SPILL PREVENTION, CONTROL AND COUNTERMEASURE PLAN (SPCC)

Lawrence Berkeley National Laboratory

Berkeley, California

REVISION 3.0

October 2007

SPCC PLAN APPROVAL

REVISION 3.0 **AMENDMENT 0**

DESCRIPTION OF SPCC PLAN AMENDMENT

This plan has been updated in accordance with the five year update requirement from 40 CFR 112.5(b). It has been updated to reflect changes throughout the facility in the number and location of facilities used for oil storage.

MANAGEMENT APPROVAL OF SPCC PLAN REVISION/AMENDMENT

11.14.2007

David McGraw, Associate Laboratory Director Operations — Date
Lawrence Berkeley National Laboratory

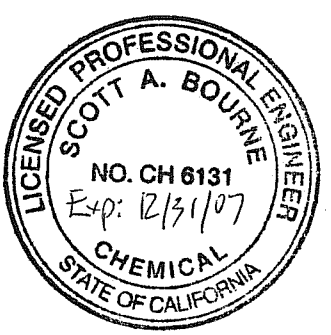
PROFESSIONAL ENGINEER CERTIFICATION

I hereby certify that I have examined the facility, and being familiar with the provisions of 40 CFR 112, attest that this SPCC Plan has been prepared or modified in accordance with good engineering practices.

Scott Bourne 10/24/07

Signature of Licensed Professional Engineer — Date
Scott Bourne., P.E.
State of California

REGISTERED CHEMICAL ENGINEER CH6131, EXP 12/31/07.



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INTRODUCTION

1.1 PURPOSE

The purpose of this Spill Prevention, Control, and Countermeasure (SPCC) Plan is to provide standards for the storage and usage of oil at the Lawrence Berkeley National Laboratory (Berkeley Lab) that will prevent the discharge of oil into or upon the navigable waters of the United States or adjoining shorelines. This SPCC Plan (Plan) has been prepared in accordance with the requirements set forth in Title 40, Part 112 of the Code of Federal Regulations (40 CFR 112); the California Health and Safety Code Chapter 6.67 (H&SC 6.67); and the United States Department of Energy (DOE) Order No. 5400.1. In order to prepare this Plan, Berkeley Lab has analyzed the facility's capability to prevent oil discharges and facilitate safety awareness. By accumulating the information necessary for the Plan, Berkeley Lab promotes the use of appropriate design and operational standards that reduce the likelihood of an oil discharge.

This Plan is not intended to address materials classified as hazardous wastes under 40 CFR 265 or Title 22 of the California Code of Regulations (CCR Title 22) stored in the Berkeley Lab's Hazardous Waste Handling Facility. Storage of these materials is addressed in the Resource Conservation and Recovery Act (RCRA) Part B permit for the Berkeley Lab. However, waste oils stored in individual Waste Accumulation Areas (WAAs) located throughout the general facility are not addressed in the RCRA Part B permit application and are therefore addressed in this SPCC Plan.

1.2 APPLICABILITY

Facilities are required to prepare SPCC Plans if they store any form of oil or petroleum product in excess of the minimum quantities defined below, and are located such that the facility could reasonably be expected to discharge harmful quantities of oil into navigable waters. Non-transportation facilities are required to prepare SPCC Plans if they meet the following criteria:

- Have an aggregate aboveground storage capacity of more than 1,320 gallons, or
- A total underground 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 Berkeley Lab currently has:

- An aggregate aboveground storage capacity that exceeds 1,320 gallons.
- Total underground oil storage capacity that is less than 42,000 gallons.

Capacities of individual storage tanks are listed in the appendices.

In addition, storm drains located in outdoor areas throughout the Berkeley Lab eventually discharge into San Francisco Bay, which is a navigable water of the United States. The Berkeley Lab is therefore subject to the requirement to prepare a SPCC Plan.

For the purposes of this Plan:

- Oil is defined in 40 CFR 112.2(a) as oil (or petroleum products) of any kind or in any form, including but not limited to petroleum, fuel oil, sludge, oil refuse and oil mixed with wastes other than dredged spoil.
- Harmful quantities of oil or petroleum products are defined in 40 CFR 110 as those that (a) violate applicable water quality standards, or (b) cause a film or sheen upon or discoloration 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.
- A bulk oil or petroleum storage unit is defined as a storage tank or drum having a capacity of at least 1 barrel, or 42 gallons. Selection of this quantity was based on the minimum quantity that must be reported in the event of a release (H&SC 6.67 §25270.8). This Plan addresses bulk storage of oil or petroleum products only. The storage of oil may be prior to use, while being used, or prior to further distribution in commerce. Oil filled electrical, operating, or manufacturing equipment is regulated under 40 CFR 112. 7 and must have appropriate containment, but is excluded from the bulk storage container requirements in 40 CFR 112.8 since the primary purpose of this equipment is not to store oil in bulk.

This plan conforms to the requirements outline in 40 CFR 112.

1.3 PLAN MAINTENANCE AND AMENDMENTS

The Environmental Services Group (ESG) of the Berkeley Lab is responsible for maintaining and updating this SPCC Plan. A complete copy of this Plan is maintained at all times at the ESG office of the Berkeley Lab and also on the World Wide Web (http://www.lbl.gov/ehs/esg/tableforreports/tableforreports.htm). This Plan is available to representatives of regulatory agencies for on-site review during normal business hours.

The California State Water Resources Control Board may require amendment to the Plan following spills of harmful quantities of oil to navigable waters. The SPCC Plan will be amended within six months following any change in facility design, construction, operation, or maintenance, which significantly affects the potential for discharges of oil into navigable waters. In addition, the Berkeley Lab will review and evaluate the SPCC Plan every five years. Within six months following completion of the review, the Berkeley Lab if necessary will revise the Plan to include any identified improvements in prevention and control technology. A Professional Engineer licensed in the State of California will certify all technical amendments to the SPCC Plan in accordance with 40 CFR 112.5(c) and 112.3(d). Changes in emergency contact names and telephone numbers will be made as they occur and will not require engineering certification. This exception allows for maintaining an emergency contact list, and does not affect the technical/engineering aspects of this Plan.

1.4 DESIGNATED RESPONSIBLE PERSONS

The following individuals are those designated responsible for oil spill prevention at Berkeley Lab:

Ron Pauer, Group Leader, Environmental Services Group

Howard Hatayama, Director, Environment, Health and Safety Division

1.5 GENERAL FACILITY INFORMATION

Facility Name and Address:	Lawrence Berkeley National Laboratory 1 Cyclotron Road Berkeley, California 94720
Type of Facility:	Research Laboratory [SIC 8733]
Owner Name and Address:	U.S. Department of Energy Berkeley Site Office 1 Cyclotron Road, MS 90R1023 Berkeley, California 94720
Operator Name and Address:	(1) University of California Regents Lawrence Berkeley National Laboratory 1 Cyclotron Road Berkeley, California 94720 (2) U.S. Department of Energy Berkeley Site Office 1 Cyclotron Road, MS 90R1023 Berkeley, California 94720
Facility Location:	*Latitude* 37 *degrees* 53 *seconds* *North* *Longitude* 122 *degrees* 51 *seconds* *East*
Start-up Date:	1931

Figure 2-1 shows the general site location on a San Francisco Bay Area map. A vicinity map of adjacent land use is shown in Figure 2-2. Figure 2-3 is a facility map indicating site boundaries. Figure 2-4 illustrates site storm and creek(s) drainage. Figure 2-5 shows the topography of the Berkeley Lab site.

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ANALYSIS OF SPILL POTENTIAL

2.1 SPILL HISTORY

There have been no known oil or petroleum product spills that have resulted in release of harmful quantities of oil to navigable waters at the Berkeley Lab. Over the years, Berkeley Lab staff has implemented numerous facility improvements that have significantly reduced the potential for release of harmful quantities of oil. Control measures include:

- Replacement of older Aboveground Storage Tanks (ASTs) with new, current technology tanks, designed with secondary containment.
- Installing secondary containment, such as sheet metal boxes, concrete berms, and catch basins around ASTs and oil-filled transformers.
- Leak testing existing containment and re-sealing where necessary.
- Additional Spill Kits placed near tanks and storage areas.
- Locating select ASTs in buildings or sheds in addition to secondary containment.
- Removal or upgrade of all Underground Storage Tanks (USTs) as required by December 1998.
- Consolidation of all 55-gallon drums into Drum Storage Areas (DSAs) with secondary containment.
- Implementing an integrity testing program for bulk storage containers.

Spills at tank removal sites are under the jurisdiction of the City of Berkeley, a Certified Unified Program Agency (CUPA). The Regional and State Water Quality Resources Control Boards have regulatory authority if groundwater is contaminated. The Environmental Restoration Program of the Berkeley Lab is carried out within the auspices of the DTSC approved RCRA Corrective Action Program. In addition, the RCRA Facility Assessment and RCRA Facility Investigation Work Plans are in place. These regulatory agencies, including the East Bay Municipal Utility District, provide regulatory oversight for Berkeley Lab's oil pollution prevention activities.

2.2 PREDICTION OF POTENTIAL SPILLS

There is only one electrical oil-filled transformer without secondary containment on the Berkeley Lab site. This oil-filled transformer is currently out of service and is not expected to ever be placed back in service. It will be removed from this plan when it is removed from the Berkeley Lab. Aboveground tanks, oil filled electrical equipment and drum storage areas have secondary containment and do not have a reasonable potential to result in a discharge of harmful quantities of oil into navigable waters (i.e., Strawberry Creek). In addition, the Berkeley Lab has implemented numerous control measures, which have significantly reduced the potential for any spills. These control measures include providing spill containment and cleanup kits for those aboveground tanks which cannot reasonably be equipped with secondary containment (i.e. portable emergency generators), and Operations & Maintenance (O&M) Group's procedures for inspection.

2.3 CONTAINMENT

Appropriate containment and/or diversionary structures or equipment used at Berkeley Lab that prevents discharged oil from reaching a navigable water course include the following:

- Coated concrete berms and sheet metal pans
- Collection pits in storm drains
- Booms
- Curbing, culverts, gutters, and other drainage systems
- Storage sheds with built-in containment
- Containment barrels for drums
- Sorbent materials and spill kits

Containment structures used for specific aboveground storage areas are described in Appendices A (Aboveground Storage Tanks-ASTs), C (Drum Storage Areas) and D (Oil Filled Transformers and Electrical Equipment).

2.4 CONTINGENCY PLAN FOR AREAS WITHOUT CONTAINMENT

All ASTs and drums used for the storage of oil or petroleum products have secondary containment. Spill kits are located strategically throughout the site, and are readily accessible. In addition, O&M operations and training address necessary procedures to be conducted in the event of any leak or spill.

