91, No. 22).
2. Amendment of first paragraph, new subsection (c) and amendment of NOTE filed 7-29-94; operative 8-29-94 (Register 94, No. 30).

§ 66264.191. Assessment of Existing Tank System's Integrity.

(a) Tanks shall have sufficient shell strength and, for closed tanks, pressure controls (e.g., vents) to assure that they do not collapse or rupture. The Department will review the design of the tanks, including the foundation, structural support, seams and pressure controls and seismic considerations. The Department shall require that a minimum shell thickness be maintained at all times to ensure sufficient shell strength. Factors to be considered in establishing minimum thickness include the width, height and materials of construction of the tank, and the specific gravity of the waste which will be placed in the tank. In reviewing the design of the tank and approving a minimum thickness, the Department shall rely upon appropriate industrial design standards and other available information.

(b) For each existing tank system that does not have secondary containment meeting the requirements of section 66264.193, the owner or operator shall determine that the tank system is not leaking or is unfit for use. Except as provided in subsections (d) and (g) of this section, and in addition to the requirements of subsection (f) of this section, the owner or operator shall obtain and keep on file at the facility a written assessment reviewed and certified by an independent, qualified professional engineer, registered in California, in accordance with section 66270.11(d), that attests to the tank system's integrity by the dates indicated below:

(1) January 12, 1988, for tanks containing RCRA hazardous wastes, unless:

(A) the owner/operator is a conditionally exempt small quantity generator as defined in 40 CFR section 261.5, or a 100 to 1000 kg per month generator as defined in 40 CFR section 265.201, or

(B) the owner/operator is not subject to regulation in 40 CFR part 264 pursuant to an exemption in 40 CFR section 264.1;

(2) July 1, 1992, for:

(A) tanks containing only non-RCRA hazardous wastes, and

(B) tanks containing RCRA hazardous wastes, if:

Attachment II

1994 UBC Section 307.2.5

3. Rooms used for the storage of Class I flammable liquids shall not be located in a basement.

307.1.6 Requirement for report. The building official may require a technical opinion and report to identify and develop methods of protection from the hazards presented by the hazardous material. The opinion and report shall be prepared by a qualified person, firm or corporation approved by the building official and shall be provided without charge to the enforcing agency.

The opinion and report may include, but is not limited to, the preparation of a hazardous material management plan (HMMP); chemical analysis; recommendations for methods of isolation, separation, containment or protection of hazardous materials or processes, including appropriate engineering controls to be applied; the extent of changes in the hazardous behavior to be anticipated under conditions of exposure to fire or from hazard control procedures; and the limitations or conditions of use necessary to achieve and maintain control of the hazardous materials or operations. The report shall be entered into the files of the code enforcement agencies. Proprietary and trade secret information shall be protected under the laws of the state or jurisdiction having authority.

307.2 Construction, Height and Allowable Area.

307.2.1 General. Buildings or parts of buildings classed in Group H because of the use or character of the occupancy shall be limited to the types of construction set forth in Table 5-B and shall not exceed, in area or height, the limits specified in Sections 504, 505 and 506.

307.2.2 Floors. Except for surfacing, floors in areas containing hazardous materials and in areas where motor vehicles, boats, helicopters or airplanes are stored, repaired or operated shall be of noncombustible, liquid-tight construction.

EXCEPTION: In Group H, Divisions 4 and 5 Occupancies, floors may be surfaced or waterproofed with asphaltic paving materials in that portion of the facility where no repair work is done.

307.2.3 Spill control. When required by the Fire Code, floors shall be recessed a minimum of 4 inches (102 mm) or shall be provided with a liquid-tight raised sill with a minimum height of 4 inches (102 mm) so as to prevent the flow of liquids to adjoining areas. Except for surfacing, the sill shall be constructed of noncombustible material, and the liquid-tight seal shall be compatible with the material being stored. When liquid-tight sills are provided, they may be omitted at door openings by the installation of an open-grate trench which connects to an approved drainage system.

307.2.4 Drainage. When required by the Fire Code, the room, building or area shall be provided with a drainage system to direct the flow of liquids to an approved location or, the room, building or area shall be designed to provide secondary containment for the hazardous materials and fire-protection water.

Drains from the area shall be sized to carry the sprinkler system design flow rate over the sprinkler system design area. The slope of drains shall not be less than 1 percent. Materials of construction for the drainage system shall be compatible with the stored materials.

Incompatible materials shall be separated from each other in the drain systems. They may be combined when they have been rendered acceptable for discharge by an approved means into the public sewer. Drainage of spillage and fire-protection water directed to a neutralizer or treatment system shall comply with the following:

1. The system shall be designed to handle the maximum worst-case spill from the single largest container plus the volume of fire-protection water from the system over the minimum design area for a period of 20 minutes.

2. Overflow from the neutralizer or treatment system shall be provided to direct liquid leakage and fire-protection water to a safe location away from the building, any material or fire-protection control valve, means of egress, adjoining property, or fire department access roadway.

307.2.5 Containment. When required by the Fire Code, drains shall be directed to a containment system or other location designed as secondary containment for the hazardous material liquids and fire-protection water, or the building, room or area shall be designed to provide secondary containment of hazardous material liquids and fire-protection water through the use of recessed floors or liquid-tight raised sills.

Secondary containment shall be designed to retain the spill from the largest single container plus the design flow rate of the sprinkler system for the area of the room or area in which the storage is located or the sprinkler system design area, whichever is smaller. The containment capacity shall be capable of containing the flow for a period of 20 minutes.

Overflow from the secondary containment system shall be provided to direct liquid leakage and fire-protection water to a safe location away from the building, any material or fire-protection control valve, means of egress, fire access roadway, adjoining property or storm drains.

If the storage area is open to rainfall, the secondary containment shall be designed to accommodate the volume of a 24-hour rainfall as determined by a 25-year storm.

When secondary containment is required, a monitoring method capable of detecting hazardous material leakage from the primary containment into the secondary containment shall be provided. When visual inspection of the primary containment is not practical, other approved means of monitoring may be provided. When secondary containment may be subject to the intrusion of water, a monitoring method for such water shall be provided. Whenever monitoring devices are provided, they shall be connected to distinct visual or audible alarms.

307.2.6 Smoke and heat vents. Smoke and heat venting shall be provided in areas containing hazardous materials as set forth in the Fire Code in addition to the provisions of this code.

307.2.7 Standby power. Standby power shall be provided in Group H, Divisions 1 and 2 Occupancies and in Group H, Division 3 Occupancies in which Class I or II organic peroxides are stored. The standby power system shall be designed and installed in accordance with the Electrical Code to automatically supply power to all required electrical equipment when the normal electrical supply system is interrupted.

307.2.8 Emergency power. An emergency power system shall be provided in Group H, Divisions 6 and 7 Occupancies. The emergency power system shall be designed and installed in accordance with the Electrical Code to automatically supply power to all required electrical equipment when the normal electrical supply system is interrupted.

The exhaust system may be designed to operate at not less than one half the normal fan speed on the emergency power system when it is demonstrated that the level of exhaust will maintain a safe atmosphere.

307.2.9 Special provisions for Group H, Division 1 Occupancies. Group H, Division 1 Occupancies shall be in buildings used for no other purpose, without basements, crawl spaces or other under-floor spaces. Roofs shall be of lightweight construction with suitable thermal insulation to prevent sensitive material from reaching its decomposition temperature.

Group H, Division 1 Occupancies containing materials which are in themselves both physical and health hazards in quantities exceeding the exempt amounts in Table 3-E shall comply with requirements for both Group H, Division 1 and Group H, Division 7 Occupancies.

307.2.10 Special provisions for Group H, Divisions 2 and 3 Occupancies. Group H, Divisions 2 and 3 Occupancies containing quantities of hazardous materials in excess of those set forth in Table 3-G shall be in buildings used for no other purpose, shall not exceed one story in height and shall be without basements, crawl spaces or other under-floor spaces.

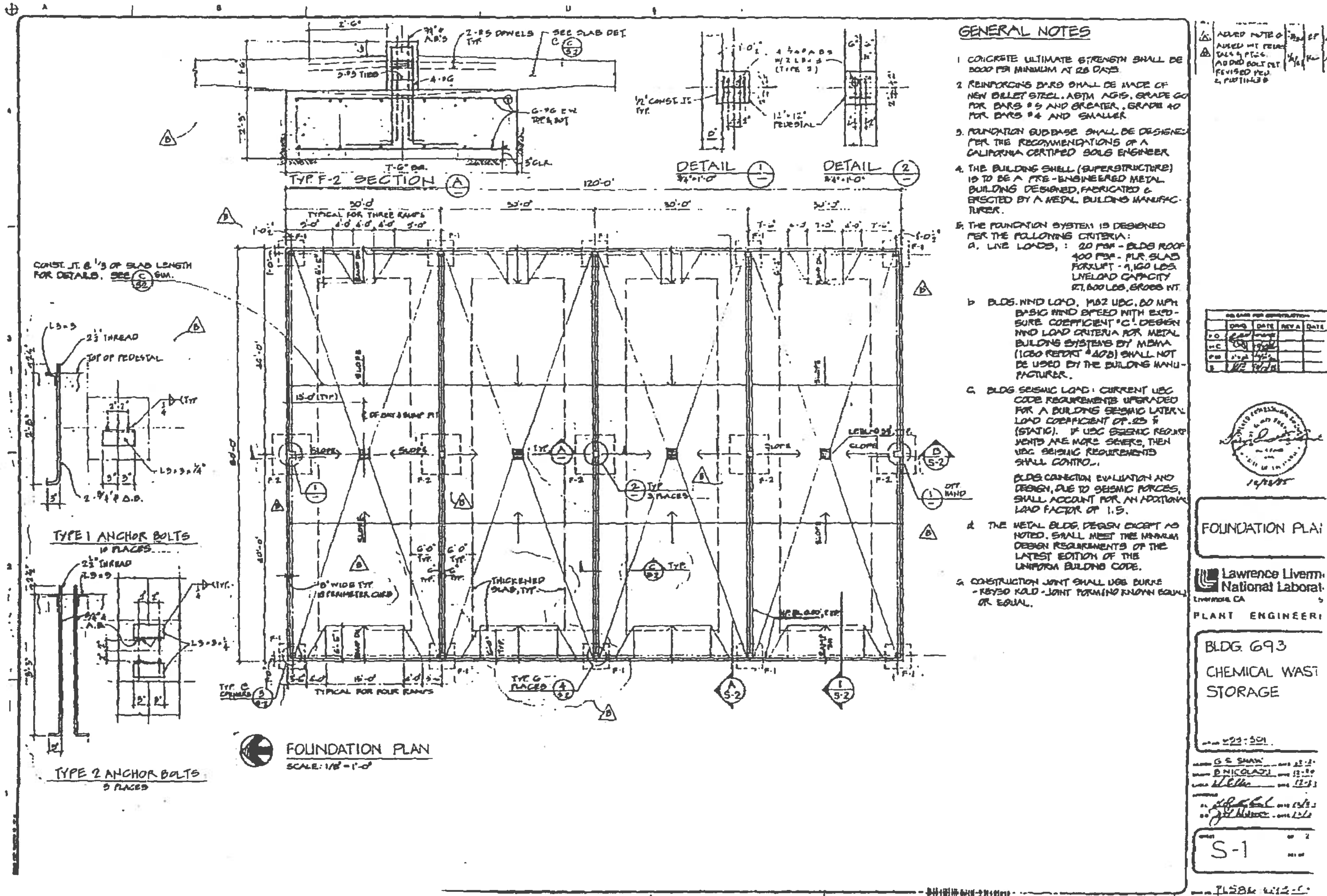
Group H, Divisions 2 and 3 Occupancies containing water-reactive materials shall be resistant to water penetration. Piping for conveying liquids shall not be over or through areas containing water reactives, unless isolated by approved liquid-tight construction.

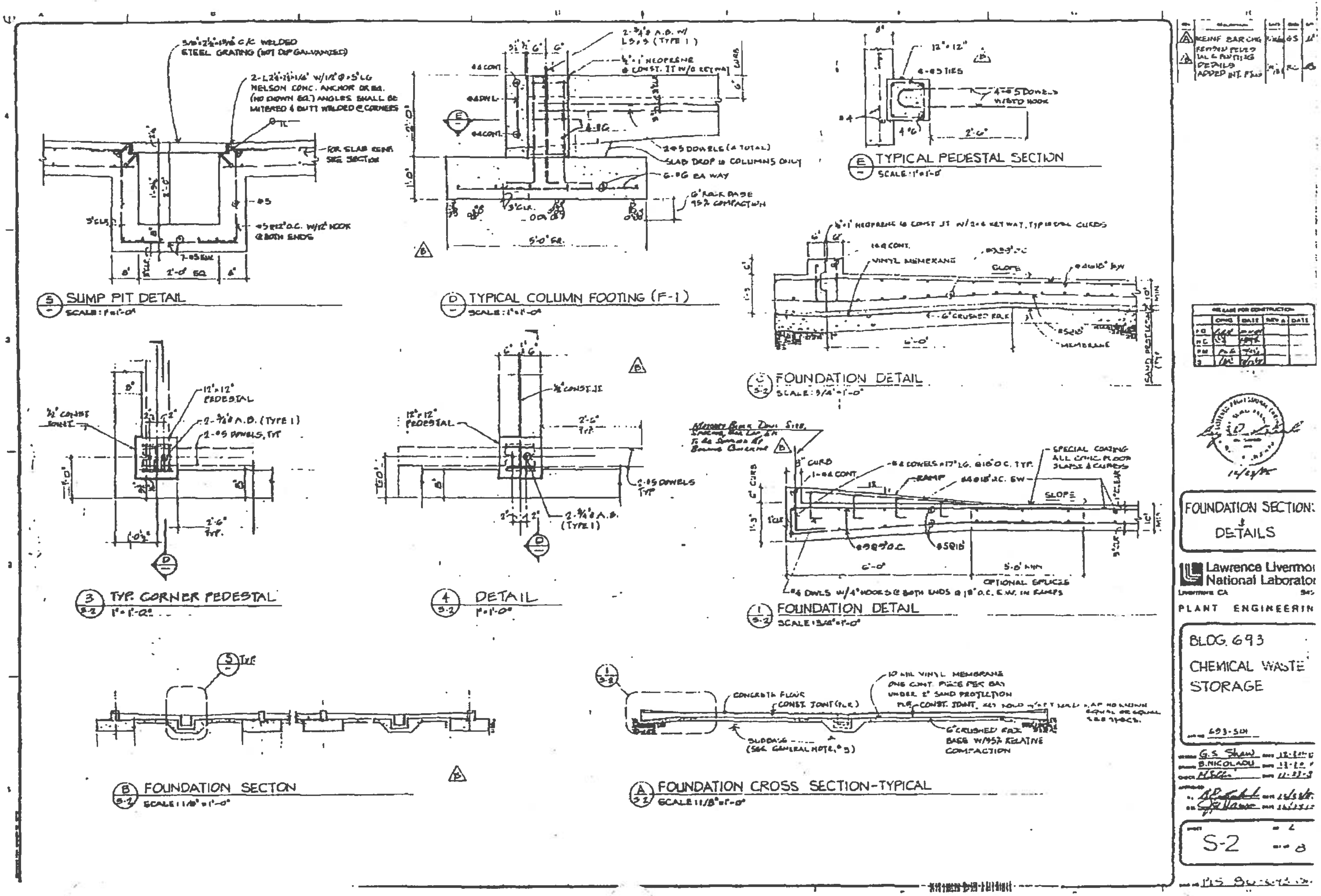
EXCEPTION: Fire-protection piping may be installed over reactives without isolation.

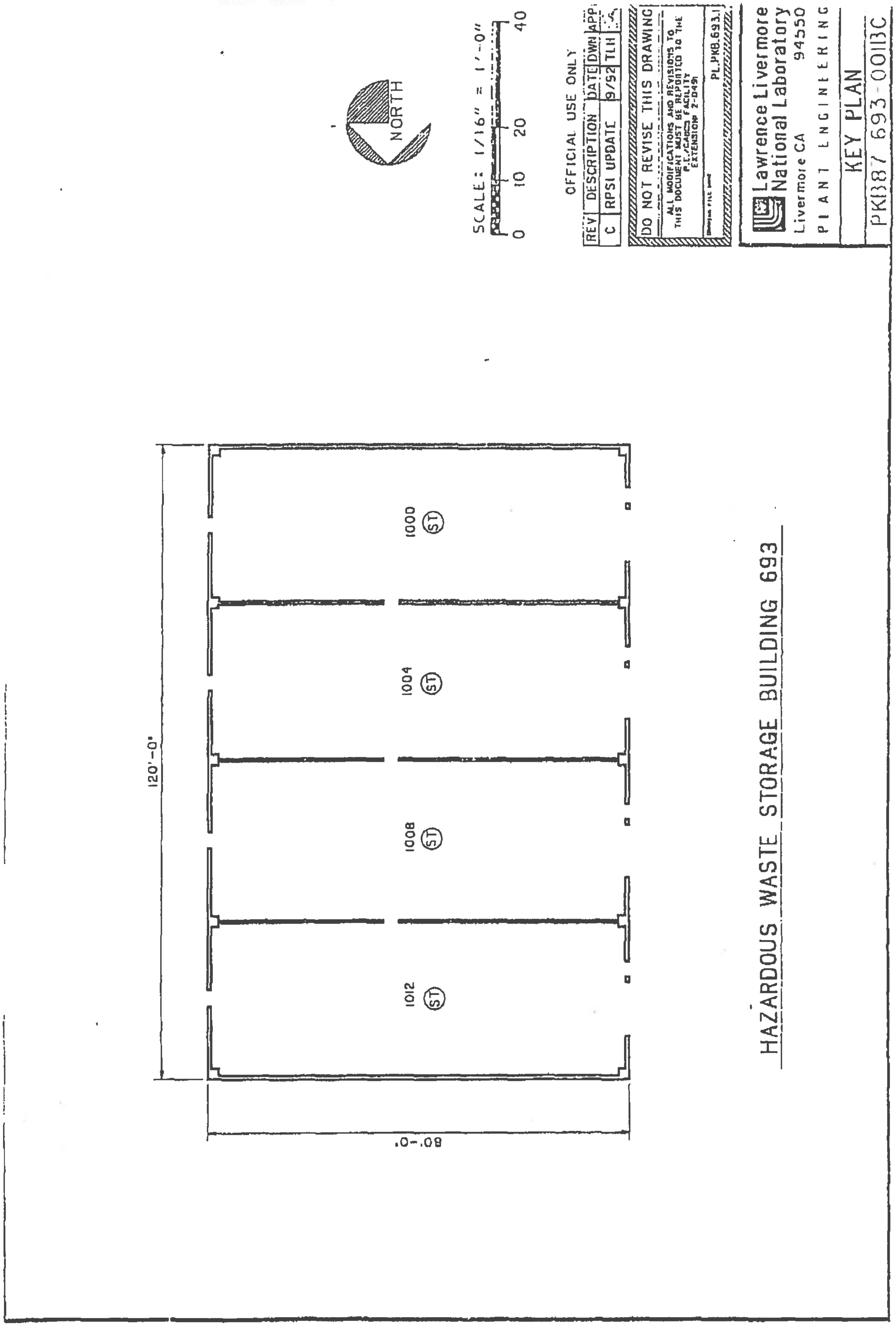
Attachment III

LLNL Drawings

PLS86-693-001D	Building 693 Chemical Waste Storage - Foundation Plan
PLS86-693-002D	Building 693 Chemical Waste Storage - Foundation Sections
LLNL Key Plan - Building 693	


GENERAL NOTES
1 CONCRETE ULTIMATE STRENGTH SHALL BE 3000 PSI MINIMUM AT 28 DAYS.
2 REINFORCING BARS SHALL BE MADE OF NEW BILLET STEEL. ASTM A615, GRADE 60 FOR BARS #5 AND GREATER, GRADE 40 FOR BARS #4 AND SMALLER.
3. FOUNDATION SUBBASE SHALL BE DESIGNED PER THE RECOMMENDATIONS OF A CALIFORNIA CERTIFIED SOILS ENGINEER
4. THE BUILDING SHELL (SUPERSTRUCTURE) IS TO BE A PRE-ENGINEERED METAL BUILDING DESIGNED, FABRICATED & ERECTED BY A METAL BUILDING MANUFACTURER.
5. THE FOUNDATION SYSTEM IS DESIGNED PER THE FOLLOWING CRITERIA:
a. LIVE LOADS, : 20 PSF - BLDG ROOF
400 PSF - FLR. SLAB
FORKLIFT - 9,160 LBS. LIVELOAD CAPACITY 27,800 LBS. GROSS WT.
b BLDG. WIND LOAD, 1982 UBC, 80 MPH BASIC WIND SPEED WITH EXPOSURE COEFFICIENT "C". DESIGN WIND LOAD CRITERIA FOR METAL BUILDING SYSTEMS BY MBMA (ICBO REPORT #408) SHALL NOT BE USED BY THE BUILDING MANUFACTURER.
c BLDG SEISMIC LOAD: CURRENT UBC CODE REQUIREMENTS UPGRADED FOR A BUILDING SEISMIC LATERAL LOAD COEFFICIENT OF .25 (STATIC). IF UBC SEISMIC REQUIREMENTS ARE MORE SEVERE, THEN UBC SEISMIC REQUIREMENTS SHALL CONTROL.
BLDG CONNECTION EVALUATION AND DESIGN, DUE TO SEISMIC FORCES, SHALL ACCOUNT FOR AN ADDITIONAL LOAD FACTOR OF 1.5.
d THE METAL BLDG. DESIGN EXCEPT AS NOTED, SHALL MEET THE MINIMUM DESIGN REQUIREMENTS OF THE LATEST EDITION OF THE UNIFORM BUILDING CODE.
6 CONSTRUCTION JOINT SHALL USE BURKE - KEYED KOLD-JOINT FORMING KNOWN EQUAL OR EQUAL.
TYP. F-2 SECTION
DETAIL 1
DETAIL 2
120'-0"
30'-0"
TYPICAL FOR THREE RAMPS
TYPICAL FOR FOUR RAMPS
SLOPE
THICKENED SLAB, TYP.
8" WIDE TYP. (@ PERIMETER CURB)
CONST. JT. @ 1/3 OF SLAB LENGTH FOR DETAILS, SEE C S-2 SIM.
TYPE 1 ANCHOR BOLTS
10 PLACES
TYPE 2 ANCHOR BOLTS
5 PLACES
2 3/4" THREAD
TOP OF PEDESTAL
FOUNDATION PLAN
SCALE: 1/8" = 1'-0"
FOUNDATION PLAN
Lawrence Livermore National Laboratory
Livermore CA
PLANT ENGINEERING
BLDG. 693
CHEMICAL WASTE STORAGE
G S SHAW
B NICOLAZZI
S-1


SUMP PIT DETAIL
SCALE: 1"=1'-0"
TYPICAL COLUMN FOOTING (F-1)
SCALE: 1"=1'-0"
TYPICAL PEDESTAL SECTION
SCALE: 1"=1'-0"
FOUNDATION DETAIL
SCALE: 3/4"=1'-0"
TYP. CORNER PEDESTAL
DETAIL
FOUNDATION DETAIL
FOUNDATION SECTON
FOUNDATION CROSS SECTION-TYPICAL
SCALE 1/8"=1'-0"
FOUNDATION SECTION & DETAILS
Lawrence Livermore National Laboratory
PLANT ENGINEERING
BLDG. 693
CHEMICAL WASTE STORAGE
G.S. Shaw
B. NICOLADU
S-2


HAZARDOUS WASTE STORAGE BUILDING 693
120'-0"
80'-0"
1000 ST
1004 ST
1008 ST
1012 ST
NORTH
SCALE: 1/16" = 1'-0"
0 10 20 40
OFFICIAL USE ONLY
REV DESCRIPTION DATE DWN APP
C RPSI UPDATE 9/92 TLH
DO NOT REVISE THIS DRAWING
Lawrence Livermore National Laboratory
Livermore CA 94550
PLANT ENGINEERING
KEY PLAN

Attachment IV

Memorandum from Bill Gall, February 12, 1996, regarding Fire Water Containment, Building 693

Interdepartmental letterhead

Mail Station *L-545*

Ext: 3-2304

HAZARDS CONTROL DEPARTMENT
ES&H Team 4

February 12, 1996

TO: Barb Quivey L-654
Roland Quong L-547
Beth Newton ICBO

SUBJECT: Fire Water Containment, B-693, Flammable Liquid Section

I Spoke with Beth Newton, International Conference of Building Officials (ICBO) today, to request an interpretation of the Uniform Building Code, sec 307.2.5, requirement for Fire Water Containment, as it relates to B-693. I explained to Ms. Newton that B-693 was an H occupancy used to store hazardous waste. B-693 is divided into four, 2400 square foot sections, each section is 30x80, storing different types of waste. The flammable waste section of the building is the end storage unit, with three exterior walls and a two hour fire wall separating it from the other sections of the building.

The primary fire protection provided for the flammable liquid section is a high expansion foam suppression system. In addition to the primary, there is a secondary fire suppression system. It is a fire sprinkler system, with high temperature heads. The fire sprinklers will not operate unless the high expansion foam system fails. The fire water containment is based on the high expansion foam system. This system discharges 125 GPM.

I asked Ms. Newton if she agreed with our decision to base the fire water containment on the high expansion foam system.

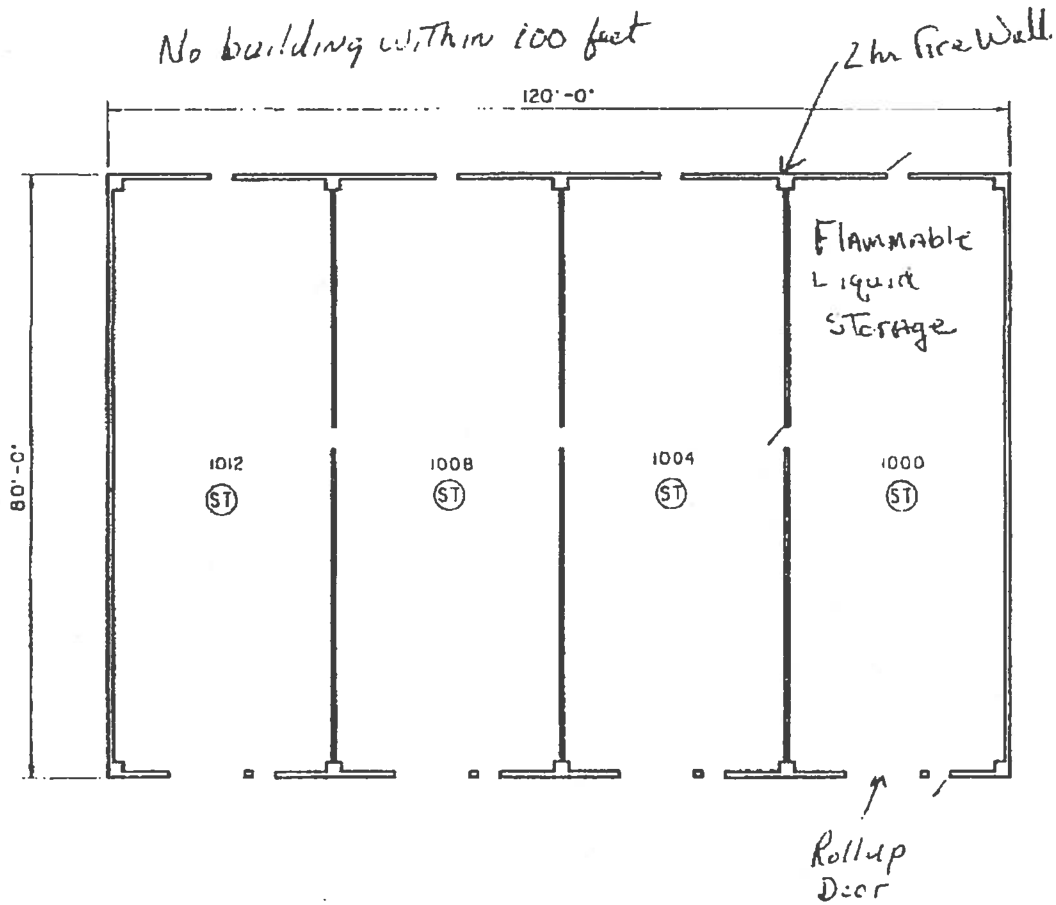
Ms. Newton agreed with our decision.

Robert Gall

Robert "Bill" Gall
Fire Protection Engineer

0015TM4BG7-693

University of California
Lawrence Livermore National Laboratory



FLAMMABLE STORAGE BUILDING 693

REV	DESCRIPTION	DATE	DWN	APPR
B	RPSI UPDATE	5/90	MST	

DO NOT REVISE THIS DRAWING

ALL MODIFICATIONS AND REVISIONS TO THIS DOCUMENT MUST BE REPORTED TO THE P.E./CADDS FACILITY EXTENSION 2-0491

PE.AEO.PKB.87.693.001 002.B.A

Lawrence Livermore National Laboratory
Livermore CA 94550
PLANT ENGINEERING

KEY PLAN

PKB87-693-001BB

COMPUTER = (C) | LAB = (L) | INDUSTRIAL SHOP = (IS) | INSTITUTIONAL USES = (IU) | MECH. EQUIP. = (M) | OFFICE = (O) | SERVICE SHOP = (SS) | STORAGE = (ST) | TOILET = (T)

Interdepartmental letterhead
Mail Station L-545
Ext: 3-2304

HAZARDS CONTROL DEPARTMENT
ES&H Team 4

February 16, 1996

TO: Roland Quong L-547

SUBJECT: Design Basis for Fire Water Containment, B-693

The Laboratory's operating contract with the Department of Energy requires that the Laboratory be operated in compliance with the national consensus fire codes and standards developed by the National Fire Protection Association (NFPA). Generally, these codes and standards require that the drainage and containment systems be designed to accommodate the credible fire flow based on a Fire Hazards Analysis. The Fire Hazards Analysis process allows the analyst to use sound engineering judgment in the design of drainage and containment systems. In this case the Fire Protection Engineer has chosen to use the containment model specified by section 307.2.5 of the Uniform Building Code.

0016TM4BG7-693

Robert Gall

Robert "Bill" Gall
Fire Protection Engineer

Concurrence:

Steve Leeds

Steve Leeds
Laboratory Fire Marshal

cc: B. Quivey, L-654
C. Van Warmerdam, L-547
S. Leeds, L-388

University of California
Lawrence Livermore
National Laboratory

SECONDARY CONTAINMENT REPORT
BUILDING 693 CONTAINER STORAGE UNIT GROUP

PREPARED FOR

LAWRENCE LIVERMORE NATIONAL LABORATORY

DECONTAMINATION AND WASTE TREATMENT FACILITY

(DWTF)

PARSONS INFRASTRUCTURE AND TECHNOLOGY GROUP INC.

PASADENA, CA.

PARSONS

Secondary Containment Report

Building 693 Container Storage Unit Group

Table of Contents

Secondary Containment Report

Building 693 Container Storage Unit Group

I. Introduction

The Building 693 Container Storage Unit Group comprises the following four Container Storage Units:

- B693 Container Storage Cells (existing interim status unit)
- B693 Annex-Classified Waste Storage
- B693 Yard-Freezer Storage
- B693 Yard Roll Off Bin Storage

Each of the above four units is a separate containment zone. The secondary containment of B693 Container Storage Cells and the freezer storage are discussed separately. This report discusses the secondary containment of the remaining two Container Storage Units. Pad requirements for freezer container storage are also discussed .

II. Containment System Design

II.A B693 Annex Classified Waste Storage

The B693 Annex Classified Waste Storage Unit will only store solid hazardous waste. There will be no liquid waste in this area. Therefore secondary containment volume for hazardous liquid waste is not considered. The containment provided in this area is for fire sprinkler water. The containment calculations for the fire sprinkler water are given in Appendix A.

The floor of the building is sloped towards a trench provided for collecting the sprinkler water (see Figure 1). The trench is connected to an Underground Storage Tank to provide adequate capacity for containing the sprinkler water. The containment floor is constructed of 8-inch reinforced concrete. There are no leaks, cracks or gaps which will allow liquid channeling through the containment area. Although there will be no liquid hazardous waste in the building, added protection to migration of waste is provided by painting the floor with three layers of an epoxy coating.

II.A.1 Material Compatibility

The floor is lined with an impervious polymeric liner. Incompatibility problems between the waste and liner are not expected due to the limited time that spilled materials would be in contact with the liners.

II.A.2 Liner Strength

The concrete floor will be lined with three coats of ChemProof Polymers as follows:

a) Two coats of ChemProof Polymers "Perma Tec 3000"
b) Top coat of ChemProof Polymers "Perma Coat 2000"

This liner is 100% solids epoxy which is resistant to mechanical (daily operations, foot, and vehicular traffic) and chemical abuse, splash, spill, or fumes. It is also 100% non-porous and thus prevents migration of spills.

II.A.3 Foundation Support

A 250 psf live load is used for all slab-on-grade at Building 693 Annex Classified Waste Storage. The slab-on-grade will be a reinforced concrete slab-on-grade and is designed to withstand failure due to pressure gradients, settlement, compression, and uplift. A 8-inch thick slab is used to accommodate forklift and heavy equipment loads. Slab-on-grade will be placed over a 6-mil polyethylene vapor barrier, underlain by two inches sand and four inches well graded gravel, to be compacted to 95 percent relative density. The vapor barrier impedes moisture infiltration from the subsurface into the secondary containment system.

II.A.4 Release Prevention

The base of the Building 693 Annex Classified Waste Storage is prepared from continuous pour reinforced concrete and is free of cracks and gaps. The top of the concrete slab is lined with a non-porous polymer which prevents migration of spills. The exterior wall base containment is provided by a continuous curb. The top of the curb as also the metal clips holding the exterior wall are lined with the non-porous polymer to prevent any migration of hazardous waste.

II.A.5 Run-on and Precipitation

Precipitation accumulation in Building 693 Annex Classified Waste Storage is not possible. Direct deposit of precipitation is prevented because the storage area is completely enclosed indoors by the building roof and surrounding walls. Hence none of the projected rainfall (24 hr-25 yr rainstorm) can get into storage area. Run-on is prevented by the grade and the swale outside of the building.

II.B B693 Yard Freezer Storage

The freezer is an existing unit that has been used primarily as storage for radiologically contaminated animal carcasses (rats, rabbits etc.). There is the potential that some of the carcasses may also have RCRA hazardous waste constituents and may be considered mixed waste. There may also be occasions when small volumes of volatile waste acids may need to be stored at low temperatures because of the instability at ambient temperatures.

The freezer's outside dimensions are 10 ft wide by 12 ft long by 8 ft-8 3/4 in high. It will be secured to a reinforced concrete pad under a shed roof cover. The unit will be used to store up to 30-gal of hazardous waste liquid. The liquid will be stored in 1- to 30-L containers or a 55-gal drum. The containers will be stored inside a fabricated metal secondary containment pan secured to the freezer walls with quick disconnect mechanisms. The secondary containment pan will be inspected daily for container leaks or spills. The containment pan will be inspected, decontaminated as necessary, and removed from the freezer and stored with other Building 693 Container Storage Unit Group when not in use. The RCRA certification of the secondary containment pan is presented separately.

II.B.1 Material Compatibility

The freezer is built with 4 in. Class I Urethane foam insulation in one seamless module supported by three 1-1/2 in. high by 3 in. wide by 12 ft long, 7 gauge steel skids. The freezer has a 30 in. by 78 in. entrance door, vapor proof interior lighting, sloped weatherproof roof, 16 gauge galvanized steel decked door, and aluminum exterior and interior. The secondary containment pan inside the freezer is compatible with the waste that will be stored and will be inspected daily for leaks or spills.

The freezer is stored on a pad adjacent to the Classified Waste Storage Building as shown in Figure 1. The pad will consist of a concrete slab on compacted fill. This slab will be 6" thick reinforced concrete and will have wind/seismic restraint system for the freezer. There are no leaks, cracks or gaps to provide for liquid channeling through the pad. The design of the concrete pad including its cross sectional view is shown in Figure 2.

II.B.2 Foundation Support

Inside the freezer, the containers will be stored within a fabricated metal secondary containment pan secured to the freezer walls with quick disconnect mechanisms. The freezer itself will be placed on the concrete pad and restrained by a wind/seismic restraint system, which consists of "L" shaped frames built of steel angles and anchored to the concrete with expansion anchors.

II.B.3 Release Prevention

The secondary containment pan inside the freezer will be inspected daily for leaks and spills. Any leaks or spills will be removed. The pan will be decontaminated and stored when not in use.

II.B.4 Run-on and Precipitation

Precipitation accumulation inside the freezer is not possible because the freezer is fully enclosed. A roof over the freezer provides added protection from precipitation entering the freezer. Run-on is prevented by the grade and the swale around the concrete pad on which the freezer will be placed.

II.B.5 Leak Detection

Administrative controls and daily inspection will ensure that any leak in the secondary containment pan is detected within 24 hours. Any spill on the pad during handling of the waste will be immediately removed.

II.B.6 Spill Removal

Accumulated liquid in the freezer pan will be transferred via a portable pump to portable storage containers for storage or disposal.

II.C. B693 Yard Roll-Off Bin Storage

The outside area just north of Building 693 will be used as a storage location for two roll-off bins. The roll-off bins will be standard steel roll-off bins with up to 40 yd3 capacity per bin. The bins will be lined with plastic and equipped with lids that can be secured when not open for putting waste in the bins. The bins will be used to store only dry solid waste; therefore, secondary containment volume for hazardous waste liquids is not considered. The bins will be shipped to commercial disposal facilities when they are full.

II.C.1 Foundation Support

The roll-off bins will be placed on a concrete pad. These bins will be delivered by a truck and normally utilize 4 steel wheels for vertical support; thus they will impose a point loading which should not exceed the typical forklift loading. The supporting slab will be a 12" thick reinforced concrete. There are no leaks, cracks or gaps in the slab to provide for liquid channeling through the pad. Any solid waste spilled on the pad will be immediately picked and deposited in the roll-off bins. The design of the concrete pad including its cross-sectional view is shown in Figure 3.

II.C.2 Run-on, Run-off and Precipitation

Precipitation accumulation inside the roll-off bin is not possible because it is fully enclosed. Run-on is prevented by the grade and the swale around the concrete pad on which the roll-off bin will be placed. Run-off controls are provided by the unit structure and the sloping asphalt area. All drainage controls (e.g. ditches, downspouts, and culverts) are sized to handle the peak flows from a 25-year storm event.

III. Certification Statement

"I have reviewed the design information for Building 693 Container Storage Unit Group to determine if the Container Storage Units are suitably designed to meet the requirements of the California Code of Regulations (CCR), Title 22, Sections 66264.175(b) and 66264.193(c)(2). To the best of my knowledge and belief, the proposed containment for B693 Annexe-Classified Waste Storage Unit is designed to:

- Be free of cracks or gaps, compatible with stored wastes, and impervious to contain leaks and spills;
- Prevent waste containers from coming in contact with leaks and spills;

The base pads underlying the B693 Yard-Freezer Storage Unit and the B693 Yard Roll-Off Bin Storage Unit are designed to:

- Be capable of providing support to the secondary containment system, resistance to pressure gradients above and below the system and capable of preventing failure due to settlement, compression or uplift.
- Be free of cracks or gaps and sufficiently impervious to contain leaks, spills and accumulated precipitation until the collected material is detected and removed.

Based on the information provided in this containment report, the secondary containment system is suitably designed to achieve the requirements of 22 CCR 66264.175(b) and 66264.193(c)(2).