2.5 SPILL RESPONSE PROCEDURES

Berkeley Lab staff is trained in the following **SWIMS** procedures below for responding to spills. These procedures are posted in areas where potential spills may occur.

S STOP and THINK. Stop working. Stop the spill.

- Assess the situation: How big is the Spill? Has it made contact with your skin or personal clothing?

W Warn Others

-Call x7911 or 9-911 if there is a medical emergency or danger to life, health or the environment.

- Alert people in laboratory.

I Isolate the Area

-Restrict access.

-Determine the extent of the spill.

-Keep doors closed.

M Monitor Yourself Carefully and Completely

-Check yourself for any chemical contamination o r signs/symptoms of exposure (wet clothing, skin or respiratory irritation).

-For medical emergencies follow directions under the PERSONAL INJURY tab.

S STAY In or Near the Area Until Help Arrives

-Minimize your movements.

-Have person knowledgeable of incident assist Emergency Personnel

- Notify your supervisor.

3

FACILITY DRAINAGE

3.1 SITE DRAINAGE PATTERNS

The topography of the Berkeley Lab site consists of steep hillsides and canyons. The site generally slopes from northeast to southwest with grades as steep as 26 percent. Ground elevations range from 500 ft to 1,050 ft above mean sea level.

The northwest portion of the site is located within the North Fork Strawberry Creek watershed, commonly referred to as Blackberry Creek. The remainder of the site is within the South Strawberry Creek Watershed. A map of the site drainage patterns is shown in Figure 2-4, and a map showing the site creeks and topography is shown in Figure 2-5. Surface runoff within the Blackberry Canyon Watershed discharges either directly or via storm drains into North Fork of Strawberry Creek. Surface runoff within the remainder of the site discharges either directly or via storm drain into tributaries of the South Fork of Strawberry Creek. The South Fork mixes with the Botanical Creek forming a settling pond area before overflowing into underground piping. Both the North Fork and the South Fork flow through separate culverts and re-surface on upper portions of the University of California (UC) Berkeley campus. The two creeks eventually merge at the lower end of the UC campus before passing beneath the City of Berkeley and discharging into the San Francisco Bay. Conditions for the creeks and tributaries range from completely dry in the summer months to heavy flows during winter storms.

3.2 DRAINAGE FROM CONTAINMENT AREAS

When rainfall results in a significant accumulation of water in secondary containment areas, the water is discharged after each storm event. An O&M Group procedure for rainwater disposal is presented in Appendix E, along with a rainwater disposal log form. The rainwater disposal procedure will be modified periodically to include secondary containment requiring rainwater disposal that is currently being constructed or planned. Modifications to the rainwater disposal procedure will be made as necessary and included in the Plan without formal modification. The general procedure for discharge of accumulated rainwater from containment is as follows:

- Bypass valves are normally sealed closed.
- Bypass valves will be opened and resealed following drainage under responsible supervision.
- Accumulated liquid will be inspected for color, clarity, odor or the presence of a sheen on the water surface. If the results of the inspection are inconclusive, a sample will be collected and analyzed for the presence of petroleum hydrocarbons.
- If the accumulated liquid consists of uncontaminated rainwater only, authorized O&M personnel will discharge the liquid through a manually operated valve. The valve will be closed and locked following completion of the discharge. No flapper-type valves are

installed in containment areas. If no discharge valves are available, the water will be pumped from the containment area into a nearby storm drain.

- If the rainwater sample test results indicate the presence of petroleum hydrocarbons, then procedures for contaminated water will be followed for the removal of the rainwater from the containment area.
- A record of storm water inspections and discharges is maintained using the form presented in Appendix F. The O&M Group will maintain records for no less than three years.

In the event that containment areas are in danger of overflowing and the accumulated rainwater shows evidence of oil contamination, the water will be pumped into temporary storage containers and analyzed to determine the appropriate method of disposal.

3.3 PLANT EFFLUENT DISCHARGES INTO NAVIGABLE WATERS

Plant effluents discharged into navigable waters include storm water and ground water discharges from hydraugers located through out the Berkeley Lab. The hydraugers are hydraulic conduits used to lower the water tables in potentially unstable hills. Many of the hydraugers discharge into the storm drain system. Some hydraugers, which could contain potentially contaminated effluents, are treated onsite before being discharged to the sanitary sewer. The hydrauger discharges are monitored periodically, as reported in the Site Environmental Report for the Lawrence Berkeley National Laboratory (SER).

Procedures for monitoring storm water discharges are discussed in the Berkeley Lab Storm Water Monitoring Plan, in compliance with the California General Industrial Storm Water Permit. The ESG is responsible for implementing the Storm Water Monitoring Plan. The Plan requires monitoring of two storm events per year with the results reported in the SER and the Storm Water Monitoring Report.

4

OIL STORAGE

4.0 OIL STORAGE

Oil storage units at the Berkeley Lab consist of ASTs, Underground Storage Tanks (USTs), drum storage areas, portable tanks, and oil-filled electrical equipment. For the purposes of this Plan, an oil or petroleum product storage unit is defined as a tank or drum having a capacity of at least 1 barrel, or 42 gallons.

4.1 MATERIALS OF CONSTRUCTION

All storage units used for oil or petroleum product storage are constructed of materials compatible with such products and in compliance with current construction standards. These materials include carbon-steel, epoxy-coated steel, fiberglass, and plastics that have been certified by the manufacturer to be appropriate for use with petroleum products. All tanks are designed for use under conditions that include atmospheric pressure, the full range of ambient temperatures normally occurring in the San Francisco Bay Area, exposure to rain, and extended periods of sunlight.

4.2 ABOVEGROUND STORAGE TANKS (ASTs)

A current list of ASTs, with a description of the secondary containment for each tank, is provided in Appendix A. All of the ASTs containing 42 gallons or more have secondary containment of sufficient capacity to contain the entire contents of the largest tank within the containment area plus a sufficient allowance for precipitation (25-year, 24-hour storm of 4.84 inches as a best management practice). Locations of ASTs are indicated on Figure A-1 in Appendix A. Berkeley Lab tanks are as follows:

- Double-walled, vault tanks for E85 blend, diesel fuel and transformer oils.
- Double-walled, belly tanks for emergency electricity generation.

Several ASTs attached to emergency generators (day tanks) are equipped with fiberglass automatic fill lines from USTs. In all cases, these day tanks have now been equipped with relay cutoffs that control solenoid valves, which prevent the uncontrolled pumping of oil in the event of a leak at the day tank.

No ASTs at the Berkeley Lab are heated; therefore regulations pertaining to internal heating coils are omitted from discussion in this Plan.

4.3 UNDERGROUND STORAGE TANKS (USTs)

A current list of USTs at the Berkeley Lab is presented in Appendix B. The locations of the USTs are shown in Figure B-1 in Appendix B. All UST systems at the Berkeley Lab are double-walled

tanks with corrosion protection and automatic release detection capability. Overfill prevention for USTs consists of:

- Automatic shutoff valves for the main fuel USTs at Building 76;
- Formal emergency procedures LBNL UST Monitoring & Emergency Response Plan (June 10, 2003) for responding to a potential overfill situation; and
- Emergency signs posted that provide instructions for power shutoff in the event of a potential overfill situation.

4.4 DRUM STORAGE AREAS

A list of drum storage areas at the Berkeley Lab is presented in Appendix C, along with a description of secondary containment or spill control measures at each area. The list includes WAAs that are currently used for storage of waste oil and hazardous waste. The locations of DSAs are indicated in Figure C-1. The locations of the WAAs are shown in Figure C-2. All WAAs may potentially be used for storage of waste oil, although waste oil that has been recently transferred to the handling facility would not be indicated on the list. Therefore, all WAAs are shown in Figure C-2, including those that do not currently contain waste oils. All WAAs are equipped with secondary containment. Currently, there are nine (9) WAAs. Generally, there are only three to four WAAs containing or expected to contain waste oil.

The centralized drum storage area is located at Building 79A. Additionally, several small drum storage sheds were constructed throughout the facility. To the extent practical, all oil containing product drums are stored within the sheds or at the drum storage facility. However, because of changing operations throughout the facility, small numbers of drums may periodically be stored near various buildings. Provisions have been made for the storage of these drums on secondary containment pallets, or within secondary containment drums.

Additionally, if conditions require the use of a drum within a building, plastic containment barrels and/or plastic drainage/containment pallets are used. The plastic containment barrels are generally used for containment of individual drums in areas where only one or two drums are stored. In accordance with 40 CFR 112.7(e)(2)(ii), secondary containment provided for drum storage areas have sufficient volume to contain the entire contents of the largest single drum or tank plus sufficient freeboard to allow for precipitation (25-year, 24-hour storm event of 4.84 inches as a best management practice), and enough space to allow for 20 minutes of fire sprinkler water (UFC, Art.79).

4.5 PORTABLE STORAGE TANKS

Portable storage tanks at the Berkeley Lab are associated with mobile portable standby generators, air compressors, and a small on-site tank truck for delivery of fuel. Most portable tanks are double-walled or have fabricated metal containment. These tanks are included in the summary of ASTs in

Appendix A. The following protective measures are in place at the Berkeley Lab for portable storage tanks:

- Portable tanks are normally located within casing for the equipment requirement a fuel supply.
- Portable tanks are normally stored at Building 31 and are moved to other locations as needed.
- Portable tanks are located and positioned to prevent spilled oil from reaching storm drains or other access points to navigable waters.
- Portable tanks are equipped with spill kits.
- The small on-site tank truck for delivery of fuel to individual emergency generators is equipped with a spill kit and is continuously manned while delivery and filling operations are occurring.

4.6 OIL-FILLED ELECTRICAL EQUIPMENT

A current list of oil-filled electrical transformers is presented in Appendix D. This list includes all facility transformers and those connected to the site primary power distribution system. The transformers are mounted on concrete pads.

The Berkeley Lab recently assumed control of the Grizzly Substation from UC Berkeley. The Grizzly Substation contains eight transformers located near Building 36A. The transformer bank designation, oil capacity, and secondary containment adequacy is listed in Appendix D, Table D-1. UC Berkeley retains ownership and responsibility for operation of the Hill Substation, adjacent to the Grizzly Substation.

Secondary containment is required for oil filled electrical equipment in order to prevent spills from reaching storm drains. An illegal discharge to the storm drain would constitute a violation of the Clean Water Act. Valves on secondary containment are to be kept in a closed position except to perform approved storm water procedures, (O&M OPER-056-C, Revision 4/29/05, Appendix E). Transformers at the Berkeley Lab are equipped with secondary containment to prevent any leaks from reaching waterways.

Containment for transformers is in the form of sheet metal berms, or in the case of some of the larger transformers, containment consists of concrete berms and retention sumps. In some areas, the capacity of the containment area may not be sufficient to contain the entire contents of the largest capacity because of the presence of rocks and gravel in the containment area. The rocks and gravel are an industry standard used to prevent fire and electrical hazards and cannot be removed.

No transformers at the Berkeley Lab are classified by Federal standards (40 CFR 761) as polychlorinated biphenyl (PCB) transformers. Some of the transformers are classified in California as PCB-contaminated (i.e., PCBs are present but concentrations are less than 500 parts per million

but greater than 5 parts per million). The concentrations of PCBs in the transformer oils are indicated in Appendix D.

Other electrical equipment at the Berkeley Lab that contains bulk quantities of oil includes the Marx research and development tanks, which are oil-filled high voltage enclosures, and oil filled electrical switching boxes. A current list of Marx tanks is presented in Appendix D.

Because of research being conducted at the Berkeley Lab, occasionally there is a temporary need for oil filled electrical equipment as part of experiments being performed by researchers. Currently, there are two temporary storage tanks located in Building 71. These tanks are filled with non-PCB Diala oil and are associated with research being conducted inside the building. One of these tanks is the power supply and has a capacity of 660 gallons; the other tank is part of a glystrom tube and has a capacity of 440 gallons. Both of these tanks are equipped with secondary containment pans to catch any drips or minor spills. Large spills would overflow the pans and would flow to the basement of the building and be retained in a sump.

5

FACILITY TRANSFER OPERATIONS

5.1 UNDERGROUND PIPING

The Berkeley Lab has upgraded all underground piping associated with USTs prior to December 1998 in accordance with the requirements for underground piping as set forth in the federal UST regulations (40 CFR 280). Underground piping is constructed of fiberglass, a non-corrodible material.

5.2 ABOVEGROUND PIPING

All aboveground piping supports will be designed to minimize corrosion and abrasion and to allow for expansion and contraction. Aboveground piping associated with USTs is monitored, visually inspected and periodically subjected to precision leak testing. All aboveground piping and valves associated with ASTs will be inspected as specified in Section 8.0. Pressure testing will be conducted if areas are identified where facility drainage is such that a pipeline failure poses a significant risk of a spill event. There are no such areas currently known to pose a significant risk.

No aboveground piping is known to be exposed to vehicular traffic. Warning signs and barriers will be posted if future pipeline installations result in exposures of pipelines to traffic.

5.3 OUT-OF-SERVICE PIPING

Underground and aboveground piping that is not in service or is in standby service for an extended time will be capped and blank-flanged when removal is not practical. The Berkeley Lab has adopted Lock Out / Tag Out procedures to increase safety around the facility and reduce the chance of spills. Underground piping that is permanently out-of-service will be removed or abandoned in place in accordance with an approved closure plan.

5.4 FACILITY TANK TRUCK LOADING/UNLOADING

Transportable storage tanks (tank trucks) are exempt from the provisions of the SPCC Plan, but do comply with additional regulatory requirements, which include spill prevention. The commercial tank trucks that deliver diesel and unleaded gasoline to the Berkeley Lab adhere to the requirements and regulations of the Department of Transportation (DOT) during unloading of fuels.

Commercial fuel deliveries are made primarily to the 10,000 gallon USTs at Building 76 and occasionally to the ASTs at Buildings 64 (6,000 gallon) and 74/83 (4,000 gallon). Automatic interlocking systems are installed in the tank trucks to prevent departure of the tank trucks before proper disconnection of the transfer lines. Drains and outlets on the tank trucks are inspected for leaks before departure of the trucks. A bonnet area at the fill pipe of each of the USTs at Building 76 captures small spills of fuel that may occur during loading operations. Administrative controls,

including procedures for monitoring and responding situations that could potentially result in a tank overfill, are used to prevent fuel spills during tank loading and unloading. Additionally, the fuel trucks are equipped with a spill kit to respond to spills.

The Berkeley Lab has its own diesel fuel delivery truck for fueling ASTs and USTs that support engine generators. Generally, the delivery of fuel is small since engine generators are typically only run once a month. The fuel delivery truck has a capacity of 600 gallons. The fueling nozzle delivers fuel at 26 gallons per minute. The truck is equipped with a fuel pump and a meter for gallons delivered. The following protective measures are in place at the Berkeley Lab for the fuel delivery trucks:

- A spill kit and some additional spill absorbent are maintained at the truck
- Two persons monitor the delivery of fuel from this truck to an AST or UST.
- The fuel delivery nozzle is always manned to prevent spills.

6

INSPECTIONS AND RECORDS

6.1 RESPONSIBILITIES

Procedures for the inspection and maintenance of tanks and piping systems are developed and implemented at the Berkeley Lab to ensure proper equipment operations.

- The Facilities Division oversees leak tests and monitoring of underground tanks and piping and maintains records of the results. Facilities Division personnel also inspect aboveground tanks and piping.
- The Berkeley Lab Environmental Health and Safety (EH&S) Division inspects Drum storage areas and WAAs.

6.2 INSPECTIONS

Leak detection/monitoring systems for underground tanks and piping are certified annually by an UST certified technician. Precision leak test methods specified in 40 CFR 280 and in CCR Title 23 are used to assess tank conditions. Cathodic protection systems installed on any containers or piping are inspected in accordance with the manufacturer's instructions and installation design requirements. As of this revision, there are no electrical cathodic protection systems at the Berkeley Laboratory requiring inspection.

Aboveground storage tanks, foundations, and tank supports are visually inspected by Facilities Division O&M personnel on a periodic basis for signs of cracks, corrosion, or other structural deterioration. The inspection also includes a visual review of aboveground valves, pipelines joints, catch pans, piping supports, locks, and metal surfaces. Examples of O&M inspection forms are located in Appendix F. If visual inspection of aboveground equipment indicates that there may be potential problems, corrective actions will be taken.

The Berkeley Lab Fire Services Group conducts formal inspections of drum storage areas on an annual basis. Users of the materials stored in drum storage areas will visually inspect the drums on an informal basis and will report evidence of leaks to the EH&S Division Environmental Services Group. Waste Management Group personnel will inspect waste drum storage areas that are classified as WAAs on a weekly basis. Any visible oil leaks identified, either during an inspection or normal use, which could result in a significant accumulation of oil within the containment area, will be promptly corrected.

6.3 INTEGRITY TESTS AND EVALUATIONS

The Berkeley Lab implements an integrity testing program for bulk storage containers which includes a combination of visual inspection and nondestructive integrity testing. The program includes nondestructive integrity tests by an independent third-party contractor. The integrity

testing follows the guidelines outlined in the Steel Tank Institute (STI) "Standard for Inspection of In-service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids" (Standard for Inspection, SPOO1) for in-service shop fabricated tanks (Appendix G).

Double-walled, vault tanks are used for storage of E85 blend, diesel fuel and transformer oils. The vaults have a concrete exterior to protect the tank and containment systems. The concrete exterior precludes nondestructive testing via ultrasonic or radiographic testing.

No field constructed AST's are used at the Berkeley Lab.

6.4 RECORDS

All records required by this SPCC Plan are maintained on-site for a minimum period of three years. After three years, the records may be retained or archived. Inspection records are maintained by the following organizations:

EH&S Division

- Drum inspections (excluding WAAs)
- WAA inspections
- Spill documentation
- Environmental compliance inspections

Facilities Department

- Tank inspections
- Rainwater discharges
- Integrity tests

7

SECURITY

7.1 BARRIERS TO ENTRY

Fencing surrounds the Berkeley Lab facility, and gates are locked or guarded. Guard stations at each of the three entry gates control access to the Berkeley Lab. Many of the storage units are located inside buildings which are locked during evening hours. Tanks on the standby generators are generally difficult to access because they are located inside the generators. The WAAs are locked and access is permitted only to authorized personnel. Oil filled electrical equipment are generally located in fenced and locked areas.

7.2 LOCKS ON VALVES AND PUMPS

All of the tank and containment area drainage valves have been equipped with locks and are maintained in the closed position by authorized O&M personnel. Any new systems with secondary containment berms that require valves for discharge from the containment area will be installed with locks.

7.3 FACILITY LIGHTING

Facility lighting is commensurate with the type and location of the facility. The following factors were considered in determining appropriate lighting:

- The facility consists of 200 acres with numerous buildings, miscellaneous structures, and wooded undeveloped areas. Lighting of the entire facility is neither practical nor desired.
- The majority of the ASTs are located throughout the facility versus in a central location.
- There are security patrols of the facility 24 hours a day; a guard at the entry gate and O&M personnel are present at all hours
- The facility is surrounded by a fence, which minimizes the potential for vandals entering the facility

8

PERSONNEL TRAINING

8.1 TRAINING PROGRAMS

Personnel involved with oil equipment and bulk storage containers at the Berkeley Lab receive instructions, on the job training and or formal classes to ensure adequate understanding in the proper operation and maintenance of equipment and spill prevention. Training may include:

- Discussion regarding applicable pollution control laws, rules, and regulations;
- Introduction of new technology or revised procedures; and
- Familiarization with the SPCC Plan, emphasizing the SPCC Plan as a resource for informing current and new employees to enhance response and pollution awareness.

Training associated with the Plan is considered job-related or required training. Whenever such training occurs, the facility manager(s) and/or the directorate's delegated personnel will record attendance of participants.

The Waste Management Group personnel who may assist in responding to spills receive state-certified training in emergency response, control, and containment. This training includes a 24-hour Hazardous Materials First Responder Training course or its equivalent, and an 8-hour Annual Refresher Course Hazardous Waste Operations and Emergency Response Personnel or its equivalent. The 24-hour Hazardous Materials First Responder Training and the 8-hour Annual Refresher Course for Hazardous Waste Operations and Emergency Response Personnel courses comply with Federal OSHA regulation 29 CFR 1910.120.

In the event of a hazardous substance spill, other EH&S personnel are also trained to provide second-responder services in order to help mitigate the effects of the spill on the surrounding population and environment. First response emergency services are provided by the Alameda County Fire Department's on-site fire station.

WAA supervisors are trained in procedures for proper handling and storage of hazardous waste by attending training courses provided by EH&S. WAA supervisors attend EH&S course 610, Waste Accumulation, and EH&S course 604, Hazardous Waste Generators (see *Publication 3092, Revision 6, June 2005*).

8.2 SPILL PREVENTION BRIEFINGS

The ESG representative will, as found necessary, conduct spill prevention briefings, training sessions, meetings or issue reports/memos to assure adequate understanding of this SPCC Plan. These activities will:

- Highlight and describe known spill events or failures;
- Provide a brief overview of applicable regulations, provide an update on changes or updates to the SPCC Plan or regulations;

- Provide a review of SPCC procedures, and recently developed precautionary measures; and
- Provide an opportunity for comments and discussion.

These activities may also be included as part of the personnel training. The target audience will include both EH&S personnel and O&M personnel responsible for implementation of the SPCC Plan or procedures, and other personnel that may be affected by the requirements in this SPCC Plan.