Handoyo Suwandhaputra, Professional Engineer — Date: 6-19-96

California Registration Number 044212

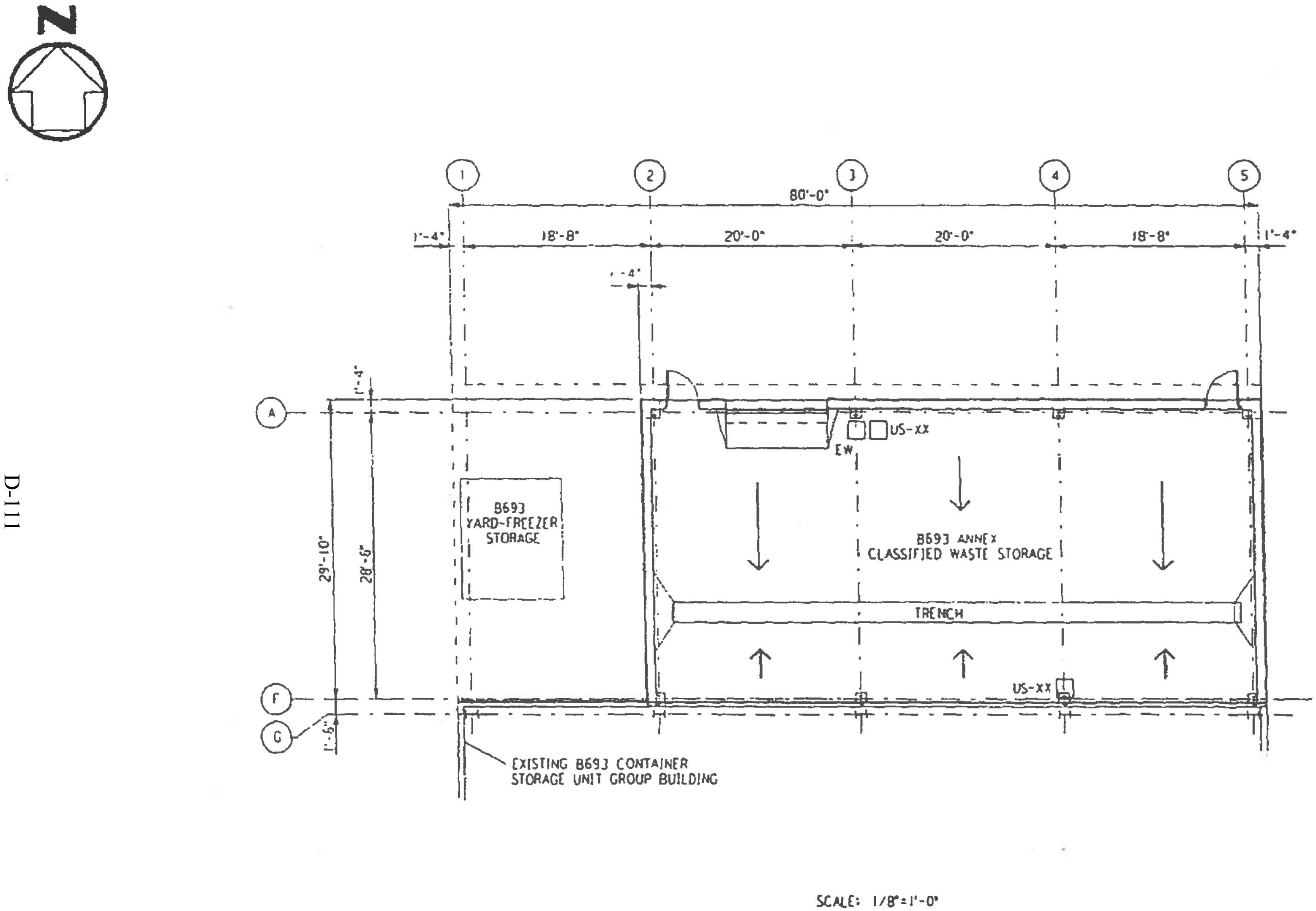


Figure 1 B693 ANNEXE CLASSIFIED WASTE STORAGE

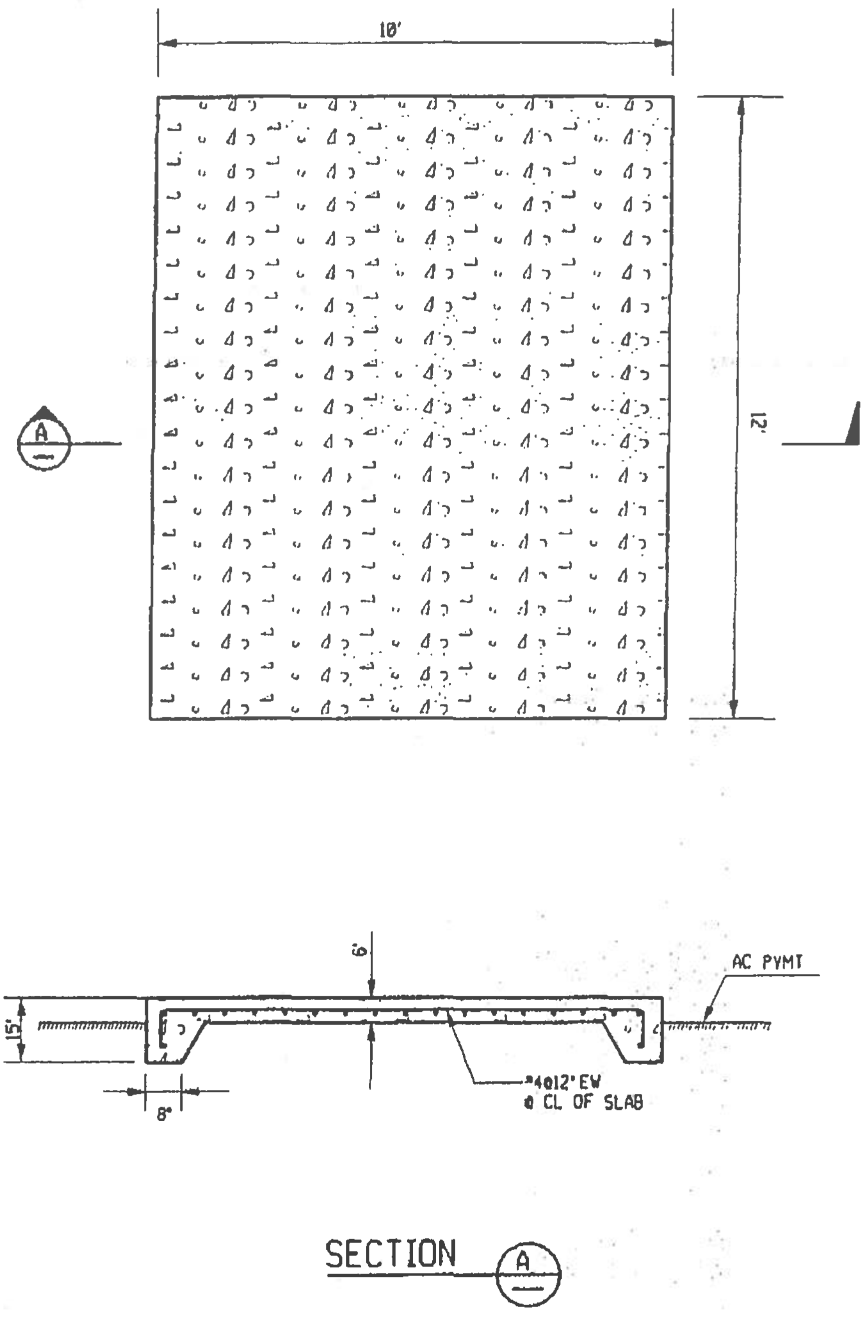


Figure 2 B693 YARD FREEZER STORAGE PAD

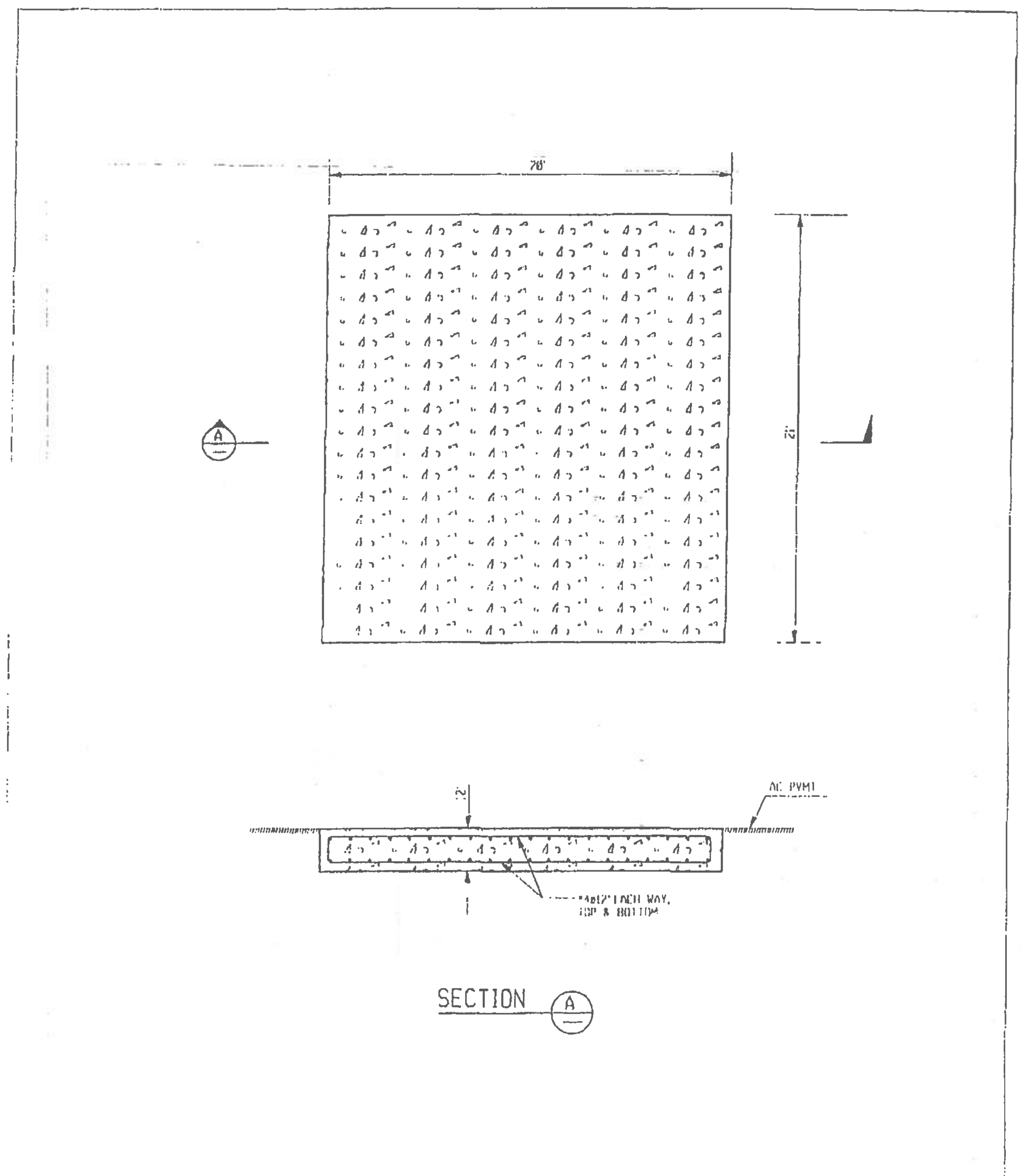


Figure 3 B693 YARD ROLL-OFF BIN STORAGE PAD

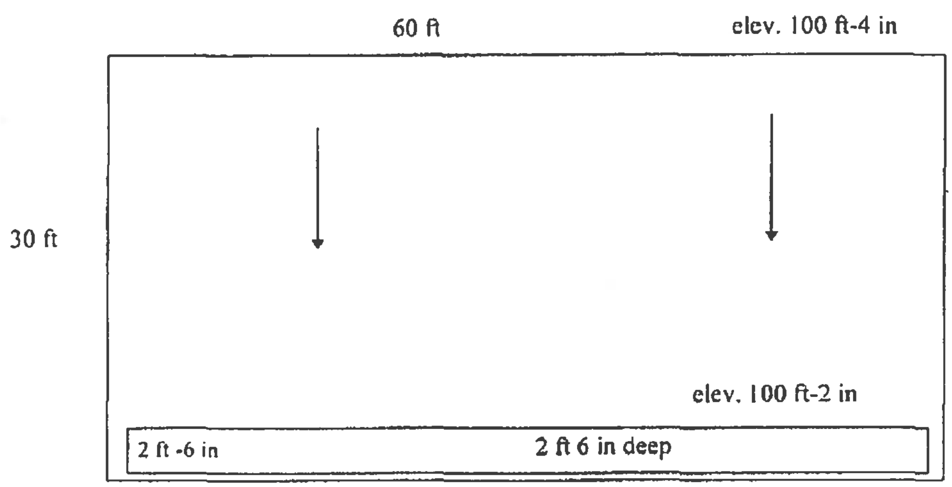
APPENDIX A

Fire-Water Containment Calculations

Annex-Classified Waste Storage

The secondary containment is rectangular in shape with a width (east-west) of 60 ft and a length of 30 ft. It occupies a floor area of 1,800 ft^2. The containment area is sloped from north to south towards the trench with a 2 in drop in elevation.

The following will calculate the volume required in the Classified Waste Storage to hold the fire water.



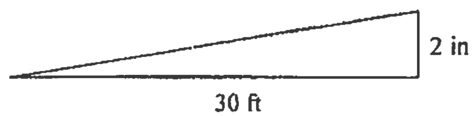
Fire water assumptions:

Flow:	0.3 gpm/ft^2
Fire Zone:	1,800 ft^2
Duration:	20 minutes

The fire water volume is as follows:

$$0.3\ gpm/ft^2 \times 1{,}800\ ft^2 \times 20\ min = 10{,}800\ gal\ (1{,}445\ ft^3)$$

Available containment volume to contain fire water:



$$24 \text{ ft} \times 2/12 \text{ ft} \times 1/2 \times 60 \text{ ft} = 150 \text{ ft}^3$$

Trench volume:

$$2.5 \text{ ft} \times 60 \text{ ft} \times 2.5 \text{ ft} = 375 \text{ ft}^3$$

Thus the total volume available is 525 ft^3 which is less than the required volume of 1,445 ft^3. It is recommended that the trench be connected to the underground storage tank which has 20,000 gallon (2,674 ft^3) capacity.

CHOW ENGINEERING, INC.

7700 Edgewater Drive, Suite 729, Oakland, CA 94621
Tel: (510) 636 8500 FAX: (510) 636 8544

Technical Certification of the Secondary Containment Pan Design for Building 693 Freezer Storage Area

I have reviewed the calculations and design of the Secondary Containment Pan for Building 693 Freezer Storage Area at Lawrence Livermore National Laboratory, to determine if the containment pan is suitably designed to meet the requirements of the California Code of Regulations (CCR) Title 22 Section 66264.175. To the best of my knowledge, based upon my review of the design and information provided, the proposed design has the following features:

1. The secondary containment pan design for the freezer storage area will be free of any cracks or gaps.
2. The containment pan will allow leaks or spills from containers to be stored inside the pan to collect adequately inside the pan.
3. The containment system design has sufficient capacity to hold 10% of the aggregate volume of all containers. Precipitation is not an issue because the pan is enclosed within the freezer unit. The design criteria used to evaluate the adequacy of the containment was based on the maximum allowable amount of liquid waste stored in the containers (30 gallons of waste liquids).
4. Run-on into the containment area is not an issue because the pan will be located inside the freezer.

I certify that the design of the Secondary Containment Pan for Building 693 Freezer Storage Area meets the requirements of 22 CCR 66264.175 in accordance with its intended purpose.

Reuben H. Chow, P.E.
Chow Engineering, Inc.

March 3, 1997
Date

Expires 9-30-00

CE Project No. 97-R2009

CE CHOW ENGINEERING, INC.

7700 Edgewater Drive, Suite 729, Oakland, CA 94621
Tel: (510) 636 8500 FAX: (510) 636 8544

May 31, 1996

Mr Frank Sizemore, Environmental Specialist
Permits and Regulatory Affairs, EPD
LAWRENCE LIVERMORE NATIONAL LABORATORY
7000 East Avenue, L-627
Livermore, CA 94550

Ref: Certification of Secondary Containment Pan for the 693 Freezer Storage Area
LLNL Task Order No. B329659, Master Task Agreement No. B324109
Our Ref: 96-S1016

Dear Mr Sizemore:

Chow Engineering, Inc. (CE) has recently completed the review, and certification of the Secondary Containment Pan system for the above described project. The system is described on Lawrence Livermore National Laboratory document entitled "Hazardous Waster Management HWM/JM 4/22/96, Revised 5/24/96", as signed by Collin Jones and Kerry Cadwell.

This certification letter has been signed and stamped by a California Registered Professional Engineer. This completes our services for the above described project. Please call me with any questions, or to let me know how else I can be of service. Thank you.

Sincerely,

Reuben Chow, P.E.
Principal

EXPIRES 9-30-96

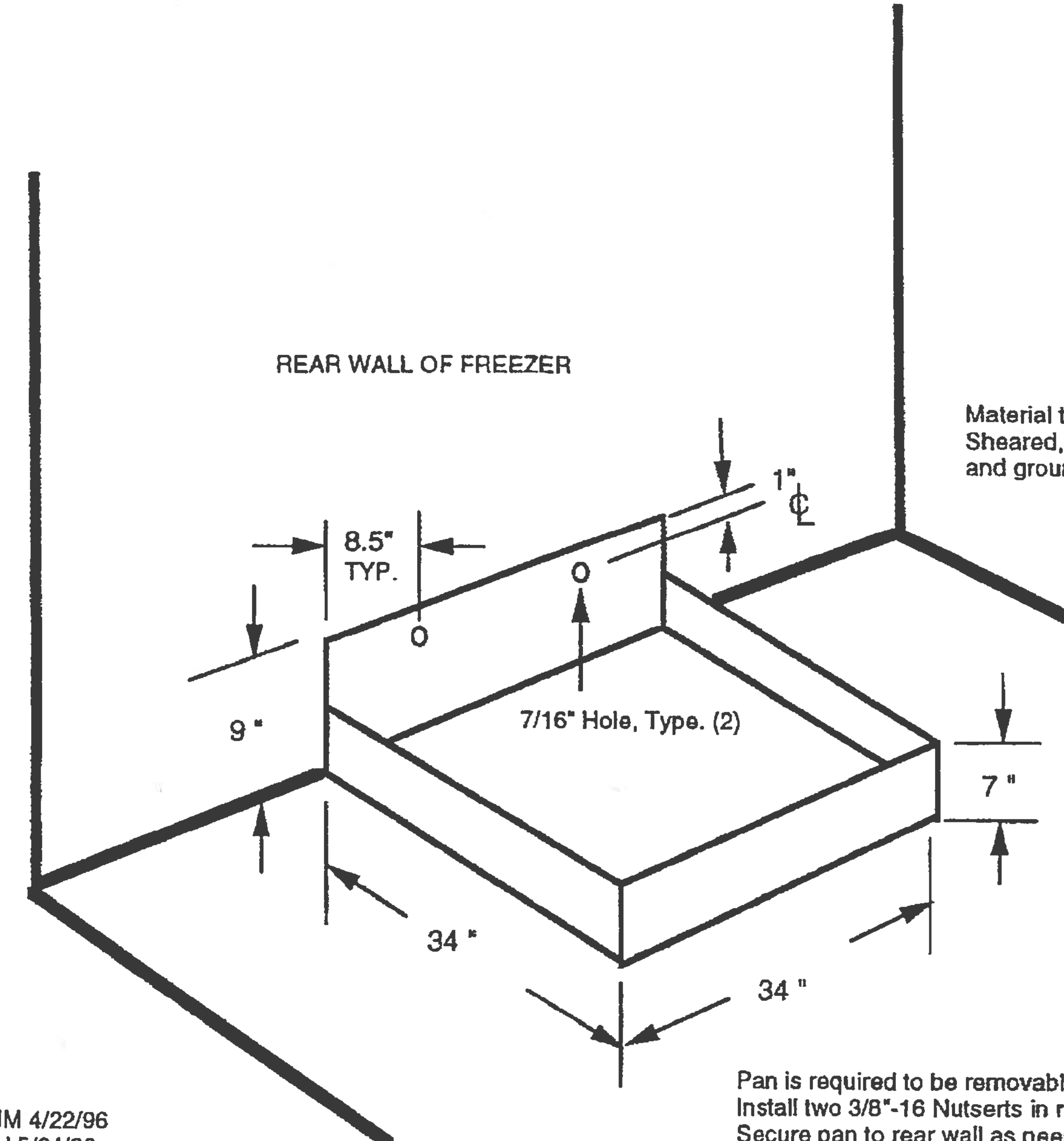
Attachment

HAZARDOUS WASTE MANAGEMENT **HWM**

Secondary Containment Pan for the 693 Freezer Storage Area

APPROVALS

DATE	SIGNATURE
5-28-96	Collin Jones
5/28/96	Kerry Cadwell



Material to be 10 - 16 gauge Stainless Steel Flat Stock. Sheared, Brake bent and the four vertical seams welded and ground smooth.

Containment required:
30 gal. = 6930 cu. inches
34" x 34" x 7" = 8092 cu. inches

Pan is required to be removable.
Install two 3/8"-16 Nutserts in rear wall of freezer
Secure pan to rear wall as needed using 2ea. 3/8" - 16 x 3/4" S/S hex head bolts.

HWM/JM 4/22/96
Revised 5/24/96

SECONDARY CONTAINMENT REPORT
BUILDING 695 STORAGE/TREATMENT UNIT GROUP

PREPARED FOR

LAWRENCE LIVERMORE NATIONAL LABORATORY

DECONTAMINATION AND WASTE TREATMENT FACILITY

(DWTF)

PARSONS INFRASTRUCTURE AND TECHNOLOGY GROUP, INC.

PASADENA, CA

PARSONS

Secondary Containment Report

Building 695 Storage / Treatment Unit Group

Table of Contents

Secondary Containment Report

Building 695 Storage / Treatment Unit Group

I. Introduction

The Building 695 S/TUG comprises the following ten containment zones:

- Liquid Waste Processing (LWP) Area Rooms 1028, 1041 and Hydraulic Power Unit (room 1040).
- Airlock (Rooms 1027 and 1038), Shredder and Chopper (Rooms 1038 and 1039), and Debris Washer (Room 1036).
- Reactive Materials Cell
- Reactive Waste Processing (RWP) Area
- Reactive Waste Storage Rooms (Four identical rooms, each a separate zone)
- Small Scale Treatment Laboratory
- DWTF Portable Tank Storage Pad

Of the ten containment zones identified above, nine are located inside Building 695 and one, the Portable Tank Storage Pad, is located outside Building 695. These zones are identified in Figures 1 and 2.

This report was prepared to demonstrate that the containment system for the Building 695 S/TUG is suitably designed to comply with the requirements of the California Code of Regulations (CCR), Title 22, Section 66264.175(b) and Section 66264.193(c), (d), (e), and (f). This report also provides the information listed in 22 CCR 66270.15(a) and 66270.16(g) required to obtain a hazardous waste permit for container storage areas and tank systems.

II. Containment System Design

The secondary containment zones located inside Building 695 have similar features. Section II.1 identifies these features and describes how they comply with the regulatory requirements for secondary containment systems. The containment features of the DWTF Portable Tank Storage Pad are presented in Section II.2. Table 1 provides a quick summary of the containment features for each zone.

Table 1 Summary of Containment Features

Containment Zone	Floor Surface Area (ft^2)	Trench	Sump	Slopped Floor	Floor Thickness	Epoxy Coated	Electronic Leak Detection System
1. LWP Area Rooms 1028 and 1041 & Hydraulic Power Unit Room 1040	11,700	√		√	8	√	√
2. Rooms 1027 and 1036 to 1039	4,580	√		√	8	√	√
3. Reactive Materials Cell	292		√	√	8	√	√
4. RWP Room	1,324		√	√	8	√	√
5. Reactive Waste Storage Room	192		√	√	8	√	√
6. Reactive Waste Storage Room	192		√	√	8	√	√
7. Reactive Waste Storage Room	192		√	√	8	√	√
8. Reactive Waste Storage Room	192		√	√	8	√	√
9. Small Scale Treatment Laboratory	808		√	√	8	√	√
10. DWTF Portable Tank Storage Pad	4,074		√	√	12	√	√

II.1 Building 695 Containment Zones

In general, secondary containment for the various Building 695 zones is provided by sloping the concrete floor to a low point, sump, or trench. Concrete curbs will be constructed at the low ends to provide the required containment. The maximum curb height used for Building 695 is 8 inches.

The concrete floor is constructed of reinforced concrete that is a minimum of 8 inches thick. For each containment zone, the floor will be installed in a continuous pour, and will be free of cracks and gaps. The floor and retaining curbs will be painted with an epoxy coating to prevent the migration of contaminants into the porous concrete surfaces.

This secondary containment report certified on October 14, 1998, described secondary containment Zone 1 as the LWP Area and secondary containment Zone 2 as the Building 695 Airlock. As a result of providing separate rooms for the debris washer, shredder and chopper (and their associated hydraulic power unit), and expanding the Building 695 Airlock into the LWP Area, these zones have now changed. Zones 1 and 2 formerly had floor surface areas of 14,720 ft^2 and 1,560 ft^2, respectively. Now the floor surface areas of Zones 1 and 2 are 11,700 ft^2 and 4,580 ft^2, respectively. However, the net floor surface area for both zones 1 and 2 combined has not changed and remains at 16,280 ft^2. This is important when determining whether the provided containment in each of the rooms is adequate for a credible fire event. In all cases, an assumption is made that excess fire water will overflow to the adjacent room and/or zone, as applicable. This assumption is valid due to the placement of roll-up and man doors, which are not water tight, and the grade (slope) of the floor. In addition, waste types approved for storage and/or treatment in these zones have not changed, so compatibility and commingling of spilled waste is not an issue.

Additional details regarding the use and design of each containment zone is provided below.

Zone 1 - LWP Area (Rooms 1028 and 1041) and Hydraulic Power Unit (Room 1040)

The LWP Area Room 1028 contains the tank farm and the liquid waste processing equipment. Room 1041 is a corridor connecting Room 1028 to the building exterior. Room 1040 houses the hydraulic power unit for the shredder and chopper. The secondary containment for the three rooms of the LWP Area is identified as Zone 1 in Figure 1. It has an equivalent floor area of 11,700 ft^2. The containment floor in Room 1028 slopes towards the west-side as shown in the figure. This sloping provides for the drainage of accumulated liquids towards the trench located at the west-side of the building. The drainage allows personnel to remove the liquids in a timely manner by pumping or some other means.

The LWP Area contains nine 5000-gallon storage/treatment tanks having a total storage capacity of 45,000 gallons of regulated waste. For the purpose of designing the secondary containment system for this zone, it is assumed that the maximum in-process storage of liquid waste within the LWP area will consist of ten 1,150-gallon portable tanks and sixty 55-gallon drums. The hold up of liquid waste within the treatment equipment is insignificant and is accounted for by the above in-process storage volume estimate. The containment system must be designed to either retain the greater of the storage tank volume (5,000 gallons) or 10% of the total expected liquid waste inventory (59,800 gallons). The maximum inventory of liquid waste within the LWP area will be administratively controlled to ensure that the secondary containment capacity is not exceeded. Hydraulic Power Unit Room 1040 is not expected to handle liquid waste, and the containment is provided mainly for fire-water.

All ancillary equipment including piping, fittings, pumps and valves that handle waste are located inside the containment Zone 1. They are located above ground, with easy access for inspection and maintenance. Any leaks from ancillary equipment will be contained within containment Zone 1.

Zone 2 - Airlocks (Rooms 1027 and 1037), Shredder and Chopper (Rooms 1038 and 1039), and Debris Washer (Room 1036).

Room 1027 Airlock is used for staging and storage of liquid and solid waste containers. Different combinations of containers up to 1150 gallons may be used. The secondary containment is identified as Zone 2 in Figure 1. Room 1027 has an equivalent floor area of 2,487 ft^2. The containment floor slopes towards the west-side as shown in the figure. This sloping provides for the drainage of accumulated liquids towards the trench located at the west-side of the building. The drainage allows personnel to remove the liquids in a timely manner by pumping or some other means.

Airlock Room 1037, Shredder and Chopper Rooms 1038 and 1039, and Debris Washer Room 1036 treat solid waste, and the handling of liquid wastes is not expected. Secondary containment is provided principally for fire water. However, secondary containment capacity for some liquid wastes may be available. The displacement of pallets containing solid waste containers is taken into account when determining the net operating capacities of these rooms.

Zone 3 – Reactive Materials Cell

The design basis for the Reactive Materials Cell secondary containment system is the in-process storage of ten 55-gallon drums containing uranium chips saturated with waste oils. Although only a small fraction of a drum would contain liquid, the entire capacity of each drum was assumed to be filled with liquid waste. The secondary containment is identified as Zone 3 in Figure 1. It has a floor area of 292 ft^2. The containment floor slopes towards the south-west corner as shown in the figure. This sloping provides for the drainage of accumulated liquids towards the sump located at the south-west corner of the building. The drainage allows personnel to remove the liquids in a timely manner by pumping or some other means.

Zone 4 – Reactive Waste Processing (RWP) Area

The expected size of the largest container in the Reactive Materials Cell is 330 gallons. The secondary containment is identified as Zone 4 in Figure 1. It has a floor area of 1,324 ft^2. The containment floor slopes towards the middle of the west wall of the room. The drainage allows personnel to remove the liquids in a timely manner by pumping or some other means.

Zones 5, 6, 7, & 8 – Reactive Waste Storage Rooms

The expected size of the largest container in the Reactive Waste Storage Room is 330 gallons. The secondary containment is identified as Zone 5 in Figure 1. Zones 6, 7, and 8 are identical to Zone 5. Each storage room has a floor area of 192 ft^2. The containment floor slopes towards a central sump as shown in the figure. The drainage allows personnel to remove the liquids in a timely manner by pumping or some other means.

Zone 9 – Small Scale Treatment Laboratory

The excepted size of the largest container in the Small Scale Treatment Laboratory is 55 gallons. The aggregate volume of all liquid waste is expected to be less than 550 gallons. The secondary containment is identified as Zone 9 in Figure 1. It has a floor area of 808 ft^2. The containment floor slopes towards a sump located at the center of the north wall as shown in the figure. The drainage allows personnel to remove the liquids in a timely manner by pumping or some other means.

II.2 Zone 10 – DWTF Portable Tank Storage Pad

The DWTF Portable Tank Storage Pad is used for the storage of tanker trucks and portable storage containers having liquid waste. The storage capacity of a tanker truck is 5,000 gallons and that of the largest portable container is 1,200 gallons. Different combinations of tanker trucks and portable containers with an aggregate capacity of up to 22,000 gallons can be stored in this containment area. The secondary containment is identified as Zone 10 in Figure 2. It has a floor area of 4,078 ft^2. The containment floor slopes towards the north-west corner as shown in the figure. This sloping provide for the drainage of accumulated liquids towards the sump located at the north-west corner. The drainage allows personnel to remove the liquids in a timely manner by pumping or some other means.

The containment floor is constructed of 12-inch reinforced concrete. There are no leaks, cracks or gaps that will allow liquid channeling through the containment area.

The tanks of the tanker trucks do not come in contact with spilled liquid because the tires of the tanker truck elevate them. The portable storage containers sit on the top of 5 inch-high pallets. The elevated location of containers, in conjunction with the drainage will prevent them from coming in contact with any spilled standing liquid in the containment system.

II.3 Materials Compatibility

The material of construction of Building 695 S/TUG secondary containment zones is compatible with the processed or stored waste. The containment floor of zones 1 to 9 is constructed of 8-inch reinforced concrete and that of zone 10 is constructed of 12-inch reinforced concrete. There are no leaks, cracks or gaps to provide for liquid channeling through the containment area. The containment floor in all zones is provided with three layers of non-porous polymer liner. The details of the concrete slab (containment floor) are provided in Figure 3. The liner along with the concrete itself, makes the containment area impervious to the wastes stored in this S/TUG. Incompatibility problems between the waste and liner are not expected due to the limited time that spilled materials would be in contact with the liners.

II.4 Liner Strength

The concrete floor of the secondary containment system is lined with three coats of ChemProof Polymers as follows:

a) Two coats of ChemProof Polymers "Perma Tec 3000"
b) Top coat of ChemProof Polymers "Perma Coat 2000"

This liner is 100% solids epoxy which is resistant to mechanical (daily operations, foot, and vehicular traffic) and chemical abuse, splash, spill, or fumes. It is also 100% non-porous and thus prevents migration of spills.

II.5 Foundation Support

A 250 psf live load is used for all slab-on-grade in Building 695 S/TUG. The slab-on-grade will be a reinforced concrete slab-on-grade and is designed to withstand failure due to pressure gradients, settlement, compression, and uplift. An 8-inch thick slab is used in Zones 1 to 9 to accommodate forklift and heavy equipment loads, and a 12-inch thick slab is used in Zone 10 to accommodate tanker trucks. Slab-on-grade will be placed over a 6-mil polyethylene vapor barrier, underlain by two inches sand and four inches well graded gravel, to be compacted to 95 percent relative density (see Figure 3). The vapor barrier impedes moisture infiltration from the subsurface into the secondary containment system.

II.6 Release Prevention

The base of all containment zones in the Building 695 S/TUG is prepared from continuous pour reinforced concrete and is free of cracks and gaps. The top of the concrete slab in all zones is lined with a non-porous polymer that prevents migration of spills. A continuous curb provides the exterior wall base containment. A typical cross section of the exterior wall base containment is provided in Figure

4. The top of the curb is also lined with the non-porous polymer to prevent any migration of spills. Interior wall base containment curbs are provided to separate the different containment zones inside Building 695 S/TUG. A typical cross section of the interior wall base containment is provided in Figure 5. The containment boundary of Zone l, the LWP Area, completely surrounds all areas adjacent to the tanks likely to come in contact with released waste, and is capable of preventing lateral as well as vertical migration of the waste.

II.7 Run-on and Precipitation

Precipitation accumulation is not possible in Building 695 S/TUG secondary containment Zones 1-9. Direct deposit of precipitation is prevented because these secondary containment zones are completely enclosed indoor by the building roof and surrounding walls. Hence none of the projected rainfall (25-year, 24-hour rainstorm) can get into containment Zones 1 to 9. Therefore, rainfall has a zero volume contribution toward the regulation containment volume requirements for these zones. Direct deposit of precipitation is possible in containment Zone 10, the DWTF Portable Tank Storage Pad. Excess capacity for Zone 10 was provided to retain precipitation resulting from a 25-year, 24-hour storm event.

Run-on in all containment zones is prevented by the grade and the swale outside of the Building 695 and around the DWTF Portable Tank Storage Pad.

II.8 Leak Detection

The trenches in containment Zones 1 and 2, and the sumps in containment Zones 3 to 10 have leak detection systems. The leak detection system is designed to detect accumulated liquids due to the failure of the primary containment within 24 hours. Conductivity type probes are used in these systems and will sound an alarm when liquid is detected in any trench or sump.

II.9 Spill Removal

Accumulated liquids will be transferred via a portable pump from a trench or a sump to a portable storage container for eventual treatment and disposal.

III. Retention Capacity

This section addresses the secondary containment capacities for each for the containment zones. Supporting engineering calculations are attached to this report. The terms and methodology used to calculate the secondary containment volume and associated liquid storage limits are as follows.

The **gross secondary containment volume** is the total void space defined by the physical dimensions of the containment zone and associated structures (e.g. berms, trenches, sumps, etc.).

The **obstruction displacement volume** is the displacement from objects located within the containment zone, such as container pallets and equipment skids. The methodology in Appendix A was used to estimate displacement volumes for pallets.

The **rainfall/run-on contingency volume** is the volume of precipitation and associated run-on from a 25-year, 24-hour storm that could enter into the containment zone. A 30 degree rainfall incident angle is assumed. The justification for this assumption is given in Appendix B. The DWTF Portable Tank Storage Pad (Zone 10) is the only zone with a potential for rain catchment. All other zones are fully covered and do not require rainfall/run-on containment volume.

The **net secondary containment capacity** is gross secondary containment volume minus the obstruction displacement and rainfall/run-on contingency volumes. The net capacity represents the volume that is available to contain leaks and spills.

An appropriate safety factor was applied to determine the net operating capacity of the secondary containment zone. The safety factor provides an added level of conservatism should the gross containment volume be overestimated and/or displacement obstructions be underestimated. In general, the net operating capacity is approximately 80% of the calculated net secondary containment volume (i.e. 20% safety factor).

To comply with regulatory requirements, the net operating capacity must be able to retain spillage of the largest container of liquid waste or 10 percent of the aggregate liquid volume of all items present in the containment zone, whichever is greater. To ensure compliance with these regulatory requirements, liquid waste storage limitations were established for each containment zone. The largest capacity limit is the maximum volume for any single item (e.g., container, portable tank, storage/treatment tank, or treatment equipment) that can be stored within the containment zone. The total inventory limit represents the combined liquid volume limit for all containers, tanks, and process vessels located within the containment zone.

Where automatic fire suppression systems are provided, retention for the volume of water that would result from the operation of the suppression system in the event of a fire was determined to ensure that containment volume is adequate. These calculations are provided in Appendix A. The fire water contingency volumes are based on the design flow rate of the suppression system over a twenty minutes period. For small rooms, such as the reactive materials cell, it is assumed that all of the sprinkler heads in the room are operational for the full 20 minutes. In large rooms such as the LWP area Room 1028, a realistic scenario was used to determine the number of sprinkler heads that would likely be activated in order to extinguish a credible fire over the 20 minutes duration.

III.1 Zone 1 – Liquid Waste Processing (LWP) Area Rooms 1028 and 1041, and Hydraulic Power Unit Room 1040

The secondary containment is identified as Zone 1 in Figure 1. It has a floor area of 11,700 ft^2. The secondary containment floor in room 1028 is sloped towards the west-wall with a grade of about 0.4% (4 inches drop in elevation). At the west-wall, there is a trench to collect leaked waste. The trench is 120 ft in length, 2 ft in width, and an average of 2 ft in depth. The height of the berm surrounding LWP Area in Zone 1 is 4 inches, which is measured at the highest elevation on the secondary containment floor (the east-end). The calculations and estimates for the gross secondary containment, displacement and rainfall/run-on volumes are provided below. Table 2 summarizes these volumes and provides the maximum liquid waste storage limits for this containment zone.

The secondary containment in rooms 1028 and 1041 comprises two rectangular floor sections (see Figure 1):

Rectangle 1: Column lines G3.6, G4, J4, J3.6 with dimensions 9.5 ft x 62 ft
Rectangle 2: Column lines J1, J4, P4, P1 with dimensions 88 ft x 122.8 ft

In rectangle 1, the drop in elevation from column G4 to J3.6 is 3 inches, and from G4 to J4 is 2 inches. The rectangle 1 has corners G3.6 and G4 at the high point and corner J3.6 at the low point. The rectangle 1 is divided into two parts A and B. Part A consists of Column lines G3.6, G4, J3.6, and part B consists of Column lines G4, J3.6, J4. The drop in elevation in part A is 3 inches. In part B, the drop is 3 inches between Column lines G4, J3.6 and 1 inch between Column lines J4, J3.6. The average drop in elevation is part B is 2 inches. The containment volume in part A is therefore given by:

$$9.5 \times 62 \times 3/12 \times 1/4 = 36.9 \text{ ft}^3$$

The containment volume in part B is given by:

$$9.5 \times 62 \times 2/12 \times 1/4 = 24.6 \text{ ft}^3$$

The containment volume in rectangle 1 is the sum of volumes in parts A and B, and is equal to 61.5 ft^3

In rectangle 2, the drop in elevation is 4 inches. The containment volume in rectangle 2 is therefore given by:

$$88 \times 122.8 \times 4/12 \times 1/2 = 1801 \text{ ft}^3$$

The trench that runs along the western wall provides the main containment capacity. The 120-foot trench has a box construction that is 2 ft wide with an average depth of 2 ft. The volume of the trench is given by:

$$120 \times 2 \times 2 = 480 \text{ ft}^3$$

The gross containment volume of Zone 1 is the sum of the containment volumes in floor rectangles 1 and 2, and the trench. Therefore, the gross containment volume is given by:

$$61.5 + 1801 + 480 = 2343 \text{ ft}^3 = 17{,}526 \text{ gallons}$$

A part of the gross containment volume is displaced by the tank farm structure, tank pedestals, and the skids used to mount the waste treatment and air pollution control equipment such as filtration module, gas adsorption unit, portable blending, centrifuge, reactive material scrubber, etc. The resulting displacement volume is estimated at 830 gallons (see attached fire water containment calculations for details of the estimate).

The rainwater cannot enter the secondary containment either directly by precipitation or indirectly as run-ons. This is because the roof and walls of Building 695 prevent direct precipitation into the secondary containment and the indirect run-ons are prevented by the berm inside the swale and grade outside Building 695. Therefore, the rainfall contribution is 0 gallon.

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Zone 1 using a 20% safety factor is 13,000 gallons. As such, the largest capacity and total inventory storage limits for Zone 1 are 13,000 and 130,000 gallons, respectively. The retention capacity is adequate for the anticipated largest capacity of 5,000 gallons that is associated with the tank farm and the net aggregate operating inventory of 59,800 gallons.

The fire water containment calculations are provided in Appendix A. These calculations demonstrate that the provided containment is adequate for a credible fire event.

Table 2 Summary of Secondary Containment Calculations Liquid Waste Processing Area (Zone 1) Rooms 1028 and 1041 Only	
Gross Secondary Containment Volume	17,526 gallons
Obstruction Displacement Volume	830 gallons
Rainfall/Run-on Contingency Volume	0 gallons
Net Secondary Containment Volume	16,696 gallons
Net Operating Capacity of Secondary Containment Zone	13,356 gallons
Maximum Liquid Waste Storage Limitations	
Largest Capacity Limit	13,000 gallons
Total Inventory Limit	130,000 gallons
Estimated Fire Water Accumulation Volume (20 minute duration) 15,000 gallons. Is Net Secondary Containment Volume Adequate for Fire Water Retention? Yes, any excess firewater will overflow to the Room 1027 Airlock.	

Hydraulic Power Unit Room 1040

The secondary containment in Room 1040 comprises the floor and a trench. The floor is 20 ft x 15.5 ft, which amounts to a floor area of 310 ft^2. At the east wall, there is trench that has about 37 ft^3 or 278 gallon capacity. The trench is 9.3 ft in length, 2 ft in width, and an average of 2 ft in depth. The height of the berm in Room 1040 is 8 inches, which is measured at the highest elevation on the secondary containment floor (west wall). The trench that runs along the eastern wall provides the main containment capacity. The volume of the trench is given by:

$$9.3 \times 2 \times 2 = 37.2 \text{ ft}^3 = 278 \text{ gallons}$$

The drop in elevation from Column line G3H3 to G3.6H3.6 is 2 inches. Locations G3 and H3 are at the same high point level and locations G3.6 and H3.6 are at the same low point. The door of Room 1040 is connected to the corridor (Room 1041) at a floor height of 100 ft 5.5 inches. The fire water will continue accumulating in Room 1040 until it reaches the height of 100 ft 5.5inches, at which time it will spill into Room 1041. The floor containment volume is therefore given by:

$$(20 \times 15.5 \times 2/12 \times 1/2) + (20 \times 15.5 \times 3.5/12) = 116 \text{ ft}^3 = 868 \text{ gallons}$$

The gross containment volume of Room 1040 is the sum of the containment volumes of the floor and the trench. Therefore the gross containment volume is given by:

$$37 + 116 = 153 \text{ ft}^3 = 1146 \text{ gallons}$$

The displacement in Room 1039 is principally from the legs of the hydraulic power unit. The estimated displacement is 1.33 ft^3 or 25 gallons.

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Room 1040 (Zone 1) is 1121 gallons.

The estimated fire water accumulation (see Appendix A) is 1860 gallons. The excess fire water will overflow to the LWP Area through the door and corridor (Room 1041). The provided containment is adequate for a credible fire event.

III.2 Zone 2 – Airlocks (Room 1027 and 1037), Shredder and Chopper (Rooms 1038 and 1039), and Debris Washer (Room 1036)

The secondary containment is identified as Zone 2 in Figure 1. Zone 2 is comprised of numbered rooms and is shaped as a 62.2 ft x 78.5 ft rectangle with 300 ft^2 rectangular piece (room 1040) at north-east corner removed. The floor area of Zone 2 amounts to 4,580 ft^2.

<u>Air Lock Room 1027</u>

In room 1027, the secondary containment floor is sloped from east to west. In all other rooms, the secondary containment is sloped from west to east. At the west-wall of room 1027 there is a trench that has about 237 ft^3 or 1,775 gallons capacity. The trench is deployed to collect leaked waste. The trench is 59.3 ft in length, 2 ft in width, and an average of 2 ft in depth. The height of the berm surrounding room 1027 is 4 inches, which is measured at the highest elevation on the secondary containment floor (the north-east corner). The trench that runs along the western wall provides the main containment capacity. The 59-foot long trench has a box construction that is 2 ft wide with an average depth of 2 ft. The volume of the trench is given by:

$$59.33 \times 2 \times 2 = 237 \text{ ft}^3 = 1775 \text{ gallons}$$

The secondary containment in room 1027 comprises the western half of the airlock defined by column lines G1, G2, J2, J1 and a trench (see Figure 1). The eastern half of the airlock (column lines G1.5, G2, J2, J1.5) has elevation greater than 100 ft 1 inch. Any liquid in the eastern half will spill over to LWP Area because the door connecting the airlock to the LWP area is at an elevation of 100 ft 1 inch. Hence, the eastern half of the airlock is not credited for containment of waste. Also the northern two third of the room is at an elevation greater than 100 ft 1 inch and hence is not credited for containment of waste. Any leaks from containers stored in the eastern half and northern two-third of the airlock will be contained by the trench and the south-western portion of the airlock.

The floor containment volume in room 1027 is therefore given by:

$$414.7 \times 1/12 \times 1/2 = 17.3 \text{ ft}^3 = 130 \text{ gallons}$$

The gross containment volume of Room 1027 is given by:

$$17.3 + 237 = 254.3 \text{ ft}^3 = 1{,}900 \text{ gallons}$$

Room 1027 occupies a floor area of 2,486 ft^2. One half of the floor space in the airlock is a pathway for through traffic in and out of the Building 695 and, therefore, can not be used for staging and storage. The floor space allowed for staging and storage is about 1,200 ft^2. However, less than half of this area can be used to store containers and portable tanks with the remaining area allocated for the maneuvering of containers and portable tanks by forklift. Based on these considerations, the equivalent floor space for staging and storage is about 540 ft^2.

The portable tanks used in this area have various capacities and hence occupy different areas:

Portable Tank Size (Gallons)	Area Occupied	Equivalent 4 ft x 4 ft Pallets	Storage Density (gallons/ft^2)
330	4' x 4'	1	20.6
660	4' x 8'	2	20.6
750	4' x 8'	2	23.4
1,000	4' x 10'	2.5	25.0
1,100	4' x 10'	2.5	27.5
1,150	4' x 10'	2.5	28.75

Different combinations of containers may be used in the airlock. Assuming that portable tanks are not allowed to be stacked on top of each other, the 1,150-gallon container tank has the highest waste storage density per unit of floor space. Therefore, in the secondary containment calculations for Room 1027, only portable tanks with 1,150-gallon capacities are considered to account for the maximum presence of hazardous waste in this area. The storage density for 1,150-gallon container tank is 28.75 gallons/ft^2. The expected amount of waste to be stored in the airlock is 11,500 gallons and corresponds to ten 1,150-gallon portable tanks, and the available storage space of 540 ft^2 is adequate to store these tanks.

The total displacement in this secondary containment can be attributed to the displacement caused by the wooden pallets on which the container tanks are singly stacked. The displacement caused by 4 ft x 4 ft pallets supporting ten 1,150 gallon containers is calculated using the displacement density of wood pallets, 0.116 ft^3/ft^2 (see Appendix B).

$$V_{pallets} = 0.116\ ft^3/ft^2 \times 4\ ft \times 4\ ft \times 2.5 \times 10$$

$$= 46.4\ ft^3$$

$$= 347\ \text{gallons}$$

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Zone 2 is 1,550 gallons. No safety factor is used in calculating net operating capacity because any excess liquid in Room 1027 flows over to another containment zone (Zone 1). As such, the largest capacity and total inventory storage limits for Room 1027 are 1,550 and 15,500 gallons, respectively. The retention capacity is adequate for the anticipated largest capacity of 1,150 gallons, and net aggregate operating inventory of 11,150 gallons that is associated with storing 10 portable tanks in the airlock.

The fire water containment calculations are provided in Appendix A. These calculations demonstrate that the provided containment is adequate for a credible fire event. Room 1027 is connected to Room 1028 (LWP area), and the excess will flow over into the LWP area.

Table 3 Summary of Secondary Containment Calculations Room 1027 Airlock (Zone 2)	
Gross Secondary Containment Volume	1900 gallons
Obstruction Displacement Volume	350 gallons
Rainfall/Run-on Contingency Volume	0 gallons
Net Secondary Containment Volume	1,550 gallons
Net Operating Capacity of Secondary Containment Zone	1,550 gallons
Maximum Liquid Waste Storage Limitations	
Largest Capacity Limit	1,550 gallons
Total Inventory Limit	15,500 gallons
Estimated Fire Water Accumulation Volume (20 minute duration) 14,900 gallons. Is Net Secondary Containment Volume Adequate for Fire Water Retention? Yes, the excess firewater will overflow to the LWP Area.	

Debris Washer Room 1036

The secondary containment in Room 1036 comprises the floor and a trench. The floor is 23.17 ft x 38.5 ft rectangle, which amounts to a floor area of 891.92 ft^2. At the east wall there is trench that has about 68 ft^3 or 508 gallons capacity. The trench is 17 ft in length, 2 ft in width, and an average of 2 ft in depth. The height of the berm in Room 1036 is 2 inches, which is measured at the highest elevation on the secondary containment floor (west wall). The trench that runs along the eastern wall provides the main containment capacity. The volume of the trench is given by:

$$17 \times 2 \times 2 = 68 \text{ ft}^3 = 508 \text{ gallons}$$

The drop in elevation from Column line I2J2 to I3.6J3.6 is 2 inches. Locations I2 and J2 are at the same high point level and locations I3.6 and J3.6 are at the same low point. The floor containment volume is therefore given by:

$$23.17 \times 38.5 \times 2/12 \times 1/2 = 74.33 \text{ ft}^3 = 556 \text{ gallons}$$

The gross containment volume of Room 1036 is the sum of the containment volumes of the floor and the trench. Therefore the gross containment volume is given by:

$68 + 74.33 = 142.33\ ft^3 = 1{,}064.6$ gallons

The displacement in Room 1036 is principally from the pallets (assume two 4 ft x 4 ft pallets) that bring the debris for treatment, and the legs of the Debris Washer. The estimated displacement is 10 ft^3 or 75 gallons.

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Room 1036 (Zone 2) is 990 gallons.

The estimated fire water accumulation (see Appendix A) is 5,351 gallons. The excess fire water will overflow to the Air Lock Room 1037 through the roll-up door. The provided containment is adequate for a credible fire event.

Air Lock Room 1037 and Shredder No. 2 Room 1038

The secondary containment in Rooms 1037 and 1038 comprises the floor and a trench. The floor is 19 ft x 38.5 ft, which amounts to a floor area of 731.5 ft^2. At the east wall there is trench that has about 51 ft^3 or 384 gallon capacity. The trench is 12 ft 10 inches in length, 2 ft in width, and an average of 2 ft in depth. The height of the berm in Rooms 1037 and 1038 is 2 inches, which is measured at the highest elevation on the secondary containment floor (west wall). The trench that runs along the eastern wall provides the main containment capacity. The volume of the trench is given by:

$12.8 \times 2 \times 2 = 51\ ft^3 = 384$ gallons

The drop in elevation from Column line H2I2 to H3.6I3.6 is 2 inches. Locations H2 and I2 are at the same high point level and locations H3.6 and I3.6 are at the same low point. The floor containment volume is therefore given by:

$19 \times 38.5 \times 2/12 \times 1/2 = 60.96\ ft^3 = 456$ gallons

The gross containment volume of Rooms 1037 and 1038 is the sum of the containment volumes of the floor and the trench. Therefore the gross containment volume is given by:

$51 + 61 = 112\ ft^3 = 840$ gallons

The displacement in Rooms 1037 and 1038 is principally from the pallets (assume two 4 ft x 4 ft pallets) that bring the debris for treatment, and the legs of the Shredder. The estimated displacement is 5.6 ft^3 or 42 gallons.

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Rooms 1037 and 1038 (Zone 2) is 798 gallons.

The estimated fire water accumulation (see Appendix A) is 4,389 gallons. The excess fire water will overflow to the LWP Air Lock Room 1027 through the roll-up door. The provided containment is adequate for a credible fire event.

<u>Shredder No. 1 Room 1039</u>

The secondary containment in Room 1039 comprises the floor and a trench. The floor is 20 ft x 23 ft, which amounts to a floor area of 460 ft2. At the east wall there is trench that has about 57.3 ft^3 or 429 gallon capacity. The trench is 14.3 ft in length, 2 ft in width, and an average of 2 ft in depth. The height of the berm in Room 1039 is 2 inches, which is measured at the highest elevation on the secondary containment floor (west wall). The trench that runs along the eastern wall provides the main containment capacity. The volume of the trench is given by:

$$14.3 \times 2 \times 2 = 57.3 \text{ ft}^3 = 429 \text{ gallons}$$

The drop in elevation from Column line G2H2 to G3H3 is 1 inch. Locations G2 and H2 are at the same high point level and locations G3 and H3 are at the same low point. The floor containment volume is therefore given by:

$$20 \times 23 \times 1/12 \times 1/2 = 19.2 \text{ ft}^3 = 143 \text{ gallons}$$

The gross containment volume of Room 1039 is the sum of the containment volumes of the floor and the trench. Therefore the gross containment volume is given by:

$$57.3 + 19.2 = 76.5 \text{ ft}^3 = 572 \text{ gallons}$$

The displacement in Room 1039 is principally from the pallets (assume two 4 ft x 4 ft pallets) that bring the debris for treatment, and the legs of the Shredder. The estimated displacement is 5.6 ft^3 or 42 gallons.

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Room 1039 (Zone 2) is 530 gallons.

The estimated fire water accumulation (see Appendix A) is 2,760 gallons. The excess fire water will overflow to the Air Lock Room 1037 through the roll-up door. The provided containment is adequate for a credible fire event.

III.3 Zone 3 – Reactive Materials Cell

The secondary containment is rectangular in shape with a width (east-west) of 14.6 ft and a length of 20 ft. It is identified as Zone 3 in Figure 1, and occupies a floor area of 292 ft^2. The secondary containment floor is sloped from north-east corner to the south-west corner as shown in this figure. At the south-west corner, there is a sump of size 2 ft x 2 ft x 2 ft. The sump is provided to facilitate the pumping of the leaked waste into portable containers. The height of the berm surrounding Zone 3 is 4 inches, which is measured at the highest elevation on the secondary containment floor (the north-east corner).

The drop in elevation from the north-east corner to the south-west corner is 1 inch. The containment volume of the floor in Zone 3 is given by:

$$14.6 \times 20 \times 1/12 \times 1/4 = 6 \text{ ft}^3$$

The volume of the sump is 8 ft^3.

The gross containment volume of Zone 3 is the sum of the containment volumes in the sump and the floor. Therefore, the gross containment volume is given by:

$$8 + 6 = 14 \text{ ft}^3 = 105 \text{ gallons}$$

The total displacement in this secondary containment can be attributed to the displacement caused by the wooden pallets or cabinets. Assuming that 25% of the floor area is displaced, the displacement is given by:

$$0.25 \times 6 = 1.5 \text{ ft}^3 = 11 \text{ gallons}$$

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Zone 3 using a 20% safety factor is 75 gallons. As such, the largest capacity and total inventory storage limits for Zone 3 are 75 and 750 gallons, respectively. The retention capacity is adequate for the anticipated largest capacity and net aggregate operating inventory of 55 and 550 gallons that is associated with storing ten 55-gallon drums in the reactive materials cell.

Table 4 Summary of Secondary Containment Calculations Reactive Materials Cell (Zone 3)	
Gross Secondary Containment Volume	105 gallons
Obstruction Displacement Volume	11 gallons
Rainfall/Run-on Contingency Volume	0 gallons
Net Secondary Containment Volume	94 gallons
Net Operating Capacity of Secondary Containment Zone	75 gallons
Maximum Liquid Waste Storage Limitations	
Largest Capacity Limit	75 gallons
Maximum Inventory Limit	750 gallons
Estimated Fire Water Accumulation Volume (20 minute duration) 0 gallons. Is Net Secondary Containment Volume Adequate for Fire Water Retention? Yes, A dry chemical fire retardant will be used in this zone and no fire water accumulation is anticipated.	

III.4 Zone 4 – Reactive Waste Processing Room

The secondary containment is identified as Zone 4 in Figure 1, and occupies a floor area of 1,324 ft^2. A sump is provided at about the middle of the west wall of the room. The secondary containment floor is sloped towards the sump as shown in the figure. The size of the sump is 2 ft x 2 ft x 2 ft. The sump is provided to facilitate the pumping of the leaked waste into portable containers. The height of berm surrounding Zone 4 is 4 inches, which is measured at the highest elevation on the secondary containment floor (the east wall).

The drop in elevation from the east corners to the sump is 2 inches. The containment volume of the floor in Zone 4 is given by:

$$1{,}324 \times 2/12 \times 1/4 = 55 \text{ ft}^3$$

The volume of the sump is 8 ft^3.

The gross containment volume of Zone 4 is the sum of the containment volumes in the sump and the floor. Therefore, the gross containment volume is given by:

$$8 + 55 = 63 \text{ ft}^3 = 472 \text{ gallons}$$

The total displacement in this secondary containment can be attributed to the displacement caused by the wooden pallets or cabinets. Assuming that 25% of the floor area is displaced, the displacement is given by:

$0.25 \times 55 = 14 \text{ ft}^3 = 104$ gallons

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Zone 4 using a 20% safety factor is 290 gallons. As such, the largest capacity and total inventory storage limits for Zone 4 are 290 and 2,900 gallons, respectively. The retention capacity is adequate for the anticipated largest capacity and net aggregate operating inventory of 55 and 550 gallons, which is associated with processing ten 55-gallon drums in the RWP area.

Table 5 Summary of Secondary Containment Calculations
Reactive Waste Processing Area (Zone 4)

Gross Secondary Containment Volume	472 gallons
Obstruction Displacement Volume	104 gallons
Rainfall/Run-on Contingency Volume	0 gallons
Net Secondary Containment Volume	368 gallons
Net Operating Capacity of Secondary Containment Zone	290 gallons
Maximum Liquid Waste Storage Limitations	
Largest Capacity Limit	290 gallons
Maximum Inventory Limit	2,900 gallons

Estimated Fire Water Accumulation Volume (20 minute duration) 0 gallons.
Is Net Secondary Containment Volume Adequate for Fire Water Retention?
Yes, A dry chemical fire retardant will be used in this zone and no fire water accumulation is anticipated.

III.5 Zones 5, 6, 7, and 8 – Reactive Waste Storage Rooms

The reactive waste storage area consists of four identically designed rooms. Each room is rectangular in shape with a width (east-west) of 17 ft 5 inches and a length of 11 ft. Each room is a separate containment zone, which are identified as Zones 5 through 8 in Figure 1. The secondary containment floor is sloped towards the center as shown in the figure. At the center there is a trench with dimensions 9 ft 5 inches long, 3 ft wide and 2 ft deep. The trench is provided to collect the leaked waste.

The drop in elevation of the floor from the wall to the trench is one inch. The volume of the sloped area is very small and will be ignored. The containment volume is provided by the trench and is given by:

$9.42 \times 3 \times 2 = 56.5 \text{ ft}^3 = 422$ gallons

Hence, the gross containment volume of Zones 5 through 8 is 422 gallons.

Since the central trench provides all of the secondary containment, obstruction displacement does not need to be estimated. The potential errors associated with calculating the net secondary containment volume are minimal and a smaller safety factor can be used. The net operating capacity of Zones 4 through 7 using a 10% safety factor is 380 gallons. Therefore, the largest capacity and total inventory storage limits for Zone 3 are 380 and 3,800 gallons, respectively. The retention capacity is adequate for the anticipated largest capacity and net aggregate operating inventory of 330 and 1,980 gallons that is associated with storing six 330-gallon containers in the reactive waste storage rooms.

The fire water containment calculations are provided in Appendix A. These calculations demonstrate that the provided containment is adequate for a credible fire event.

Table 6 Summary of Secondary Containment Calculations
Reactive Waste Storage Room (Zones 5 through 8)

Gross Secondary Containment Volume	422 gallons
Obstruction Displacement Volume	0 gallons
Rainfall/Run-on Contingency Volume	0 gallons
Net Secondary Containment Volume	422 gallons
Net Operating Capacity of Secondary Containment Zone	380 gallons
Maximum Liquid Waste Storage Limitations	
Largest Capacity Limit	380 gallons
Maximum Inventory Limit	3,800 gallons
Estimated Fire Water Accumulation Volume (20 minute duration) 105 gallons. Is Net Secondary Containment Volume Adequate for Fire Water Retention? Yes.	

III.6 Zone 9 – Small Scale Treatment Laboratory

The secondary containment is rectangular in shape with a width (east-west) of 32 ft and a length of 25.25 ft. It is identified as Zone 9 in Figure 1, and occupies a floor area of 808 ft^2. A sump is provided near the center of the north wall of the laboratory to facilitate pumping of spilled waste. The secondary containment floor is sloped towards this sump as shown in the above figure.

The dimension of the sump is 2 ft x 2 ft x 2 ft. The sump is the low point in the containment zone. The drop in elevation from the east, west and the south walls towards the sump is 2 inches. The containment volume of the floor in Zone 9 is given by:

$$32 \times 25.25 \times 2/12 \times 1/4 = 33 \text{ ft}^3$$

The volume of the sump is 8 ft^3.

The gross containment volume of Zone 9 is the sum of the containment volumes in the sump and the floor. Therefore, the gross containment volume is given by:

$$8 + 33 = 41 \text{ ft}^3 = 307 \text{ gallons}$$

Assuming that cabinets and tables occupy 25% of the floor space, the displacement volume is given by:

$$0.25 \times 33 = 8 \text{ ft}^3 = 60 \text{ gallons}$$

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Zone 9 using a 20% safety factor is 200 gallons. Therefore the largest capacity and total inventory storage limits for Zone 9 are 200 and 2,000 gallons respectively. The retention capacity is adequate for the anticipated largest capacity and net aggregate operating inventory of 55 and 550 gallons that is associated with storing ten 55-gallon drums in the small-scale treatment laboratory.

The fire water containment calculations are provided in Appendix A. These calculations demonstrate that the provided containment is adequate for a credible fire event. Fire water in excess of the net containment capacity will overflow into the LWP containment area.

Table 7 Summary of Secondary Containment Calculations Small Scale Treatment Laboratory (Zone 9)	
Gross Secondary Containment Volume	307 gallons
Obstruction Displacement Volume	60 gallons
Rainfall/Run-on Contingency Volume	0 gallons
Net Secondary Containment Volume	247 gallons
Net Operating Capacity of Secondary Containment Zone	200 gallons
Maximum Liquid Waste Storage Limitations	
Largest Capacity Limit	200 gallons
Maximum Inventory Limit	2,000 gallons
Estimated Fire Water Accumulation Volume (20 minute duration) 4,900 gallons. Is Net Secondary Containment Volume Adequate for Fire Water Retention? Yes, Fire water in excess of net capacity will overflow into the LWP containment area.	

III.7 Zone 10 – DWTF Portable Tank Storage Pad

The DWTF Portable Tank Storage Pad is rectangular in shape with a width (east-west) of 68.67 ft and a length (north-south) of 59.33 ft. The entire floor is used for secondary containment and is identified as Zone 10 in Figure 2. It has an equivalent floor area of 4,074 ft^2. The containment area is sloped towards the north-west corner and a sump is provided at this corner. The drop in elevations from the south side to the north-west corner is 1.8 ft and to the north-east corner is 1.45 ft. This provides for drainage of accumulated liquids towards the sump at the north-west corner. This drainage allows personnel to remove the liquids in a timely manner by pumping or some other means.

The pad is constructed of 12-inch reinforced concrete. There are no leaks, cracks or gaps that can provide for liquid channeling through the containment area. The floor area is painted with three layers of an epoxy coating, thereby preventing any migration of hazardous liquids.

Rain precipitation would deposit directly in this secondary containment zone because the truck/tanker storage area is in open space and does not have any cover. The 25-year, 24-hour rainstorm is 3.11 inches.

The pad is designed to accommodate up to two trucks/tankers and 10 portable tanks in the Zone 10 containment area at the same time. Different combinations of trucks and tankers with a variety of waste storage capacities can be parked in this storage pad. The capacity for the tankers can be up to 5,000 gallons each, and the largest portable tank used is 1,150 gallons. Therefore, approximately 22,000 gallons of liquid wastes can be stored in this containment zone.

The secondary containment is composed of a sloped area from the south to the north (marked area A in Figure 2) with a drop in elevation of 1.3 ft (from FS 611.0' at the south-side to FS 609.7'); an area sloped towards the north-west corner (marked area B in Figure 2) with a drop in elevation of 0.5 ft (from FS 609.7' to FS 609.2'); and a 2 ft x 2 ft x 2 ft sump at the north-west corner.

The containment volume of area A is given by:

$$68.67 \times 42.83 \times 1.3/2 = 1{,}911 \text{ ft}^3$$

The containment volume of area B is given by:

$$68.67 \times 16.5 \times (0.5/4 + 1.3) = 1{,}614 \text{ ft}^3$$

The containment volume of the sump is 8 ft^3.

The gross containment volume of Zone 10 is the sum of the containment volumes in areas A and B, and the sump. Therefore, the gross containment volume is given by:

$$1{,}911 + 1{,}614 + 8 = 3{,}533 \text{ ft}^3 = 26{,}440 \text{ gallons}$$

Displacement due to tires and pallets

The displacement in this secondary containment is primarily attributed to the tires of trucks and tankers. It is assumed that each truck or tanker has ten tires and each tire would take a space of 6.28 ft^3 (the bottom 2-ft for a 2-foot-radius 1-foot-wide tire). The displacement by each truck or tanker will amount to 62.8 ft^3. The total displacement caused by 2 trucks or tankers will amount to 126 ft^3 or 940 gallons. The displacement is a very conservative estimate because the average merging height for the tire would be 1 ft 2.5 inches instead of the 2 ft used in this calculation. Furthermore, the spoke area of tires has a less-than-full displacement capability.

The displacement caused by the pallets on which the portable containers are stacked is calculated using the displacement density of pallets, 0.116 ft^3/ft^2 (see Appendix A). The displacement for ten 1,200-gallon containers is given by:

$$0.116 \times 4 \text{ ft} \times 4 \text{ ft} \times 2.5 \times 10 = 46.4 \text{ ft}^3 = 347 \text{ gallons}$$

The gross displacement is 940 + 347 = 1,287 gallons.

Rain Catchment

The displacement volume caused by a 25-year, 24-hour worst rainstorm is calculated below. The catchment of rain by the sides of the trucks/tankers occurs when the vehicles are parked along the side of the area boundary. It is assumed that the rain has a unidirectional oblique angle. Only vehicles parked on the side opposite to the direction of the rain can catch additional rain. A 30-degree rain fall incident angel is assumed. The justification for this assumption is given in Appendix C. Assuming the height of the truck is 15 ft, the wall catchment area along the side is 15 ft x (60 ft + 70 ft) = 1,950 ft^2. The projected area of this wall on the ground is the equivalent rain catchment area. The equivalent wall catchment area is given by:

$$A_{wall} = 1{,}950 \times \tan(30^{\circ}) = 1{,}126 \text{ ft}^2$$

Therefore, the total effective rain catchment area is:

$$A_c = 60 \times 70 + A_{wall}$$
$$= 5{,}326 \text{ ft}^2$$

The rain catchment volume based on the 25-year, 24-hour storm level of 3.11 inches is:

$$V_c = 5{,}326 \text{ ft}^2 \times 3.11$$
$$= 1{,}381 \text{ ft}^3$$
$$= 10{,}326 \text{ gallons}$$

Based on the calculated gross secondary containment and displacement volumes, the net operating capacity of Zone 10 using a 20% safety factor is 11,000 gallons. Therefore the largest capacity and total inventory storage limits for Zone 10 are 11,000 and 110,000 gallons respectively. The retention capacity is adequate for the anticipated largest capacity and net aggregate operating inventory of 5,000 and 22,000 gallons, which is associated with storing two 5,000-gallon truck tankers and ten portable tanks on the DWTF Portable Tank Storage Pad.

Table 8 Summary of Secondary Containment Calculations DWTF Portable Tank Storage Pad (Zone 10)	
Gross Secondary Containment Volume	26,440 gallons
Obstruction Displacement Volume	1,287 gallons
Rainfall/Run-on Contingency Volume	10,326 gallons
Net Secondary Containment Volume	14,827 gallons
Net Operating Capacity of Secondary Containment Zone	11,000 gallons
Maximum Liquid Waste Storage Limitations	
Largest Capacity Limit	11,000 gallons
Maximum Inventory Limit	110,000 gallons

IV. Engineering Statement

I have reviewed the design information and containment calculations for Building 695 S/TUG containment zones to determine if they are suitably designed to meet the requirements of the California Code of Regulations (CCR), Title 22, Sections 66264.175(b) and 66264.193(c), (d), (e), and (f). To the best of my knowledge and belief, the proposed containment zone is designed to:

- Be free of cracks or gaps, compatible with stored wastes, and impervious to contain leaks, spills, and accumulated precipitation;

- Prevent waste containers from coming in contact with leaks, spills, and accumulated precipitation;

- Retain container volume in accordance with the requirements specified in 22 CCR 66264.175(b)(3) & (4) and 66264.193(E)(1)(A) & (B); and

- Allow removal and detection of leaks, spills, and accumulated precipitation in a timely manner.

Based on the information provided in this containment report, the secondary containment system is suitably designed to achieve the requirements of 22 CCR 66264.175(b) and 66264.193(c), (d), (e), and (f).

Roger Zandi, Professional Engineer
California Registration Number M17363

1/27/00
Date

REGISTERED PROFESSIONAL ENGINEER
ROGER ZANDI
No. M17363
Exp. 3/31/00
MECHANICAL
STATE OF CALIFORNIA

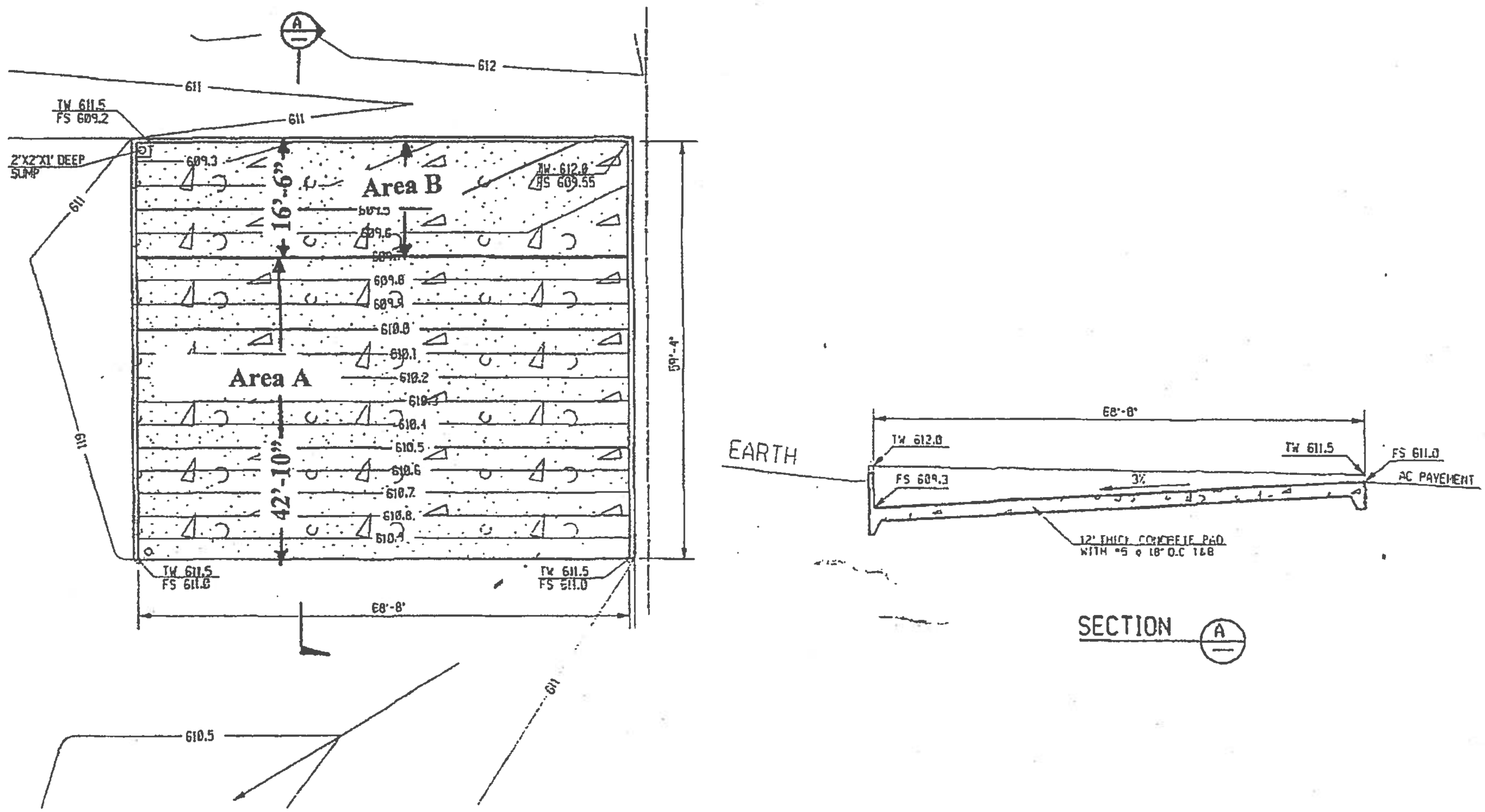


Figure 2 Secondary Containment Zone 10
Portable Tank Storage Pad

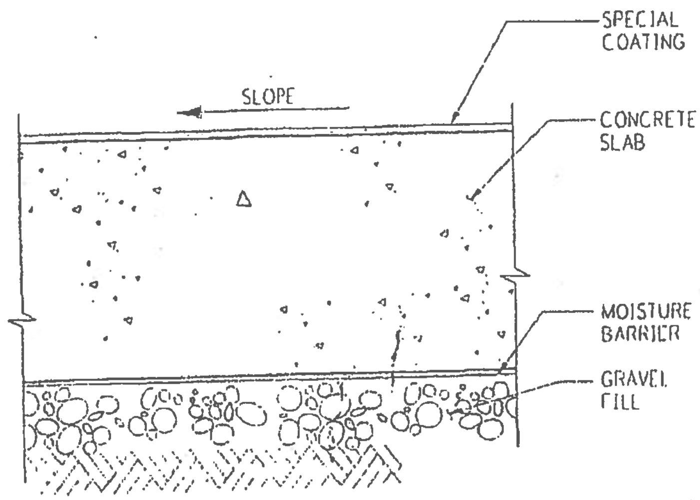


Figure 3

CONCRETE SLAB DETAIL

SCALE: 3" = 1'-0"

eo319.dtz

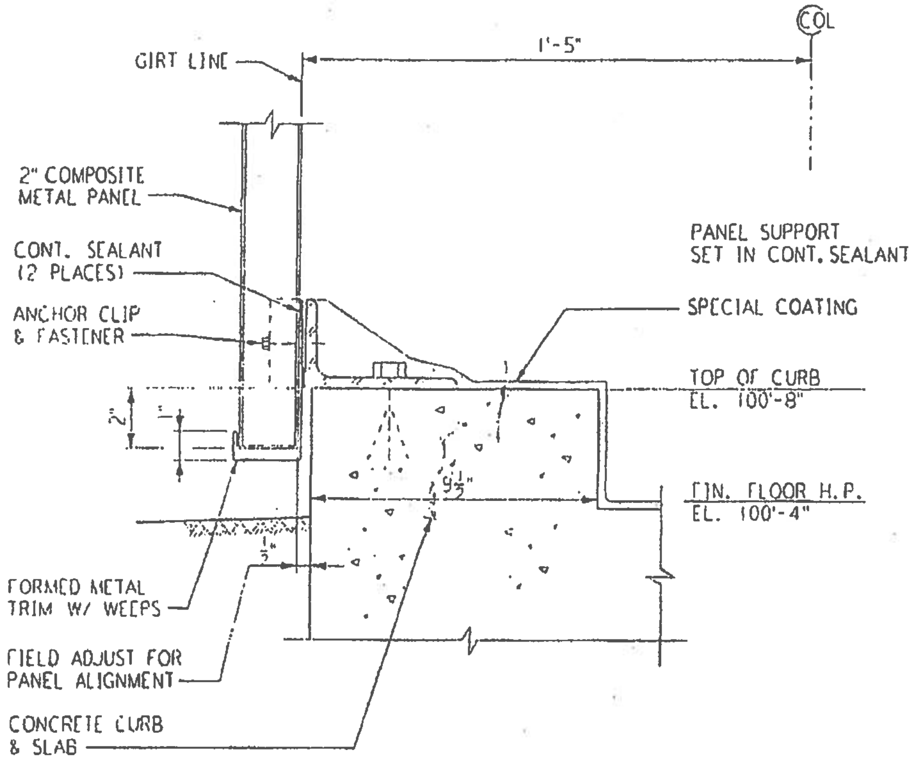


Figure 4

EXTERIOR WALL BASE CONTAINMENT

SCALE: 3" = 1'-0"

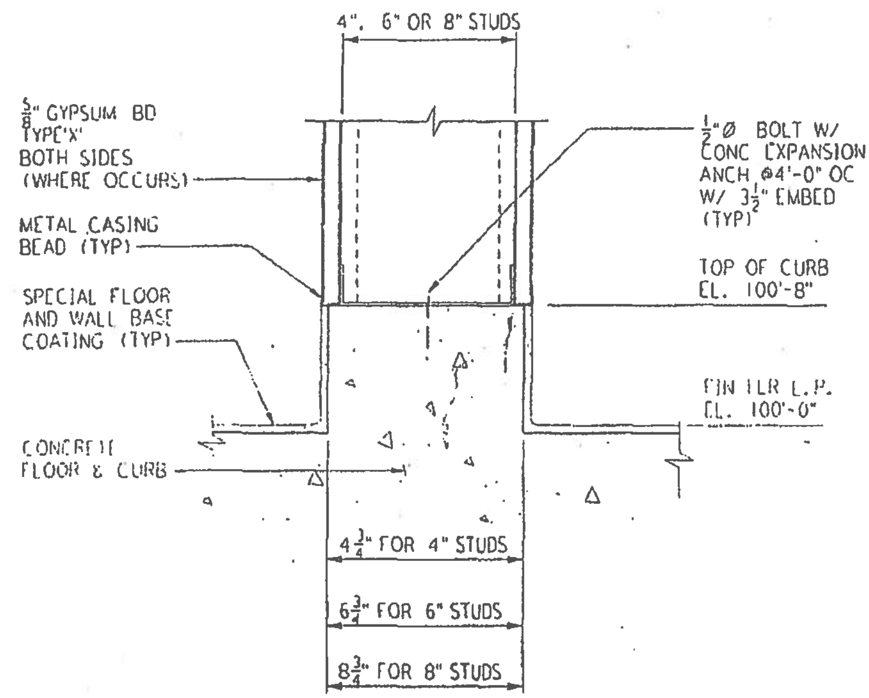


Figure 5

INTERIOR WALL BASE CONTAINMENT

SCALE: 3" = 1'-0"

Appendix XIV.2-C

Secondary Containment Calculations for Building 696R and 696S

APPENDIX XIV.2-C SECONDARY CONTAINMENT CALCULATIONS FOR BUILDING 696R AND 696S

Table 1 Secondary Containment and Fire Sprinkler Containment Calculation Summary for Building 696R

Value Description	Room 1010	Room 1011
Gross secondary containment:	2128 ft^3 (15,917 gal)	1900 ft^3 (14,212 gal)
Obstruction displacement volume:	631 ft^3 (4720 gal)	631 ft^3 (4720 gal)
Rainfall/run-on accumulation:	0 ft^3	0 ft^3
Net (regulatory) secondary containment capacity:	1497 ft^3 (11,198 gal)	1269 ft^3 (9,492 gal)
Largest container to store liquids:	44 ft^3 (330 gallons)	44 ft^3 (330 gallons)
Maximum liquid storage capacity based on net secondary containment capacity:	14,970 ft^3 (111,980 gal)	12,690 ft^3 (94,920 gal)
Permitted storage capacity	9070 ft^3 (67,848 gal[a])	9070 ft^3 (67,848 gal[a])
Adequate secondary containment, based on Title 22 regulatory definition?	YES	YES
Total required fire sprinkler waste retention volume	855 ft^3 (6400 gal)	855 ft^3 (6400 gal)
Is net secondary containment capacity adequate for fire water retention?	YES	YES

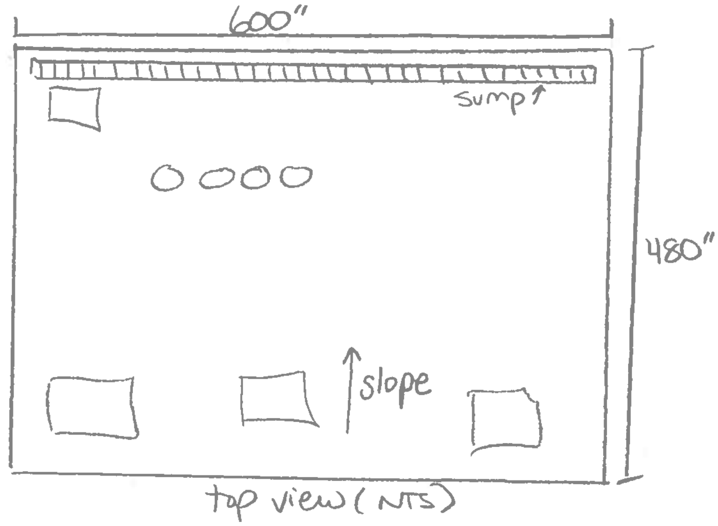
a This liquid waste can be stored in any type of approved container ranging from 1-gal cans up to 330-gal TUFF containers. However, the maximum liquid waste stored at any time cannot exceed these limits for the respective rooms.

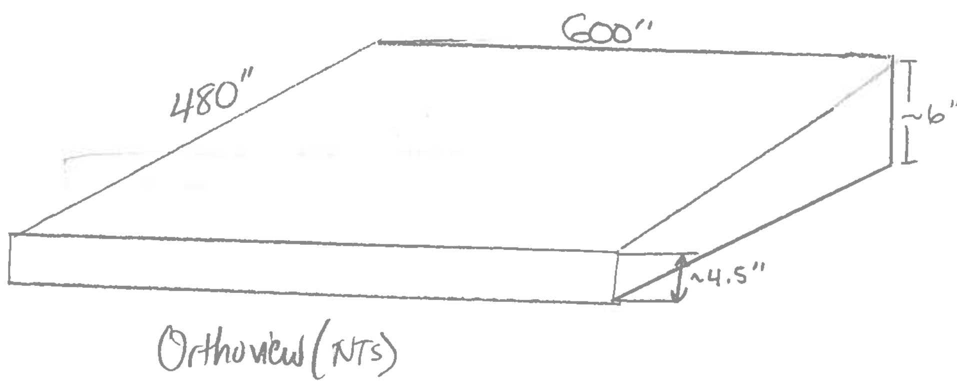
Table 2 Secondary Containment and Fire Sprinkler Containment Calculation Summary B696S

Value Description	Rooms 1001, 1007, 1008, & 1009
Gross secondary containment:	2558 ft^3 (19,134 gal)
Obstruction displacement volume:	692 ft^3 (5176 gal)
Rainfall/run-on accumulation:	0 ft^3
Net (regulatory) secondary containment capacity:	1866 ft^3 (13,958 gal)
Largest container to store liquids:	44 ft^3 (330 gal)
Maximum liquid storage capacity based on net secondary containment capacity:	18,660 ft^3 (139,580 gal)
Permitted storage capacity	3000 ft^3 (22,440 gal[a])
Adequate secondary containment, based on Title 22 regulatory definition?	YES
Total required fire sprinkler waste retention volume	855 ft^3 (6400 gal)
Is net secondary containment capacity adequate for fire water retention?	YES

a This liquid waste can be stored in any type of approved container ranging from 1-gal cans up to 330-gal TUFF containers. However, the maximum liquid waste stored at any time cannot exceed these limits for the respective rooms.

OS-169 CWAA Secondary Containment Calculations





OS-169 CWAA Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

The total secondary containment volume is the volume of the CWAA plus the 350 gallon sump located at the northern boundary (capacity of sump provided in WAA Contingency Plan).

V_{floor} = 600 in x 480 in x 5.25 in = 1512000 in^3 x 0.004329 gal/in^3 = 6545 gallons
V_{sump} = 350 gallons

Total volume of secondary containment (V_T):
V_T = V_{floor}+ V_{sump} = 6545 gallons + 350 gallons = 6895 gallons

B. Calculation of Displacement from Containers and Equipment (V_{DT})

The contents of the CWAA are subject to change since it is a 90-day waste accumulation area. Therefore, it is assumed that as a worst case 80% of the floor space may be covered and displace spilled oil.

V_{DT} = 0.80 x (600 in x 480 in x 5.25 in) = 5236 gallons

C. Precipitation Volume (V_P)

No freeboard because tank is under cover.

V_P = 0 ft^3

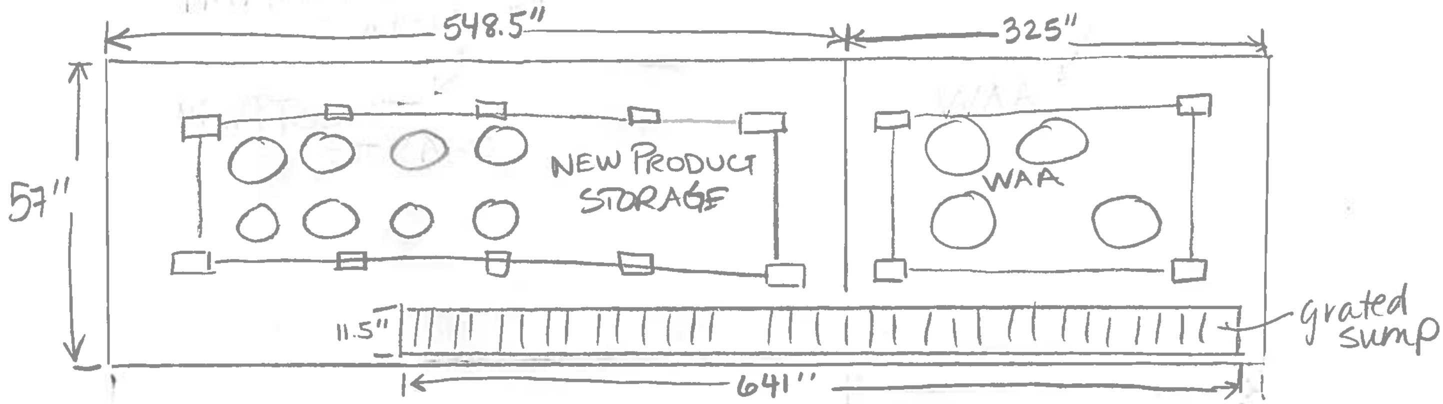
D. Net Total Secondary Spill Containment Capacity (V_N)

V_N = V_T – V_{DT} - V_{PT} = 6895 gallons -5236 gallons – 0 gallons = 1659 gallons

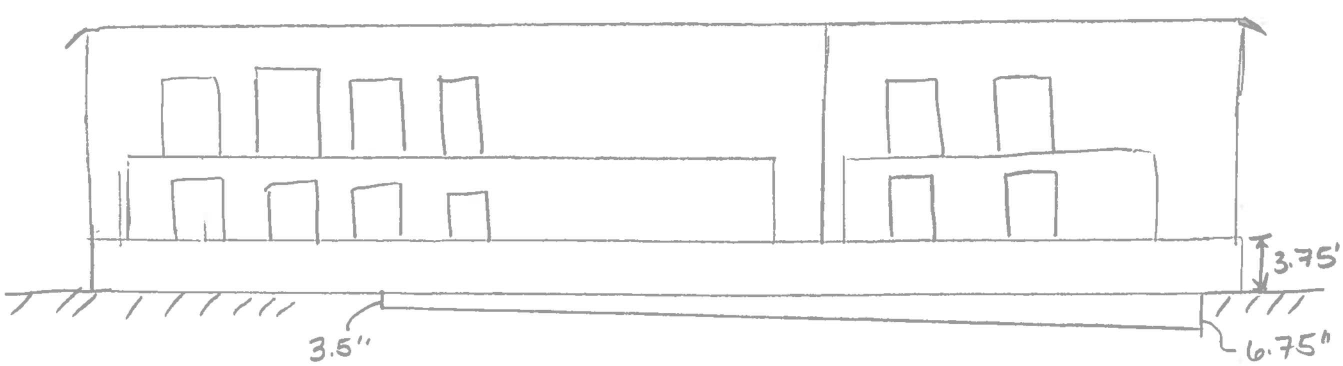
The largest volume of oil contained in equipment at this location is 330 gallons. Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container.

<u>B321A WAA/Product Rack Secondary Containment Calculations</u>

The storage area consists of two distinct areas: a Waste Accumulation Area (WAA) used to temporarily store hazardous waste and a new product storage area used to store virgin product. Although the area consists of two separate storage units, the secondary containment calculations have been combined because the two areas have a berm making the secondary containment area one large space.



Top View (not to scale)



Side View (NTS)

B321A WAA/Product Rack Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

The total secondary containment is made up of the long, grated trench that runs along the northern boundary of the storage area (V_{trench}), plus the volume contained within the product storage area (V_{stor}), plus the volume contained within the WAA (V_{WAA}).

The trench is sloped to the west, with depth of 3.5 inches at one end and 6.75 inches at the other (average height = 5.125 inches)

V_{trench} = 641 in * 11.5 in * 5.125 in = 37779 in^3 * 0.004329 gal/in^3 = 163.5 gallons
V_{stor} = 57 in * 548.5 * 3.75 in = 117241.9 in^3 * 0.004329 gal/in^3 = 507.5 gallons
V_{WAA} = 57 in * 325 * 3.75 in = 49469 in^3 * 0.004329 gal/in^3 = 300.7 gallons

Total volume of secondary containment (V_T):
V_T = V_{trench}+ V_{stor} + V_{WAA} = 163.5 gallons + 507.5 gallons + 300.7 gallons = 971.7 gallons

B. Calculation of Displacement from Containers and Equipment (V_{DT})

Displacement volumes will be from storage rack supports inside the bermed areas:

V_{DT} = 14 *(3 in * 3 in * 3.75 in) = 472.5 in^3 * 0.004329 gal/in^3 = 2.0 gallons

C. Precipitation Volume (V_P)

No freeboard because storage areas are under cover.

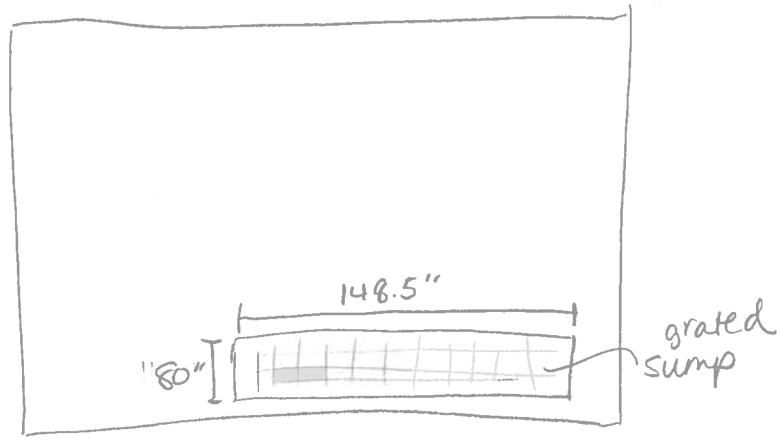
V_P = 0 ft^3

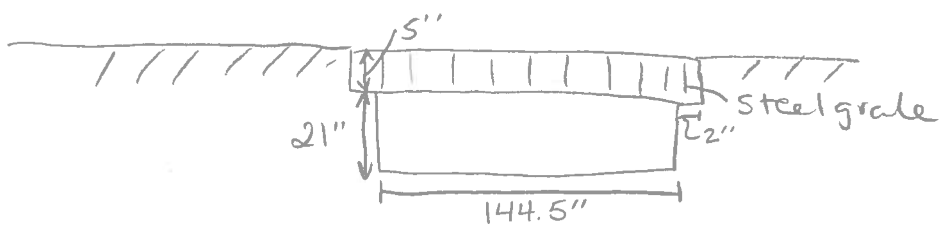
D. Net Total Secondary Spill Containment Capacity (V_N)

$V_N = V_T - V_{DT} - V_{PT}$ = 971.7 gallons – 2.0 gallons – 0 gallons = 969.7 gallons

The largest volume of oil contained in equipment at this location is 330 gallons. Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container.

B332A WAA Secondary Containment Calculations





B332A WAA Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

The total secondary containment volume for the sump is the volume of the rectangular sump.