As much as possible, SPCC awareness will be incorporated into other required EH&S training courses. Periodically, the ESG will schedule/conduct refresher/training classes for SPCC awareness. The official SPCC training course is EH&S 680.

8.2 SPILL NOTIFICATION AND REPORTING

Individual agencies have spill notification and reporting requirements that apply if a release of oil occurred at the Berkeley Lab. Federal, state and local agency notification and reporting requirements for unauthorized oil releases are summarized in the table below. Berkeley Lab staff that discover a spill immediately notify the Fire Department. All regulatory notifications are performed by ESG.

Table 8.2 – Spill Reporting Procedure Summary

Unauthorized Release Description	Report to	When	Law or Regulation Citation
42 gallons or more (to water or potential to threaten waters of the state, including ground water)	Call and notify OES Written report to CUPA	Immediately (Note 1) Within five working days	California Water Code 13272 and California Health and Safety Code 25270.8
	Call and notify the local responding agency or the 911 emergency response system	When you determine emergency response assistance outside the company is required	California Health and Safety Code 25270.8
Any volume to soil	Call and notify local agency	Agency-specific typically within 24 hours	Agency-specific requirements
Contact Information			
LBNL FIRE DEPT.:	911	CA OFFICE OF EMERGENCY SERVICES: U.S. FISH AND WILD LIFE:	1-800-852-7550 1-916-978-4613
BERKELEY TOXICS MGMT DIVISION (CUPA)	(510) 981-7460	STATE OF CALIFORNIA WATER BOARD:	1-415-464-1255
POLICE DEPARTMENT:	911	WATER QUALITY CONTROL BOARD:	1-510-286-1255

Note 1. The California Water Code Section 13272(a) clarifies the meaning of the term "immediately" as follows (paraphrased—see law for exact language): Immediately = 1. as soon as that person has

knowledge of the discharge, 2. as soon as notification is possible, and 3. as soon as notification can be provided without substantially impeding cleanup or other emergency measures

If such a spill occurs, the written report must include the following information:

- Name of the facility;
- Name(s) of the owner(s) or operator(s) of the facility;
- Location of the facility;
- Date and year of initial facility operation;
- Maximum storage or handling capacity of the facility and normal daily throughput;
- Description of the facility, including maps, flow diagrams, and topographical maps;
- A complete copy of the SPCC Plan with any amendments;
- The cause(s) of such spill, including a failure analysis of system or subsystem in which the failure occurred;
- The corrective actions and/or countermeasures taken, including an adequate description of equipment repairs and/or replacements;
- Additional preventive measures taken or contemplated to minimize the possibility of recurrence; and
- Such other reasonable information the USEPA RA may require, pertinent to the Plan or spill event.

9

REFERENCES

9.1 DOCUMENTS

9.1.1 Emergency Procedures

- *Emergency Management, Chapter 9,* Environment, Health & Safety Manual, Publication 3000, http://www.lbl.gov/ehs/pub3000/
- *Master Emergency Plan,* Pub 533, http://www.lbl.gov/ehs/ep/policy.shtml

9.1.2 Additional Plans and Procedures

- Berkeley Lab *Environmental Monitoring Plan*, http://www.lbl.gov/ehs/esg/
- Berkeley Lab *Site Environmental Report*, http://www.lbl.gov/ehs/esg/
- *Chemical Hygiene and Safety Plan*; http://www.lbl.gov/ehs/chsp/html/chsp_site_map.htm
- *Hazardous Materials Business Plan* (HMBP, Inventory) March 2007

9.1.3 Regulatory

- California Aboveground Petroleum Storage Act, Division 20, section 25270.
- 40CFR, part 109, 112; California Health and Safety Code; Chapter 6.67 (H&SC 6.67); Department of Energy, DOE Order 5400.1.
- City of Berkeley Municipal Code, Hazardous Material Disclosure Ordinance, BMC Chapter 11.52.
- City of Oakland Municipal Code Chapter 20, Storm Water Management and Discharge Control, Ordinance No. 11590 C.M.S..

9.1.4 Specialty

- *Stormwater Pollution Prevention Plan*, http://www.lbl.gov/ehs/esg/
- Berkeley Lab's Hazardous Waste Handling Facility, *RCRA Part B Permit, Section VIII - Contingency Plan*, July 2001.
- Strawberry Creek, A Walking Tour of Campus Natural History, December 1991.
- *Underground Storage Tanks: Monitoring and Emergency Response Plan*, June 2003.

9.2 LIST OF ACRONYMS

AST	Aboveground storage tank
BTEX	Benzene, Toluene, Ethlybenzene, and Xylenes
CCR	California Code of Regulations
CFR	Code of Federal Regulations
CUPA	Certified Unified Program Agency
DCA	Dichloroethane
DCE	Dichloroethene
DOE	Department of Energy
DOT	Department of Transportation
EH&S	Environment, Health, and Safety
EPA	Environmental Protection Agency
ESG	Environmental Services Group
H&SC	Health and Safety Code
HWM	Hazardous Waste Management
IC	Incident Commander
ICS	Incident Command System
LBNL	Lawrence Berkeley National Laboratory
MEK	Methyl ethyl ketone
MW	Monitoring well
MSL	Mean Sea level
O&M	Operations and Maintenance
NDT	Nondestructive testing
PCB	Polychlorinated biphenyl
PCE	Perchloroethylene
PPM	Parts Per Million
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation Work Plan
RWQCB	Regional Water Quality Control Board
SPCC	Spill Prevention, Control, and Countermeasure
TCA	Trichloroethane
TCE	Trichloroethene
TPH-D	Total Petroleum Hydrocarbons as Diesel
TPH-G	Total Petroleum Hydrocarbons as Gasoline
UST	Underground storage tank
VOC	Volatile organic compound
WAA	Waste Accumulation Area

9.3 SPCC PLAN COMPLIANCE REFERENCE TABLE

Reg. 40 CFR 112 Requirement	SPCC Plan Section
112.3 (d) P.E. certification	After Title Page
112.3 (c) Plan Maintenance	1.3
112.4 (a) Agency review and amendment	1.3
112.5 Amendments by owner/operator	1.3
112.7 Management approval	After title page
112.7 (a)(1) Rule Conformance	1.2
112.7 (a)(3) Facility Diagram	Figures B-1, B-2, B-3 and B-4
112.7 (a)(4) Spill Reporting	8.2
112.7 (a)(5) Spill Response Procedures	2.5
112.7 (b) Prediction of spills	2.2
112.7 (c)(1) Containment and diversionary structures	2.3
112.7 (c)(2) Offshore Facilities	N/A
112.7 (c)(3) Rainwater Drainage	3.2
112.7 (c)(6) Integrity Tests	6.3
112.7 (d) Oil spill contingency plan	2.4
112.7 (e) Inspection and records	6.0
112.7 (f) Personnel Training	8.0
112.7 (g) Security	7.0
112.7 (h) Facility tank car loading/unloading	5.4
112.7 (i) Brittle Fracture Requirement	6.3
112.8 (b) Facility drainage	3.0
112.8 (c) Bulk storage	4.0
112.8 (c)(1) Materials of construction	4.1
112.8 (c)(2) Secondary containment on storage unit	4.2, 4.4, 4.5, 4.6
112.8 (c)(3) Rainwater drainage	3.2
112.8 (c)(4) Underground tanks	4.3
112.8 (c)(5) Partially buried tanks	Not applicable
112.8 (c)(6) Tank Inspections Integrity Tests	6.3
112.8 (c)(7) Internal heating coils	Not applicable
112.8 (c)(8) Overfill protection	4.3
112.8 (c)(9) Plant effluents	3.3
112.8 (c)(10) Visible oil leaks	6.2
112.8 (c)(11) Portable storage tanks	4.5
112.8 (d) Transfer operations	5.0
112.8 (d)(1) Underground piping	5.1
112.8 (d)(2) Out-of-service piping	5.3
112.8 (d)(3) Piping supports	5.2
112.8 (d)(4) Piping inspections	6.2
112.7 (d)(5) Traffic warnings	5.2