V_T= L*W*H = 72 in * 144.5 in * 21 in = 218484 in^3 * 0.004329 gal/in^3 = 945.8 gallons

B. Calculation of Displacement Inside Secondary Containment (V_D)

Drums sit on grate over the sump. There is no displacement volume.
V_D = 0 gallons

C. Precipitation Volume (V_P)

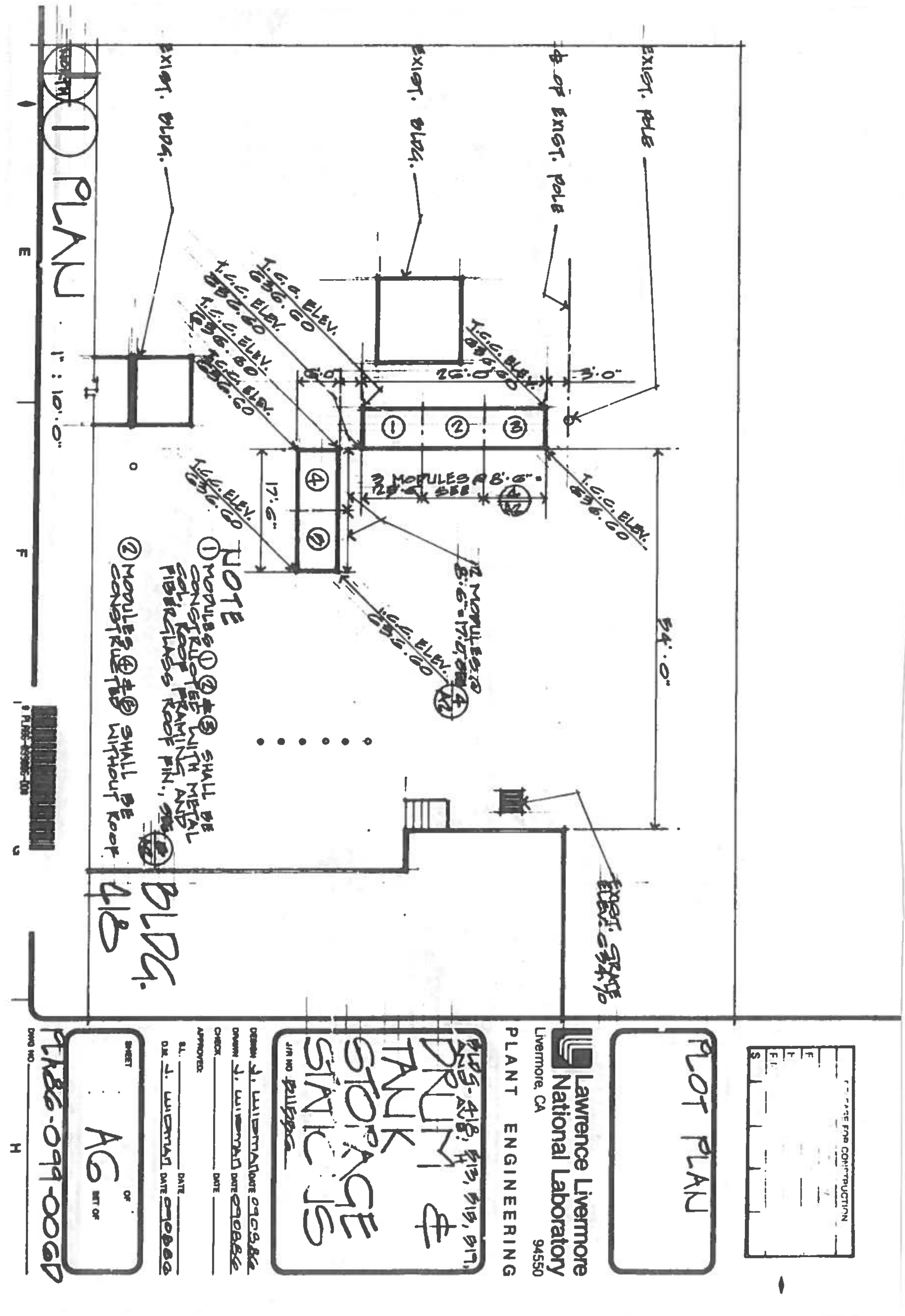
No freeboard because storage area is under cover.
V_P = 0 gallons

D. Net Total Secondary Spill Containment Capacity (V_N)

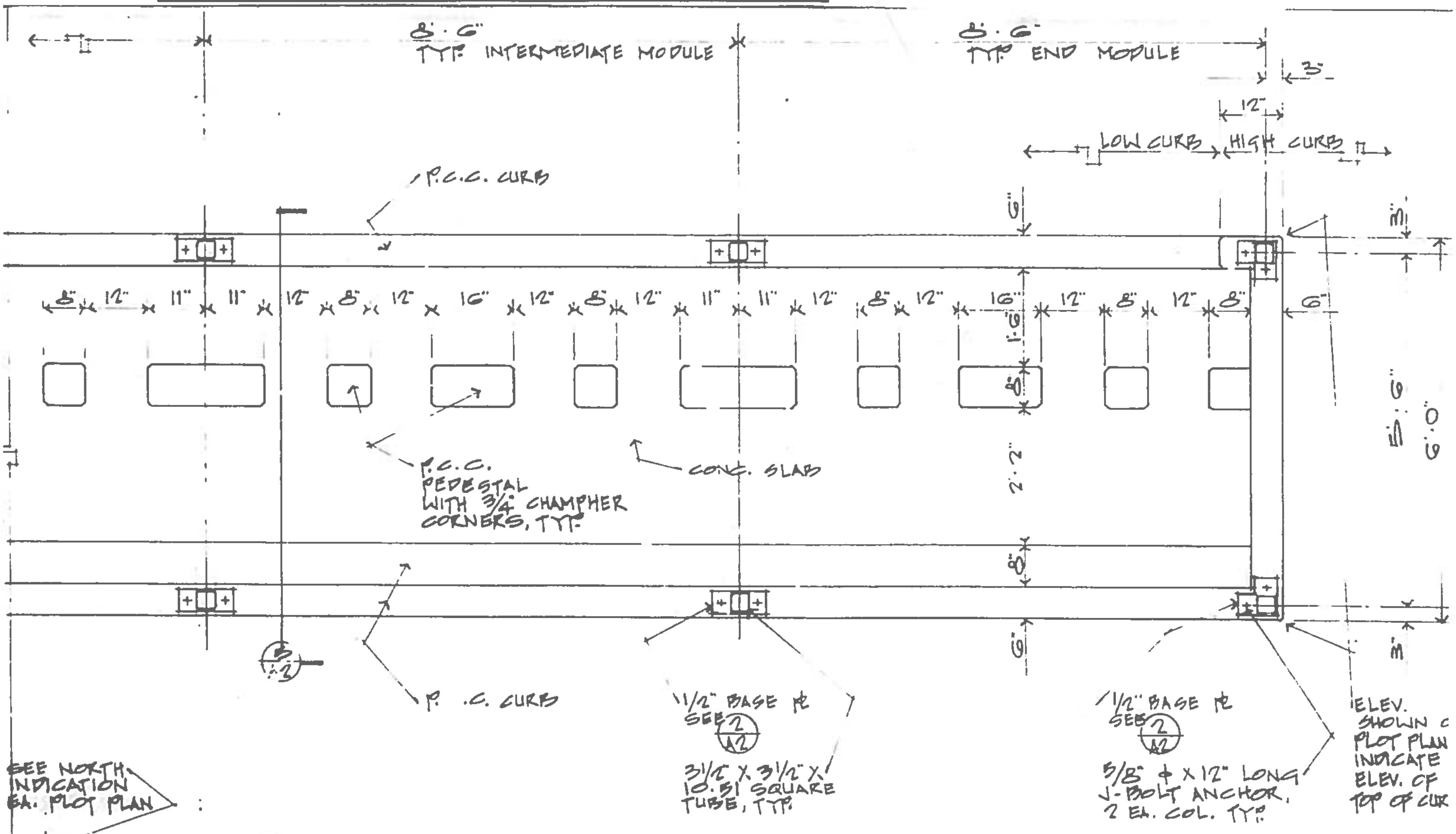
$V_N = V_T - V_D - V_P$ = 945.8 gallons – 0 gallons – 0 gallons = 945.8 gallons

The largest volume of oil contained at this location is 55 gallons. Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container.

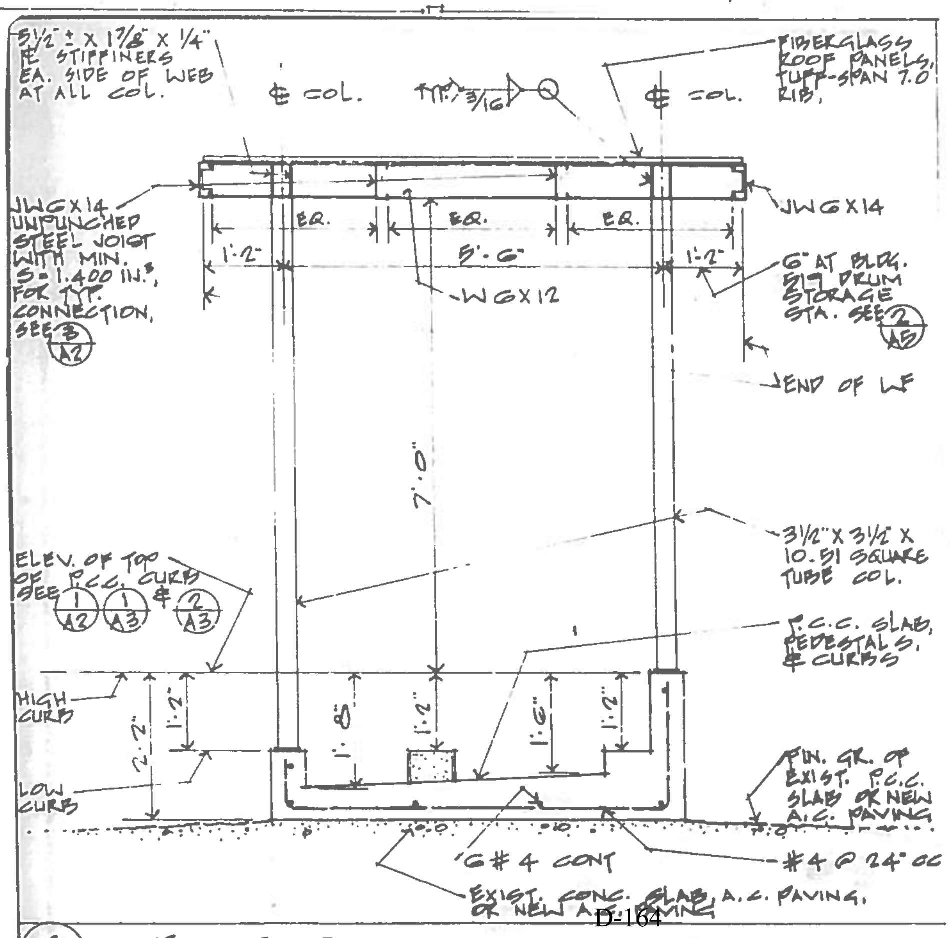
B418 WAA Secondary Containment Calculations



B418 WAA Secondary Containment Calculations



4 PARTIAL DETAIL PLAN 3/4" : 1'-0"



5 SECTION 3/4" : 1'-0"

B418 WAA Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

The WAA has two separate epoxy coated concrete basins. The total secondary containment volume for each basin is the volume of the rectangular prism (average height for both basins = 5").

BASIN 1

$V_{TBASIN1}$ = 300 in * 60 in * 5 in = 90000 in^3 * 0.004329 gal/in^3 = 389.6 gallons

BASIN 2

$V_{TBASIN2}$ = 198 in * 60 in * 5 in = 59400 in^3 * 0.004329 gal/in^3 = 257.1 gallons

B. Calculation of Displacement from Pedestals Inside Secondary Containment (V_D)

BASIN 1

There are two 22" by 8" by 6" pedestals, eight 8" by 8" by 6" pedestals, and three 16" by 8" by 6" pedestals.

V_{D1} = 2*(22 in * 8 in * 6 in) = 2112 in^3 * 0.004329 gal/in^3 = 9.1 gallons
V_{D2} = 8*(8 in * 8 in * 6 in) = 3072 in^3 * 0.004329 gal/in^3 = 13.3 gallons

V_{D3} = 3*(16 in *8 in *6 in) = 2304 in^3 x 0.004329 gal/in^3 = 10.0 gallons

$V_{DBASIN1}$ = V_{D1} + V_{D2} + V_{D3} = 9.1 gallons + 13.3 gallons + 10.0 gallons = 32.4 gallons

BASIN 2

There are one 22" by 8" by 6" pedestals, six 8" by 8" by 6" pedestals, and two 16" by 8" by 6" pedestals.

V_{D1} = 22 in * 8 in * 6 in = 1056 in^3 * 0.004329 gal/in^3 = 4.6 gallons
V_{D2} = 6*(8 in * 8 in * 6 in) = 2304 in^3 * 0.004329 gal/in^3 = 10.0 gallons

V_{D3} = 2*(16 in *8 in *6 in) = 1536 in^3 x 0.004329 gal/in^3 = 6.6 gallons

$V_{DBASIN2}$ = V_{D1} + V_{D2} + V_{D3} = 4.6 gallons + 10.0 gallons + 6.6 gallons = 21.2 gallons

C. Precipitation Volume (V_P)

No freeboard because storage areas are under cover.

V_P = 0 gallons

D. Net Total Secondary Spill Containment Capacity (V_N)

BASIN 1

$V_{NBASIN1} = V_{TBASIN1} - V_{DBASIN1} - V_P$ =389.6 gallons – 32.4 gallons – 0 gallons = 357.2 gallons

The largest volume oil container in BASIN 1 is 330 gallons. Therefore, the net containment capacity of the secondary containment system at BASIN 1 is sufficiently sized to contain the contents of the largest container.

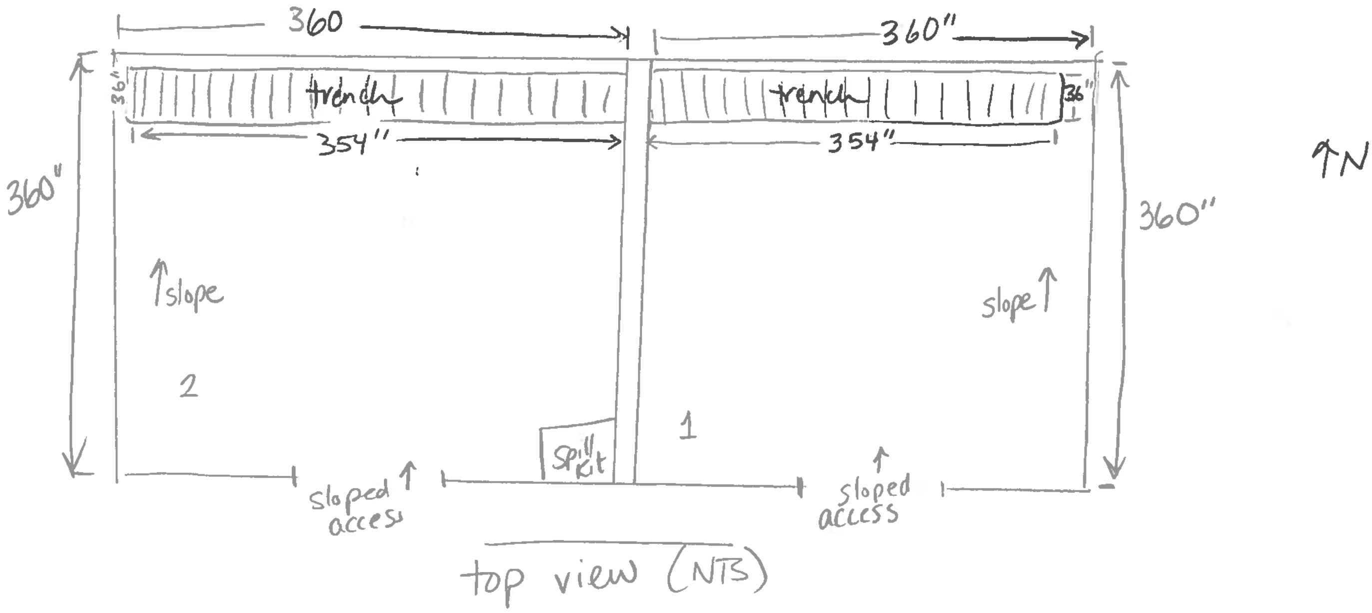
BASIN 2

$V_{NBASIN2} = V_{TBASIN2} - V_{DBASIN2} - V_P$ =257.1 gallons – 21.2 gallons – 0 gallons = 235.9 gallons

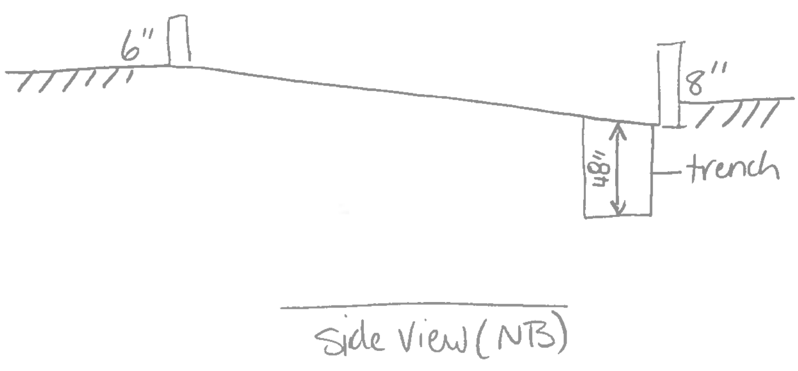
The largest volume oil container in BASIN 2 is 55 gallons. Therefore, the net containment capacity of the secondary containment system at BASIN 2 is sufficiently sized to contain the contents of the largest container.

B495 WAA Secondary Containment Calculations

The B-495 WAA is covered with a roof and surrounded by berms. The epoxy-sealed concrete floor slopes to the north, which allows liquids to flow to the two trenches along the north side of the WAA. The berm height is 6-inches at the southern end and 8-inches at the northern end. Run-on control measures are in place in the B-495 WAA to prevent storm water from entering the WAA and to keep rainwater from coming into contact with waste containers. The closest storm drain is approximately 90 feet to the southwest. There is a small grassy swale from the northeast corner of the WAA approximately 80' north to Arroyo Las Positas.



top view (NTS)



side view (NTS)

B495 WAA Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

The total secondary containment volume for the WAA is the volume of the two triangular prism shaped berms plus the volume of the two trenches.

$V_{T1} = V_{prism} + V_{trench}$ = .5*(2 in * 360 in)*360 + 36 in * 354 in* 48 in = 741312 in^3 * 0.004329 gal/in^3 = <u>3209.1 gallons</u>

$V_{T2} = V_{prism} + V_{trench}$ = .5*(2 in * 360 in)*360 + 36 in * 354 in* 48 in = 741312 in^3 * 0.004329 gal/in^3 = <u>3209.1 gallons</u>

$V_T = V_{T1} + V_{T2}$ = 3209.1 gallons + 3209.1 gallons = <u>6418.2 gallons</u>

B. Calculation of Displacement Inside Secondary Containment (V_D)

The contents of the WAA are subject to change since it is a 90-day waste accumulation area. Therefore, it is assumed that as a worst case 80% of the floor space may be covered and displace spilled oil.

V_{DT1} = 0.80 * .5*(2 in * 360 in)*372 =133920 in^3 * 0.004329 gal/in^3 = 579.7 gallons
V_{DT2} = 0.80 * .5*(2 in * 360 in)*372 =133920 in^3 * 0.004329 gal/in^3 = 579.7 gallons

$V_{DT} = V_{DT1} + V_{DT2}$ = 579.7 gallons + 579.7 gallons = <u>1159.4 gallons</u>

C. Precipitation Volume (V_P)

No freeboard because storage area is under cover.
V_P = <u>0 gallons</u>

D. Net Total Secondary Spill Containment Capacity (V_N)

$V_N = V_T - V_D - V_P$ = 6418.2 gallons – 1159.4 gallons – 0 gallons = <u>5285.8 gallons</u>

The largest volume of oil potentially contained at this location is <u>330 gallons.</u> Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container.

Secondary Containment Report for Area 612-4 Receiving, Segregation, and Container Storage Unit (Building 612 Complex)

(612 WAA)

April 13, 1995

David K. Dennison
Hazardous Waste Management Division
Environmental Process Engineering Group

University of California
Lawrence Livermore National Laboratory

Table of Contents

Executive Summary

The first section of this report was prepared to meet the requirements of Title 40 of the Code of Federal Regulations, Section 270.15 (a) (1-4) and Title 22 of the California Code of Regulations, Section 66270.15 (a) (1-4) as the requirements pertain to the containment system (i.e., secondary containment system) for the waste management unit: Area 612-4 Receiving, Segregation, and Container Storage Unit. The section presents an evaluation of the secondary containment available for each individual cell in the unit without regard for fire sprinkler volume or any containment volumes external to the cells. The evaluation is based on the criteria in 40 CFR 264.175 and 22 CCR Section 66264.175.

The second section of this report discusses the impact of the discharge of fire sprinkler water into the storage unit. It provides analysis to certify that the overall containment system, which includes containment volumes which are common to each of the five cells of the unit but external to them (i.e. sloped trench and 12,000 gallon underground tank), can adequately contain 20 minutes of fire sprinkler flow discharged from any one cell at a time.

Based on regulatory definition of secondary containment (as calculated in this report) this unit has a total regulatory storage capacity of 44,680 gallons of regulated waste (8,680 gallons in each of Cells B, C, and D and 9,320 gallons in each of Cells A and E). The regulatory secondary containment capacity is 868 gallons in Cells B, C, and D and 932 gallons in Cells A and E. The largest container used to store liquid waste is 330 gallons.

The secondary containment for this unit is free from defects which could result in leaks. It is sloped to provide for easy and timely removal of accumulated liquids and to provide for protection of elevated wastes coming into contact with accumulated liquids.

Run-on and precipitation is managed by a roof, ancillary structures, and personnel. This unit has a roof and additional structural protection from rain, but it can collect precipitation. Run-on is prevented by a berm, grades. and a storm drain trench.

Based on the calculations in the second section of this report, the storage unit can safely contain the accumulation of fire sprinkler water from the sprinklers in any one of the cells. The fire sprinkler flow is assumed to be at the rate of 0.3 gallons/minute/ ft^2 and for a duration of 20 minutes. This complies with the 1994 Uniform Fire Code Table 7902.5F requirements for Class II liquids.

Certification

Technical Certification of the Area 612-4 Receiving, Segregation, and Container Storage Facility Containment Design

I have reviewed the calculations for and inspected the Area 612-4 Receiving, Segregation, and Container Storage Facility at Lawrence Livermore National Laboratory to determine if the facility is suitably designed to meet the requirements of the California Code of Regulations (CCR) Title 22 Section 66264.175. To the best of my knowledge, based upon review of the facility and information provided, the proposed design has the following features:

1. Each cell of the storage facility has a secondary containment basin or bermed area beneath the containers of waste which is free of cracks or gaps. The concrete and its coating should provide a sufficiently impervious containment if the wastes stored in the area are restricted to those types of wastes compatible with the coating used.

2. The base of the containment area for each cell is designed to be sloped so that leaks or spills will be directed to the low point of the containment area and not allow liquids to accumulate.

3. The containment system design for each cell has sufficient capacity to hold 10% of the aggregate volume of all containers in that cell or the volume of the largest container in that cell, whichever is greater, plus additional capacity to contain precipitation from a 24-hour, 25-year storm. The design criteria used to evaluate the adequacy of the containment was based on the maximum allowable amount of liquid waste stored in the facility (8,680 gallons for Cells B, C, and D and 9,320 gallons for Cells A and E) plus precipitation (404 gallons in Cells B, C, and D and 423 gallons in Cells A and E), plus displacement volume (420 gallons in all cells), and secondary containment capacity (1,692 gallons in Cells B, C, and D and 1,775 gallons in Cells A and E).

   The regulatory secondary containment capacity is equal to 10% of the volume of stored waste (868 gallons for Cells B, C, and D and 932 gallons for Cells A and E) plus rainfall.

4. Run-on into the containment area is prevented on three sides by the containment berm walls. Run-on into the fourth side is prevented by sloping all pavement areas away from the berm concrete pad.

5. The containment berm of each cell plus the external containment volumes (sloped trench and the 12,000 gallon underground tank) are adequate to contain the regulatory containment capacity plus the fire sprinkler volume for any one of the five cells in the unit at a time.

I certify that the design of the Building 612-4 Receiving, Segregation, and Container Storage Facility meets the requirements of 22 CCR 66264.175.

Date 6-20-95

REGISTERED PROFESSIONAL ENGINEER
REUBEN H CHOW
No. M22778
EXPIRES 9-30-96
MECHANICAL
STATE OF CALIFORNIA

University of California
Lawrence Livermore National Laboratory

Subject:

This is a report on the adequacy of containment within the Area 612-4 Receiving, Segregation, and Container Storage Unit due to the installation of a dry fire pipe sprinkler system and a 12,000 gallon overflow tank.

Scope:

The scope of this report is to evaluate secondary containment criteria based on the regulations found in 40 CFR 264 subpart I (264.175) and 22 CCR Article 9 (66264.175). This report is intended to cover all aspects of the secondary containment criteria. This report does not cover structural criteria that is not related to secondary containment.

This report includes the appropriate displacements using the maximum number of allowable storage containers, double stacked in the tightest possible configuration with adequate aisle space, and stored on pallets which are assumed to have maximum volume displacement.

A typical arrangement for these storage containers in the berm is shown in Figure 1. The container storage area consists of five cells which are independent from each other but share the same secondary containment trench and 12,000 gallon underground double walled tank. The secondary containment analysis is based on three rows of pallets in each cell with each row containing nine 4' x 4' pallets. To obtain the maximum container displacement, it will be assumed that 330 gallon rectangular shaped TUFF tanks are used exclusively in the bermed area to hold the waste. Some of these containers will be double stacked as necessary up to the maximum capacity allowable in the berm cells. However, the number of containers actually used in the berm will never exceed the allowable volume of waste for each cell.

Reference Drawings

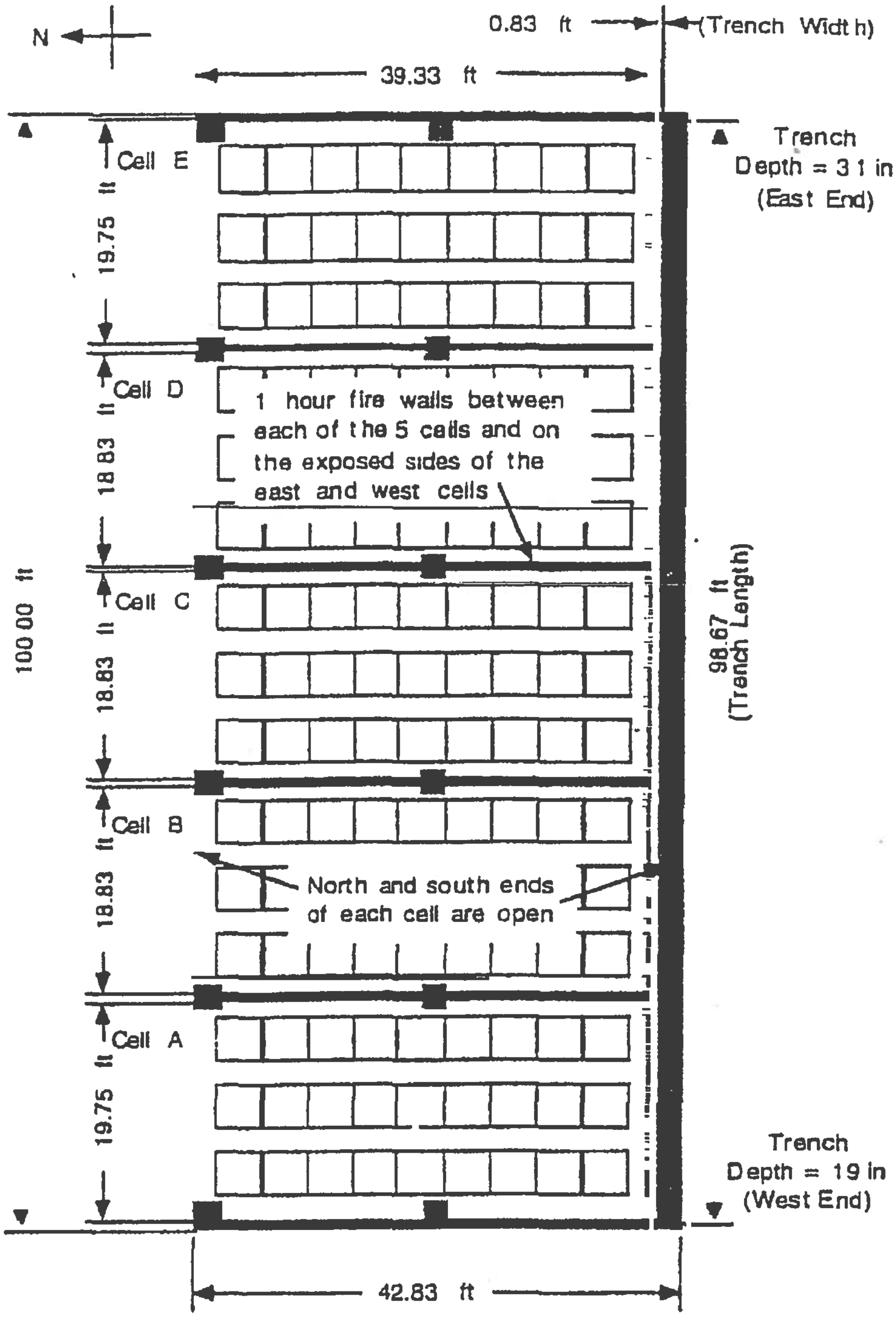
Site Plan (Civil)	PLC 89 612 002D
Structural	PLS 89 612 002D
Structural	PLS 89 612 003D

In addition to these drawings, actual measurements of the existing facility were taken. When the measured dimensions differed from those shown on the drawings then the measured dimensions took precedence and were used to determine secondary containment volumes.

Slope or Drainage:

The secondary containment area for this container storage unit consists of five concrete bermed areas (cells) all sloping to the south (See Figure 1). The usable floor space of each cell is that of a rectangle less the roof support piers. According to the structural drawing (PLS 89 612-002D) the five bermed cells are all sloped from north to south starting with an elevation of 646.0 feet and ending with an elevation of 645.0 feet. (Actual measurements showed this drop to be 11" instead of 12"). This slope provides for drainage of accumulated liquids. This drainage allows personnel to remove these liquids in a timely manner by pumping or some other means.

Figure 1 - Area 612-4 Receiving, Segregation, and Container Storage Unit



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In addition, the center of the back wall of each cell has a 3' wide and 9" deep weir notch penetration. This is to allow for drainage of the fire sprinkler overflow from each cell into a sloped trench located behind the cells and which is common to all the cells. The overflow from the trench is directed through a nominal 6" diameter pipe to a 12,000 gallon underground tank. Both the trench and the 12,000 gallon tank volumes, which are external to the cell berms, are designed to be used only to contain fire sprinkler water. These volumes are not considered when determining the maximum waste storage capacity of each cell.

The trench floor slopes from west to east and drops a total of 12" over its length. A horizontally mounted double walled 6" diameter pipe penetrates the east end of the trench. This pipe allows the overflow liquid in the trench to drain into a 12,000 gallon double walled tank located underground just beyond the east end of this storage facility. The height of the lower side of this 6" pipe ID is 16" from the lowest point of the trench floor.

Prevention of Migration:

The floor of each of the berm cells is constructed of 10" of reinforced concrete. The roof is held up on top of the berm and piers by steel I-beams and is prefabricated. There are no leaks cracks or gaps which can provide for liquid channeling through the containment area. The berm walls, trench walls and all floor areas are painted with a high solids epoxy, latex, or acrylic enamel compatible with the stored wastes. The frequency of re-coating of these surfaces is based on visual evidence of deterioration. These sealants along with the concrete itself, the double walled holding tank, and the double walled connection pipe to the holding tank make the containment areas substantially impervious to the wastes stored in this unit.

Fire Sprinklers:

A dry pipe fire sprinkler system is used in this container storage unit to prevent the spread of fire throughout the cells. The required sprinkler delivery rate is 0.3 gallons/ft^2/minute which is consistent with the 1994 Uniform Fire Code Table 7902.5. The cells are separated from each other by one hour duration fire walls and the end cells have fire walls on their outer edges. However, the north and south ends of each of the cells are open. This analysis assumes the fire sprinklers are operated for a maximum of 20 minutes and that the sprinklers are activated in only one cell at a time.

Run-on and Precipitation

Run-on and precipitation is managed by the roof, ancillary structures, and personnel. This unit can contain all of the waste stored as well as the projected rainfall (24 hr-25 yr rainstorm). Storm drains, ramps, and berms provide prevention of run-on and precipitation. The rain catchment is calculated in the next section.

Cell Secondary Containment Calculations

The maximum total allowable storage in each cell is 8,680 gallons (Cells B, C, and D) and 9,320 gallons (Cells A and E) For conservatism, the wastes are assumed to be stored in 330 gallon TUFF containers which are double stacked as appropriate on the 27 pallets in each cell. The total available secondary containment volume for each cell consists of only the available volume in each cell's berm. The trench and the underground tank volumes are not considered when determining the maximum waste storage capacity of each cell.

Total Secondary Containment For Each Cell:

The three interior cells (B, C, and D) are identical and have the dimensions as shown in Figure 2. The end cells (A and E) are mirror images of each other and have the dimensions as shown in Figure 3. The elevation dimensions for all five cells are shown in Figure 4. The effective secondary containment areas are simple rectangles minus the two central concrete post support pads and are calculated from the dimensions shown in Figures 2, 3, and 4 as follows:

$A_i = (18.83\ ft \cdot 32.182\ ft) - (2 \cdot 2\ ft \cdot 0.67\ ft) = 603.3\ ft^2$. (Cells B, C, and D)

$A_o = (19.75\ ft \cdot 32.182\ ft) - (2 \cdot 2\ ft \cdot 0.67\ ft) = 632.9\ ft^2$. (Cells A and E)

The containment volume for each cell can be calculated as a rectangular prism. The relationship and calculation is given below:

$$V = \frac{1}{2} \cdot A \cdot h$$

V = Total Containment Volume (ft^3)
A = Effective Containment Area (ft^2)
h = Maximum Depth of the Cell Secondary Containment (ft)

$$V_i = \frac{1}{2} \cdot 603.3\ ft^2 \cdot \frac{9\ in}{12\ in/ft} = 226.2\ ft^3 \text{ or } 1692 \text{ gallons}$$

(Cells B, C, and D)

$$V_o = \frac{1}{2} \cdot 632.9\ ft^2 \cdot \frac{9\ in}{12\ in/ft} = 237.3\ ft^3 \text{ or } 1775 \text{ gallons}$$

(Cells A and E)

Displacement Volume for Each Cell:

The displacement caused by elevating devices (like pallets or skids) for the waste containers stored in each of the cells can be conservatively estimated by assuming three rows of nine pallets containing the waste storage containers as shown in Figure 1. For additional conservatism it is assumed that the rows of pallets are pushed as close as possible to the south berm wall of each cell. The displacement caused by wood pallets per unit berm area has been calculated to be 0.116 ft^3/ft^2. The calculation of this factor is outlined in Appendix A.

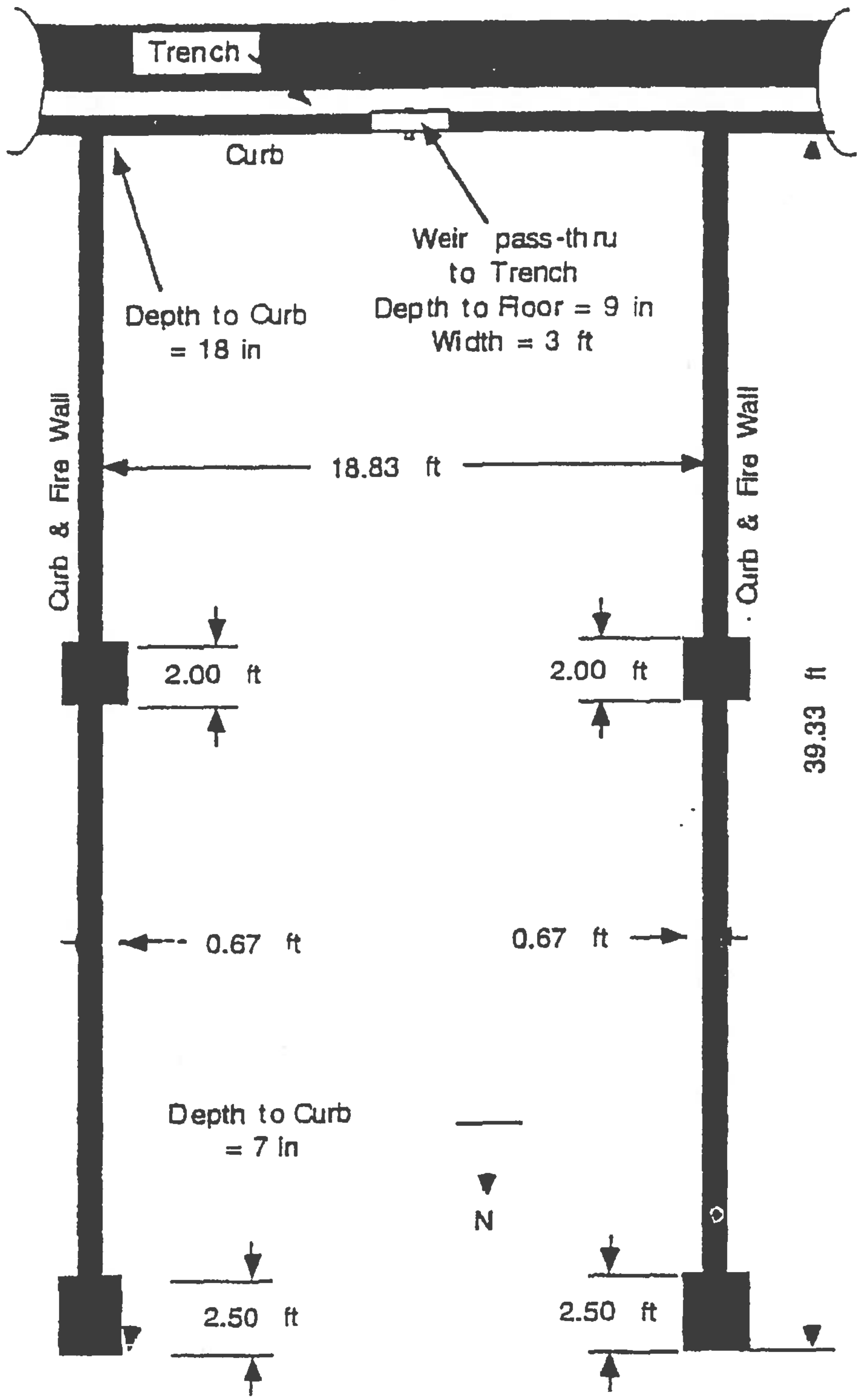

Figure 2 Interior Cell Dimensions (Cells B, C, and D)

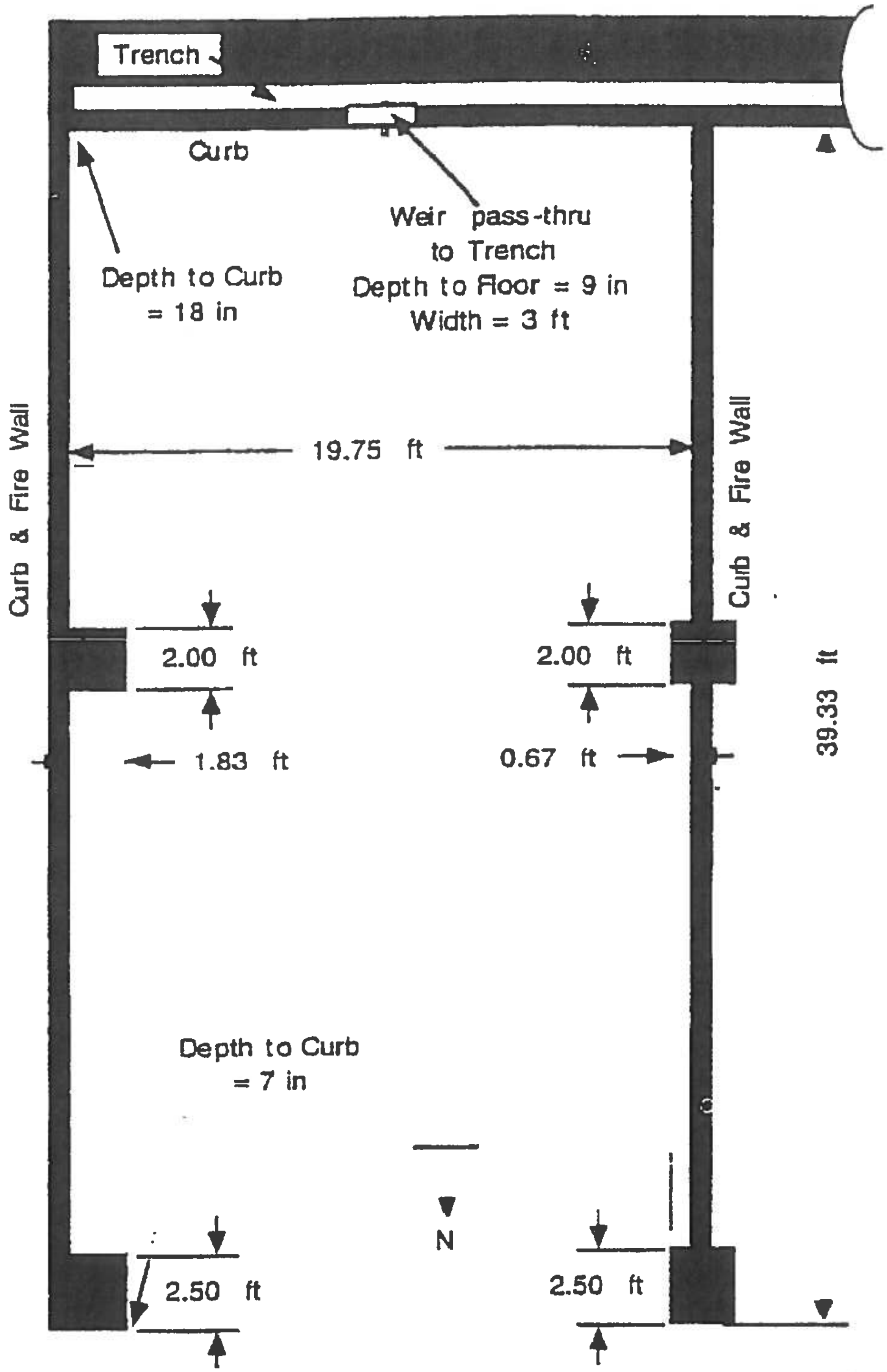

Figure 3 End Cell Dimensions (Cells A and E)

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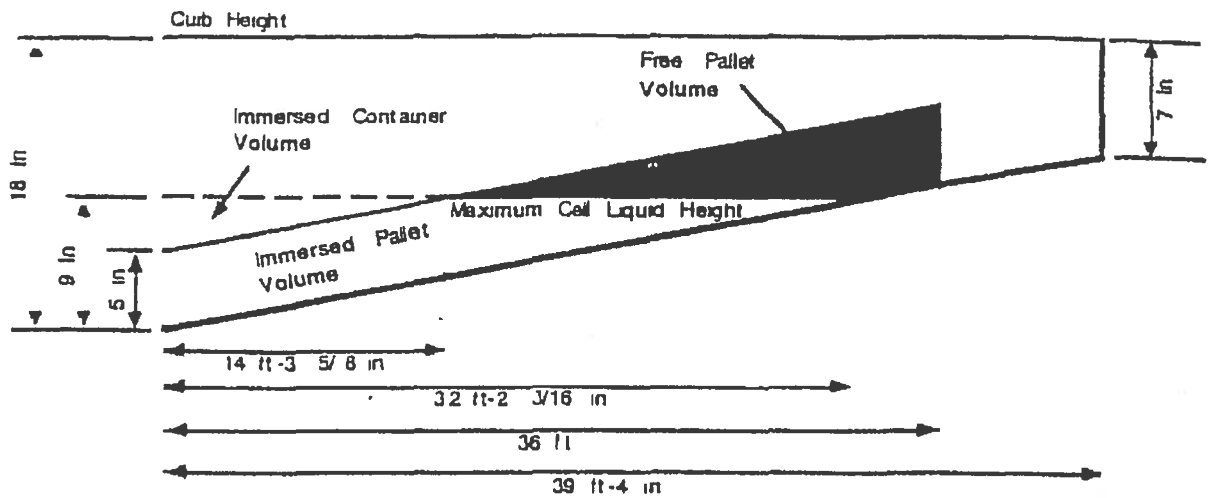


Figure 4 Cell Elevation Dimensions

Using this displacement factor the total elevating device displacement for each cell is calculated as follow:

d_v = 4 ft • 4 ft • 0.116 ft^3/ft^2 • 9 pallets • 3 rows • 7.4805 gallons/ft^3
= 375 gallons

However, as shown in Figure 4 the pallets on the north end of the berm are only partially submerged. The free pallet volume can be calculated as follows:

d_f = [$\frac{1}{2}$ • (32.182 ft - 14.303 ft) • 4 ft • 3 rows • 0.116 ft^3/ft^2
+ (36 ft - 32.182 ft) • 4 ft • 3 rows • .0.116 ft^3/ft^2] • 7.4805 gal/ft^3
= 133 gallons

Therefore, the immersed pallet displacement is the difference between the total displaced pallet volume and the free pallet volume:

d_p = 375 gallons - 133 gallons
= 242 gallons

Also, since the storage container pallets are only 5" high and the berm liquid depth at the south end can be 9" it is possible that a portion of the lower ends of the storage containers can be immersed in the contained waste. The most conservative method to calculate this displacement is to assume use of the 330 gallon TUFF (rectangular shaped) storage containers stacked on the pallets. For the sake of conservatism, the maximum external dimensions of these containers (3 ft 4 in wide x 4 ft long x 5 ft 3 in high) are used to determine the displacement for this calculation.

Displacement due to the lower ends of the TUFF containers immersed in the maximum level of liquid is calculated below. These calculations are based on the dimensions shown in Figure 4.

Average container height immersed in the liquid:

$$l_c = \frac{(9\ \text{in} - 5\ \text{in})}{2} = 2\ \text{in}$$

Average container immersed volume displacement per area:

$$d_c = \frac{3'4'' \cdot 4' \cdot \frac{2\ \text{in}}{12\ \text{in/ft}}}{4\ \text{ft} \cdot 4\ \text{ft}} = 0.139\ \text{ft}^3/\text{ft}^2$$

Therefore the immersed container displacement is:

$$V_c = 14.303\ \text{ft} \cdot 4\ \text{ft} \cdot 3\ \text{rows} \cdot 0.139\ \text{ft}^3/\text{ft}^2 \cdot 7.4805\ \text{gallons/ft}^3$$
$$= 178\ \text{gallons}$$

The total displaced volume within the berm is equal to the sum of the immersed pallet volume and the container displacement volume.

$$V_d = 242\ \text{gallons} + 178\ \text{gallons}$$
$$= 420\ \text{gallons (For each cell)}$$

Rain Volume for Each Cell:

The displacement volume due to a 24 hour, 25 year rainstorm is calculated below. Justification for the 30 degree incident angle assumption used in the calculation is outlined in Appendix B.

The amount of surface area of the Area 612-4 cells which are exposed to the incident rain angle is calculated from the roof dimensions outlined in the referenced drawings. For all five cells the east and west ends are protected from the incidence of rain by the fire walls. Therefore, rain can enter each of the cells only from either the north or south ends but not both at the same time. The roof is higher on the north side of the structure than on the south side. Therefore, calculation of the rain incidence from the north side is more conservative and will be used for this analysis. The distance from the lower face of the Area 612-4 roof structure beam to the top of the concrete berm pedestals is 16 feet. The roof structure beams are 13.625 inches high, the roof purlins are 10 inches high, the curb height at the north end of the berm is 7 inches, and the roof extends out directly over the north edges of the berm pedestals.

Therefore, the rain catchment width is:

$$X = \left(16\ \text{ft} + \frac{7\ \text{in} + 13.625\ \text{in} + 10\ \text{in}}{12\ \text{in/ft}}\right) \cdot \tan(30°) = 10.7\ \text{ft}$$

The total rain catchment areas assuming rain which falls on the side curbs goes into the berm are:

$$A_i = \left(18.83 \text{ ft} + \frac{8 \text{ in curb width}}{12 \text{ in/ft}}\right) \cdot 10.7 \text{ ft} = 208.6 \text{ ft}^2 \text{ (Cells B, C, and D)}$$

$$A_o = \left(19.75 \text{ ft} + \frac{8 \text{ in curb width}}{12 \text{ in/ft}}\right) \cdot 10.7 \text{ ft} = 218.4 \text{ ft}^2 \text{ (Cells A and E)}$$

The rain catchment volume, based on the 24 hour, 25 year worst storm level of 3.11" (See Appendix B), is:

$$V_{ri} = 208.6 \text{ ft}^2 \cdot \frac{3.11 \text{in}}{12 \text{ in/ft}} \cdot 7.4805 \text{ gal/ft}^3 = 404 \text{ gallons (Cells B, C, and D)}$$

$$V_{ro} = 218.4 \text{ ft}^2 \cdot \frac{3.11 \text{in}}{12 \text{ in/ft}} \cdot 7.4805 \text{ gal/ft}^3 = 423 \text{ gallons (Cells A and E)}$$

Secondary Containment Calculation Summary

A summary of the calculations are shown in the following table. Each of Cells B, C, and D are adequate to handle up to 8,680 total gallons of waste and each of Cells A and E are adequate to handle up to 9,320 gallons of waste including portable tanks up to 330 gallons.

Value description	*Cells B, C and D*	*Cells A and E*
Cell secondary containment:	1692 gallons	1775 gallons
Total cell displacement volume:	-420 gallons	-420 gallons
Cell rainfall accumulation:	-404 gallons	-423 gallons
Regulatory containment (net of the above):	**868 gallons**	**932 gallons**
Largest container to store liquids:	330 gallons	330 gallons
Maximum storage or treatment capacity:	8,680 gallons*	9,320 gallons*
(Based on regulatory definition)		
Adequate secondary containment:	YES	YES

* This liquid waste can be stored in any type of certified container ranging from gallon cans up to 330 gallon TUFF containers. However, the maximum liquid waste stored at any time cannot exceed these limits for the respective cells.

Fire Sprinkler Containment Calculations

For this calculation it will be assumed that the fire sprinklers are activated in only one of the five cells at a time and that sufficient time (to allow pump out of the water) elapses before a second activation of the fire sprinklers in any of the cells occurs. This is a valid assumption since there are one hour duration fire walls between each of the cells and on the exposed sides of the end cells. For conservatism 10% of the stored waste volume is added to the 20 minutes of fire sprinkler flow to obtain the total required fire sprinkler retention volume.

Total Cell Fire Sprinkler Volume:

The volume displacement due to the fire sprinkler water for each of the cells is calculated assuming a 0.3 gpm/ft^2 flow rate for a total operational time of 20 minutes. For this calculation, since fire walls are located between each of the cells, it is assumed that the fire sprinklers go off in only one cell and all the water which lands on the side curbs goes into the cell. The total sprinkled water volume for each of the interior cells including that which falls on the side curbs is calculated as:

$$V_{si} = 39.33 \text{ ft} \cdot \left(18.83 \text{ ft} + \frac{8 \text{ in}}{12 \text{ in/ft}}\right) \cdot 0.3 \text{ gpm/ft}^2 \cdot 20 \text{ minutes} = 4601 \text{ gallons}$$

(Cells B, C, and D)

$$V_{so} = 39.33 \text{ ft} \cdot \left(19.75 \text{ ft} + \frac{8 \text{ in}}{12 \text{ in/ft}}\right) \cdot 0.3 \text{ gpm/ft}^2 \cdot 20 \text{ minutes} = 4818 \text{ gallons}$$

(Cells A and E)

Total Trench Fire Sprinkler Volume:

All the fire sprinkler water which lands on the back curb is assumed to go directly into the sloped trench.

$$V_{ti} = \left(18.83 \text{ ft} + \frac{8 \text{ in}}{12 \text{ in/ft}}\right) \cdot \frac{42 \text{ in}}{12 \text{ in/ft}} \cdot 0.3 \text{ gpm/ft}^2 \cdot 20 \text{ minutes} = 409 \text{ gallons}$$

(Cells B, C, and D)

$$V_{to} = \left(19.75 \text{ ft} + \frac{8 \text{ in}}{12 \text{ in/ft}}\right) \cdot \frac{42 \text{ in}}{12 \text{ in/ft}} \cdot 0.3 \text{ gpm/ft}^2 \cdot 20 \text{ minutes} = 429 \text{ gallons}$$

(Cells A and E)

Available Trench Volume:

The sloped trench is available as containment for the fire sprinkler overflow from each of the Area 612-4 cells. The trench dimensions are shown in Figure 5. The top of the 6" diameter outlet pipe from the sloped trench is flush with the lower edges of the weir openings coming from each of the cells. The height of the lower side of this 6" pipe ID is 16" from the lowest point of the trench floor. The maximum secondary containment volume of the sloped trench is:

$$V_t = \frac{1}{2} \cdot \frac{(16 \text{ in} + 4 \text{ in})}{12 \text{ in/ft}} \cdot \frac{10 \text{ in}}{12 \text{ in/ft}} \cdot 98.67 \text{ ft} \cdot 7.4805 \text{ gals/ft}^3$$

$$= 513 \text{ gallons}$$

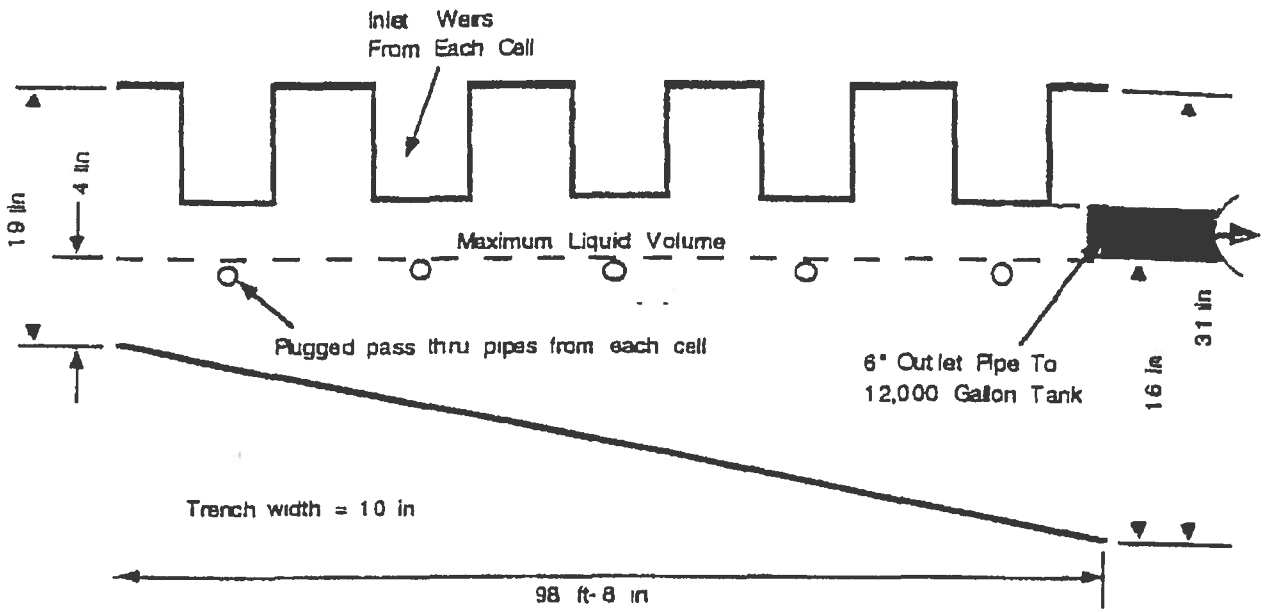


Figure 5 Sloped Trench Dimensions

Available Underground Tank Volume

The underground tank is a double walled Fiberglas tank located in the ground with its top inside surface located below the level of the inlet pipe coming from the sloped trench. The inlet pipe is a 6" diameter double contained plastic pipe. The maximum tank volume available for fire sprinkler water containment is 12,000 gallons.

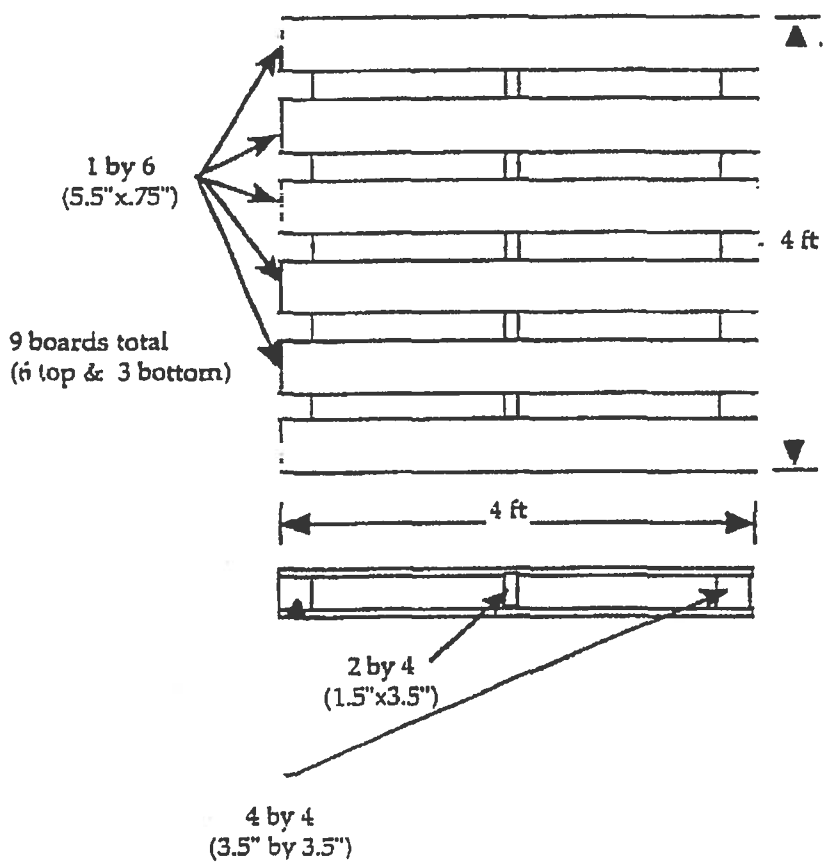
Fire Sprinkler Containment Calculation Summary

Value description	*Cells B, C and D*	*Cells A and E*
Total generated cell fire sprinkler volume:	4,601 gallons	4,818 gallons
Total generated trench fire sprinkler volume:	409 gallons	429 gallons
10% of cell waste:	868 gallons	932 gallons
Total fire sprinkler volume to be contained:	**5,878 gallons**	**6,179 gallons**
Total trench volume available:	513 gallons	513 gallons
Total tank volume available:	12,000 gallons	12,000 gallons
Total cell volume available:	868 gallons	932 gallons
Total available fire sprinkler containment volume:	**13,381 gallons**	**13,445 gallons**
Excess fire sprinkler containment volume:	7,503 gallons	7,266 gallons
Adequate total fire sprinkler containment volume:	YES	YES

Appendix A

Displacement Due to Container or Equipment Supporting Devices

Containers will be elevated by some means such as pallets, skids, stanchions or legs, dollies, and trucks. This not only gives efficient use of containment, it also provides for ease in container handling and prevention of wastes coming into contact with standing liquids. It provides enhanced segregation and quick access in case of an emergency. These devices which do elevate the containers will cause some displacement of liquids such as rainwater. The conservative approach is to estimate the volume per area of floor space consumed by displacement of the more common large elevating device. The device to estimate displacement is the wooden pallet. The wooden pallet is used throughout the facilities to elevate wastes. This type of device also displaces volume greater than our portable tank skids, wooden and metal box legs, and galvanized steel pallets. The wooden pallet displacement volume per unit area is somewhat comparable to our secondary containment pallet, dolly, and truck displacements. The common pallet is 4 feet by 4 feet and is constructed of 1" by 6" (top and bottom platform), 4" by 4" (end platform supports), and 2" by 4" (center platform support). The diagram below depicts a wooden pallet.



These pallets consume the following volume per square foot:

$$DF = \frac{2 \bullet 4 \bullet \left(\frac{3.5}{12}\right)^2 + 4 \bullet \left(\frac{1.5 \bullet 3.5}{12^2}\right) + 9 \bullet 4 \left(\frac{0.75 \bullet 5.5}{12^2}\right)}{4 \bullet 4} = 0.116 \frac{ft^3}{ft^2}$$

DF = The displacement factor (ft)
note: standard wood dimensions are used

This impact is quite small, but does have significance when combined. We will take it into consideration in our calculations. Many containment areas have maximum depths of less than that of the pallet height which is 5". In these instances we will take the fraction of the containment height with 5" to develop a new displacement factor.

Appendix B

Rain Fall As It Relates to Secondary Containment Calculations

Rainfall Vertical Angle:

Rain is assumed to fall at a 30° angle from the vertical. This is a conservative angle and it will be demonstrated as such in the following discussion. If rain did fall vertically (A 0° angle from the vertical) then the roofs which cover many of our containment areas (Hazardous and Mixed Waste Management Units) would provide complete protection from rain. If a 45° angle was chosen, most containment area calculations would show much more rain than they would really collect, and thus show a non-realistic collection of rainfall. Some containment areas would show less rainfall than they would actually receive due to the allowance of protection from surrounding structures.

The value of 30° was chosen as a more realistic rainfall angle as well as a conservative one. It is actually almost double the calculated value based on drag coefficient calculations, yet it is still more realistic based on wind speeds and frequencies. The calculation demonstrating the evaluation of this angle is given below.

Rainfall Geographical Direction:

The direction of rainfall will be assumed to be in the direction of greatest impact to the secondary containment area. The direction is also assumed to be the same throughout the duration of the rainfall period. The directions will be given as south, southwest, north, northeast, etc....... There will be no more refinement of direction (no more than 4 singly split quadrants, 45°). There will be no directions given like "south southwest". This is not necessary to evaluate the greatest impact of rainfall.

Rainfall Amount:

The rainfall will be considered to be 3.11 inches. This "integral rate" of 3.11 inches is the estimated worst case of 24 hour rain storm in 25 years. (See reference listed below).

References (Engineering and Scientific literature):

Data which support the assumptions used in the following analyses are given in the following references:

1) "Environmental Report For 1989" Lawrence Livermore National Laboratory UCRL - 50027 - 89, Editors John M. Simms et. al., 1989 (Limited distribution)

   - Discussions of the climate (page 23)
   - The wind rose (page 24)
   - The frequency of rainfall (page 25)
   - Ground elevation contour (page 26)

2) "Rainfall Depth Duration Frequency Data For California", Department Of Water Resources, July 1988

- Integral Rate of 3.11 inches (25 year, 24 hour worst rainstorm)

3) "Unit Operations", Published by Krieger 2nd edition, 1990, Written by Foust et. al.

   - Drag coefficient principles and correlations (chapter 22, correlations on page 612)

4) "Handbook of Chemistry and Physics", Published by CRC press 68th edition, 1988, Edited by Weast et. al.

   - Physical properties were obtained for air viscosity and density at 640 ft elevation, by interpolation (page F-144)
   - Air-Water surface tensions, estimate relative droplet diameter (F-34)

5) "Perry's Chemical Engineering Handbook", Published by McGraw Hill 50th edition, 1984, Edited by Don W. Green et. al.

   - Discussion of liquid drops in gases, maximum diameter of droplets along with their prospective velocity (page 5-66)

Prevailing Conditions at LLNL:

The winds are calm and the climate is mild. The most frequent winds occur in a range of 0.5 to 2.9 meters per second (over 30 % of the time). For these calculations the conservative value of 2.9 meters per second will be used. This value will produce the largest rain incidence angle off the vertical. Since the wind direction varies so much in the area, the worst case wind direction will always be assumed to be that which will capture the maximum amount of rain for the specific berm being analyzed. The direction is determined by examination of the surrounding structures in the area as well as the ancillary equipment associated with the unit(s).

Calculation of the Vertical Angle:

To determine the vertical angle we perform the following:

- Obtain the rain drop "effective" diameter from the typical water drop volume
- Obtain the drag coefficient from correlation
- Determine the Reynolds number from the related drag coefficient
- Calculate the terminal velocity based on the value of the Reynolds number and associated physical properties
- Obtain prevailing wind speeds
- Calculate the vertical angle based on the terminal velocity and the prevailing wind speeds

A typical water droplet "settles" to a volume of 20 to 50 μ-liters. The larger volume droplet is the most conservative with respect to this calculation because it results in the largest angle from vertical. Also, it is shown in Reference 3 that a spherical droplet has the lowest drag coefficient with respect to the effective diameter of the sphere. Therefore the effective diameter is calculated as:

$$D_p = \sqrt[3]{\frac{6}{\pi} \bullet V}$$

$D_p \equiv$ Rain drop effective diameter

$V \equiv$ Volume of the rain drop

$$D_p = \sqrt[3]{\frac{6}{\pi} \bullet 50 \bullet 10^{-6} \bullet .0353} = 15 \bullet 10^{-3}\ \text{ft}$$

From the plot shown in Reference 3 the minimum drag coefficient for a spherical droplet is 0.38 and that corresponds to a Reynold's Number of 3000. Using the Reynold's Number and the appropriate air properties the droplet terminal velocity can be calculated as follows:

$$[Re] \equiv \frac{D_p \bullet \rho_g \bullet u_t}{\mu} = \varnothing(C_d)$$

$C_d \equiv$ Drag Coefficient $= 0.38$

$[Re] \equiv$ Reynolds Number $= 3000$

$D_p \equiv$ Rain drop diameter $= .015$ ft

$\rho_g \equiv$ Air density $= .075\ \frac{lb_m}{ft^3}$

$u_t \equiv$ Terminal Velocity $(\frac{ft}{s})$

$\mu \equiv$ Air viscosity $= 1.2 \bullet 10^{-5}\ \frac{lb_m}{fts}$

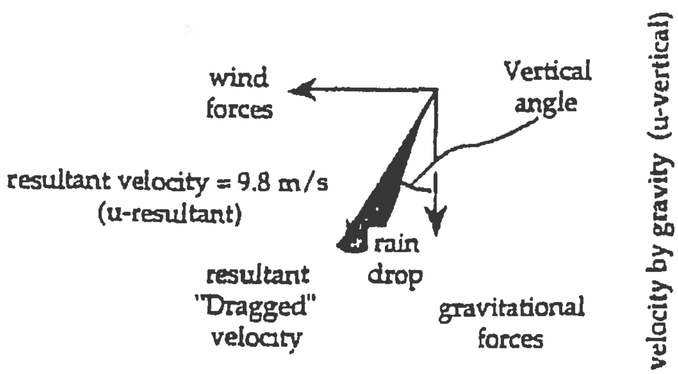
$$u_t = \frac{3000 \bullet 1.2 \bullet 10^{-5}}{15 \bullet 10^{-3} \bullet .075} = 32\frac{ft}{sec}$$

$$u_t = 9.8\ \frac{m}{s}$$

The resultant velocity is due to drag forces of air resistance. This resistance is caused by wind and gravitational forces. From the resultant velocity and the horizontal velocity of the frequent wind, we can calculate the vertical angle by the arc-sine (or inverse sine) of the ratio of horizontal velocity to resultant velocity.

The schematic below along with the associated equation show the relationships:

Wind velocity = 2.9 m/s (u-horizontal)



$$\theta = \sin^{-1}\left(\frac{u_h}{u_r}\right)$$

$$\theta = \sin^{-1}\left(\frac{2.9}{9.8}\right) = 17.2^\circ$$

Vertical angle = 17.2°

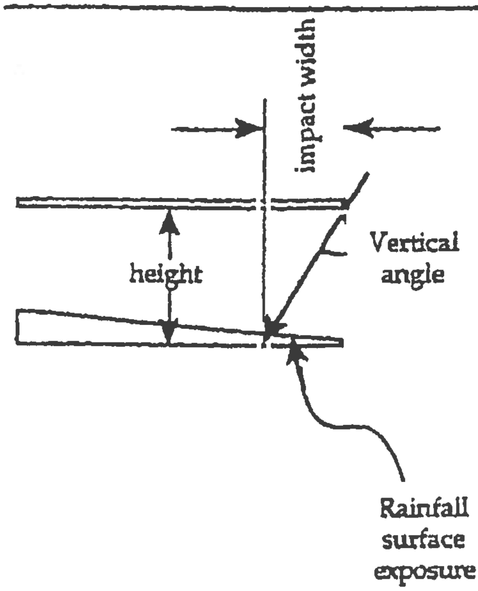
vertical angle = arsine (u-horizontal/u-resultant)

This angle was calculated using various approximations all with sound judgment and engineering validity. But, since the methods used are approximations, we will use a more conservative angle of 30° which is almost double our approximation. This will provide sound estimates of rainwater catchment without the use of an unrealistic vertical angle such as 45°.

Why is the vertical angle needed? As mentioned above many of our containment areas have only limited protection from the rain. This protection is afforded by roofs, slatted fences, adjacent buildings and structures, and other ancillary equipment (Beams, Berms, and Working platforms).

The direction of rainfall will be chosen at the worst direction. The choice is done on the basis of the configurations of the limited protection mentioned above. The direction is chosen such that the protection from rainfall will be at a minimum. This is done since the prevailing wind patterns do not have a unidirectional dominance.

The Rainfall catchment can now be calculated using the height of the major protecting structure such as a roof or working platform, and the tangent of the vertical angle (30°). See the figure and associated equation below:

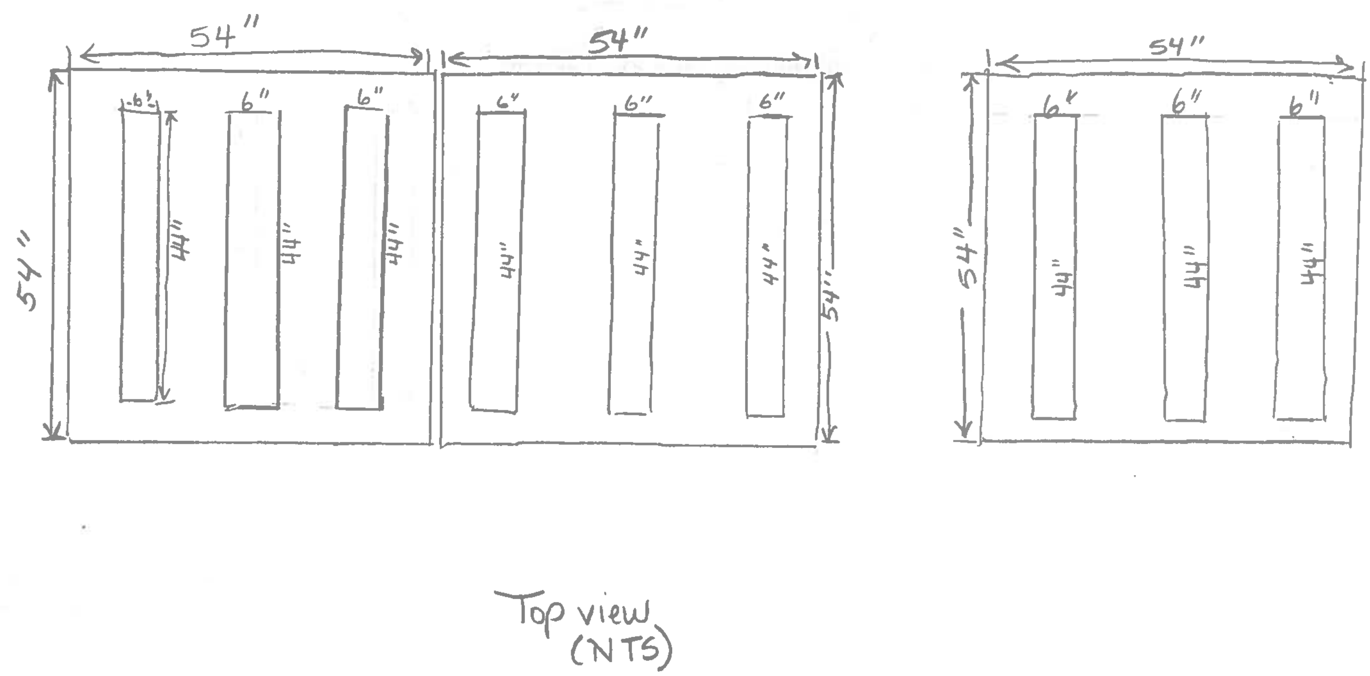


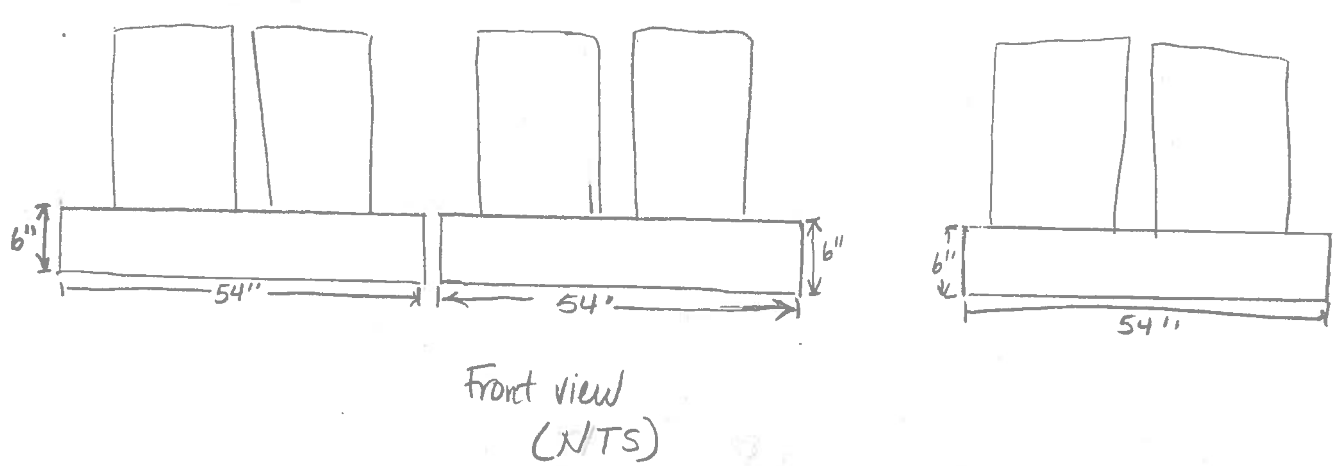
$$\text{tangent}(\theta) = \frac{\text{impact width}}{\text{height}}$$

$$\text{height} \bullet \text{tangent}(\theta) = \text{impact width}$$

<u>B194 Drum Storage Secondary Containment Calculations</u>

The drum storage at this location consists of three separate containment units, all equally sized and capable of holding up to 4- 55 gallon drums.





B194 Drum Storage Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

Three separate containment units all capable of storing 4-55 gallon drums. The calculations below are for one secondary containment unit, but are applicable to each containment unit.

Total volume of secondary containment (V_T = LxWxH):
V_T = 54 in x 54 in x 6 in = 17,496 in^3 x 0.004329 gal/in^3 = 75.7 gallons

B. Calculation of Displacement from three pedestals (V_{DT})

V_{DT} = 3*(6 in x 44 in x 6 in) = 4752 in^3 x 0.004329 gal/in^3 = 20.6 gallons

C. Precipitation Volume (V_P)

No freeboard because drum storage area is under cover.

V_P = 0 ft^3

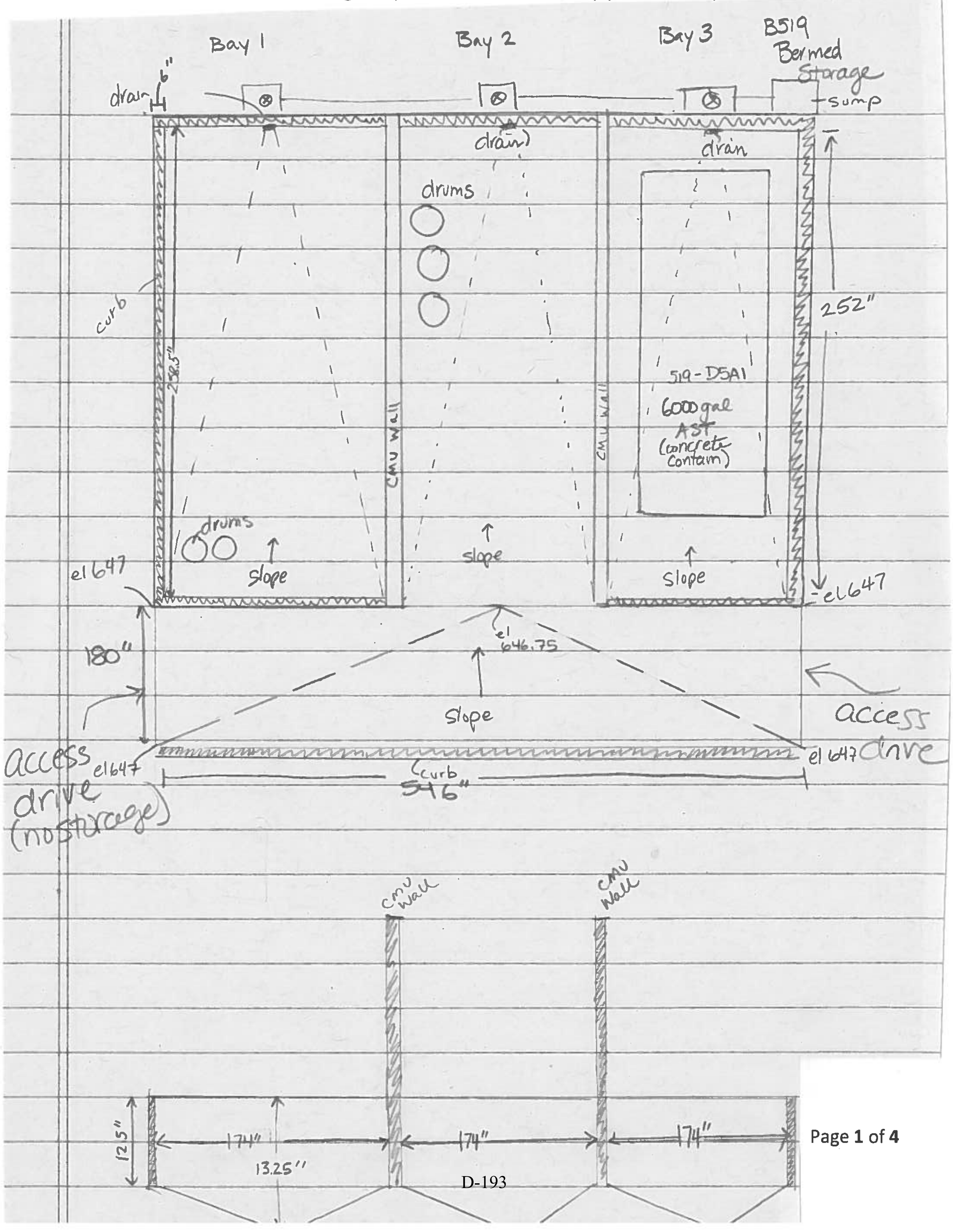
D. Net Total Secondary Spill Containment Capacity (V_N)

$V_N = V_T - V_{DT} - V_{PT}$ = 75.7 gallons -20.6 gallons – 0 gallons = 55.1 gallons

The largest volume of oil contained in each containment unit is 55 gallons. Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container.

Avenue H Drum Storage Secondary Containment Calculations

Consists of three bays. Two are completely bermed enclosures (one houses the double-walled, 6,000 gallon diesel tank) suitable for storage. Bays are valved at end and piped to a sump.



Avenue H Drum Storage Secondary Containment Calculations

BAY 1 and BAY 3

A. Calculation of Total Containment (V_T)

The total secondary containment volume for the two completely enclosed berm areas is calculated by adding the volume of a rectangle (V_A) and a triangular pyramid (V_B).

BAY 1

V_A = 174 in * 252 in * 12.5 in = 548100 in^3 *0.004329 gallons/in^3= 2372.7 gallons

V_B = 1/3*(A*H) = 1/3*[(1/2*174in*252in)*0.75in] = 5481 in^3 *0.004329 gallons/in^3= 23.7 gallons

$V_{TBAY1} = V_A + V_B$ = 2372.7 gallons + 23.7 gallons = 2396.4 gallons

BAY 3

Bay 3 is of similar construction to Bay 1. Therefore,

V_{TBAY3} = 2396.4 gallons

B. Calculation of Displacement from Drums or Tank inside containment (V_D)

BAY 1

Assume 35 drums stored in area (diameter of one drum = 23-inches):
V_{DBAY1} = 35*[π*r^2*H] = 35*[π*$(23\ in/2)^2$*12.5in] = 181770.6 in^3*0.004329 gallons/in^3= 786.9 gallons

BAY 3

Diesel tank dimensions are: 212.5 in long by 102 in wide by 100 in high

Portion of tank in containment is 12.5 in.
V_{DBAY3} = 212.5 in * 102 in * 12.5 in = 270937.5 in^3*0.004329 gallons/in^3= 1172.9 gallons

C. Precipitation Volume (V_P)
D = 25-year, 24-hour storm event = 3.7-inches

Total surface area of secondary containment for one bay (both bays will have same rainfall volume):

$A = 174$ in * 252 in = 43848 in^2

V_P = A*D = 43848 in^2 *3.7 in = 162237.6 in^3*0.004329 gal/in^3 = 702.3 gallons

D. Net Total Secondary Spill Containment Capacity (V_N)

BAY 1

$V_{NBAY1} = V_{TBAY1} - V_{DBAY1} - V_P$ =2396.4 gallons - 786.9 gallons – 702.3 gallons = 907.2 gallons

The largest volume oil container in BAY 1 is 55 gallons. Therefore, the net containment capacity of the secondary containment system at BAY 1 is sufficiently sized to contain the contents of the largest container plus freeboard for precipitation from the 25-year, 24-hour storm event.

BAY 3

$V_{NBAY3} = V_{TBAY3} - V_{DBAY3} - V_P$ =2396.4 gallons - 1172.9 gallons – 702.3 gallons = 521.2 gallons

The largest volume oil container in BAY 3 is a 6,000 gallon diesel tank. However, the tank is a double-walled tank and is secondarily contained.

BAY 2

A. Calculation of Total Containment (V_T)

Bay 2 is contained only on 3 sides. The total secondary containment volume is calculated by adding the volume of a rectangular prism (V_A) and a triangular pyramid (V_B).

V_A = 0.5 * 252 in * 12.5 in *174 in = 274050 in^3 *0.004329 gallons/in^3= 1186.4 gallons

V_B = 1/3*(A*H) = 1/3*[(1/2*174in*252in)*0.75in] = 5481 in^3 *0.004329 gallons/in^3= 23.7 gallons

$V_{TBAY2} = V_A + V_B$ = 1186.4 gallons + 23.7 gallons = 1210.1 gallons

B. Calculation of Displacement from Drums or Tank inside containment (V_D)

Assume 35 drums stored in area (diameter of one drum = 23-inches) with 5 drums across and 7 drums deep (unlikely, but conservative):

V_D = 5*[π*(23 in/2)^2*12.5 in] + 5*[π*(23 in/2)^2*11 in] + 5*[π*(23 in/2)^2*9.3 in] +5*[π*(23 in/2)^2*7.6 in] + 5*[π*(23 in/2)^2*5.9 in] = 96182.6 in^3*0.004329 gallons/in^3= 416.4 gallons

C. Precipitation Volume (V_P)

Because of design of storage area, the rainfall from the adjacent driveway is directed towards the drum storage bay. Therefore, the precipitation volume is the rainfall in the storage bay (V_{PStor}) plus the rainfall from the adjacent driveway (V_{PDrive}).

D = 25-year, 24-hour storm event = 3.7-inches

Total surface area of secondary containment:

A_{Stor} = 174 in * 252 in = 43848 in^2

V_{PStor} = A*D = 43848 in^2 *3.7 in = 162237.6 in^3*0.004329 gal/in^3 = 702.3 gallons

A_{Drive} = 180 in * 546 in = 98280 in^2

V_{PDrive} = A*D = 98280 in^2 *3.7 in = 363636 in^3*0.004329 gal/in^3 = 1574 gallons

V_P = V_{PStor} + V_{PDrive} = 702.3 gallons + 1574 gallons = 2276.3 gallons

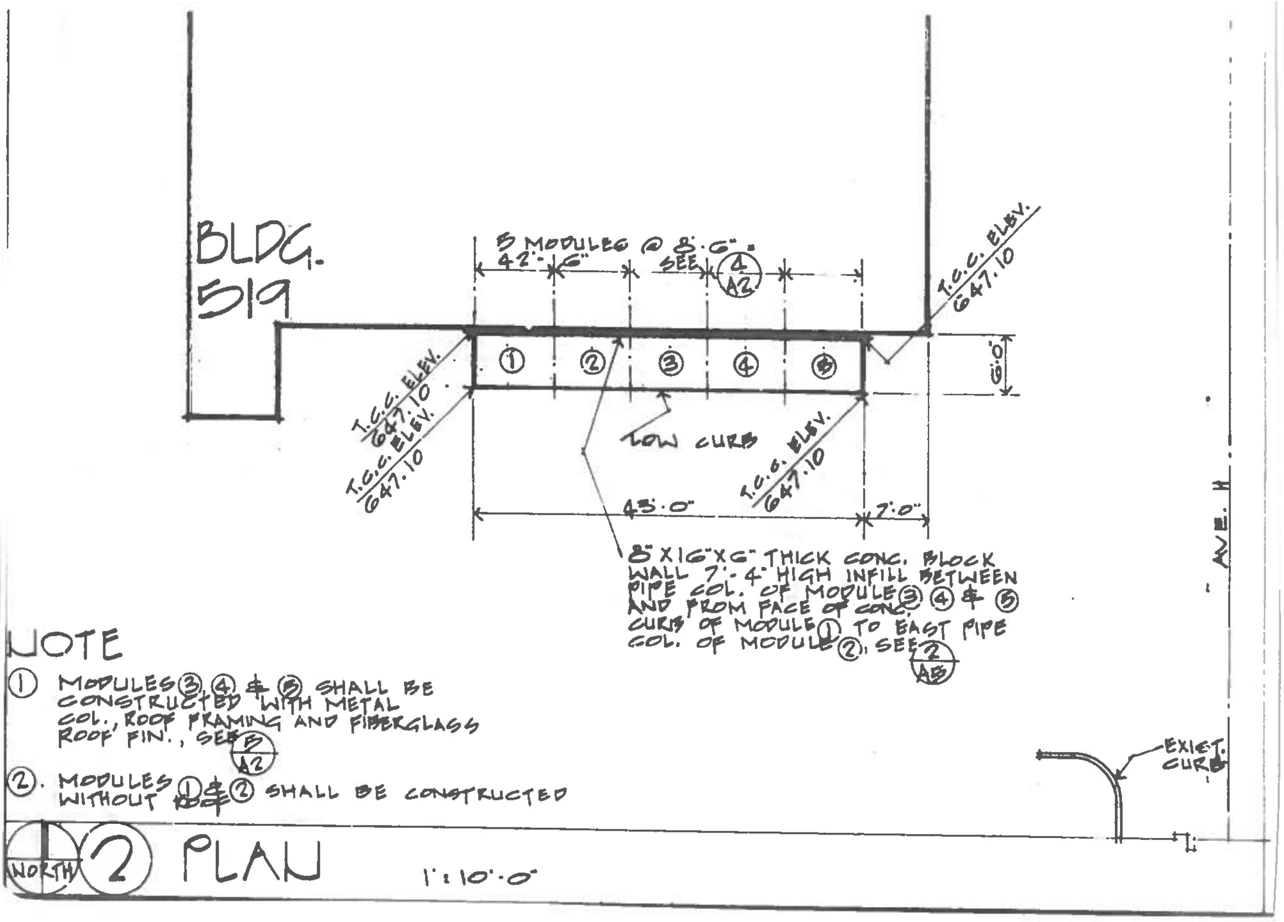
D. Net Total Secondary Spill Containment Capacity (V_N)

V_{NBAY2} = V_{TBAY2} – V_{DBAY2} - V_P =1210.1 gallons – 416.4 gallons – 2276.3 gallons = -1482.6 gallons

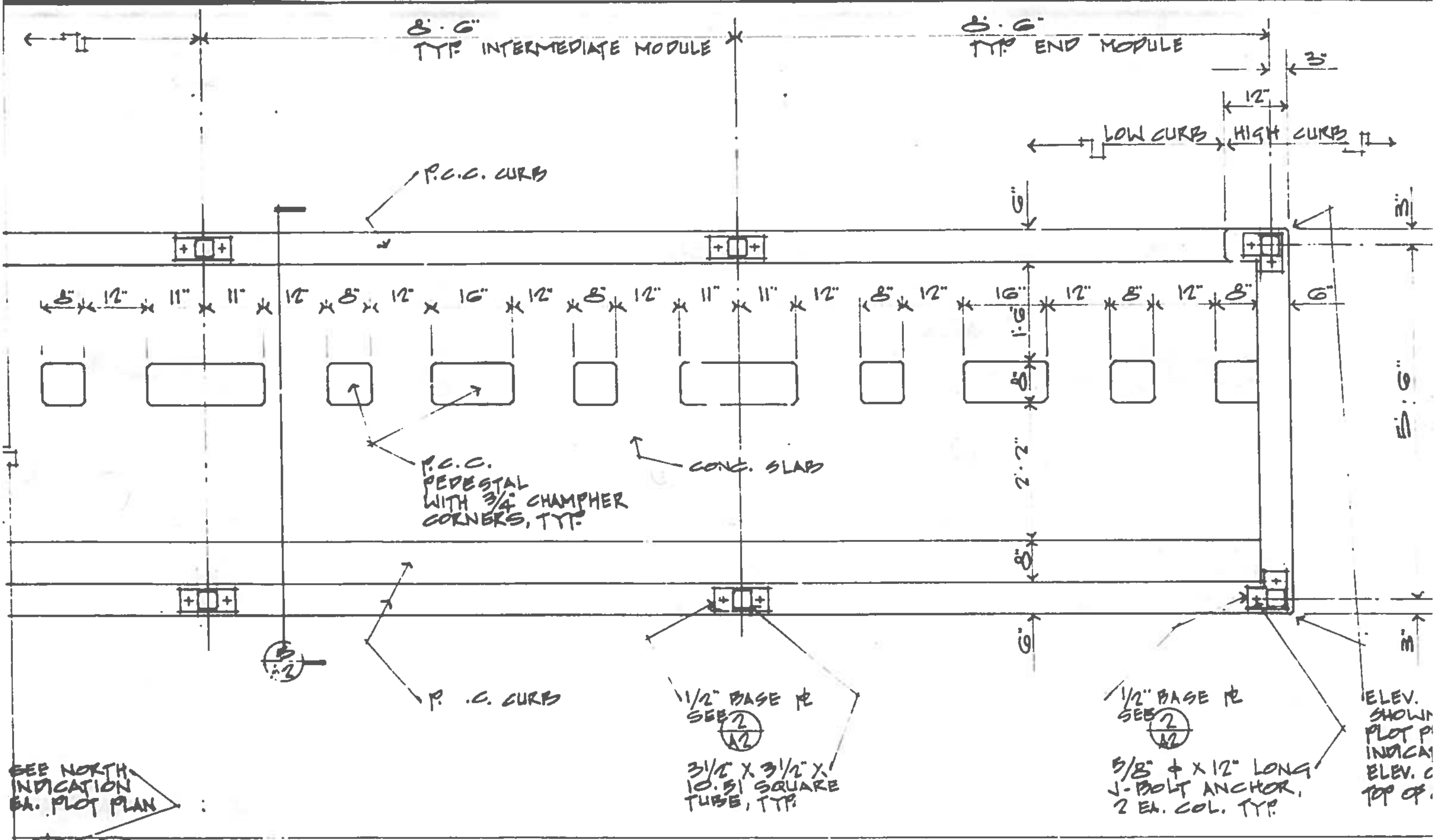
The largest volume oil container in BAY 2 is 55 gallons. Therefore, the net containment capacity of the secondary containment system at BAY 2 is NOT sufficiently sized to contain the contents of the largest container plus freeboard for precipitation from the 25-year, 24-hour storm event, but is sized to contain 110% of the largest container. Drum storage is allowed in this bay area, but recommend modification to the storage area to prevent storm water run on from adjacent driveway area.