FIGURES

GENERAL FACILITY INFORMATION

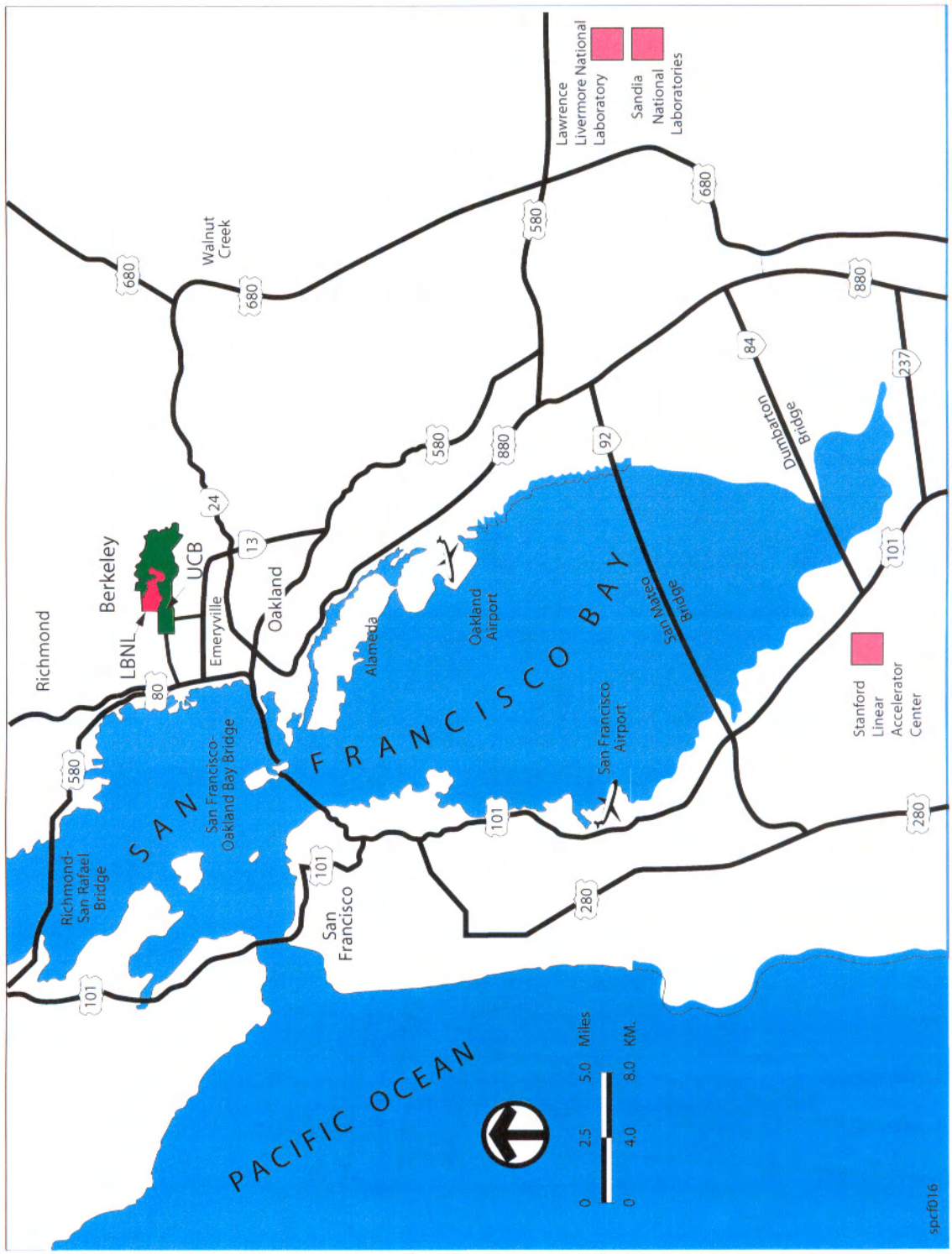

Figure 2-1 San Francisco Bay Area Map

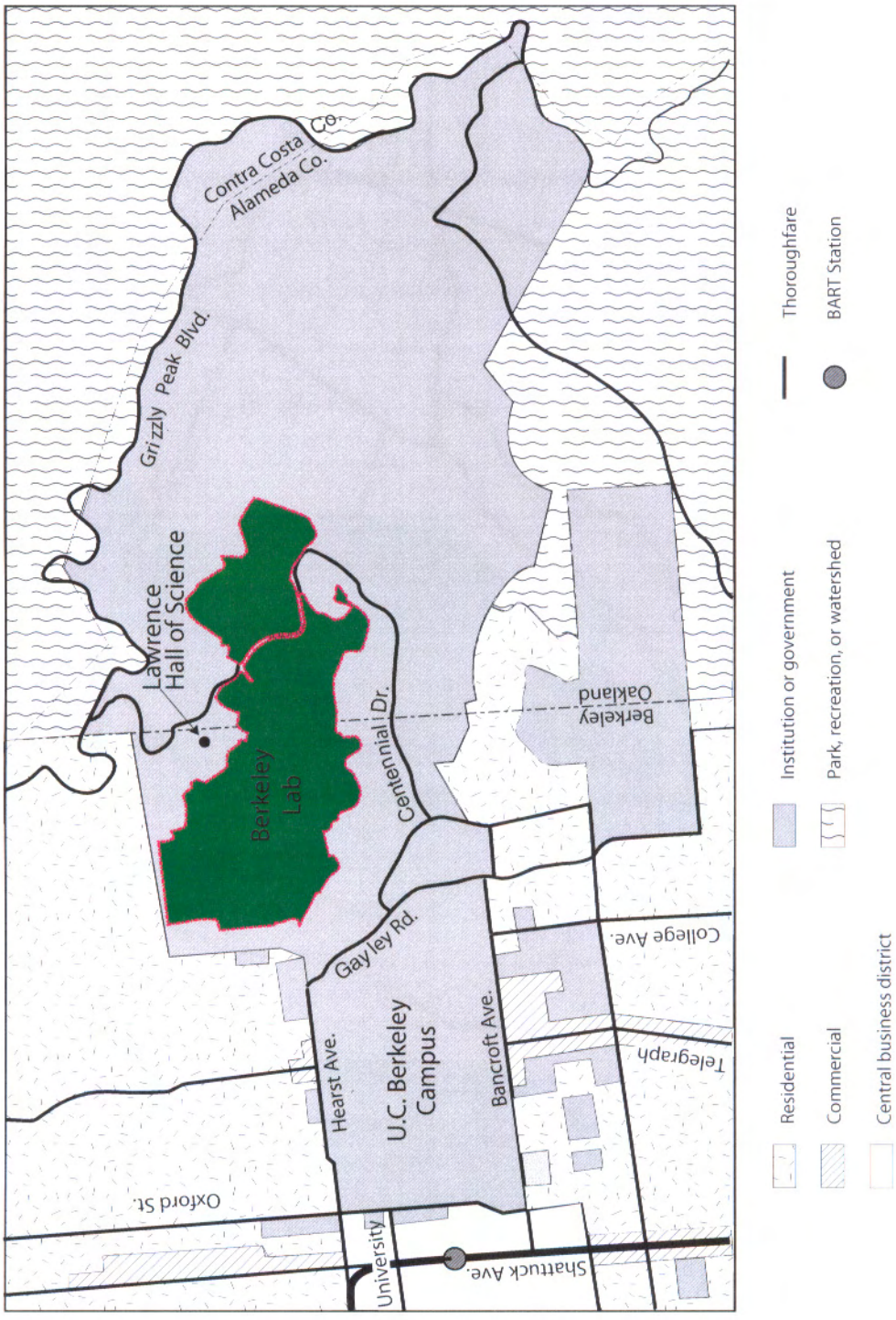

Figure 2-2 Adjacent Land Use Map

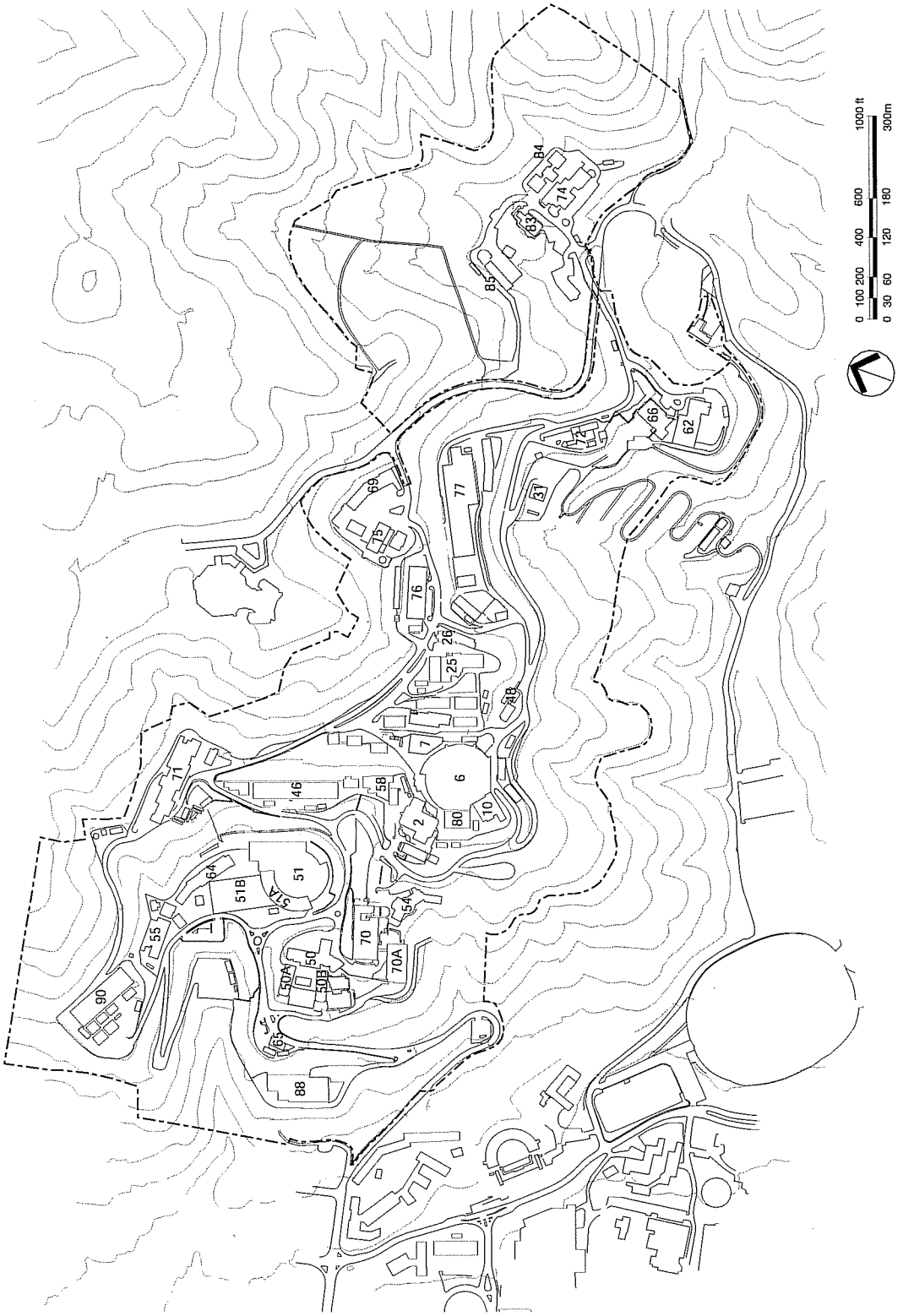

Figure 2-3 Lawrence Berkeley National Laboratory Buildings Map

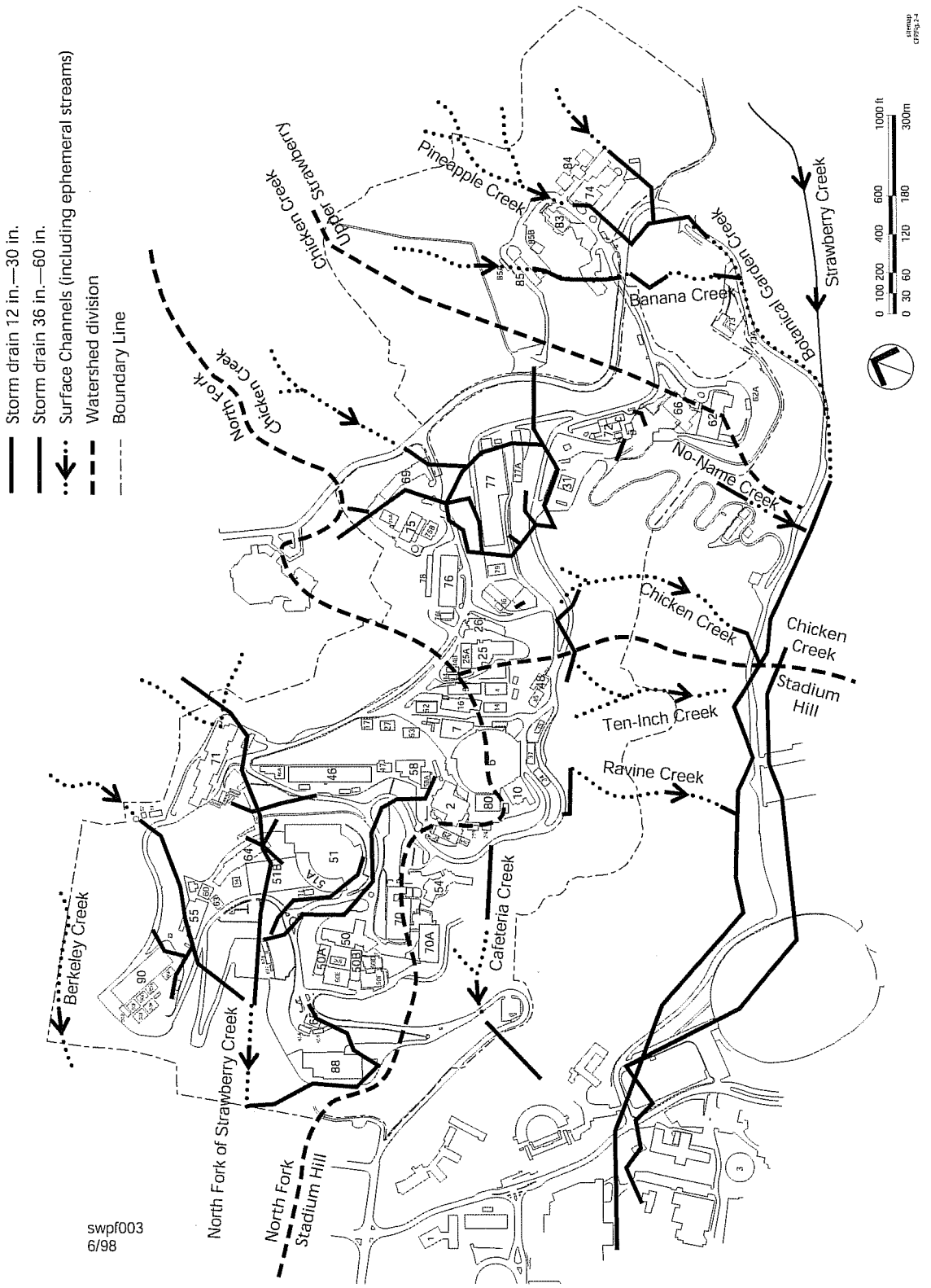

Figure 2-4 Site Storm Drainage

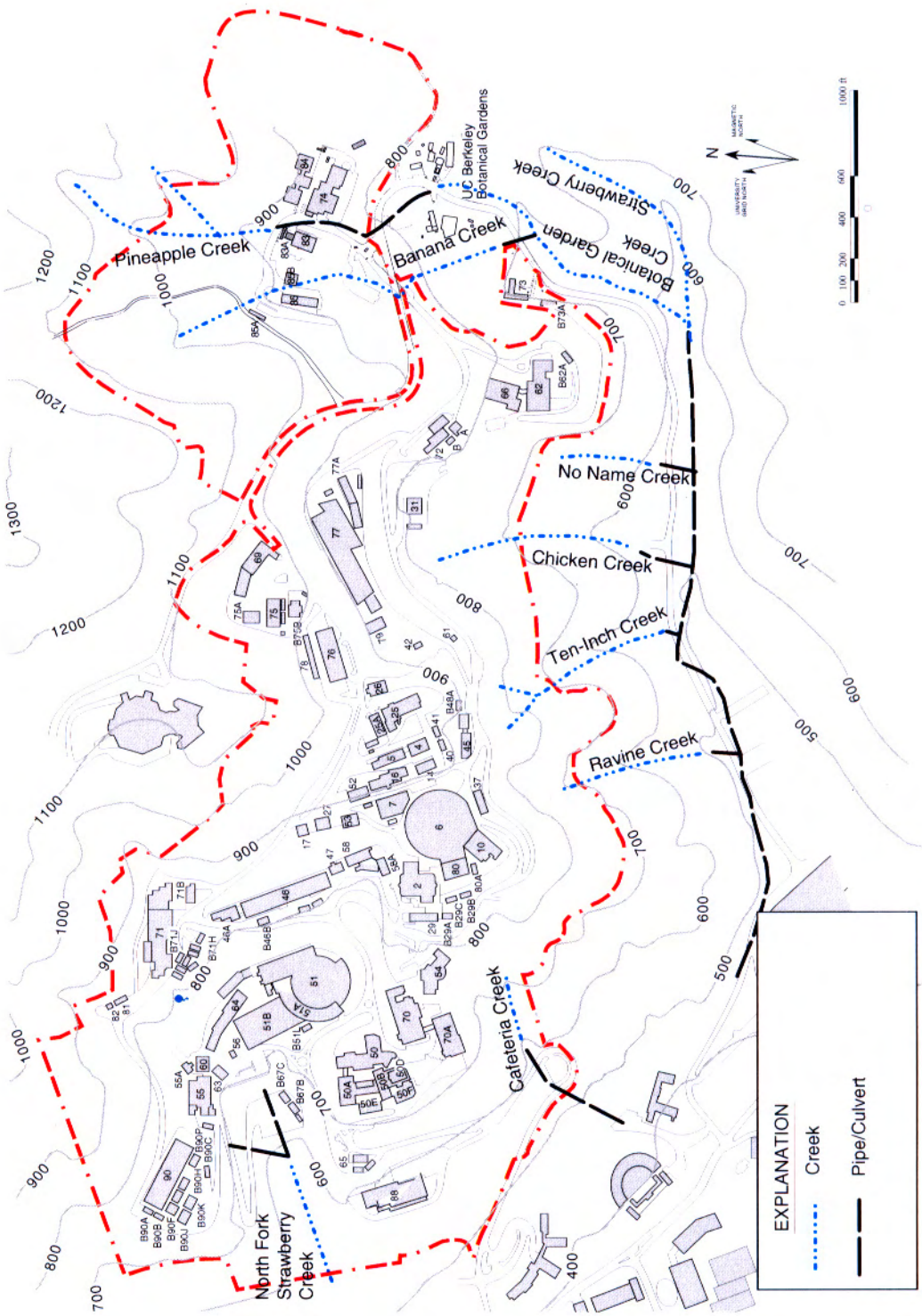

Figure 2-5 Setting and Topography of the LBNL Site

APPENDIX A

ABOVEGROUND STORAGE TANKS

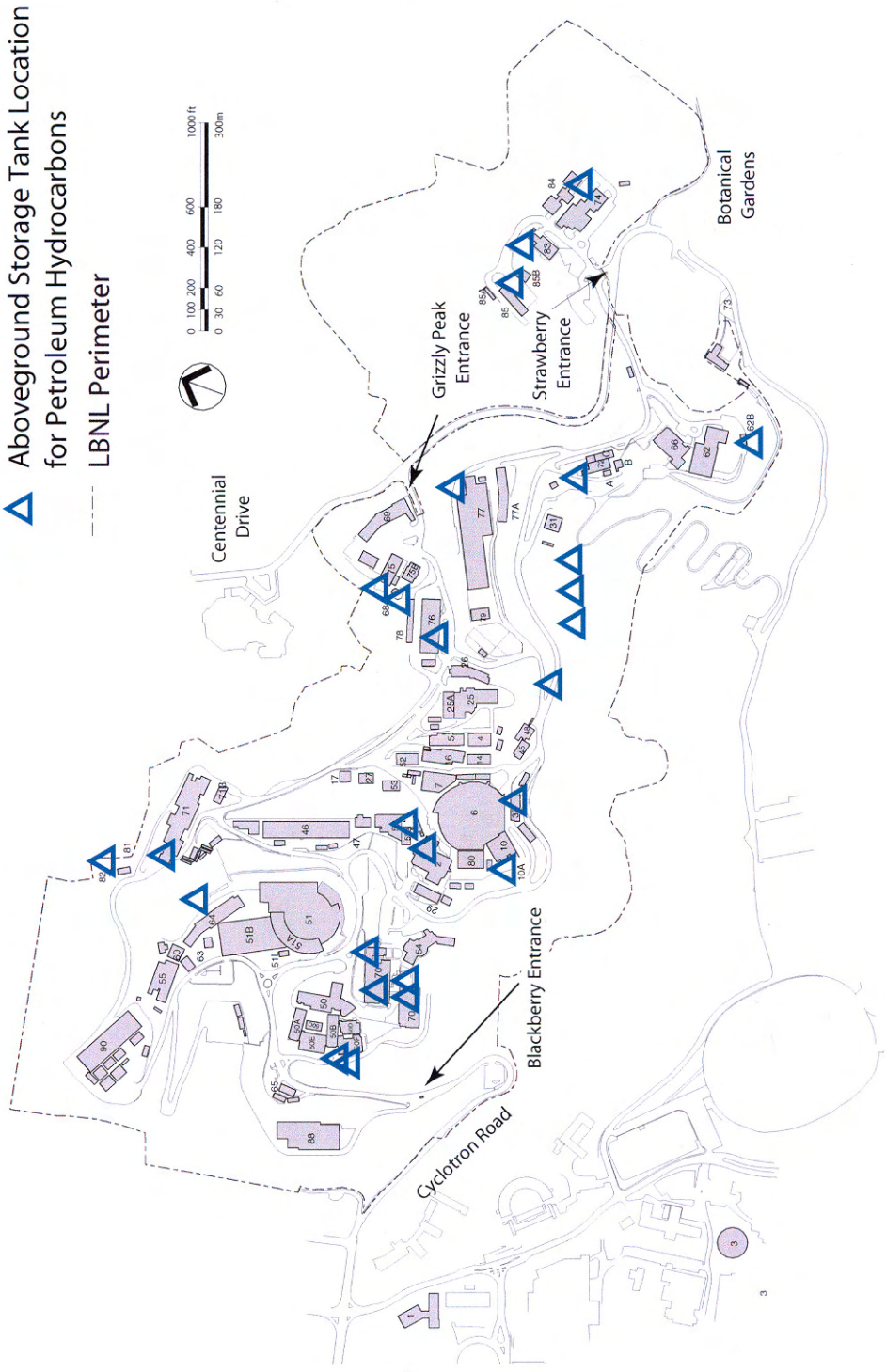

Figure A-1 Aboveground Storage Tank Map

Table A-1: Summary of Aboveground Storage Tanks

Building	Tank No.	Capacity (gallons)	Contents	Use	Containment	Status
2	EG-68-02	50	Diesel	Service to engine generator	Concrete berm with coating	No action required
10A	EG-80-10A	55	Diesel	Service to engine generator	Double wall tank	No action required
31 (P)	EG-74-76	160	Diesel	500 kW generator (portable)	Spill kit provided	No action required
31 (P)	EG-75-76	50	Diesel	100 kW generator (portable)	Spill kit provided	No action required
31 (P)	EG-93-76	195	Diesel	150 kW Cummins generator (portable)	Metal berm	No action required
37	TK-102-37	500	Diesel	Service to EG-73-6	Concrete berm inside building	No action required
48	EG-100-48	367	Diesel	Service to engine generator	Double wall tank with leak detection.	No action required
50 Complex	EG-101-50A	275	Diesel		Double wall tank	No action required
50 Complex	EG-95-50B	275	Diesel	Service to engine generator	Double wall tank with leak detection.	No action required.
58A	TK-02-58A	2,000	Diala Oil	Service to R&D Marx tanks	Double wall w/ leak detection	No action required
62B	EG-81-62B	55	Diesel	Service to engine generator	Double wall tank	No action required