519 South Storage Area Secondary Containment Calculations (Former 519 WAA)

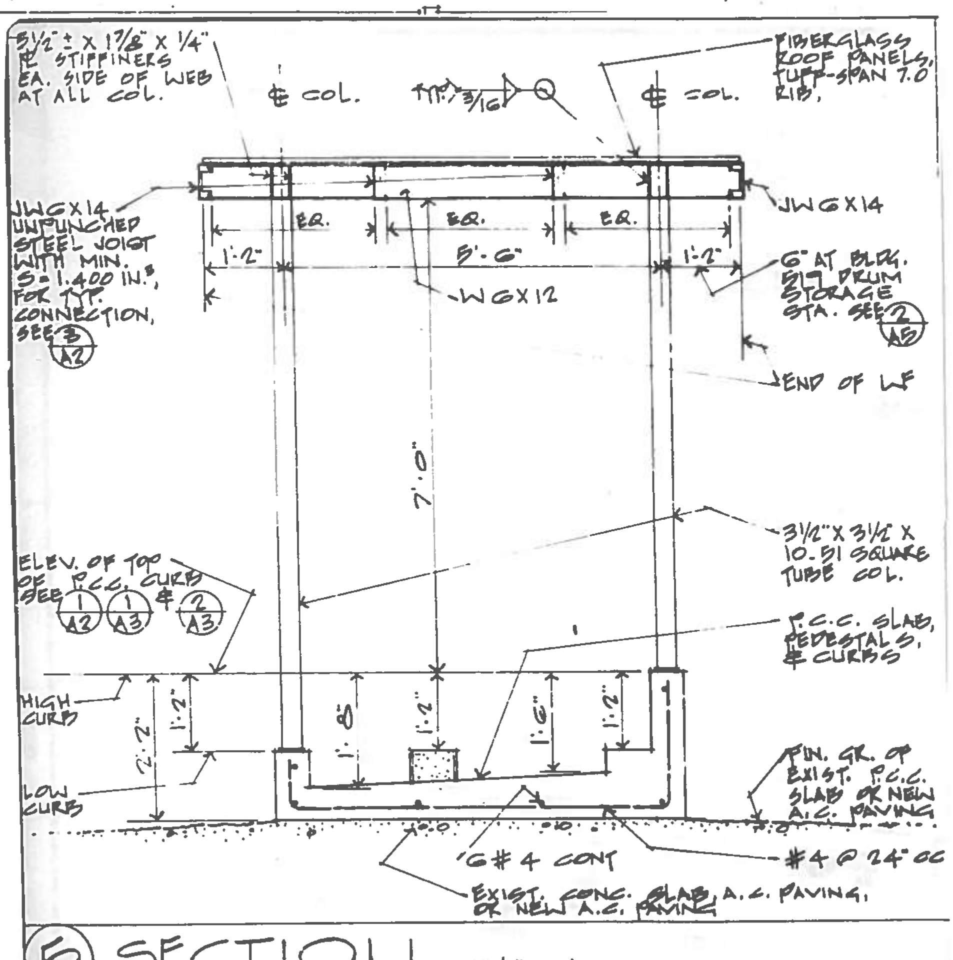
Storage area is one rectangular bermed area 43' long by 6' wide (curbs are 6" thick). The storage area is divided into 5 covered modules. The floor of the storage area is sloped to the south and is 4" at the shallowest point and 6" at the deepest point (average depth 5").



519 South Storage Area Secondary Containment Calculations (Former 519 WAA)



4 PARTIAL DETAIL PLAN 3/4" : 1'-0"



5 SECTION 3/4" : 1'-0"

519 South Storage Area Secondary Containment Calculations (Former 519 WAA)

A. Calculation of Total Containment (V_T)

The total secondary containment volume for the berm is the volume of the rectangular prism.

V_T = L*W*H = 504 in * 60 in * 5 in = 151200 in^3 * 0.004329 gal/in^3 = 654.5 gallons

B. Calculation of Displacement from Pedestals Inside Secondary Containment (V_D)

There are four 22" L by 8" W by 6" H pedestals, twelve 8"L by 8"W by 6"H pedestals, and five 16"L by 8"W by 6"H pedestals.

V_{D1} = 4*(22 in * 8 in * 6 in) = 4224 in^3 * 0.004329 gal/in^3 = 18.3 gallons
V_{D2} = 12*(8 in * 8 in * 6 in) = 4608 in^3 * 0.004329 gal/in^3 = 19.9 gallons

V_{D3} = 5*(16 in *8 in *6 in) = 3840 in^3 x 0.004329 gal/in^3 = 16.6 gallons

$V_D = V_{D1} + V_{D2} + V_{D3}$ = 18.3 gallons + 19.9 gallons + 16.6 gallons = 54.8 gallons

C. Precipitation Volume (V_P)
No freeboard because storage areas are under cover.
V_P = 0 gallons

D. Net Total Secondary Spill Containment Capacity (V_N)

$V_N = V_T – V_D - V_P$ = 654.5 gallons – 54.8 gallons – 0 gallons = 599.7 gallons

The largest volume of oil contained in equipment at this location is 55 gallons. Therefore, the net containment capacity of the secondary containment system at this location is sufficiently sized to contain the contents of the largest container.

B-133 / T1652 & 1653 Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

Vt= L × W × D : 482 in (204 in) (6.75 in) = 663,714 in / 231 = **2,873 gallons**

Trench Volume 36 in (200 in) (27½) = 198,000 / 231 = **857.1 gallons**

B. Calculations of Displacements

Displacement (1) = (126+125.25) / 2 = 126.625 (433+434.25) / 2 = 433.625

126.625 × 433.625 × 6.75 = **1591.8 gallons**

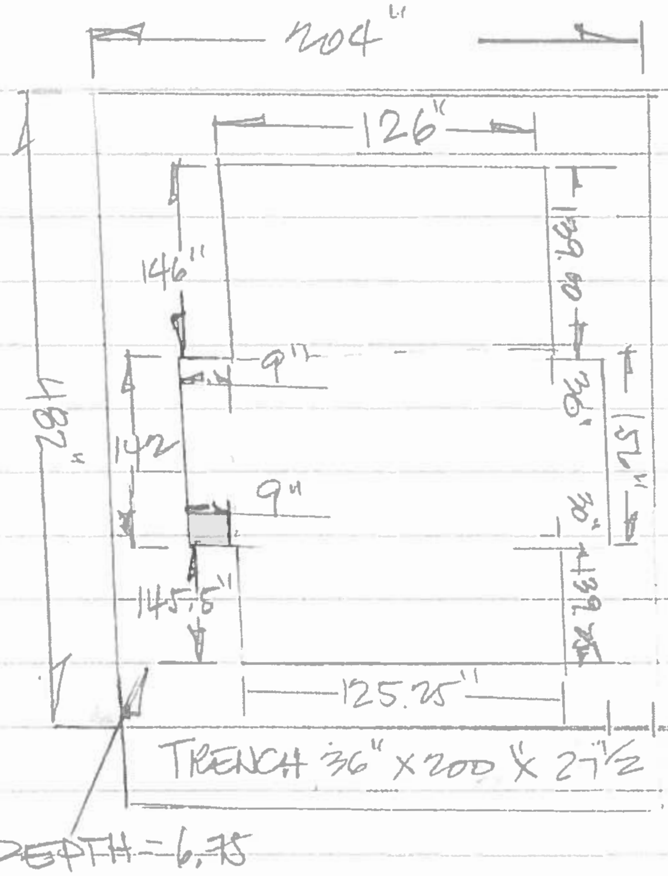
Displacement (2) = (9) (142) (6.75) = 8,626.5 / 231 = **37.3 gallons**

Displacement (3) = (30) (156) (6.75) = 31,590 / 231 = **136.8 gallons**

Total Displacement = 1591.8 + 37.3 + 136.8 = 1765.9

C. Total Containment (Available) = 857.1 + 2873 – 1765.9 = **1964 gallons**

B-133 T1652 + T1653



TRENCH VOL = $\frac{36(200)(27\frac{1}{2})}{231}$ = 857.1 gals *

CONTAINMENT VOL = $\frac{482(204)(6.75'')}{231}$ = 2873. gals

(125.625) (433.625)(6.75)

DISPLACEMENT (1) = $\frac{\left(\frac{126+125.25}{2}\right)\left(\frac{433+434.25}{2}\right)(6.75)}{231}$ = 1591. gals

DISPLACEMENT (2) = $\frac{(9)(142)(6.75)}{231}$ = 37.3 gals

DISPLACEMENT (3) = $\frac{(36)(156)(6.75)}{231}$ = 136.8 gals

TOTAL DISPLACEMENT = (D1) + (D2) + (D3)
= 1591.8 + 37.3 + 136.8 = 1765.9

Total Containment (AVAILABLE) = 857.1 + 2873 − 1765.9) = 1964 g

B-165 / T1763 Secondary Containment Calculations

A. Calculation of Total Containment (V_T)

Vt= L × W × D: Vol = 240 in (150.5 in) (5.5 in) / 231 - 9 (22) (5.5) / 231

860 - 4.7 = **855.3**

B. Calculations of Displacement

(123.5) (78) (3.625) + (91) (118.5) (3.625) / 231 = 34,920 + 38,925.25 / 231 = 73845.3 / 231 = **319.7 gallons**

C. Transformer Footing

(20.375) (32) (5.5 – 3.625) / 231 = **5.3 gallons**

D. Total Volume Containment

855.3 gals – 319.7 gals – 5.3 gals = **530.3 gallons**

B-175 / T1217 Secondary Containment Calculations

A. Calculation of Total Containment

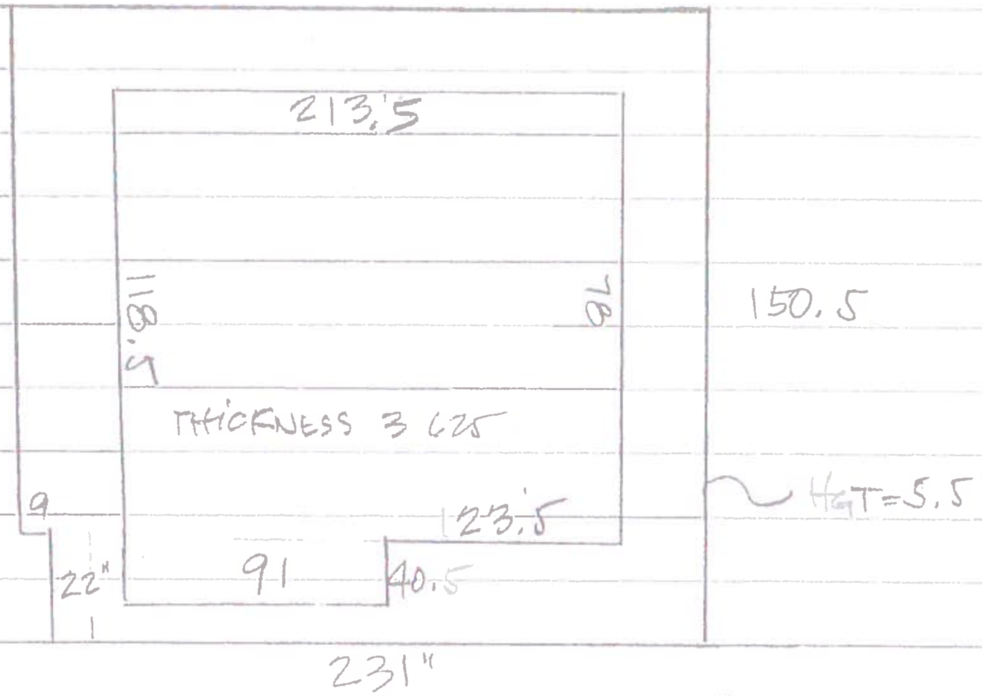
Vt= L × W × D : (156 in) (104.75 in) (14.5 in) / 231 = **1025.7 gallons**

B. Calculations of Displacement

(105 in) (66 in) (14 in) / 231 = **420 gallons**

Total Volume – Total Displacement = 1025.7 gal – 420 gal = **605.7 gallons** available

B-165 **T1763**



VOL = 240"(150.5")(5.5") / 231 − 9(22)(5.5) / 231
= 860 − 4.7
= 855.3

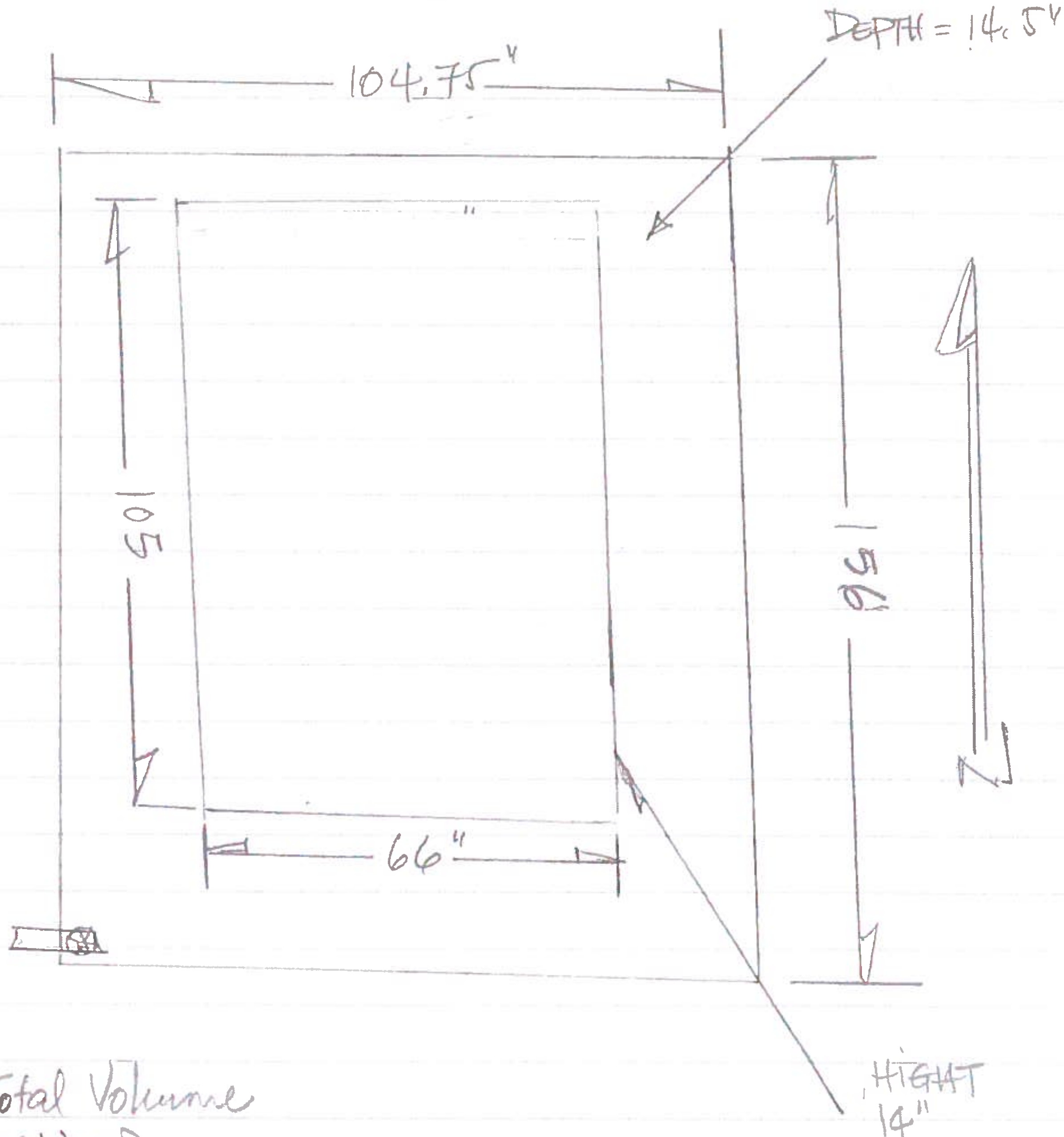
DISPLACEMENT = [(123.5)(78)(3.625) + (91)(118.5)(3.625)] / 231

= (34,920 + 38,925.25) / 231 = 73845.3 / 231 = 319.7 gals

Transformer Footing = (20.375")(32")(5.5" − 3.625") / 231 = 5.3 gals

VOL CAPACITY (Displaced Vol) = 855.3 gals − 319.7 gals − 5.3 gals = 530.3 gals

B-175 T1217



Total Volume

V = L × W × D

V = 156" × 104.75" × 14.5

231 cu in = 1 gal

$V = \frac{156(104.75)(14.5)}{231}$

V = 1025.7 gals

DISPLACEMENT

V = 105" × 66" × 14"

V = 105(66)(14)

$V = \frac{105(66)(14)}{231}$

V = 420 gals

VOL Avail = Displaced Volume − Total Cap.

VOL AVAIL. = 1025.7 gal − 420 gal

VOL A = 605.7 gals *

T650 Secondary Containment Calculations

A. Calculation of Total Containment

Vt= L × W × D: (90.5) (8.5) (8 1/8) = 6250 in

(154 ¾) (8) (8 ¼) = 10213 in

(83 ½) (7) (8 1/3) = 4749 in

6250 + 10213 + 4749 = 21212 in / 231 = **91 gallons**

T975 Secondary Containment Calculations

A. Calculation of Total Containment

Vt= L × W × D: (192) (4.5) (12) = 10,368 in
(36) (10) (12) = 4,320 in
(123) (20.5) (12) = 30,258 in
(36) (15) (12) = 6,480 in
(349) (36) (12) = 150,768 in

= 202,194 in / 231 = **875 gallons**

T1830 & T1831 Secondary Containment Calculations

A. Calculation of total Containment

Vt= L × W × D: (84.5) (8 ¾) (6) = 4,436 in

(94 ¼) (6 ¼) (9) = 5,301 in

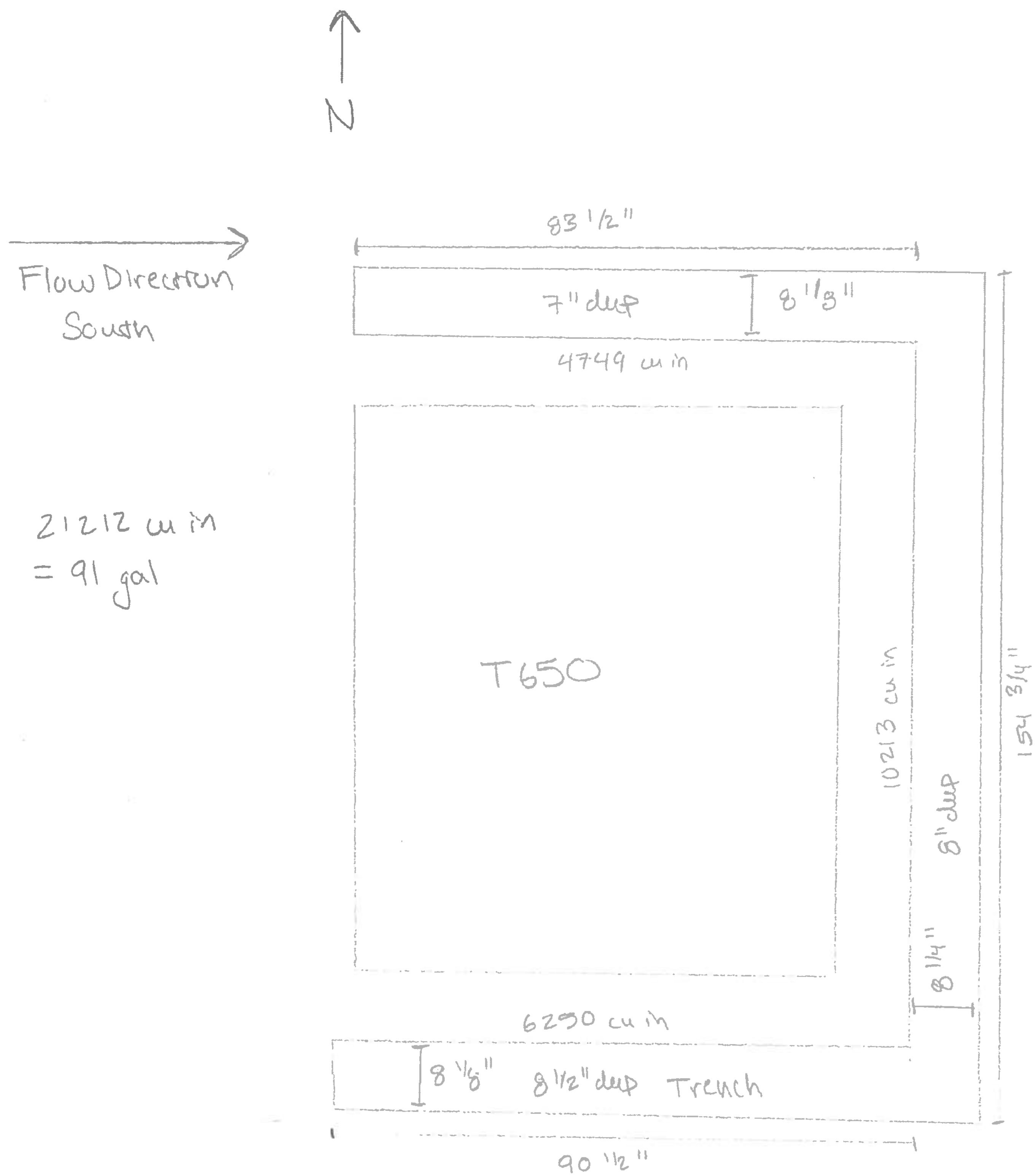
(84 ¼) (6 ¼) (5 ¾) = 3,027 in

= 12,765 in * 2 (identical units) = **25,530 in**

Vault calculations = (33 ½) (72) (72) = **173,664 in**

173,664 + 25,530 = 199,194 in / 231 = **862 gallons**

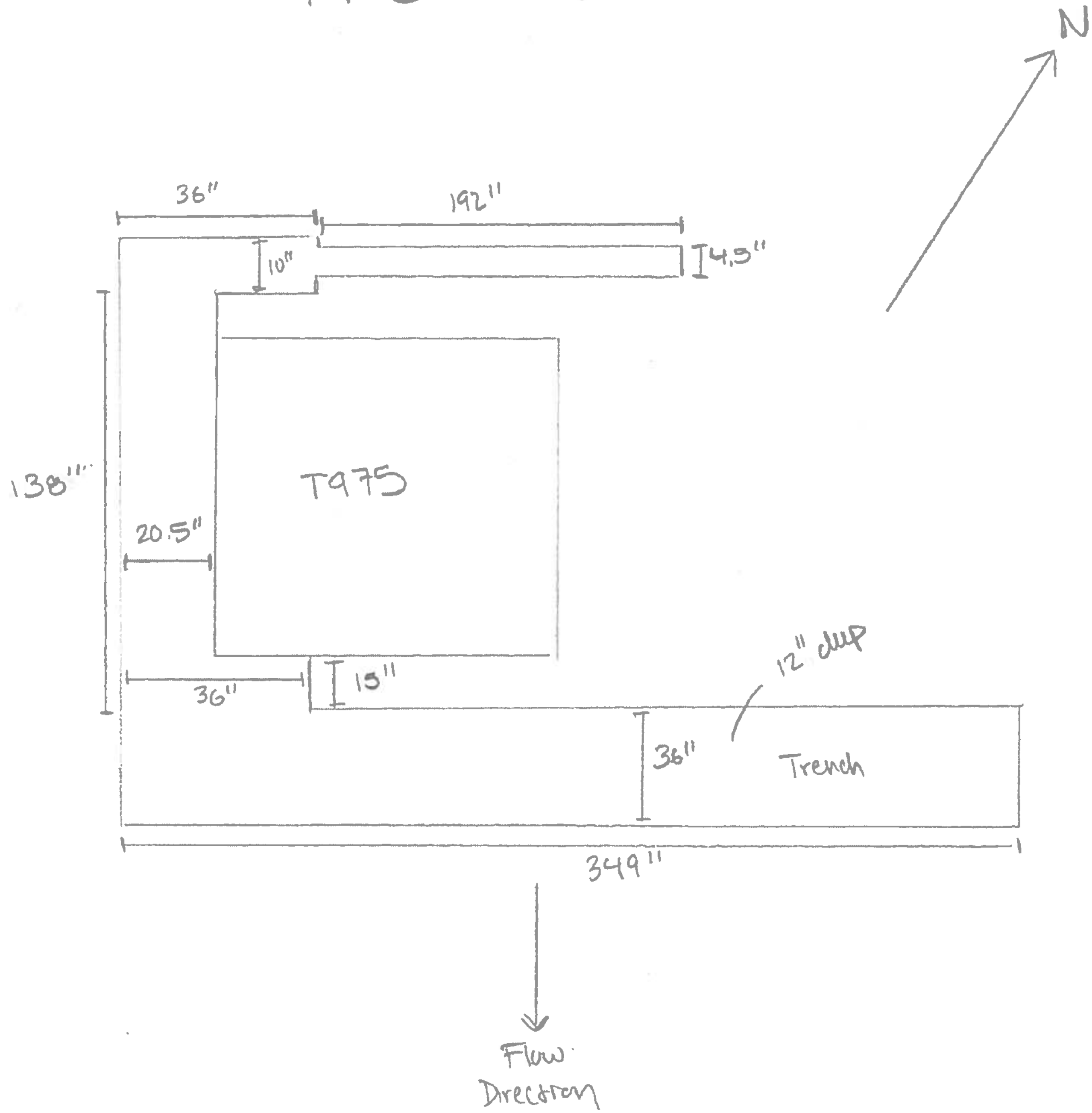
T650


N
Flow Direction South
83 1/2"
7" deep
8 1/8"
4749 cu in
21212 cu in = 91 gal
T650
10213 cu in
154 3/4"
8" deep
8 1/4"
6290 cu in
8 1/8"
8 1/2" deep Trench
90 1/2"

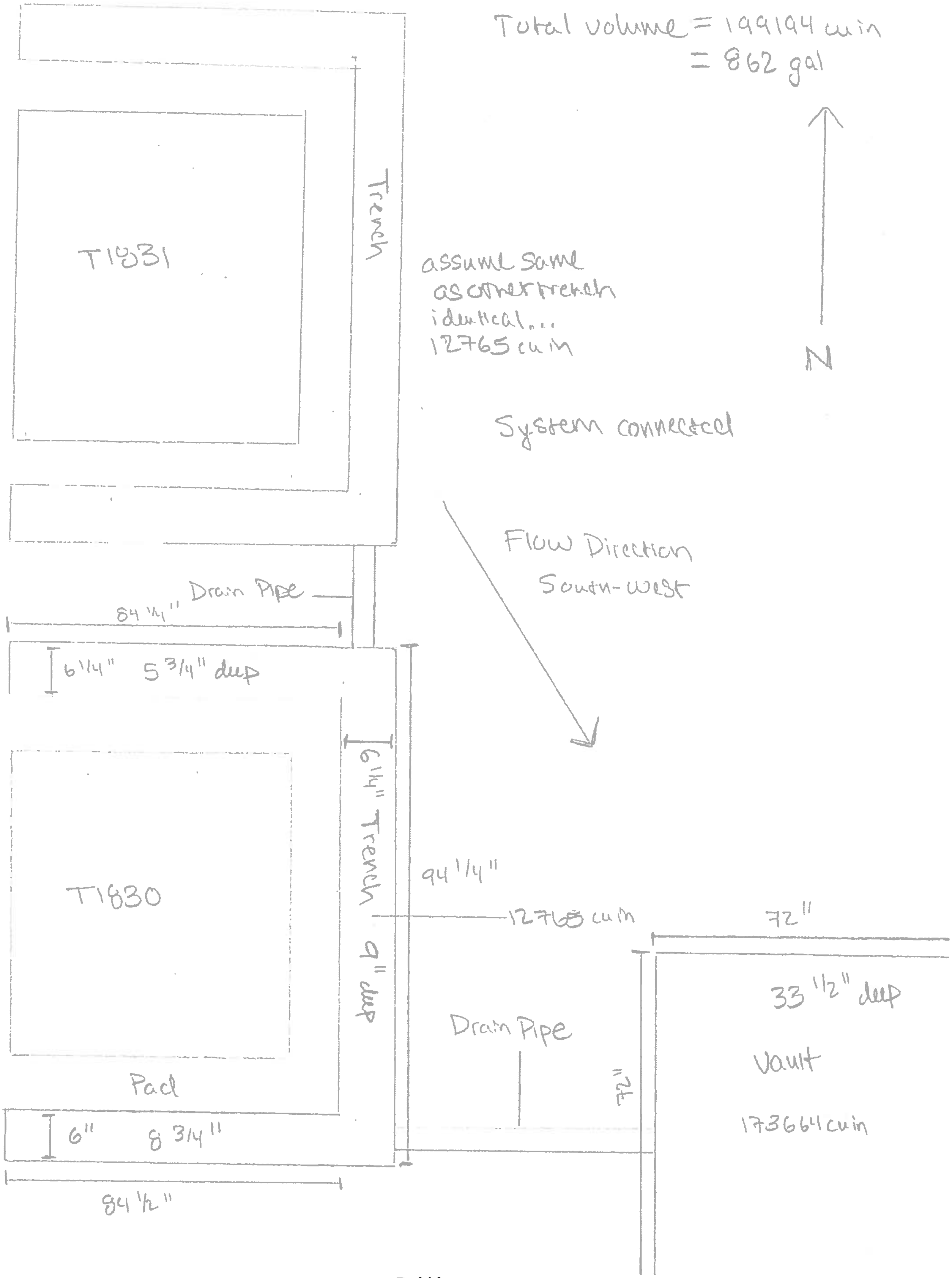
T975

Volume = (192" · 4.5" · 12")
+ (36" · 10" · 12")
+ (123" · 20.5" · 12")
+ (36" · 15" · 12")
+ (349" · 36" · 12")

202194 cu in
= 875 gal



T1830 and T1831



Building 231, Room 1000, 1750 ton press Secondary Containment Calculations

The press is located over a vault that serves as secondary containment. It was not possible to enter the vault, a confined space, at the time of the inspection to obtain exact measurements of the vault depth. Length and width were measured, and depth estimate was provided by the operator. The vault depth was checked by visual inspection and by estimating based on a ladder that was in the vault.

Since the vault appeared to be larger than the container holding oil, a conservative estimate of the depth will be used to calculate secondary containment capacity.

Calculation of total containment:

V= L*W*D= 16.75' * 5.7' * 10'= 954.75

954 CF * 7.48 = 7,136.42 Gallons

Considering the press is inside a room and the oil container holds 1200 gallons of oil, the secondary containment capacity is more than enough.

Appendix E

Procedure for Handling Rainwater in Secondary Containment and Rainwater Release Form

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Appendix E. Procedure for Handling Rainwater in Secondary Containment and Rainwater Release Form

During periods of rainfall, LLNL Programs shall monitor their secondary containments to ensure that they have enough capacity to contain a maximum spill from the primary container. If necessary to release rainwater, this procedure must be implemented. WAAs have a separate procedure for disposing of rainwater collected in secondary containment as outlined in the *Contingency Plan for Waste Accumulation Areas at Site 200* (latest edition).

E.1 Method of Release

During periods of rainfall, the Programs shall monitor the secondary containment of tanks or oil-containing equipment to prevent accidental discharges. This monitoring must include the following:

- Ensure that secondary containment has enough capacity to contain a maximum spill of the largest container. If there is not enough capacity, the Program shall arrange for appropriate disposition of the accumulated rainwater.
- The secondary containment release valve(s) shall normally be sealed closed. The valve(s) shall be resealed following planned drainage of the secondary containment.
- The sample "Aboveground Oil Storage Secondary Containment Rainwater Release Form" found at the end of this appendix is used to document releases of rainwater. Alternatively, the release may be documented on a customized form as long as it contains the same information as that provided on the sample form. Fill out the form completely. If certain items do not apply, mark N/A on the appropriate line under "Comments."
- In some cases, the volume of rainwater in an electrical utility vault system exceeds the storage capacity of the available container. The Radioactive and Hazardous Waste Management (RHWM) Division should be contacted to see if it can provide the support required to safely pump and contain rainwater from the utility vaults. The ES&H field EA is also available to assist in these cases.

  If there is an imminent risk to health and safety or of severe damage to facilities requiring immediate access to the utility vault, there may be no time to pump or arrange for pumping of the rainwater to a container. Though a discharge of contaminated rainwater from an electrical utility vault does not comply with storm water BMPs, health and safety are the highest priority. In this case, when no other option is available, the rainwater should be pumped out to the extent possible to the available containment. The remaining rainwater should be pumped to the nearest landscaped area to prevent direct discharge to the storm drainage system.

  A sample of the discharged rainwater shall be collected and submitted for analysis, and have a Wastewater Discharge Authorization Record completed as a follow-up to the discharge. The EDO should be immediately notified of the discharge.

  The time, date, and reason(s) for the discharge shall be recorded, along with identifying changes in procedure, to prevent further occurrences. If the rainwater is contaminated, this information will be included in a report to the San Francisco Bay Regional Water Quality Control Board.

E.2 Form Retention and Distribution

The form generated must be maintained by the Program for a minimum of 3 years and shall be available for review whenever EFA or regulatory personnel request them. In the event that a spill is observed, the form must be sent to EFA upon completion.

Aboveground Oil Storage Secondary Containment Rainwater Release Form

Instructions: Complete Part A for all rain-water releases. Complete Part B if a spill is not visible in the secondary containment structure. Complete Part C if a spill is visible within the secondary containment structure. Provide descriptions and comments if necessary. Verify that each checklist item is completed and then initial the item. This record is to be maintained by the program for a minimum of 3 years and made available by request of EFA or regulatory personnel.

Note: A spill is defined as a film or sheen upon or discoloration of the surface of the water, or sludge or emulsion deposited beneath the surface of the water.

Part A - To be completed for all releases of storm water.

Date________________________ Operator's Name_________________________________

Tank number__________________________
Tank contents_________________________
Location______________________________

Part B - To be completed if a spill <u>is not visible</u> in the secondary containment structure.

Initial:	Action:	Comments:
________	1. Inform equipment custodian.	_____________________________
________	2. Release rainwater from the secondary containment.	_____________________________
________	3. Close valve.	_____________________________

Operator signature_______________________________________
Date_________________________________

Part C - To be completed if a spill <u>is visible</u> in the secondary containment structure.

Initial:	Action:	Comments:
________	1. Do not release rainwater. Contact the ES&H Field EA assigned to the program for guidance on proper disposition of water.	_____________________________
________	2. Check leak-monitoring equipment, overfill-protection devices, and spill-prevention devices for signs of system malfunctions.	_____________________________
________	3. Check level of tank(s) for unexplained level changes or exceptionally high levels.	_____________________________
________	4. Check tank(s), piping, pump(s), valve(s), and joints for signs of leakage (e.g., drips, stains, wet spots, cracks, or bulges).	_____________________________
________	5. Inform the equipment custodian of the contaminated rainwater in the secondary containment so that the cause can be verified and repairs can be made as necessary.	_____________________________
________	Send a completed copy of this form to EFA/SPCC, L-627	_____________________________

Wastewater Discharge Authorization Record (WDAR) Number: ______________________________

Supervisor's signature_______________________________________ Date______________________________

Environmental Analyst's signature______________________________ Date______________________________

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Appendix F

Oil Spill Contingency Plan

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LLNL Livermore Site Oil Spill Contingency Plan

April 2017

Lawrence Livermore National Laboratory

Livermore, California 94551

LLNL LIVERMORE SITE OIL SPILL CONTINGENCY PLAN

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1.0 INTRODUCTION

1.1 Purpose

This Oil Spill Contingency Plan was prepared as an appendix to the Livermore Site Spill Prevention, Control, and Countermeasure (SPCC) Plan to address areas of the facility where inadequate secondary containment has been identified or to provide additional resources for other conditions as specified in the SPCC regulations where a contingency plan is to be relied upon for supplemental response actions, or to comply with qualified equipment requirements, as documented in the Plan in accordance with 40 CFR 112.7(d). A signed written commitment of resources statement is provided in Attachment 1.

This Oil Spill Contingency Plan was prepared to minimize negative impacts to human health and the environment from spill events (defined in the Plan) from SPCC equipment that holds oil in capacity of 55-gallons or greater (also defined in the Plan). This Plan defines procedures and tactics for responding to discharges of oil into navigable waters and adjoining shorelines of the United States from releases that could potentially occur from the Livermore Site.

Hereafter, the LLNL employees who have functional responsibility for the operation of the Livermore Site Facility will hereafter be referred to as the “Facility Managers” or “Representatives.”

This Oil Spill Contingency Plan reflects LLNL’s ordered, consistent response to unplanned events so that the response actions required, the resources used, and the lists of contacts are much the same for all of the Livermore Site emergency plans.

In most cases, the Livermore Site emergency service elements are capable of managing operational emergencies at the Site. However, this plan may be used in conjunction with the *LLNL Livermore Site Contingency Plan* and the *LLNL Emergency Plan.* The *LLNL Livermore Site Contingency Plan* addresses emergencies such as fires, explosions, or releases of hazardous waste. The *LLNL Emergency Plan* is a Laboratory-wide Plan that provides procedures for response to major accidents and disasters, including fires, explosions, hazardous or toxic material and waste releases, and other emergencies that are mitigated by the LLNL Onsite Emergency Response Organization.

Guidance for emergency roles, responsibilities, and actions to be taken during a Facility incident are provided in other documents, including the current edition of the following documents:

- LLNL Emergency Plan (LLNL, latest revision, UCRL-AM-218588).
- *LLNL Livermore Site Contingency Plan* (LLNL, latest revision)
- Self-help Plan, Radioactive and Hazardous Waste Management (LLNL, latest revision).
- *LLNL Implementation Procedure for Reporting Occurrences to DOE* (LLNL, latest revision, UCRL-MA-133867).
- LLNL Emergency Management Division, Policies and Procedures Manual, *Procedure 1612 Hazardous Materials Response Plan.*

1.2 Scope of the Plan

This Contingency Plan identifies personnel responsibilities, emergency equipment, and required actions necessary to mitigate oil spills at the Livermore Site. It is intended to instruct and prepare the Livermore Site and

Facility personnel for potential emergencies. This plan should be updated in conjunction with other plans to ensure consistency.

This section defines the types of emergencies that must be responded to by the Alameda County Fire Department (hereafter referred to as the Fire Department) and those that may be remedied by Livermore Site Facility personnel per established protocol.

The Fire Department uses a classification system that designates incidents as Level 1, Level 2, or Level 3. The designations are as follows:

- Level 1: An incident that can be handled by the first alarm companies or can be contained within single jurisdiction without the need for mutual-aid assistance.
- Level 2: An incident that requires more resources than those which responded to the first alarm. These additional resources are readily available through the Twin Valley Mutual Aid and are expected to be adequate to handle the emergency.
- Level 3: An incident that requires more resources than those that can be readily obtained by local mutual aid.

1.3 Implementation of the Oil Spill Contingency Plan

This Contingency Plan is designed to minimize hazards to human health or the environment from any unplanned sudden or non-sudden release of oil to soil and/or surface water. These can occur from fires, explosions, or equipment failures as described in the SPCC Plan.

1.4 Maintenance of the Plan

This Contingency Plan will be amended, as necessary, to ensure that it is current and reflects actual Facility response practices. It is reviewed by Livermore Site management and appropriate program personnel on an annual basis in conjunction with the LLNL Livermore Site Contingency Plan. It is immediately amended whenever:

- The LLNL Resource Conservation and Recovery Act (RCRA) Part B Permit Application is revised or the issued permit is significantly modified and impacts this Contingency Plan.
- Applicable federal or state regulations are revised.
- The plan fails in an emergency.
- A Facility changes its design, construction, operation, maintenance, or other circumstances in such a way that the potential is increased for fires, explosions, or releases of hazardous or toxic waste, or in such a way that a change in the emergency response is necessary.
- The list of emergency coordinators changes.
- The list of emergency equipment changes.

2.0 FACILITY DESCRIPTIONS

2.1 General Information

Site Operators:	1. Lawrence Livermore National Security, LLC (LLNS) 2. U.S. Department of Energy (DOE) Mailing
Address:	Lawrence Livermore National Laboratory P.O. Box 808 Livermore, CA 94550
Location:	Lawrence Livermore National Laboratory 7000 East Avenue Livermore, CA 94550
Owner:	U.S. Department of Energy
Address:	National Nuclear Security Administration (NNSA) Livermore Field Office P.O. Box 808 (L-293) Livermore, CA 94551
NNSA/LFO Contact:	N. Nicole Nelson-Jean, Manager Livermore Field Office National Nuclear Security Administration (NNSA) P.O. Box 808 (L-293) Livermore, CA 94551 (925) 422-6265

2.2 Resources at Risk

The Livermore Site consists of 1.3 square miles (821 acres) of land area and is largely developed. A map showing the Site vicinity is provided as **Map F-1**. The Alameda Creek Watershed, within which the site lies, is the largest in the Bay area, and drains approximately 650 square miles (416,000 acres) of land area. The main site includes few major surface water features, including Arroyo Las Positas and Arroyo Seco, and more numerous internal, man-made surface water features (e.g., lined storm channels).

As described in the SPCC Plan, the topographic surface of the Livermore Site is characterized by having relatively flat low relief surfaces that slope gently to the northwest. The elevation of the Livermore Site ranges from 172 to 206 feet above mean sea level (msl).

A combination of storm drains, catch basins, lined and unlined storm channels, and other engineered features are used to manage stormwater from the facility. On-site drainage for the Livermore Site is segregated, as described below:

- The southeast portion flows through both underground conduits and unlined open channels into siltation traps and then into a lined drainage retention basin referred to as Lake Haussmann. The retention basin level is controlled by a weir that also acts as an overflow mechanism during moderate rainfall periods, releasing water to an underground conduit exiting at the Arroyo Las Positas.

- The westerly, central, and northerly portions flow through both underground conduits and unlined open channels into the Arroyo Las Positas. Arroyo Las Positas is an effluent-dominated stream modified into a storm water conveyance channel that traverses the northern portion of the Livermore Site and carries drainage from the northwest corner in a northerly direction offsite.

- Just east of Building 591, Arroyo Las Positas receives treated water from the Livermore Site Ground Water Project as part of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) activities, and water flows year-round in the lower two-thirds reach.

- A small southwest portion flows through both conduits and unlined open channels into the Arroyo Seco. Arroyo Seco is a redirected intermittent stream that traverses the southwest corner of the Livermore Site and carries drainage in a northwesterly direction offsite. The majority of the Arroyo Seco channel remains dry year-round except when rainfall creates drainage runoff. The last 20 feet of the channel onsite and at least a few hundred feet of the channel downstream of the Livermore Site flows year round due to treated groundwater discharge operated under CERCLA

The facility has numerous catch basins, drainage channels, subsurface storm drain lines and other features as shown on facility drainage map in Map F-2. The Site Maps show the area layout, including the storm drainage systems, drainage inlets, drainage areas, and discharge locations.

Storm water discharges from industrial areas on site are monitored in accordance with the National Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Industrial Activities (Order No. CAS000001).

The arroyos are considered waters of the US, and provide habitat for a number of aquatic species and mammals. Additional information about the sensitive receptors, including endangered and threatened species and potential cultural resources, is available from subject matter experts (SMEs) in the EFA.

Figure F-1 shows these surface water features at the main site and in the Livermore Valley.

2.2.1 Critical Waterways for Sensitive Habitat

Several drainage courses at the Livermore Site, as well as Arroyo Las Positas and Arroyo Seco, including downstream reaches of these waterways, are considered potential habitat for several special status species. A map of the sensitive areas that are located at the Livermore Site is included as Figure F-3.

2.2.2 Order of Priority of Protection of Water Uses

A spill scenario that involved protecting more than one water use is not likely. Every effort should be made to prevent oil from entering any of these water systems. In the unlikely event of a spill scenario that involved more than one critical water use, the order of protection should be protection of the discharges that contain critical waterways for sensitive species.

2.2.3 Risk Assessment

Bulk Storage Container Potential Releases
Bulk storage containers at the site include fuel tanks, emergency generator tank systems, as well as portable containers such as drums. In most cases, sized secondary containment, often consisting of double walled tanks, containment berms, and containment pallets provide sufficient containment capacity to meet SPCC requirements. However, in a few instances, the existing design of some double walled tanks with fittings or openings such as drain lines that penetrate below the top of the tanks. This design reduces the technical containment capacity of the secondary shell. In these instances, the measures described in this Contingency Plan are designed to address these deficiencies. Further information about bulk storage containers is presented in the SPCC Plan.

Releases from bulk storage containers of this design would likely migrate to the closest catch basin, storm drain inlet, or surface feature such as a drainage channel or ditch. Depending upon the location of the equipment, discharges in a catastrophic release would eventually be directed to either the Las Positas, Arroyo Seco, or Lake Hausmann.

The largest bulk storage container with insufficient containment due to drain lines penetrating below the liquid level of the tank would be 1000 gallons. For planning purposes, this is considered the worst case discharge.

Qualified Oil filled Operating Equipment Potential Releases
As identified in the SPCC Plan, certain oil filled operating equipment at the site is considered “qualified’ as an alternative to providing secondary containment structures. The Facility meets these requirements through implementing an inspection and monitoring program, preparing this oil spill contingency plan, and providing a written commitment of resources to control and remove discharged oil. Table C-2 in the SPCC Plan presents this information, and Section 3.6 of the plan describes the inspection procedures.

For planning purposes, the largest estimated most probable release for oil filled equipment where insufficient containment is provided for the facility is approximately 200 gallons.

2.2.4 Response Strategy

Onsite personnel, along with subcontracted on-site resources (such as the Alameda County Fire Department) are equipped and trained to respond to certain minor discharges that may be confined to the Livermore Site. Minor discharges are those considered to be small quantity discharges that can easily be stopped and controlled. These discharges include those where releases would not be likely to reach groundwater, or reach surface water or adjoining shorelines. Actions to be taken for discharges of this type are described in the SPCC Plan and also in this document. More detailed information about the implementation of the Emergency Plan for the Livermore Site is also provided in other documents referenced in this Plan.

This Contingency Plan addresses all discharge incidents involving petroleum releases from the Facility, including those that may affect navigable waters or incidents where oil cannot be safely controlled by facility personnel and confined within the boundaries of the site. These types of releases may require the use of outside contractors or other responders to prevent imminent impacts to navigable waters and other receptors.

3.0 PREPAREDNESS AND PREVENTION

3.1 Facility Design

The Livermore Site has been located, designed, and constructed to minimize the risk of hazardous waste incidents, including oil spills. A vicinity map (Map C-1) and the facility diagram (Map C-2) are included in the SPCC Plan.

3.2 Procedural Controls

Operations at the Facilities are conducted using approved written procedures and within the framework of the Facility permits. The written procedures are used as training tools for Facility operations and are easily accessible to Facility personnel. Each procedure contains:

- A description of an anticipated activity and its hazards and risks.
- The name of the individual responsible for ensuring compliance with the Integration Work Sheet (IWS) or Facility Safety Plan (FSP).
- Instructions to be followed to implement the controls that will reduce the risks to an acceptable level.
- Information concerning any special conditions that may be present.