64	EG-79-64	250	Diesel	Service to generator	Double wall tank	No action required
64	TK-001-64	6,000	Diesel	Service to 2 MW engine generator	Double Wall tank	No action required
64	TK-002-64	60	Motor oil	Service to 2 MW engine generator	Single wall tank	Spill kit needed
66	EG-109-66	450	Diesel	Service to engine generator	Double wall tank	No action required
67	TK-002-67A	1500	Diesel	Service to engine generator	Double wall tank with Veeder Root Monitor 300 leak detection	No action required
67	TK-003-67A	100	Diesel	Service to engine generator	Double wall tank with Simplex Control Panel leak detection	No actionr equired
68	TK-003-68	150	Diesel	Service to fire water pump	Metal containment bin inside building	No action required
70	EG-106-70	430	Diesel	Service to engine generator	Double wall tank	No action required
70A	TK-14-70A	50	Diesel	Daytank filled from TK-15-70A	Inside building, double wall with leak detection	No action required
70A	TK-15-70A	983	Diesel	Service to engine generator	Double wall w/ leak detection	No action required
72	TK-001-72	1,000	Diesel	Service to EG-098-72	Double wall tank with leak detection.	No action required
75	TK-2-75	275	Diesel	Service to EG-89-75	Metal containment bin with cover	No action required
76	TK-007-76	4,000	85% EtOH / 15% gas	Fuel dispensing	Double wall tank with leak detection, Veeder Root LS-350	No action required
76	SCT-40-76	175	Motor oil	Storage, motor pool	Double wall containment	No action required
77	TK-94-77	200	Diesel	Service to EG-94-77	Double walled tank	No action required
82	EG-67-66	50-200	Diesel	Portable generator 6V-92TA	Double wall tank	No action required
82	TK-003-82	350	Diesel	Service to fire water pump	Inside building with metal containment	No action required
83	TK-014-74	4,000	Diesel	Service to engine generator EG-61-74	Double walled tank with leak detection.	No action required
84	TK-4-84	6,000	Diesel	Service to engine generator	Double wall w/ leak detection, locked room	No action required
85	TK-3-85	56	Diesel	Service to EG-85 (day tank)	Double wall w/ leak detection	No action required

APPENDIX B

UNDERGROUND STORAGE TANKS

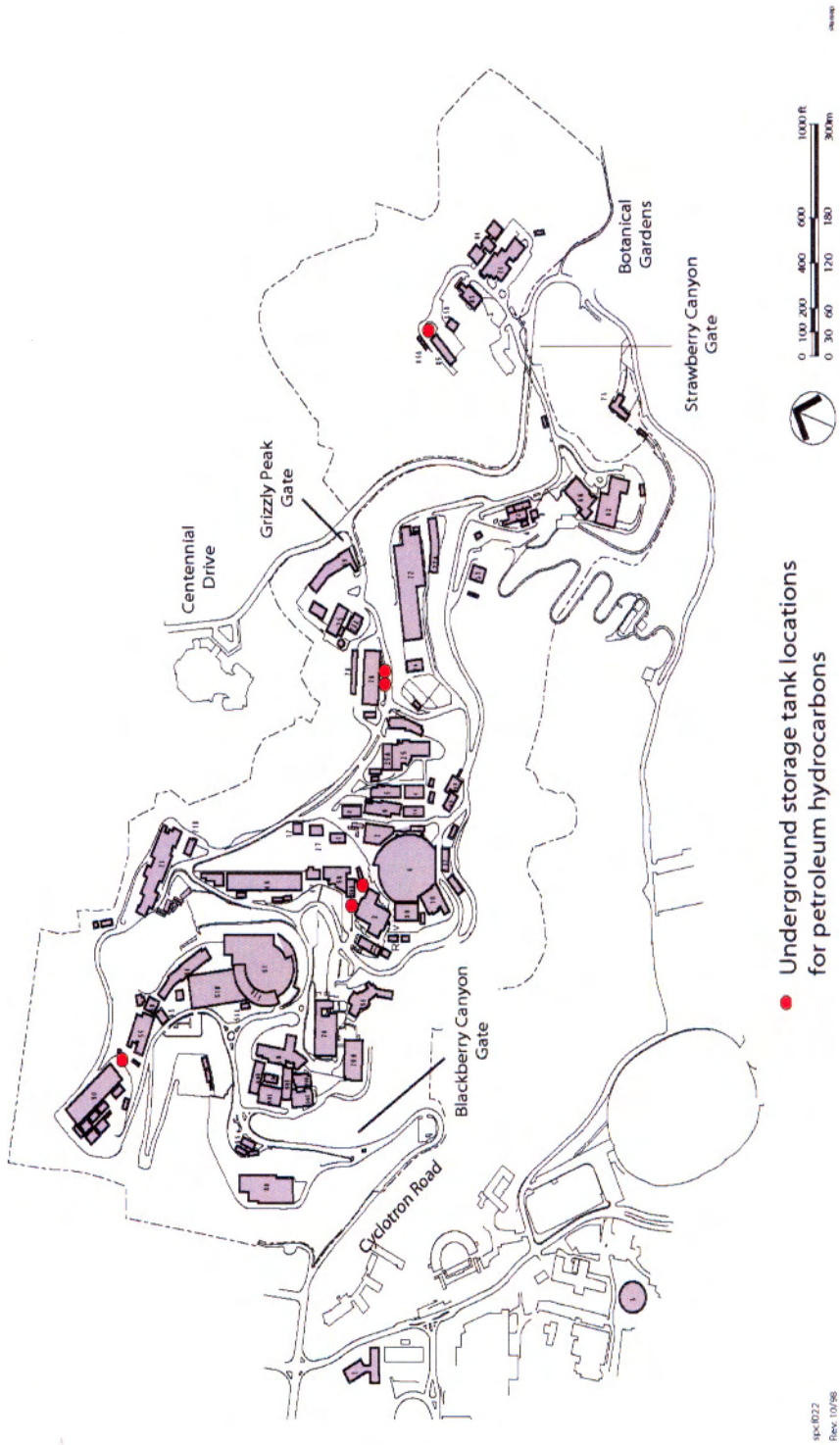

Figure B-1 Underground Storage Tank Map

APPENDIX B: Summary of Underground Storage Tanks (UST)

Bldg.	Tank No.	City of Berkeley ID#	Generator	Capacity (gallons)	Contents	Construction	Installed	Monitoring
2	TK-3-2	COB 2-1	Boilers BR-1-2, BR-2-2	4,000	Diesel	Double-wall fiberglass	1988	Interstitial monitoring, Veeder Root TLS 300
2	TK-4-2	COB 2-2	EG-68-2	1,000	Diesel	Double-wall fiberglass	1988	Interstitial monitoring, Veeder Root TLS 300
55	TK-1-55	COB 55-1	EG-69-55	1,000	Diesel	Double-wall steel with fiberglass reinforced plastic corrosion protection	1986	Interstitial monitoring, Veeder Root TLS 300
76	TK-05-76	COB 76-1	N/A	10,000	Unleaded Gasoline	Double-wall Glasteel with fiberglass reinforced plastic corrosion protection	1990	Automatic tank gauging and leak detection; Veeder-Root 350, tank level and interstitial monitoring for vapor and secondary containment; mechanical line leak detector (Red Jacket)
76	TK-06-76	COB 76-2	N/A	10,000	Diesel	Double-wall Glasteel with fiberglass reinforced plastic corrosion protection	1990	Automatic tank gauging and leak detection; Veeder-Root 350, tank level and interstitial monitoring for vapor and secondary containment; mechanical line leak detector (Red Jacket)
85	TK-001-85	COB 85-1	EG-85	2,500	Diesel	Double-wall FRP (reinforced fiberglass)	1995	Automatic tank gauging and hydrostatic leak detection (brine filled), INCON Tank Sentinel 1000