3.3 Evaluations and Audits

Any new potentially hazardous operation must be thoroughly evaluated by the LLNL Environment, Safety, and Heath (ES&H) Team prior to commencement. In addition, all Facilities are subject to audits and evaluations by various subject matter experts in the fields of environment, safety, and health. Results of these audits are forwarded to the appropriate Facility Manager so that any deficiencies can be corrected.

3.4 Personal Protective Equipment

Personal protective equipment (PPE), including gloves, goggles, coveralls, and other protective clothing, are available for use during emergency situations. Each Facility maintains PPE appropriate for the material managed at the Facility. PPE and emergency equipment and guidelines for PPE use are included in Livermore Site Contingency Plan.

3.5 Engineering Controls

Forklifts may be used to move hazardous materials and hazardous waste (including product and waste oil) loaded on pallets or skids. Drum dollies are used to move individual drums. The paving in loading and unloading areas has been constructed to facilitate the ease and safe access of equipment transporting waste containers to the storage units and to minimize accidents during loading and unloading operations.

3.6 Aisle Space

Aisle space is always maintained in the Facilities to allow unobstructed access to hazardous waste containers.

3.7 Self-help Program

LLNL maintains a Self-help Program for incidents when onsite emergency response resources needed. Whenever a major emergency event occurs and LLNL's Onsite Emergency Response Organization is needed, Self-help Plans are implemented. Each department/division is required to prepare and keep its own employee emergency response plan. The Plans are designed to collect and safeguard personnel and visitors during site-wide emergencies.

LLNL Livermore Site has designated Assembly Points, where Assembly Point Leaders control the local emergencies while awaiting direction or assistance from the Onsite Emergency Response Organization. Personnel are instructed to meet at this Assembly Point if an evacuation were necessary.

4.0 RESPONSIBILITIES DURING AN EMERGENCY

In most cases, the Livermore Site emergency service elements are capable of managing operational emergencies at the Site. The senior fire officer serves as the Incident Commander (IC) during most incidents, including fire, medical, hazardous material, and rescue emergencies. The senior Protective Forces officer serves as IC during security incidents. The IC reports directly to the Emergency Coordinator/Laboratory Emergency Duty Officer (LEDO).

If an oil spill emergency escalates to an event that requires additional personnel, the *LLNL Emergency Plan* is implemented in conjunction with the LLNL Livermore Site Contingency Plan and this Oil Spill Contingency Plan. The LLNL Onsite Emergency Response Organization becomes operational when the *LLNL Emergency Plan* is implemented.

The personnel available who are trained to respond during an incident at LLNL Livermore Site are numerous. The positions described below are those most likely to respond to an oil spill incident, depending on the size and character of the incident. Additional positions and responsibilities are described in the *LLNL Emergency Plan.*

4.1 Emergency Coordinator

Select members of LLNL's Laboratory Emergency Duty Officer (LEDO) program fulfill the responsibilities of Emergency Coordinator as required by State and Federal regulations.

The Emergency Coordinator/LEDO (Table 1) is authorized to commit LLNL resources necessary to respond to an incident. The Emergency Coordinator/LEDO has access to information on LLNL's facility and operations. The Emergency Coordinator/LEDO is on call for 24-hours per day on a weekly basis. The Alameda County Regional Emergency Communications Center maintains a copy of the emergency call list of Emergency Coordinators/LEDOs.

The Emergency Coordinator/LEDO has the authority to commit all LLNL resources and the capability to obtain outside resources needed to implement this Contingency Plan.

Table F-1 Emergency Coordinator Call List

Name and Title	L-Code	Work Phone	Work Address	24 Hour Phone	Home Address
Joel Bowers Emergency Coordinator Primary/ Laboratory Emergency Duty Officer	L- 113	(925) 423-6877 (925) 423-7705, pager #02601	7000 East Ave. Livermore, CA 94551	(925) 447-6880	2256 Rhone Drive Livermore, CA 94550
Mark Sueksdorf Emergency Coordinator Alternate/ Laboratory Emergency Duty Officer	L- 654	(925) 423-8449 (925) 423-7705, pager #06761	7000 East Ave. Livermore, CA 94551	(925) 447-6880	726 Everett Drive Danville, CA 94506

In an emergency, immediately notify the Alameda County Regional Emergency Communications Center at extension 911 or dial (925) 447-6880 if calling from offsite, cellular phone, or pay phone. If paging from offsite, cellular phone, or pay phone, dial (925) 423-7705 and pager number. If using a handheld radio, use the call sign "MIKE" to contact the CAS Operator.

The Emergency Coordinator works with the Fire Department Incident Commander (IC) to coordinate emergency response activities. The Emergency Coordinator shall:

- Assess the emergency conditions and initiate onsite response activities.
- Identify the character, exact source, amount, and extent of released material with assistance from the ES&H Team Environmental Analyst during normal working hours or the EDO during off-hours.
- Assess possible hazards to human health with assistance from the ES&H Team Industrial Hygienist and/or Health Physicist. Assess possible hazards to the environment with assistance from the ES&H Team Environmental Analyst during normal working hours or the EDO during off-hours. If assessment indicates that evacuation of local areas may be advisable, the Incident Commander shall immediately notify appropriate local authorities and shall be available to help appropriate officials decide whether local areas should be evacuated.
- Ensure that all required notifications to outside agencies take place. Authority is delegated to the ES&H Team Environmental Analyst during normal working hours or the EDO during off-hours to make notifications for environmental emergencies.
- Activate the Emergency Paging System to notify personnel in selected areas of LLNL Livermore Site or the entire LLNL Livermore Site population, if necessary. Initiate evacuation of personnel, if appropriate.
- Notify appropriate state or local agencies with designated response roles if their help is needed, or if material is released offsite.

- Provide on-scene operational control for life safety, rescue, fire control and extinction, spill control and containment, and property conservation and salvage.
- Stop all waste or material-handling processes and operations in the area to prevent the occurrence, recurrence, and spread of fires, explosions, and releases.
- Ensure that monitoring is performed for leaks, pressure buildup, gas generation, or ruptures in valves, pipes, or other equipment.
- Ensure that recovered wastes, contaminated soil, or run-off water (from firefighting, sprinkler systems, broken water lines, etc.) are treated, stored, or disposed of in accordance with all applicable regulations.
- Ensure that waste that is incompatible with the released waste is not handled in the area of the release until cleanup is complete. Authority may be delegated to the ES&H Team Environmental Analyst during normal working hours or the EDO during off-hours.
- Ensure that all emergency equipment is cleaned and restocked before operations are resumed.

4.3 Fire Department

The Fire Department should be contacted if one or more of the following conditions occur:

- Fire or explosion, or
- An incident is regarded by personnel as unsafe to manage without the aid of the Fire Department, or
- Release of hazardous, radioactive, or mixed waste with hazards unfamiliar to personnel, or
- Release of hazardous, radioactive, or mixed waste that cannot be identified, or
- Injuries result that require medical treatment other than simple first aid as directed by Health Services, or
- Incident requires evacuation of a building or facility, or
- Oil migrates into a storm drain or sanitary sewer drain.

The Fire Department provides the first response and is responsible for invoking the incident command system. The Fire Department has the responsibility and authority as legally required to be in charge of site management for incidents, and to delegate authority to mitigate emergency situations. The Fire Department shall ensure the appropriate measures are taken to:

- Contain and control waste to protect personnel, the environment, and property from its effects.
- Provide technical and operational coordination to return the site of the incident to stable.

4.4 Support Organizations

There are numerous resources and expertise available at LLNL that can be drawn upon in the event of a Facility emergency. The following are descriptions of those support functions that may be called upon at a Livermore Site Facility emergency.

4.4.1 Security

Security Organization personnel respond to all emergencies at LLNL Livermore Site. In non-security incidents, Security provides personnel and vehicular control, building access control, and protection of classified matter.

4.4.2 Maintenance & Utilities Services Department

The Maintenance & Utilities Services Department (MUSD) has an organizational structure that includes maintenance and crafts personnel for emergency response.

4.4.3 Environment, Safety, and Health Team

The ES&H Team has overall responsibility for the initial response and control of most emergency situations at LLNL. The Fire Department assumes IC responsibility for most non- security emergencies at the Site. A senior member of ES&H Team usually serves as one of the ES&H Team Department Operations Center representatives.

ES&H Team members provide response and teams for environmental, fire safety, explosive safety, health physics, industrial hygiene, and industrial safety.

During an incident requiring Fire Department action, the ES&H Team Leader provides the IC with information concerning the incident, safety precautions, and control measures in dealing with the hazardous material. The ES&H Team Leader also assists the IC in assessing contamination control zones and coordinates team member responses in their respective disciplines.

Depending upon the nature of the incident, the ES&H Team members may include an industrial hygienist, fire safety engineer, environmental analyst, health physicist, explosives safety engineer, criticality safety representative, and an industrial safety engineer.

4.4.4 Environmental Functional Area

The EFA representative (i.e., the EFA Environmental Analyst) ensures that environmental regulatory issues are addressed by:

- Assisting in the determination of the actual or potential environmental impacts.
- Conducting sample collection or determining needs and assessment of release area.
- Determining regulatory reporting requirements and preparing the reports.

The EFA representative also provides the IC with EFA personnel and resources as needed during the incident, prepares the EFA Environmental Incident Report, and notifies LLNL management of the incident. Environmental Analysts are members of EFA, who act as Subject-Matter- Experts for spill clean-up and reporting, and on the ES&H Team, as secondary responders who support immediate responders at the scene of the incident.

4.4.5 ES&H Team/EFA Environmental Duty Officer

The EDO, who is the on-call EFA or ES&H Team Environmental Analyst, responds to emergencies and is responsible for carrying out emergency notification requirements. The EDO will notify the agencies identified in Table X based upon the incident conditions. The notification includes the information described in Section 11, Recordkeeping and Notification Requirements. The EDO reports directly to the IC.

4.4.6 Public Affairs Office

The Public Affairs representative receives situation updates from the IC and provides news releases, following the normal policies and procedures of LLNL.

4.4.7 Radioactive and Hazardous Waste Management

RHWM has personnel and equipment available to support the ES&H Team Field EA or EDO with incident mitigation. RHWM may:

- Assist in sampling and cleanup operations.
- Assist in preparing the waste for offsite disposal.
- Provide spill response equipment as described in **Section 10.4**.
- Assist in control, containment, and decontamination. The Emergency Coordinator may delegate this responsibility to RHWM, and supervise the control, containment, and decontamination work.

4.4.8 Livermore Site Medical Service

The Livermore Site medical facility and personnel decontamination unit is located in Building 663. It is typically staffed during normal operating hours, Monday through Friday. The medical facility number is extension 3-5250. For emergency assistance, workers call 911 (from an onsite LLNL phone) or (925) 447-6880 (cell phone or offsite phone).

Personnel at the Fire Department at the Livermore Site are also emergency medical service (EMS) first-responders. In the event the medical facility is closed, emergency aid can be provided by the Fire Dept. at B325.

4.5 Facility Manager, Representative, or Designated Alternate

The Facility Manager or Representative manages small incidents at their respective Facilities. The Facility Manager coordinates all incident response measures and has the authority to commit resources needed to mitigate small incidents as described in this Contingency Plan.

During large incidents, the Facility Manager, Representative, or alternate provides information regarding wastes stored at the Facility to the IC when requested. The information provided by waste records includes identification of wastes involved, quantities, and Facility status. The Facility Manager or Representative shall also develop and implement, in conjunction with the EFA, actions needed to meet environmental requirements related to the incident.

The Facility Manager or Representative has the following specific responsibilities during Facility incidents:

- Evaluate the immediate scope of the incident.
- Initiate evacuation of personnel, if necessary.
- Notify the Fire Department.
- Take appropriate action to safeguard Facility personnel.
- Ensure that the ES&H Team Environmental Analyst, Assurance Office, and the Health and Safety Technician have been notified.
- As temporary IC, direct area personnel in accordance with the Facility Safety Plans (FSP) and Contingency Plan until the Fire Department and the official IC arrive.
- Ensure that all normal waste handling operations cease in areas within and bordering the incident until cleanup and/or control procedures are completed.
- Assist the IC and provide appropriate direction to Facility personnel who are lending support.

- Ensure personnel and equipment are properly decontaminated.
- Ensure that all Facility emergency equipment listed in the Contingency Plan is cleaned and fit for its intended use before operations are resumed.

4.6 Facility Personnel

Facility personnel have the following responsibilities during a large emergency incident:

- Maintain personal safety.
- Notify the Facility Manager, Representative, or alternate; and, in the event of an extremely hazardous, life-threatening situation, immediately notify Facility personnel to begin evacuation of the area.
- If safe, follow the first five steps of the Ten-step Plan for hazardous waste releases (described in Section 8) while awaiting the arrival of the LLNL Fire Department.
- Observe the two-person rule—never work alone.
- Follow instructions and provide assistance to the IC, as requested, for release cleanup or hazard control.
- Ensure that hazardous residues and contaminated disposable clothing and equipment are managed appropriately.
- Ensure that all incidents are properly documented in daily inspection logs.

5.0 ARRANGEMENTS WITH LOCAL AUTHORITIES

LLNL has mutual aid agreements with several local authorities to provide assistance in the event of an emergency that cannot be handled by LLNL internal response measures. Through LLNL's participation in mutual aid agreements, virtually all emergency response organizations in the local region can be accessed. Primary local authorities that provide assistance through the Alameda County Mutual Aid Agreement are:

- Alameda County Sheriff's Office
- The Alameda County Health Care Services Agency
- Valley Care Medical Center
- Eden Medical Center
- City of Livermore Police Department

The Fire Department provides emergency medical care during emergencies and transports the ill or injured either directly off-site or to the LLNL Health Services facility for further medical evaluation and care. LLNL operates under the ALCO- EMS Emergency Medical Plan protocols. The plan identifies Valley Care Medical Center in Pleasanton as the medical base hospital for the East Zone of Alameda. Highland Hospital is the trauma base hospital for Alameda County.

Under ALCO-EMS protocol, patients may be transported to the closest appropriate receiving facility. The ALCO-EMS plan will be activated if medical service needs resulting from an incident will overwhelm the resources of a single ALCO-EMS zone. Each base hospital will coordinate emergency response within its zone and between other zones. An emergency dispatch system [Alameda County Central Medical Emergency Dispatch (ALCO-CMED)] is in place to alert all hospitals in the plan. The Fire Department and Health Services Department have radio links with ALCO-CMED. ALCO-CMED is located in the Fire Department Dispatch Center and operated under the Alameda County Emergency Dispatch Consortium Mutual Aid Agreement. ALCO-CMED will send ambulances to the disaster site and maintain receiving hospital bed count status. Air transportation via helicopter may be used if the overall time for transport to a hospital is at least 20 minutes less than ground transportation.

Other hospitals will cancel routine services to prepare to receive patients.

In the event of an emergency, requests for outside assistance will be channeled through the LLNL Emergency Notification System, and outside authorities will be contacted via telephone or radio.

Copies of all agreements are filed in the LLNL Emergency Management Division Office.

5.1 Distribution of Contingency Plans and Emergency Response Information

This Oil Spill Contingency Plan is distributed as an appendix to the SPCC Plan to all facility and site managers with SPCC-equipment as well as to all SPCC equipment custodians and Site environmental staff.

6.0 EMERGENCY COMMUNICATIONS PROCEDURES

6.1 Internal Emergency Communication

In the event of a large oil spill, the observer is to move immediately to a safe telephone and notify the Emergency Dispatcher by dialing 911. (For cellular phone calls to the Dispatcher, the emergency number is [925] 447-6880.) The dispatcher may also be notified by radio. The caller remains in contact to verify that the dispatcher has the correct information and to receive instructions.

Once notified, the Emergency Dispatcher promptly relays the information to the immediate response groups. Next, the Dispatcher uses the best available method—usually a dial page—to notify other, requested key personnel. During off-shift hours, key personnel are notified by telephone or dial page. Response personnel are available on a 24-hours-a-day basis.

If the incident escalates to the point that the Livermore Site Department Operations Center is activated, the Center is updated on all pertinent information. Assembly Point Leaders, or Program and Support Group Representatives contact the Emergency Dispatcher to report Assembly Point Status to the Livermore Site Department Operations Center or the Fire Department. The Fire Department uses a 400-mHZ radio system and utilizes talk groups to coordinate communication.

6.2 External Emergency Communication

Offsite emergency support agencies are communicated with according to the emergency classification or the need for support. The Emergency Dispatcher, under the direction of the IC, makes the initial notifications. The DOE NNSA/Livermore Site Office and appropriate state agencies are notified and kept informed throughout the emergency. Additionally, if an alert involves a security threat, the Federal Bureau of Investigation is notified.

If the IC or designee determines that the release, fire, or explosion could threaten human health or the environment or otherwise cause the implementation of this Contingency Plan, the incident is reported as discussed in Section 11.

7.0 EMERGENCY CONTROL PROCEDURES

Response to an emergency at the Facility is designed to be appropriate to the incident. The transition from one level of emergency to another must be automatic and keyed to well-defined criteria. The Fire Department emergency action levels are defined according to the event (see Section 1.2) and the potential hazard to onsite personnel and offsite persons. Trained Operations and Facility personnel may respond to small incidents. The Fire Department is notified and responds to all others.

The Fire Department is familiar with the layout of the Facilities, the location of entrances and exits, and work locations of Facility personnel. Both the Fire Department and the LLNL Health Services Department are familiar with the types of injuries or illnesses that could result from releases from the Facilities.

7.1 Release Response for Hazardous Materials and Waste

7.1.1 Fire Department Response

Releases from Level 1, 2 or 3 incidents must be stabilized by the Fire Department, which has established event scenarios and consequences (Run Cards) that are used for responding to hazardous material emergencies. These response guidelines describe possible scenarios, time to consequence, evacuation protection zones, and recommended actions among other information.

In the event of a Level 1, 2 or 3 incident at a Livermore Site Facility, Facility personnel can provide technical expertise for the material(s) involved in the incident, support for hazardous material release cleanup, and resolution of explosive waste incidents.

7.1.2 Container-failure Response

If a container being used to manage hazardous waste or material releases its contents to the environment, and if there is no immediate threat to personnel safety, Facility personnel cease waste handling operations and take immediate action to contain the release using the procedure described in **Section 8**.

7.2 Equipment Failure

Procedures have been developed to manage situations in which equipment failure may cause a release of hazardous or toxic waste or materials. Equipment failure includes forklift failure during transfer operations, container failure, and equipment failure. Malfunctions are addressed in the Facility safety procedure.

8.0 TEN-STEP GUIDANCE PLAN FOR CHEMICAL-WASTE RELEASE RESPONSE

Leaks and releases of materials are managed according to the following ten-step approach (Note: If it is not considered safe to perform any one of Steps 1-5, then personnel immediately call the LLNL Emergency Dispatcher at 911.)

The ten-step approach is illustrated below:

Identify the spill | If safe, shut off the source | Eliminate ignition sources | Contact your supervisor | Cordon off the area

If the release is manageable, personnel continue with Steps 6–10. If not, they call the Emergency Dispatcher at 911.

Contain | Absorb and neutralize | Clean up | Dispose of as hazardous waste | Decontaminate and restock spill equipment

9.0 DECONTAMINATION

The Fire Department manages all decontamination efforts associated with emergency incidents. The Fire Department's decontamination procedures are discussed in detail in the LLNL Emergency Management Division, Policies and Procedures Manual, *Procedure 1612, Hazardous Materials Response Plan.*

9.1 Decontamination Activities

Proper decontamination procedures and equipment requirements need to be established before cleanup activities begin. The decontamination area will be located upwind of the contaminated area where it will not become threatened by the release during the incident.

9.2 Personnel

If a release occurs and personnel come into direct contact with a hazardous material or waste and if they are capable of helping themselves, they immediately:

- Use eyewash or shower to flush eyes or skin.
- Remove contaminated clothing.

- Use soap and water to scrub off contaminant.

When an immediate rescue is initiated, designate a decontamination corridor, and accomplish decontamination in the emergency decontamination area.

9.3 Equipment and Material

At every incident in which an entry will be made into a chemical spill area and there is the possibility of contact with the product, Fire Department personnel are to lay out a charged hose line.

- Tarps and/or pools are used to collect runoff from decontamination activities.
- Non-disposable items are decontaminated.
- Disposable items are handled as hazardous waste unless analysis indicates otherwise.
- Rinse water generated from decontamination operations is managed as hazardous waste, pending analysis.
- Analytical results from swipes and rinse water are used to determine the presence of hazardous material residue and to verify whether decontamination procedures are complete.
- Spill kits and PPE are restocked.

10.0 EMERGENCY EQUIPMENT

This section briefly describes the emergency equipment located at Livermore Site and equipment that is available to be deployed. This equipment includes communication systems, spill response equipment, emergency response and release control equipment, Safety Data Sheets (SDSs), emergency lighting systems, and decontamination equipment. Spill kit inventory is presented in the SPCC Plan.

10.1 Communication Systems

Telephones are located throughout buildings at the Livermore Site.

Notification of emergencies and requests for outside assistance are channeled through the Alameda County Regional Emergency Communications Center at extension 911 or (925) 447-6880 if on a cell phone. The Alameda County Regional Emergency Communications Center can contact outside authorities and obtain assistance via telephone or radio. In addition, all ES&H Team and EFA operations personnel wear radio pagers and are available in the event of any incident. Internal notification of personnel can be accomplished through the site-wide public address system and building page system if an evacuation is necessary.

After-hours emergency calls received are handled by the Emergency Dispatcher who, in turn, contacts the LEDO. If the incident or emergency involves Livermore Site, notification is made to the Fire Dispatcher. After an initial emergency classification has been made, the Livermore Site Senior Protective Force Duty Officer calls the assigned Livermore Site Security/Protective Force Representative and the Livermore Site Manager, who will determine whether further notifications are necessary.

If additional calls are deemed necessary, the Livermore Site Protective Force Central Alarm Station operator has access to lists of knowledgeable personnel.

10.2 Spill Response Equipment

The Fire Department maintains or has access to a mobile supply of equipment required to mitigate diverse emergencies that can be used in the event of an incident. In addition, RHWM maintains a response trailer containing bulk quantities of equipment at the OS169 WAA. The equipment is available to support the Fire Department in the event of an emergency release at Livermore Site and has capabilities up to 100 gallons. In addition, a spill response contractor is on call to provide additional resources for a more complex or involved release scenario. The capabilities are described in the following sections.

10.2.1 Spill Response Trailer

A spill response trailer is stocked with a variety of items to be used in the event of a spill. The spill response capability of the spill trailer includes the following:

Drain Blockers-Drain Covers: These are flexible mats or covers that can be deployed to cover storm drain inlets, catch basins, and similar features to prevent oil from entering storm drain system.

Gutter and Grate Guards: These devices are similarly used to isolate and protect inlets

Pneumatic Pipe Plugs: These are inflatable plugs that can be used to contain or isolate sections of storm drain systems, and range from 4” to 16” diameters

Absorbents; Pads, Socks, and Bulk: A variety of absorbent pads and similar absorbents are used to contain and collect oil from surfaces.

Spill Berms: These are used to isolate, collect, and recover oil and to contain and prevent further migration of oil from spill sources.

Spill Containment Systems: These are collapsible containers that can provide portable containment areas for temporary use.

Other Equipment: Barricades, emergency medical response equipment, light stands, and other equipment is stored in the emergency response trailer for additional capability in a release.

The complete inventory list for the emergency response trailer is included in Table F-2.

Table F-2. Emergency Response Trailer Inventory

Quantity	***Description***	***Dimension***
6 Boxes, 1 Per Box	PIG Drain blocker- Round Drain Cover Item # PLR 274	42in Round
5 Boxes, 1 Per Box	PIG Drain Blocker- Drain Cover Item # PLR 233	12in Diameter
6 Boxes, 1 Per Box	PIG Drain Blocker-Drain Cover Item # PLR 203	48in W. x 48in L.
6 Boxes, 1 Per Box	PIG Drain Blocker-Drain Cover Item # PLR 202	36in W. x 36in L.
6 Boxes, 1 Per Box	PIG Drain Blocker-Drain Cover Item # PLR 224	24in W. x 24in L.
1 Bag, 1 Per Bag	Gutter Guard Model # 9320-UDG009320	9in x 8ft L.
3 Boxes, 1 Per Box	PIG Grate Guard Item # FLT 252	48in x 24 in
1 Box	PIG Absorbent Clip And Fit Sock Item # PIG 220	3in Dia. x 120ft L.
8 Bags, 10 per bag	PIG Storm Water Outflow Absorbent Pads Item # FLT 264	18in W. x 6ft L.
10 Bags, 10 per bag	PIG Storm Water Outflow Absorbent Pads Item # FLT 261	10in W. x 6ft L.
98 Bags, 20 per	PIG Storm Water Outflow Absorbent Fabric Loops Item # FLT 434	

Quantity	***Description***	***Dimension***
bag		
8 Bags	UltraSorb- Ultra Oil Absorbent Item # 8835	33.33 LBS.
1 Unit	PIG Collapse-A-Tainer Spill Containment System Serial # 21723-1	
1 Unit	PIG Collapse-A-Tainer Spill Containment System Item # PAK 953 BK - Serial # 21540-1	
1 Box	PIG Spill Berm Item # PAK 933	
1 Box	PIG Spill Berm Item # PAK 934	
4 Boxes	PIG Spill Blocker-Rough Surface Dike Item # PLR 230	2.25in H. x 2in W. x 10ft L.
2 Plug	Pneumatic Pipe Plug (Includes Gauge and Connection) Item # PLR 238	8 – 16 in
2 Plugs	Pneumatic Pipe Plug (Includes Gauge and Connection) Item # 60417	4 – 8 in
2 Cases	Tripod Light Stands (Yellow)	
1 Box	PIG Rubber Wheel Caster Assembly Item # DLY 204	5 in
4 Drums	Medical- Emergency Response Kit	55 Gallon
2 Boxes, 1 Per Box	Versa-Guard Portable Expanding Barricade Item # VG-3015-C	15ft 4in
2	Rubbermaid Plastic Barricade	1ft W.

Quantity	***Description***	***Dimension***
2	Rubbermaid Plastic Barricade	4ft W.

10.2.2 Vacuum Trucks

Four-5000-gallon vacuum trucks are located at the Livermore Site and can be used in an oil spill emergency for removing liquids. Two smaller 1000-gallon vacuum trucks are also available in the event of emergency for controlling releases.

10.2.3 Spill Response Contractor

To assist in spill response, a contract has been established with a local spill response contractor. The contract includes providing 24-hour secondary spill response services. Contractor personnel must arrive to the Site within 2 hours of notification by LLNL. The spill response contractor is prepared to provide two vacuum trucks with drivers, four trained emergency response personnel with appropriate PPE, equipment and supplies necessary to effectively handle liquid spills.

10.3 Livermore Site Fire and Rescue Equipment

In case of a fire, explosion, or release of waste, fire-fighting equipment, containment, and emergency equipment are available for use. All Fire Department vehicles are equipped with radios on LLNL channels, and on all mutual aid channels. Alameda County Fire Station 21 in B-325 contains:

- Two water pumper trucks
- One aerial ladder truck
- Three command vehicles (two are four-wheel drive)
- Two auxiliary water pumper trucks
- One primary and one reserve ambulance
- Special Services Unit 1 for hazardous materials response

The Fire Department can respond within five minutes to a medical emergency with an ambulance. Patients can be taken to the LLNL Health Services in B-663, which is located near the LLNL east gate. For severe accidents, patients are taken to Valley Care Medical Center in Pleasanton or Eden Medical Center in Castro Valley.

10.4 Response Vehicles and Heavy Equipment

A variety of heavy equipment is available from the Maintenance Services Division within the Facilities & Infrastructure Department during an emergency. This equipment includes, but is not limited to, compressors, cranes, cutting torches, forklifts, generators, pumps, bulldozers, etc.

All LLNL emergency equipment is maintained on a regular basis to ensure that it is operational at all times. The water trucks are kept full of fuel and water. Based on the recommended factory schedule, preventative maintenance checks are performed by the Fleet Management maintenance crew.

10.5 Site Safety Equipment

Eyewash stations, showers, and fire extinguishers are located throughout the Facility. Mobile/portable equipment for deployment at spill response locations is typically available on the spill response trailers, emergency vehicles, Fire Department response trucks, and through the spill response contractor.

10.6 Personal Protective Equipment

The level of PPE assigned to a Facility is based upon the activity at the Facility. Workers must wear solid-toe safety shoes at all times when working in waste management operational areas or around heavy equipment or machinery. Operators handling waste or oil containers must wear coveralls or their equivalent at all times. Leather, acid, base, or solvent-resistant gloves are worn as appropriate for the waste handling activity. When handling hazardous waste, workers must wear face shields, goggles, safety glasses, or other facial and eye protection as needed in accordance with the FSPs and IWSs.

PPE for responding to hazardous (chemical) waste releases is located in the emergency spill kits.

10.7 Emergency Assembly Point Kit (Self-help Kit)

Protective and emergency equipment are stored in the Self-help Kit located at the designated Livermore Site evacuation assembly points. The kits are maintained for major emergencies that require the evacuation of Facility and other Livermore Site personnel. Kits contain a first-aid kit, blankets, stretcher, flashlights, safety glasses, gloves (plastic, leather, and cotton), and hard hats among other items. Kits are inspected on a routine basis, and items are replaced when necessary.

10.8 Safety Data Sheets

Safety Data Sheets (SDSs) list the characteristics and hazards of a chemical. An SDS can be obtained from the CHEMTRACK SDS Hotline (extension 4-4404) or online at the ChemTrack home page.

10.9 Run Cards (Emergency Response Drawings)

Run cards containing information pertinent to Facility emergency response are maintained at the Livermore Site Fire Station. They include:

- Special Information Sheets that provide a list of hazardous materials, special hazards, and their physical locations within the building and surrounding area.
- Building Plans that provide plot plans of the buildings and surrounding areas, room numbers, and locations of shut-off valves and fire alarm panels.

10.10 Emergency Lighting

All fuel truck service vehicles involved in fuel transfers are equipped with emergency lights that provide a minimum intensity of 5 foot-candles at transfer connections. Work areas that are not transfer connection points are provided with a minimum light intensity of 1 foot-candle. This level of lighting allows for visibility of spills by facility personnel or security personnel during rounds.

10.11 Decontamination Equipment

RHWM maintains equipment that is available to decontaminate areas that may potentially be contaminated by a hazardous material release. This includes containment booms, mops, brooms, shovels, and a pressure washer. The equipment is inspected on a quarterly basis.

10.12 LLNL Livermore Site Equipment

Additional emergency response equipment is also readily available from the LLNL Livermore Site, including release response equipment, response vehicles and heavy equipment, site safety equipment, PPE, emergency assembly point kits, and SDSs.

RHWM also maintains a response trailer containing bulk quantities of spill response equipment to support the Fire Department when necessary.

10.13 Access to Receiving Waterbodies

Vehicle and equipment access to the Las Positas Discharge Point is served by the road that parallels Arroyo Las Positas. Near the Discharge Point, additional access areas are located in the buffer areas just west of the discharge point. Coordination with LLNL internal security is needed to access these locations. These locations provide suitable access for the deployment of boom, absorbents, and other spill response measures.

Further downstream locations offsite of the LLNL property can be accessed from parking areas that serve commercial business parks north of Patterson Pass Road. The Arroyo Las Positas eventually turns westward and parallels the railroad tracks. Access in this area is afforded by pathways located on both sides of the Arroyo. Coordination with local police and fire agencies will be needed to stage equipment downstream of the LLNL property.

Vehicle and equipment access to Arroyo Seco is afforded by a similar access road located near the southwestern corner of the facility. Downstream locations outside of the LLNL facility also exist just west of the site across S. Vasco Road. Pathways that could provide limited vehicle and equipment access are located along the Arroyo at this location, which is in a residential neighborhood. At about 0.35 miles downstream from the LLNL facility border, the Arroyo transitions from unlined streambed to culverted. Coordination with local police and fire agencies will be needed to stage equipment downstream of the LLNL property.

Access to Lake Hausmann is provided by roads and pathways that are located along the perimeter of the late. The weir gate can also be accessed via a pathway leading to the discharge area. All areas around Lake Hausmann are controlled by LLNL.

11.0 INCIDENT REPORTING

11.1 Internal Reporting

Employees shall notify the Facility Manager or Representative of all release incidents and the Fire Department of all Level 1, 2, or 3 incident releases, fires, or other emergencies. The Facility Manager or Representative gathers preliminary information and then immediately notifies upper management, the ES&H Team, the Assurance Office, and the Environmental Analyst. The Environmental Analyst, in consultation with appropriate subject matter experts and biologists, evaluates the incident to determine what was released and if the incident is reportable to a local, state, or federal agency, or to DOE.

Following a major accident or a high-risk incident at a Facility, Facility management must ensure that an incident analysis occurs in order to provide information about the unidentified hazards or issues that led to the incident. Recommendations for corrective measures are included in the report, and copies shall be distributed to management, the ES&H Team, and others who benefit from the information contained in the report. The ES&H Team maintains a central file of all incident analysis reports and provides follow-up information. Summary reports are prepared by ES&H Team personnel and are freely distributed within LLNL.

All Facility-related incident reports (both reportable and recordable) are maintained in the Hazardous Waste Facility Operating Record.

11.2 Notification to DOE and/or Regulatory Agencies

Releases must be reported to a variety of regulatory agencies under different circumstances. In all instances when the Contingency Plan is implemented, both verbal and written notification is required.

EFA responds to all reports of releases or other environmental occurrences through a well- established reporting process. The EDO determines the reporting requirements and works with Environmental Analysts, biologists, and Laboratory management on the process of notifying federal, state, and local regulatory agencies and DOE. The LEDO responds to occurrences throughout LLNL. The EDO will also assist the program/department in determining whether the DOE must be notified. If the incident is reportable to DOE under the occurrence reporting requirements set forth in DOE Order 232.1, program/department personnel must verbally notify the LLNL Occurrence Reporting Office of the incident and write the required occurrence reports. The ES&H Team Field EA or EDO may assist the program/department with compiling occurrence report information.

In addition, emergencies requiring activation of the Emergency Management Center will be subject to the reporting requirements of the *LLNL Emergency Plan (*UCRL-AM-218588). The procedures for reporting are described in the *LLNL Environmental Incident Notification and Reporting Procedure LLNL TM 617312*.

When a release occurs, ES&H Directorate personnel (the ES&H Team Field EA during normal working hours or the EDO during off-hours) must be notified immediately. The EDO will inform the Laboratory Emergency Duty Officer (LEDO), LLNL Occurrence Reporting Office, and the appropriate program/department of required reporting to federal, state, and local agencies. EFA personnel or the EDO will then notify environmental regulatory agencies as necessary following EFA's Environmental Incident Notification and Reporting Procedure.

Table F-3 Emergency Notifications

Discharge Condition	When to Notify	Who to Notify	Contact Information
Harmful quantity of oil discharge that reaches navigable waters [1]	Verbal notification immediately after discovery of the discharge	National Response Center (NRC)	1-800-424-8802
<u>In addition to the notification above, if the discharge also meets the following criteria, you should perform the following additional notifications:</u>			
42 gallons or more of oil by direct discharge to a receiving water	Verbal notification immediately after discovery of the discharge	California Office of Emergency Services (OES)	1-800-852-7550
		Livermore-Pleasanton Fire Department (CUPA)	(925) 454-2361 (8:00-5:00) (925) 447-6880 (off hours)
More than 1,000 gallons of oil are discharged into or upon navigable waters in a single event. – OR – Whenever two spill events (more than 42 gallons each) occur within any 12-month period resulting in “harmful quantities” of oil being discharged into or upon navigable waters.	Written notification within 60 days of the event.	EPA Region 9	Phone: (415) 744-2000 Address: 75 Hawthorn Street San Francisco, CA 94105
		Regional Water Quality Control Board – San Francisco Bay Region	Phone: (510) 622-2300 Address: 1515 Clay St, Suite 1400 Oakland, CA 94612
An oil spill that posed a hazard or potential hazard to human health, property, or the environment.	Written notification within 15 days of the event	Department of Toxic Substances Control, Region 2	Phone: (510) 540-3739 Address: California EPA, Department of Toxic Substances Control 700 Heinz Avenue, Suite 200 Berkeley, CA 94710
Discharge of oil to the sanitary sewer system	Verbal notification immediately after discovery of the discharge	Livermore Water Reclamation Plant	(925) 960-8100

[1] A harmful quantity is any quantity of discharged oil that violates state water quality standards, causes a film or sheen on the water’s surface, or leaves sludge or emulsion beneath the surface.

All reportable oil spills at the Livermore Site are reported to the appropriate regulatory agencies as described in the *Environmental Incident Notification and Reporting Procedure* (latest revision). This technical manual includes information and procedures that enable the LLNL staff reporting a discharge to be able to provide the following information:

- Exact address or location and phone number of the facility,
- Owner/operator name
- Date and time of discharge,
- Type of material discharged,
- Estimate of the total quantity discharged,
- Description of source and all affected media,
- Cause of the discharge, including a failure analysis if the discharge reached navigable waters
- Any damages or injuries caused by the discharge,
- Actions (corrective actions and countermeasures) being used to stop, remove, and mitigate the effects of the discharge,
- Whether an evacuation may be needed, and
- Names or individuals and/or organizations that have been contacted.
- Maximum storage/handling capacity of the facility and normal daily throughput
- Weather conditions at the incident location
- Adequate description of the facility, including maps, flow diagrams, and topographical maps, as necessary
- Additional preventive measures taken or planned to take to minimize discharge reoccurrence
- Other information to help emergency personnel respond to the incident

All written reports will include the following:

- Name, address, and telephone number of the owner or operator (LLNL or LLNS).
- Date, time, and type of incident (e.g., release, fire, or explosion).
- Name and quantity of material(s) involved.
- Extent of injuries, if any.
- Assessment of actual or potential hazards to human health or the environment, when this is applicable.
- Estimated quantity and disposition of recovered material that resulted from the incident.

All written reports will be reviewed and forwarded to the appropriate regulatory agency by the EFA Manager.

12.0 ACRONYMS

AGOV	Acids gases/organic vapors
APL	Assembly Point Leader
ARAC	Atmospheric Release Advisory Capability
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSA	Container Storage Area
CWA	Clean Water Act
DOE	U.S. Department of Energy
DTSC	Department of Toxic Substances Control
EDO EFA	Environmental Duty Officer Environmental Functional Area
EMS	Emergency medical service
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right—to-Know Act (Section 313 of SARA)
ES&H	Environment, Safety, and Health
EWSF	Explosives Waste Storage Facility
EWTF	Explosives Waste Treatment Facility
FSP	Facility Safety Plan
HEPA	High-efficiency particulate air (filter)
IC	Incident Commander
IWS	Integration Work Sheet
LEDO	Laboratory Emergency Duty Officer
LLNL	Lawrence Livermore National Laboratory
LLNS	Lawrence Livermore National Security, LLC (LLNS)
LFO	Laboratory Field Office
SDSs	Safety Data Sheets
NNSA	National Nuclear Security Administration
NIOSH	National Institute of Occupational Safety and Health
PCB	Polychlorinated biphenyl
PLS	Physical and Life Sciences
PPE	Personal protective equipment
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RQ	Reportable quantity

RHWM	Radioactive and Hazardous Waste Management
SCBA	Self-contained breathing apparatus
SARA	Superfund Amendments and Reauthorization Act of 1986

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13.0 WRITTEN COMMITMENT OF RESOURCES CERTIFICATION

I commit all necessary manpower, equipment, and materials required to expeditiously control and remove any quantity of oil discharged that may be harmful. To that end, I certify that this SPCC and/or contingency plan:

- Identifies and inventories applicable equipment, materials, and supplies that are available locally and regionally;
- Estimates the equipment, materials, and supplies that would be required to remove the maximum oil discharge to be anticipated;
- Develops agreements and arrangements in advance of an oil discharge for the acquisition of equipment, materials, and supplies to be used in responding to such a discharge;
- Provides for well-defined and specific actions to be taken after discovery and notification of an oil discharge, including commitment of trained, prepared, and available operating personnel;
- Pre-designates properly qualified individuals who are charged with the responsibility and delegated commensurate authority for directing and coordinating response operations and who know how to request assistance from federal authorities operating under current national and regional contingency plans;
- Designates a preplanned location for response operations and a reliable communications system for directing the coordinated overall response actions;
- Provides for varying degrees of response effort depending on the severity of the oil discharge; and
- Specifies the order of priority in which the various water uses are to be protected where more than one water use may be adversely affected as a result of an oil discharge and where response operations may not be adequate to protect all uses.

Signature:

__________________________________ ______________________

Frances Alston Director Environment, Safety, & Health	Date

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Figure F-1

Vicinity Map

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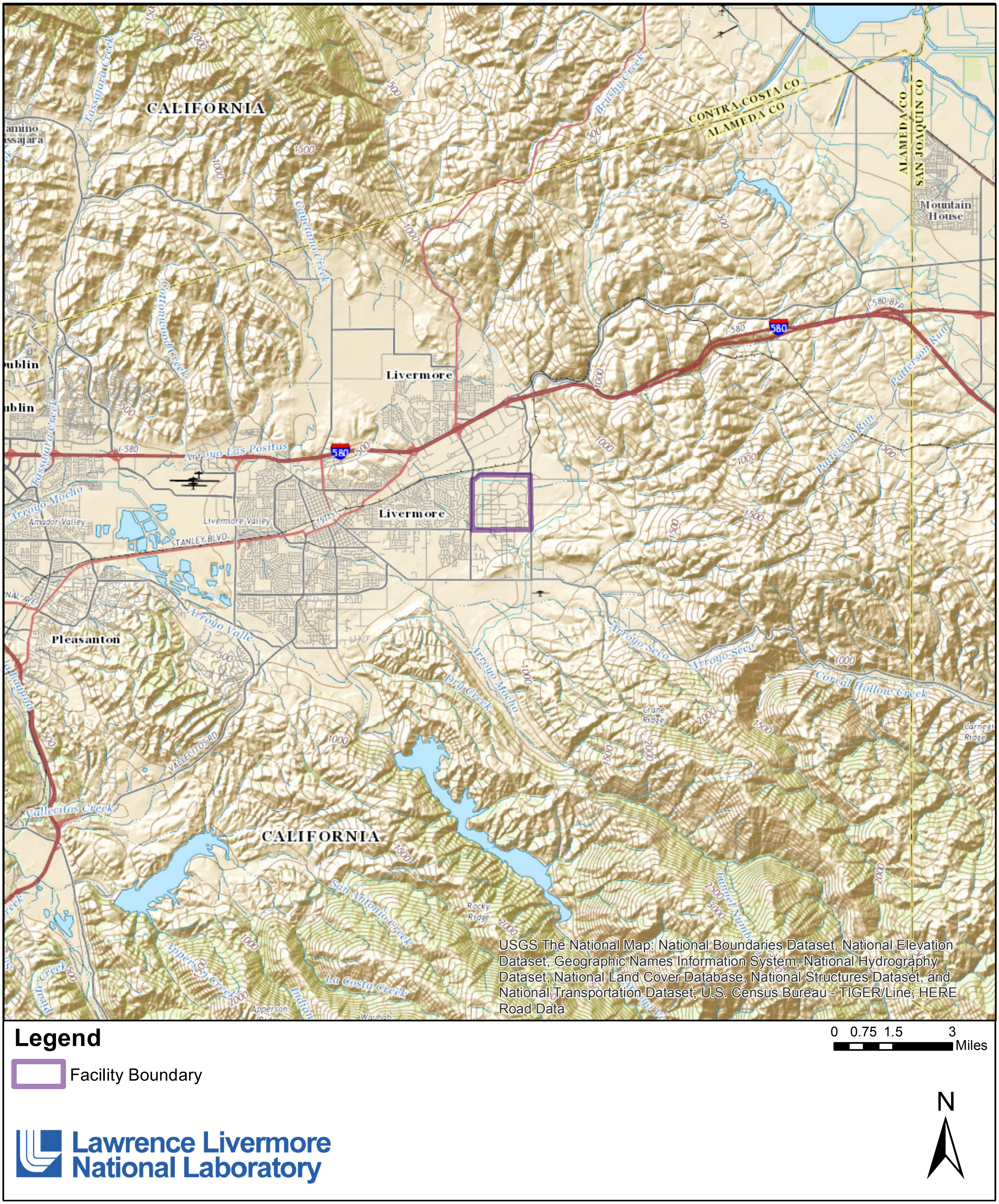

Z:\ESPM\GIS\Maps\S200\SPCC\2016\Figure 1 - Vicinity map.mxd

Figure F-2

Drainage Features Map of Livermore Site

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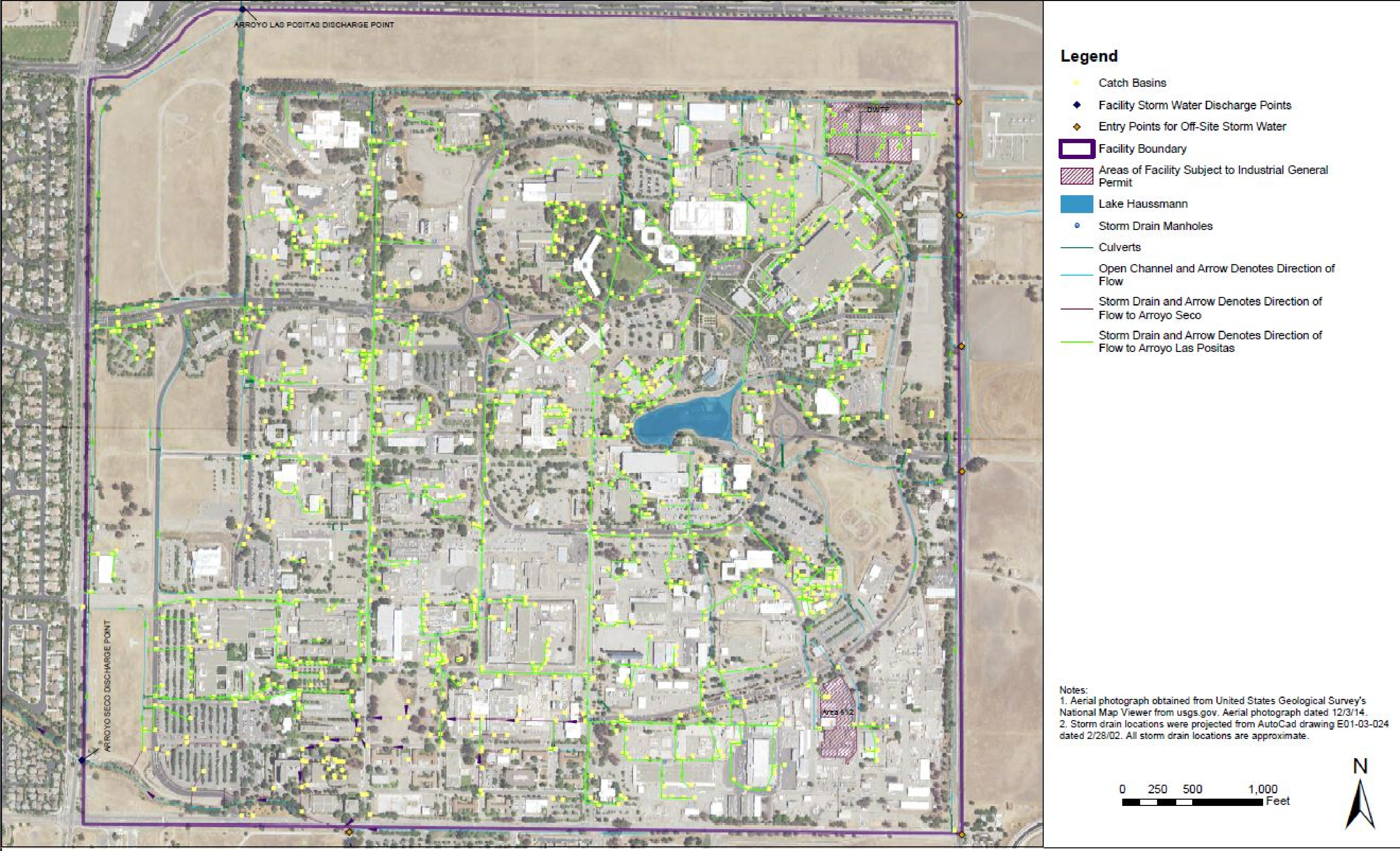

Figure F-2, Facility Drainage

Lawrence Livermore National Laboratory

Figure F-3

Sensitive Receptors at Livermore Site

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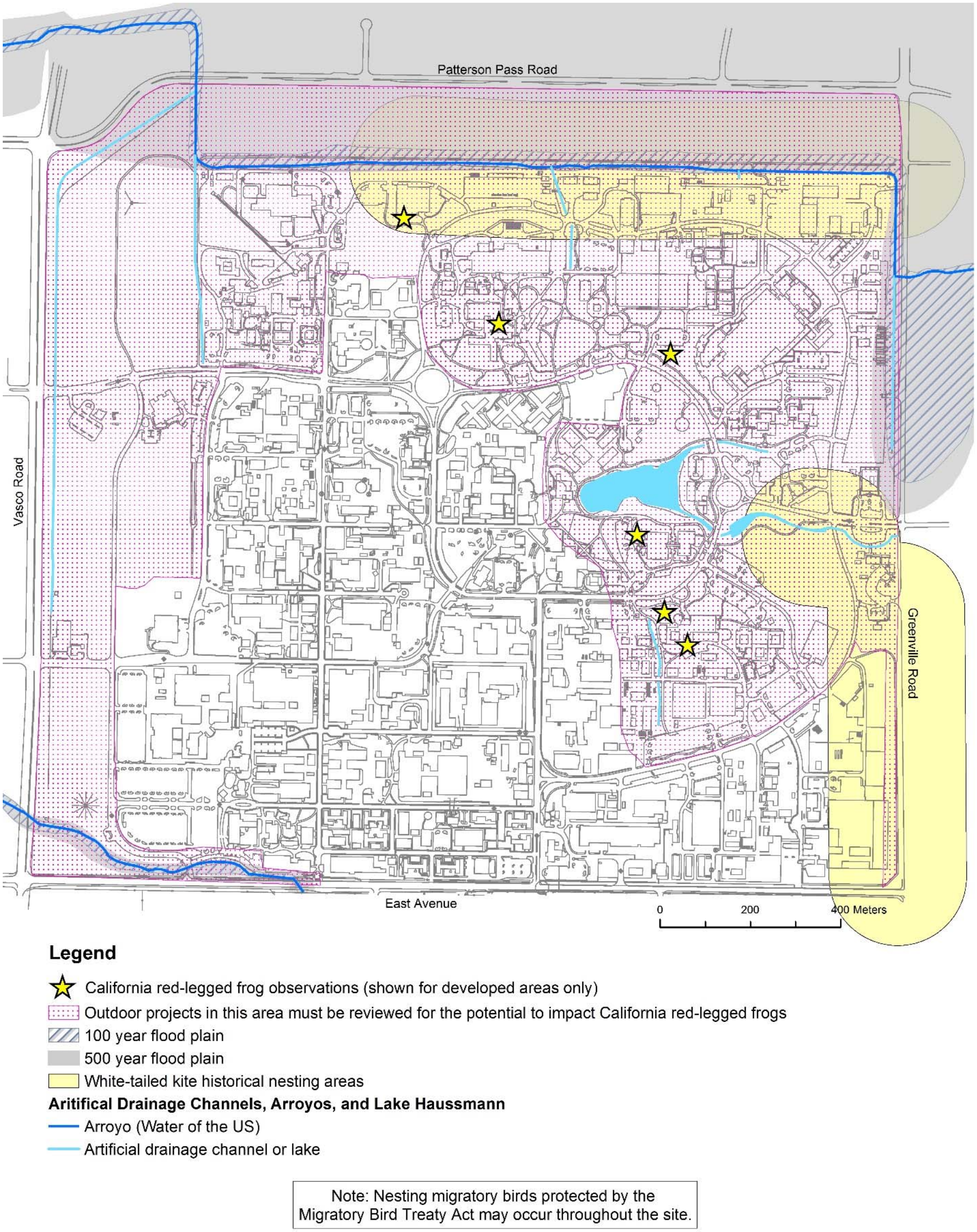
Patterson Pass Road
Vasco Road
Greenville Road
East Avenue
0
200
400 Meters
Legend
California red-legged frog observations (shown for developed areas only)
Outdoor projects in this area must be reviewed for the potential to impact California red-legged frogs
100 year flood plain
500 year flood plain
White-tailed kite historical nesting areas
Aritifical Drainage Channels, Arroyos, and Lake Haussmann
Arroyo (Water of the US)
Artificial drainage channel or lake
Note: Nesting migratory birds protected by the
Migratory Bird Treaty Act may occur throughout the site.

Appendix G

Spill Kit Inventory

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Appendix G. Spill Response Materials Inventory

Location	Contents
Tanker Trucks	• 8 - Absorbent Sock (4 feet each) • 5 Absorbent Sock (10 feet each) • 100 - 15" W x 20" L Absorbent Mat Pads • 10 - Polyethylene Disposal Bags
HE Shop Trucks	• 20 – ext. dia. 15" x 20" Absorbent Mat Pad
Other Shop Trucks	• 4 – Absorbent Sock • 28 –Absorbent Mat Pads • 5 – Polyethylene Disposal Bags • 1- 21.75" L x 17.25" W x 7.25" D Carry Bag
B141 Room 162	• 15 lbs Sorbent Material
B231 Rm 1841	• 55 lbs Sorbent Material
B383 Rm 100	• 10 - 15" W x 19" L Absorbent Mat Pads • 3 - Absorbent Sock • 1 - Pairs of Gloves • 2 – Polyethylene Disposal Bags
B511 Rm 159 (2 kits)	Each kit contains: • 3 - 50 lbs Sorbent Material • 4 - Absorbent Sock (4 feet each) • 10 - 18" W x 18" L Absorbent Mat Pads • 3 - Pairs of Gloves • 1 - Shovel • 1 - Broom
B321A Room 1000 (2 kits)	Each kit contains: • 16 - ext. dia. 3" x 48" L Absorbent Sock • 10 - ext. dia. 3" x 10' L Absorbent Sock • 60 - 15" W x 20" L Absorbent Mat Pad • 8 - 17" W x 21" L x 2" H Absorbent Pillow • 56 - 11.875" W x 13" L All-Purpose Wipers • 10 - 36" W x 60" H Polyethylene Disposal Bags
B321C Room 1315B	• 4 - ex. dia. 3" x 10' L Absorbent Sock • 25 - 15" W x 20" L Absorbent Mat Pads • 5 – 36" W x 60" H Polyethylene Disposal Bags • 4 – ext. dia. 8" x 18" L Sump Skimmer
B321C Room 1411C	• 4 - ex. dia. 3" x 10' L Absorbent Sock • 25 - 15" W x 20" L Absorbent Mat Pads • 5 – 36" W x 60" H Polyethylene Disposal Bags • 4 – ext. dia. 8" x 18" L Sump Skimmer
B321C Room 1415	• 16 - ext. dia. 3" x 48" L Absorbent Sock • 10 - ext. dia. 3" x 10' L Absorbent Sock • 60 - 15" W x 20" L Absorbent Mat Pad • 8 - 17" W x 21" L x 2" H Absorbent Pillow • 56 - 11.875" W x 13" L All-Purpose Wipers • 10 - 36" W x 60" H Polyethylene Disposal Bags

Additional spill equipment available at the Livermore Site, but not part of the inventories includes shovels, brooms, buckets, rags, drain covers, additional absorbent, PPE, and other materials located in various other locations throughout the Livermore Site.

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Appendix H

Inspection Procedures and Checklists

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Appendix H. Aboveground Oil Systems and Oil-Filled Operating Equipment Inspection Procedures and Checklists

All SPCC-regulated equipment must be inspected according to industry standards, including STI SP001, and inspection results are recorded using inspection forms or checklists. Periodic visual inspections are required, and the frequency of the periodic inspection depends on the type of equipment and other factors such as containment. Formal inspections such as external inspections conducted by a certified inspector, leak tests, etc. may also be required for specific pieces of equipment. **The appropriate inspection frequency and which checklist should be used for each piece of SPCC equipment is indicated on Tables C-1, C-2, and C-3 in Appendix C of the SPCC Plan.**

Some pieces of equipment use a specific checklist developed strictly for that piece of equipment (e.g., elevators, WAAs). These checklists are not included in this SPCC plan. In general, a summary of required inspections is as follows, however to ensure the correct inspection frequency for each piece of equipment, the Appendix C tables should be referenced.

Table H.1 Inspection Frequency for Types of Equipment

Type of Equipment	Inspection Frequency	Checklist(s)
Bulk Storage Containers Associated with Stationary Emergency Generators Diesel Fueling Station	Monthly and Annual	H.1, H.4
Bulk Storage Containers Associated with Portable Emergency Generators	Monthly	H.1
RCRA Tank Systems and Permitted Areas	Monthly	RCRA Form
WAA	Monthly	WAA Form
SAA	Monthly	SAA Form or H.2
New Product Containers Mobile Refuelers	Monthly	H.2
Transformers and other Oil-Filled Electrical Equipment with Secondary Containment	Semiannual	H.3
Transformers and other Oil-Filled Electrical Equipment without Secondary Containment	Monthly	H.3
Elevators	Service Contract	Elevator Contractor Form
Machining Equipment	Monthly	H.3

Inspectors must focus on identifying oil leaks, spills, accumulations, or staining, as well as equipment wear, damage, or other degradation that is affecting or could affect the integrity or tightness of oil containing tanks, containers, and equipment. Observe all visible portions of any oil-containing apparatus including metal surfaces, flanges, pipe joints, expansion joints, valve bodies, valve glands, catch pans, pipe and tank supports, etc.

The checklists contain a series of “yes” or “no” questions. Some answers contain an asterisk (*) next to the “yes” or “no.” Explain any checklist item answered with the “*” in the comments column and the space provided for explanations at the end of the form. Take appropriate actions consistent with LLNL work practices to address non-compliant items. Forward a copy of the completed checklist to EFA once complete.

Who Can Inspect

Periodic visual inspections do not require a certified inspector. Inspections are performed by custodians or their agents who are familiar with the equipment and can identify changes and developing problems. Inspectors should have taken the LLNL SPCC training courses, 3045-W and 3045-RW, as required.

Required Actions

Remove promptly upon discovery standing water or liquid in the primary tank, secondary containment area, interstitial space, or spill container. Before discharge, inspect the liquid for regulated products or other contaminants. If a sheen or other contaminants are noted, notify the ES&H Field EA immediately, and use booms, sorbents, or other means to remove the sheen. Alternatively, liquids can be removed by a vacuum truck and disposed of properly. Plant records, if properly documented, can be used to document these actions.

Non-conforming items important to tank or containment integrity require evaluation by an engineer experienced in AST design, a certified inspector, or a tank manufacturer who will determine the corrective action. Note the non-conformance and corresponding corrective action in the comment section.

Note: If a change has occurred to the tank system or containment that may affect the SPCC plan, the condition should be evaluated against the current plan requirement by a Professional Engineer knowledgeable in SPCC development and implementation.

Inspection Guidance

The following section provides additional details about the questions and responses needed for completing the inspection forms.

H.1 Non-RCRA Bulk Storage Container Monthly Inspection Checklist (Appendix H.1)

Instructions: Verify that each checklist item is completed. Under status, check the appropriate box. Provide comments if necessary. Sign and date the checklist at the bottom. Submit completed checklists to the appropriate manager.

(*) in the status column designates an item is in a non-conformance status. The inspector must determine whether the non-conforming item is important to tank or containment integrity. An item important to tank or containment integrity is defined as an item, if not addressed, that would imminently lead to an environmental release. Non-conforming items important to tank or containment integrity (cracks, tank or containment deformation, etc.) require evaluation by an engineer experienced in AST design, a certified inspector, or a tank manufacturer to determine corrective action.

In the event of severe weather or maintenance that could affect the operation of critical components, an inspection of these components is required as soon as the equipment is safely accessible after the event.

1.0 Evidence of leaks/spills from container or tank, piping, gaskets or valves?
Check the exterior of the equipment, and note any spills/releases from any of the equipment. Continuing slow drips should be addressed through normal maintenance practices. If visible leaks are occurring, take appropriate action to address the leaking. Pay particular attention to the piping, gaskets, threaded connections, and valves, and report deficiencies on the form.

2.0 Is water present in the primary tank?
Check for water in the fuel in the primary tank at the lowest point possible.

3.0 Are visible signs of leakage from the interstice present?
Where present, check the interstitial monitoring equipment to ensure it is functioning properly. If no sensor is installed, check interstitial space for indications of a leak. Liquid inside the interstitial space requires follow-up investigation and actions, as this condition implies a leak from the primary tank.

4.0 Any liquids in containment areas?
Check for oil, rainwater, or other liquids in the containment. Evidence of petroleum in containment areas requires follow-up investigation and actions, as this condition implies a leak from the tank, drum, or container. If water is found in secondary containment and no sheen is present, that water should be discharged. Record discharges in comments area on form.

5.0 Are primary tank drain valves locked?
Where present, ensure that the primary tank drain valves are locked. Ensure there is no evidence of a leak around the valve.

6.0 Are secondary containment drain valves operable and in closed position?
Where present, ensure that the drain valves operate properly and are closed except when releasing liquids. If liquids are released, log this information on the proper form.

7.0 Any debris, cracks, or fire hazards in secondary containment areas?
Debris or fire hazards in external secondary containment take up space that is needed to contain a release if one were to occur from the equipment or tank/container. Take actions if these are found to remove these items from the secondary containment areas.

8.0 Are tank supports and foundation unstable or not suitable for continued use?
Check the tank supports and foundation areas for cracks, corrosion, failure, leaning or listing, or other indications of impaired integrity. If the supports or foundation are not suitable, note the condition and follow-up using laboratory procedures to make repairs.

9.0 Is Level Gauge not operational or not readable?
Many of the tanks at LLNL use gauges that provide the level of the fuel in the tank. If the level gauge does not appear to be functioning properly, note this on the form and take action to repair or replace the equipment.

10.0 Is overfill equipment operable?
Where present, test overfill alarms to ensure they are operable.

11.0 Spill Containment Boxes on Fill Pipe

Where present, inspect spill boxes on fill pipes for debris, residue, or water. Ensure valves are operable and closed.

12.1 **Are ladders and platform structures secure with no signs of corrosion or damage?**
Where present, observe the condition of ladders and platform structures. If evidence of severe corrosion or other damage is observed, follow proper safety procedures for ensuring the equipment is not used until necessary repairs are made.

12.2 Any pathways or aisles blocked?
Can tanks be accessed easily to conduct inspections? For storage areas, pathways should remain clear and free of obstructions and fire hazards. Make sure that adequate aisle space remains so that people and equipment can move freely.

12.3 Any other conditions that should be addressed for continued safe operation or that affects the SPCC Plan?
If conditions are encountered that could affect the safe operation of the equipment or other conditions are observed that could affect the SPCC Plan, include this information on the form and report the information to the equipment custodian or program representative.

H.2 Portable Container Monthly Inspection Checklist (Appendix H.2)

Portable containers at the facility include drums, totes, and the tanks associated with the mobile refueler. Many of the questions are similar to inspection items for other equipment.

Instructions: Verify that each checklist item is completed. Under status, check the appropriate box. Provide comments if necessary. Sign and date the checklist at the bottom. Submit completed checklists to the appropriate manager.

(*) in the status column designates an item is in a non-conformance status. The inspector must determine whether the non-conforming item is important to tank or containment integrity. An item important to tank or containment integrity is defined as an item, if not addressed, that would imminently lead to an environmental release. Non-conforming items important to tank or containment integrity (cracks, tank or containment deformation, etc.) require evaluation by an engineer experienced in AST design, a certified inspector, or a tank manufacturer to determine corrective action. In the event of severe weather or maintenance that could affect the operation of critical components, an inspection of these components is required as soon as the equipment is safely accessible after the event.

1.0 Are containers within designated storage areas?
Drums and other portable storage containers at the facility should be stored within the designated storage areas on containment pallets or inside the units, unless they are in active use elsewhere. If no longer needed at active use areas in other parts of the facility, make arrangements to move the containers back to the designated storage area.

2.0 Any debris, spills or fire hazards in containment or storage area?
Containment areas should be free of debris and fire hazards. This includes spills or liquids in containment pallets or on the floor of buildings or structures. If spills or fire hazards are found note results on form, notify supervisor, and take actions to restore area.

3.0 Evidence of leaks/spills from container?

Check the containers for any leaking or spillage from the container—the entire storage area should be inspected. Record the results on the form. If leaks are found, take action consistent with LLNL practices to repair equipment or remove the equipment from service and repair.

4.0 Any containers distorted, buckling, denting or bulging?
Inspect containers to check for damage, including checking for bulging or distorted conditions. If found, ensure that the containers are still suitable for petroleum storage. If not, take action to replace the container.

5.0 Any pathways or aisles blocked?
This inspection item applies to hazardous materials and waste storage areas. Pathways should remain clear and free of obstructions and fire hazards. Make sure that adequate aisle space remains so that people and equipment can move freely.

6.0 Any liquids in containment areas?
Check for oil, rainwater, or other liquids in the containment. Evidence of petroleum in containment areas requires follow-up investigation and actions, as this condition implies a leak from the tank, drum, or container. If water is found in secondary containment and no sheen is present, that water should be discharged. Record discharges in comments area on form.

7.0 Are secondary containment valves closed?
Several berms and vaults have secondary containment valves that should be checked to ensure they are in a closed position.

H.3 Oil-Filled Electrical and Operational Equipment Monthly Inspection Checklist (Appendix H.3)

Transformers and other oil filled electrical equipment at the facility include transformers and programmatic equipment as identified in Table C-2 and C-3 of the SPCC Plan.

Instructions: Verify that each checklist item is completed. Under status, check the appropriate box. Provide comments if necessary. Sign and date the checklist at the bottom. Submit completed checklists to the appropriate manager.

(*) in the status column designates an item is in a non-conformance status. The inspector must determine whether the non-conforming item is important to equipment integrity. An item important to equipment integrity is defined as an item, if not addressed, that would imminently lead to an environmental release. Non-conforming items important to equipment integrity (cracks, equipment deformation, etc.) require evaluation by an engineer experienced in AST design, a certified inspector, or a tank manufacturer to determine corrective action.

In the event of severe weather or maintenance that could affect the operation of critical components, an inspection of these components is required as soon as the equipment is safely accessible after the event.

1.0 Any Evidence of Oil Leaks/Spills from container, piping, gaskets or valves?
Check the exterior of the equipment for any leaking or spillage—the entire perimeter of the equipment should be inspected. Pay close attention to any piping, gaskets, or valves, as these are

common areas for leaks. Record the results on the form. If oil leaks are found, take action consistent with LLNL procedures to repair equipment.

2.0 Any Equipment Damage, or Deterioration, including bolts and seams?
Check the equipment for evidence of wear or damage. Evidence of wear could include frayed wiring, piping, and other mechanical equipment. Note the location of the wear or damage on the form, and notify the equipment custodian if condition warrants.

3.0 Any liquids in containment areas
Check for oil, rainwater, or other liquids in the containment. Evidence of petroleum in containment areas requires follow-up investigation and actions, as this condition implies a leak from the tank, drum, or container. If water is found in secondary containment and no sheen is present, that water should be discharged. Record discharges in comments area on form.

4.0 Any other conditions that should be addressed for continued safe operation or that affects the SPCC Plan?
If conditions are encountered that could affect the safe operation of the equipment or other conditions are observed that could affect the SPCC Plan, include this information on the form and report the information to the equipment custodian.

H.4 Bulk Storage Container Annual Inspection Checklist (Appendix H.4)

Bulk storage containers requiring an annual inspection (in addition to the monthly inspection) are indicated on Table C-1. The following section provides additional details about the questions and responses needed for completing the inspection forms.

Instructions: This annual checklist should be completed on an annual basis supplemental to the monthly-performed inspections.

Verify that each checklist item is completed. Under status, check the appropriate box. Provide comments if necessary. Sign and date the checklist at the bottom. Submit completed checklists to the appropriate manager.

(*) in the status column designates an item is in a non-conformance status. The inspector must determine whether the non-conforming item is important to equipment integrity. An item important to equipment integrity is defined as an item, if not addressed, that would imminently lead to an environmental release. Non-conforming items important to equipment integrity (cracks, equipment deformation, etc.) require evaluation by an engineer experienced in AST design, a certified inspector, or a tank manufacturer to determine corrective action.

In the event of severe weather or maintenance that could affect the operation of critical components, an inspection of these components is required as soon as the equipment is safely accessible after the event.

1.1 Any holes or cracks in external secondary containment walls or floor, and/or evidence of tank leakage?
Inspect secondary containment area and note any substantial cracks or holes. Hairline cracks that appear to have no significant impact to the integrity of the containment (that is, would not leak or fail) will normally not be of major concern. If holes or cracks in containment exist that could affect the ability to contain a release are observed, take action to address situation. Check for any tank leakage.

1.2 Are secondary containment drain valves operable and in closed position?
Ensure that the drain valves operate properly and are closed except when releasing liquids. If liquids are released, log this information on the proper form.

2.1 Any evidence of tank foundation settling?
Check external secondary containment systems for indications of settlement of the tank. Evidence of settling would be cracking or dimpling of the containment system, tanks not level, or other similar conditions.

2.2 Any washout of containment, foundation or supports?
Check the perimeter of the containment area for locations where footings or anchors have been eroded or degraded or exposed. Observe the foundation and tank footings to ensure these have not settled or have been undermined or washed-out. Evidence of settlement could include tanks noticeably out of level, or stress cracking in the vicinity of the tank's footings. If the integrity of the containment could be compromised, take actions to repair or replace any areas of washout or settlement.

2.3 Any evidence of corrosion or paint failure of the tank supports?
Check the saddles or footings of the tank for evidence of significant corrosion or paint failure that could jeopardize the stability of the tank. Tanks that are in contact with stormwater for extended periods should be checked carefully, as standing water will rapidly corrode tank supports. Take actions to address corrosion or paint failure of tank supports.

2.4 Does water drain away from tank?
To avoid corrosion, water should drain away from the tank and footings. Ensure that containment areas remain free of standing water by taking appropriate actions. Do not allow water to remain in contact with steel supports or the tank.

2.5 Any cracking or spalling of the concrete pad?
Most tanks are situated on housekeeping or structural concrete pads. Check these for the presence of cracks or spalling (deterioration of the concrete, sometimes associated with corrosion of rebar). Observe these areas and record results on the form.

2.6 Is grounding strap secured and in good condition?
Check the grounding strap to make sure remains securely connected to the tank and is not frayed or damaged.

3.1 Evidence of corrosion or coating failure?
Check all areas of the tank exterior for significant corrosion or paint failure has occurred. Take actions to address corroded areas and to repaint failed areas promptly.

3.2 Evidence of denting, buckling, bulging, or cracking?
Visually inspect the shells of the tanks to check for damage of these types. If observed, take prompt actions consistent to address these issues. If noticeable distortions have occurred, a more detailed inspection may be required to ensure safe continued operation.

4.1 Venting
Visually inspect vents. Ensure they are unobstructed and can move freely. If vents are obstructed or otherwise not operating properly, take action consistent with LLNL procedures to repair equipment.

4.2 Any active leaks from piping, valves or gaskets?

Piping, valves, and gaskets should be in good condition, not leaking, corroded or damaged. If this equipment is not fit for continued service, take appropriate action consistent with LLNL procedures to repair or replace.

4.2.1 Check anti-siphon and gate valves

Cycle anti-siphon and gate valves open and closed to ensure that they are operating properly. If this equipment is not fit for continued service, take appropriate action consistent with LLNL procedures to repair or replace if not.

4.3 Check condition of interstitial leak detection equipment

a. Check sight glasses

If present, ensure sight glasses are clean and clear to enable detection of leak in interstitial space. If this equipment is not fit for continued service, take appropriate action consistent with LLNL procedures to repair or replace.

b. Check wire connections to electronic gauges

Ensure wire connections to electronic gauges are in good working order meaning no exposed wiring, are connected properly and free of any corrosion. If this equipment is not fit for continued service, take appropriate action consistent with LLNL procedures to repair or replace.

c. Check interstitial leak detection system

Ensure system is operational. If the system is electronic, remove and test sensor. If this equipment is not fit for continued service, take appropriate action consistent with LLNL procedures to repair or replace.

4.4 Spill Containment Boxes on Fill Pipe

Where present, inspect spill boxes on fill pipes for debris, residue, or water. Ensure valves are operable and closed. Check for any corrosion and weeping or loose fittings that could compromise the integrity. If this equipment is not fit for continued service, take appropriate action consistent with LLNL procedures to repair or replace.

4.5 Filters

a. Is the filter in good condition and within the manufacturer's expected service life?

Check the fuel filter. Replace if not in good condition or if the service life expectation has been exceeded.

b. Are leaks or decreased fuel flow present?

Observe for leaks or decreased fuel flow. Replace filter if leaks or fuel flow decreases are observed.

4.6 Liquid Level Equipment

a. Is the tank liquid level gauge operable? Record Tank Level

Observe the liquid level gauge to check for operability. Record the tank level on the form. Refer to the following question to confirm the accuracy of the gauge for level indication.

b. Has level gauge been calibrated or checked consistent with the manufacturer's recommendations (at minimum annually)?

Liquid level gauges are required to be checked regularly under SPCC Plan regulations, normally interpreted as "annually" or as required by the equipment manufacturer. Typically, level gauges are checked by manually gauging the tank, and then comparing the results from the gauge. Check with the equipment manufacturer to determine the best means to confirm proper operation of the level gauge.

c. Test high level alarm. Does it operate as designed?
High level alarms should also be checked using manufacturer's instructions.

5.1 Are electrical wiring and boxes in good condition??
Where electrical boxes are present, do they appear in good condition? Is evidence of frayed wires visible? Make arrangements to have electrical condition inspected by electrician if warranted.

5.2 Are labels and tags intact and readable?
Ensure that any labels are accurate, intact, and readable, if tank is so equipped. Make arrangements to replace labels if they have become unreadable.

5.3 Are there other conditions that should be addressed for continued safe operation or that may affect the site SPCC Plan?
Use this section to record any observations that could affect the safe operation of the equipment, or if there are other findings that could affect the Spill Plan. If equipment is found that is not suitable for continued service, take action consistent with facility practices to return the equipment into active service.

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Form H.1: Bulk Storage Container Monthly Inspection Checklist

REQUIRED INFORMATION:
Inspection Date: ________ Inspector Name: ________________________________ Container Number: _________________
Location: ____________________________________ Container Contents: ____

Checklist --See Section H.1 for instructions and required follow-up actions for non-conforming items marked with an asterisk (*)

	Inspection Item:	**Status:**	If (*), is item important to tank or containment integrity? (Y/N)	**Comments, Including Follow-up Action taken (Work Order #, etc.)**
1.0	Is evidence of leaks/spills from container, piping, gaskets or valves present?	☐ Yes* ☐ No		
2.0	Is water present in the primary tank?	☐ Yes* ☐ No		
3.0	Are visible signs of leakage from the interstice present (applies only to double-walled tanks)?	☐ Yes* ☐ No ☐ NA		
4.0	Are liquids present in containment areas?	☐ Yes* ☐ No		
5.0	If present, are primary tank drain valves locked?	☐ Yes ☐ No* ☐ NA		
6.0	Are containment drain valves operable and in a closed position?	☐ Yes ☐ No* ☐ NA		
7.0	Are debris, cracks, or fire hazards present in secondary containment areas?	☐ Yes* ☐ No ☐ NA		
8.0	Are tank supports/foundation unstable or not suitable for continued use?	☐ Yes* ☐ No ☐ NA		
9.0	Is Level Gauge operational and readable?	☐ Yes ☐ No* ☐ NA		
10.0	Is overfill equipment (e.g., high level alarm) operable?	☐ Yes ☐ No* ☐ NA		
11.0	Spill Containment Boxes on Fill Pipe a. Is debris, residue, or water present in spill containment box on fill pipe	☐ Yes* ☐ No ☐ NA		
	b. Are drain valves on spill containment boxes on fill pipe operable and closed	☐ Yes ☐ No* ☐ NA		
12.0	**Other Conditions**	☐ Yes		

Inspection Item:	**Status:**	If (*), is item important to tank or containment integrity? (Y/N)	**Comments, Including Follow-up Action taken (Work Order #, etc.)**
12.1 If present, are ladders and platform structures secure with no signs of severe corrosion or damage?	☐ No* ☐ NA		
12.2 Any pathways or aisles blocked?	☐ Yes* ☐ No ☐ NA		
12.3 Are there other conditions that should be addressed for continued safe operation or that may affect SPCC?	☐ Yes* ☐ No		

COMMENTS:

Signature: ____ Date: ____________________

Form H.2: Portable Container Storage Area Monthly Inspection Checklist

REQUIRED INFORMATION:

Inspection Date: ________ Inspector Name: ___________________________________ Container Number: __________________

Location: ____ Container Contents: ____

Checklist --See Section H.2 for instructions and required follow-up actions for non-conforming items marked with an asterisk (*)

Inspection Item:	**Status:**	If (*), is item important to tank or containment integrity? (Y/N)	**Comments, Including Follow-up Action taken (Work Order #, etc.)**
1.0 Are containers within designated storage areas?	☐ Yes ☐ No*		
2.0 Are debris, spills, or other fire hazards present in the containment or storage area?	☐ Yes* ☐ No		
3.0 Are visible signs of leakage around the container or storage area present?	☐ Yes* ☐ No		
4.0 Are there noticeable container distortions such as buckling, denting, or bulging?	☐ Yes* ☐ No		
5.0 Are egress pathways clear and gates/doors operable?	☐ Yes ☐ No* ☐ NA		
6.0 Are liquids present in containment areas or surrounding concrete or soil?	☐ Yes* ☐ No ☐ NA		
7.0 Are secondary containment drain valves in a closed position?	☐ Yes ☐ No* ☐ NA		

COMMENTS:

Signature: ____ Date: ___________________

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Form H.3: Oil-Filled Electrical and Operational Equipment Inspection Checklist

REQUIRED INFORMATION:

Inspection Date: ________ Inspector Name: _________________________________ Equipment Number: __________________

Location: ______________________________________ Equipment Contents: ____

Checklist --See Section H.3 for instructions and required follow-up actions for non-conforming items marked with an asterisk (*)

Inspection Item:	**Status:**	If (*), is item important to tank or containment integrity? (Y/N)	**Comments, Including Follow-up Action taken (Work Order #, etc.)**
1.0 Is evidence of a leak or spill visible from anywhere on the exterior of the equipment (seams, piping/hosing, gaskets, or valves)?	☐Yes* ☐ No		
2.0 Any equipment damage or deterioration that could affect equipment integrity (including bolts and seams)?	☐Yes* ☐ No		
3.0 Are liquids present in containment areas or surrounding concrete or soil?	☐Yes* ☐ No		
4.0 Are there any other conditions that should be addressed for continued safe operation that may affect the Site SPCC Plan? If yes, please describe.	☐Yes* ☐ No		

COMMENTS:

Signature: ____ Date: ____________________

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Form H.4: Bulk Storage Container Annual Inspection Checklist

REQUIRED INFORMATION:
Inspection Date: ________ Inspector Name: ___________________________________ Container Number: __________________
Location: _______________________________________ Container Contents: ____

Checklist --See Section H.4 for instructions and required follow-up actions for non-conforming items marked with an asterisk (*)

Inspection Item:	**Status:**	If (*), is item important to tank or containment integrity? (Y/N)	**Comments, Including Follow-up Action taken (Work Order #, etc.)**
1.0 Tank Secondary Containment Area			
1.1 Is evidence of any of the following observed in the containment structure: Holes or cracks in containment wall or floor, or leakage	☐ Yes* ☐ No ☐ NA		
1.2 Are secondary containment drain valves operable and in a closed position?	☐ Yes ☐ No* ☐ NA		
2.0 Tank Foundation and Supports			
2.1 Are visible signs of tank foundation settlement present?	☐ Yes* ☐ No		
2.2 Are visible signs of washout of containment, foundation or supports present?	☐ Yes* ☐ No		
2.3 Are visible signs of corrosion, paint failure, or other defect present on the tank supports?	☐ Yes* ☐ No ☐ NA		
2.4 Does water drain away from the tank?	☐ Yes ☐ No* ☐ NA		
2.5 Is the concrete pad cracking or spalling?	☐ Yes* ☐ No ☐ NA		
2.6 Is the tank grounding strap secured and in good condition?	☐ Yes ☐ No* ☐ NA		
3.0 Tank Exterior 3.1 Is evidence of corrosion or coating failure present?	☐ Yes* ☐ No		
3.2 Is evidence of any of the following observed in the steel: Dents, Buckling, Bulging, Cracking	☐ Yes* ☐ No		
4.0 Tank Equipment 4.1 Are tank vent components moving freely and are vent passages unobstructed?	☐ Yes ☐ No*		
4.2 Are visible signs of leaks, corrosion and/or damage present on any valves, gaskets, or piping?	☐ Yes* ☐ No		
4.2.1 Cycle the anti-siphon check and gate valves open and closed. Are they operating properly?	☐ Yes ☐ No* ☐ NA		

Inspection Item:	**Status:**	If (*), is item important to tank or containment integrity? (Y/N)	**Comments, Including Follow-up Action taken (Work Order #, etc.)**
4.3 Check the condition of the interstitial leak detection equipment.			
a. Is the sight glass clean and clear for sight leak gauges?	☐ Yes ☐ No* ☐ NA		
b. Are the wire connections of electronic gauges tight and free of corrosion?	☐ Yes ☐ No* ☐ NA		
c. Test the sensor. Does equipment operate as required?	☐ Yes ☐ No* ☐ NA		
4.4 Check the condition of the spill containment boxes on fill pipes			
a. Is corrosion, damage or wear present that compromises the ability of the unit to perform spill containment functions.	☐ Yes* ☐ No ☐ NA		
b. Are connections to the container tight?	☐ Yes ☐ No* ☐ NA		
c. Are drain valves operable and closed?	☐ Yes ☐ No* ☐ NA		
4.5 Filters			
a. Is the filter in good condition and within the manufacturer's expected service life? Replace, if necessary.	☐ Yes ☐ No* ☐ NA		
b. Are leaks or decreased fuel flow present?	☐ Yes* ☐ No ☐ NA		
4.6 Liquid Level Equipment			
a. Is the tank liquid level gauge operable (record tank level in comments)?	☐ Yes ☐ No* ☐ NA		
b. Has level gauge been calibrated or checked consistent with the manufacturer's recommendations?	☐ Yes ☐ No* ☐ NA		
c. Test the high level alarm. Does equipment operate as required?	☐ Yes ☐ No* ☐ NA		
5.0 Miscellaneous			
5.1 Are electrical wiring and boxes in good condition?	☐ Yes ☐ No* ☐ NA		

Inspection Item:		**Status:**	If (*), is item important to tank or containment integrity? (Y/N)	**Comments, Including Follow-up Action taken (Work Order #, etc.)**
5.2	Are labels and tags intact and readable?	☐ Yes ☐ No* ☐ NA		
5.3	Are there other conditions that should be addressed for continued safe operation or that may affect the site SPCC Plan?	☐ Yes* ☐ No		

COMMENTS:

Signature: ____ Date: ___________________

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Appendix I

24-Hour, 25-Year Return Period Storm Memorandum

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January 5, 2005

TO: Lily Sanchez

FROM: Chris G. Campbell, Environmental Scientist

SUBJECT: **Calculation of the 24-Hour 25-Year Return Period Storm for the Livermore Site (S200) for Design of Secondary Containment for Tanks**

The following analysis was designed to establish the 24-hour 25-year storm return period for the Livermore Site (Site 200) at the Lawrence Livermore National Laboratory. Precipitation values (in inches) for this design storm are required for calculations made in support of regulatory guidance on the design of secondary containment berms around tanks.

Data

Data was gathered from historical records of total daily rainfall for LLNL since 1958. While this record has not been subject to a rigorous quality control and assurance program prior to about 1996, it is the best record with the most continuous data found for this region. The daily total rainfall data are continuous from 1958 through 1986. There is a 10-year break in the data until 1996 when data is available from the Livermore Site weather station. This data could have been supplemented with records from a local conscientious observer for the National Weather Service. Given, however, that this has the potential to add additional error, the LLNL data for 1958 to 1986 and 1996-2004 where used as sufficient for this analysis.

One high data value for 1970 was excluded from the analysis (4.26 in precipitation on Nov 30, 1970) as the value from the NWS conscientious observer was well below this extreme value and given that the date of this high value occurred after a weekend. Removal of this data value only altered the analysis in a minor way, shifting the upper limit at 3 years from 4.26 to 4.0. It is our judgment that the removal of the extreme value from Nov 30, 1970 improved the accuracy of this analysis.

Analysis

The analysis was performed by developing a frequency distribution for the occurrences of precipitation events at 0.5 inch intervals up to 4.5 inches. The frequency of occurrences per year were plotted using the upper and lower value of the 0.5 inch ranges to present a reasonable range for a return period. The frequency distribution of 24-hr precipitation events in inches is in Figure 1. The resulting 24-hr return periods in years are plotted against the precipitation amount in inches in Figure 2.

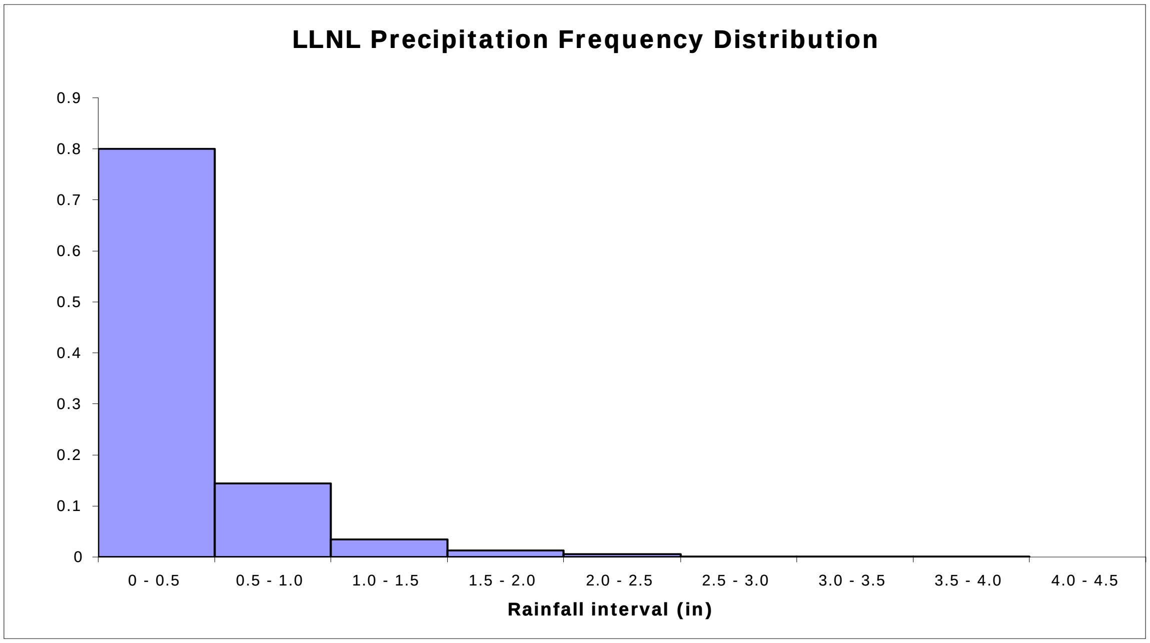

Figure 1: The frequency distribution (histogram) for precipitation events measured for 1958-1986 and 1996-2004 at the Livermore Site (S200) of LLNL.

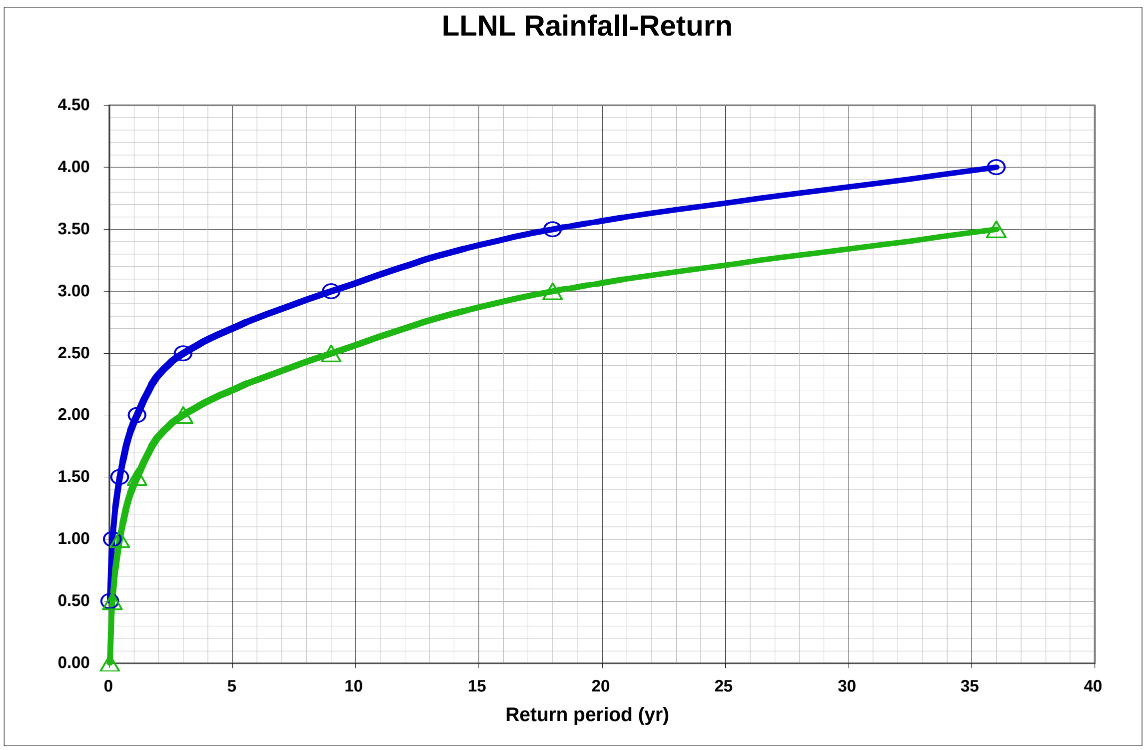

Figure 2: The 24-hr storm return periods for years on the X-axis and precipitation in inches on the Y-axis for precipitation events measured for 1958-1986 and 1996-2004 at the Livermore Site (S200) of LLNL.

RESULTS

Our analysis provides a conservative range for precipitation values for the 24-hr 25-yr event of 3.2 to 3.7 inches. These values are reasonable given that the 24-hr 25-yr storm for San Francisco, California has been estimated to be 4.17 inches (Golden Gate Weather Services 2002, Goodridge 1982). This result is the best available estimate of the 24-hr 25-yr storm event calculated using the best available data and information.

REFERENCES

Golden Gate Weather Services 2002, http://ggweather.com/sf/return.html

Goodridge, J.D. 1982, Rainfall Depth-Duration-Frequency for California, California Department of Water Resources, Sacramento, CA.