APPENDIX C

DRUM STORAGE
AND
WASTE ACCUMULATION AREAS

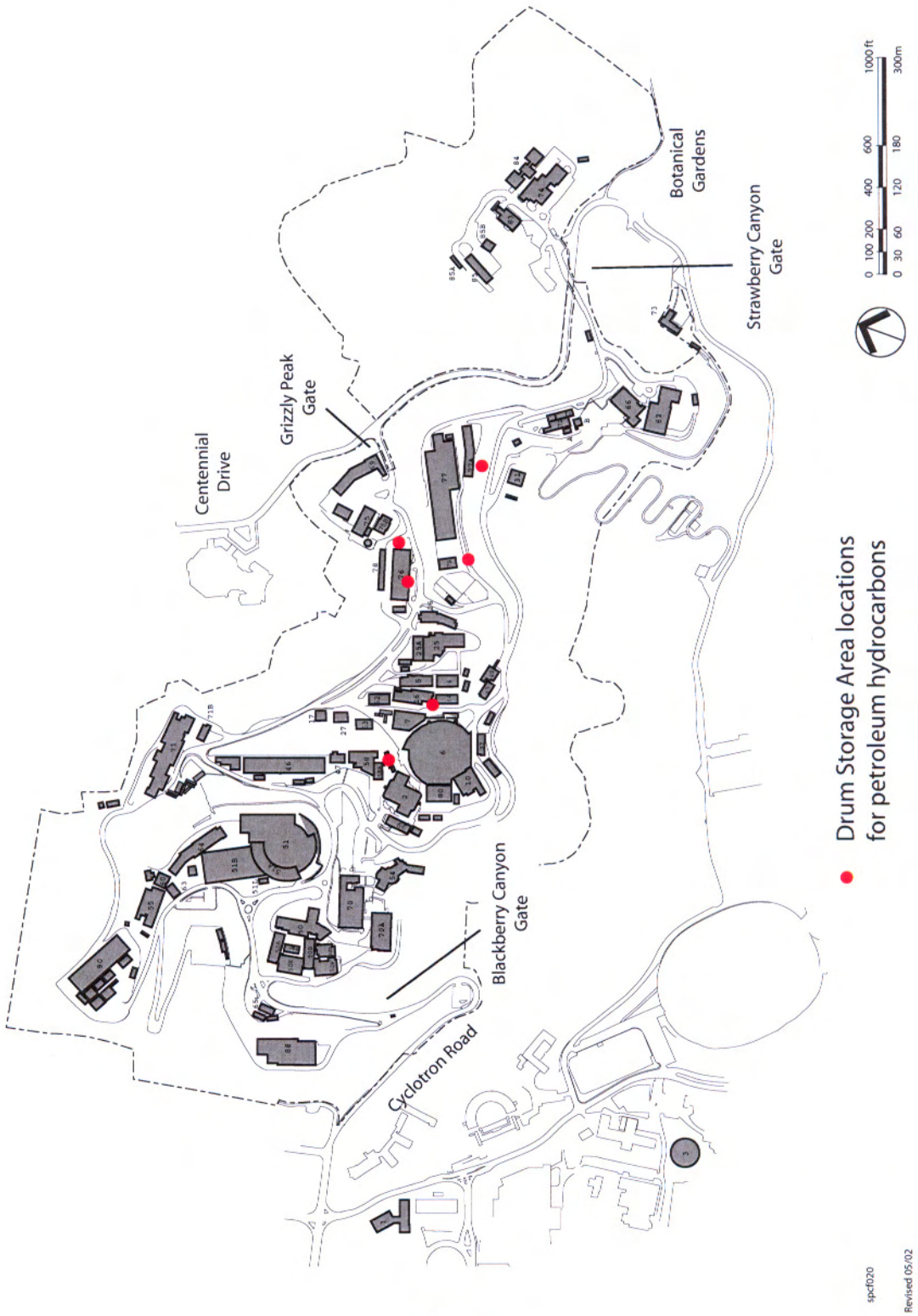

Figure C-1
Drum Storage Map

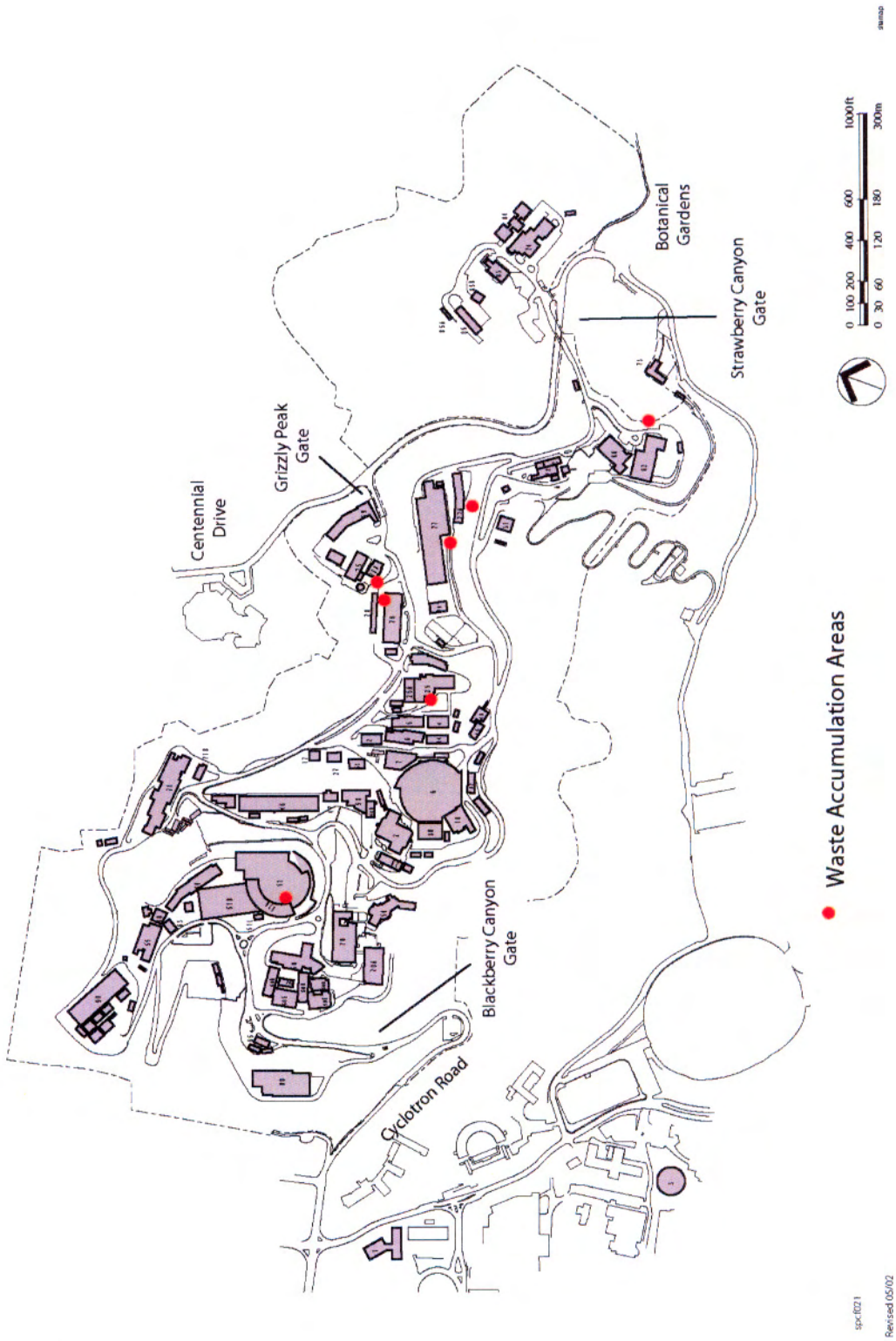

Figure C-2 Waste Accumulation Area (WAA) Map

Table C1: Location of Drum Storage Areas

Building	Location	No. of Drums with Oil/Petroleum products	Contents	Containment	Action for SPCC
16	South corner	1 (2 max.)	Vacuum pump oilc	Storage shed	No action required
58A	South of building	3	Various oils	Storage shed w/containment	No action required
62	East of building	Varies (4 max.)		Drum storage shed	No action required
76	Inside, downstairs	3	Lubricating oils	Containment trench	No action required
76	East of building	Varies (4 max.)		Drum storage shed	No action required
79A	Entire building	21	Various oils	Central drum storage	No action required

Table C2: Location of Waste Accumulation Areas (WAA)

Building	Location	Division
25	West side of building	Engineering
27	South side of building	Facilities
51	West side of building	EH&S
62	East side of building	Material Sciences
76 O & M	East side of building	Facilities
76 Paint	East side of building	Facilities
77A Plating	South side of building	Engineering
77 Paint	West side at Paint Shop	Engineering
85	HW8, Upper Yard	EH&S

APPENDIX D

OIL-FILLED TRANSFORMERS AND ELECTRICAL EQUIPMENT

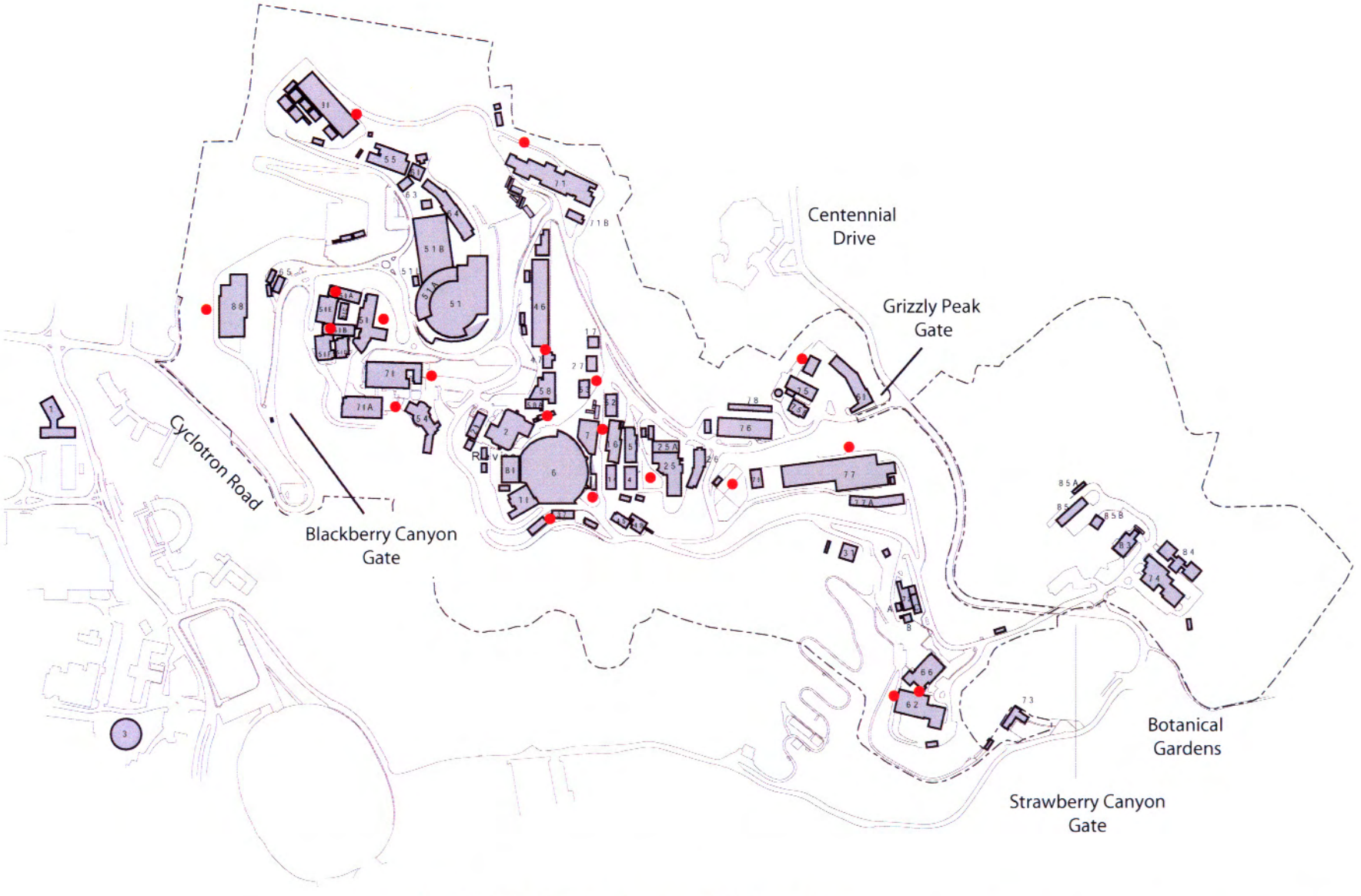

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Table D-1: Oil-Filled Transformers

Building	Bank	Fluid	Capacity (gallons)	PCB Concentration (ppm)	Secondary Containment Provided
6	301	Oil	403	ND	Yes
6	302	Oil	404	ND	Yes
6	303	Oil	404	ND	Yes
6	304	Oil	219	ND	Yes
6	305	Oil	167	ND	Yes
6	306	Oil	225	ND	Yes
6	307	Oil	442	ND	Yes
6	upper pad/419	Oil	1113	ND	Yes
6	356 spare	Oil	250	ND	Yes
6	365 spare	Oil	305	ND	Yes
25	14	Oil	244	ND	Yes
27	CTS-HVPS-1	Oil	150	ND	Yes
36A	1-A	Oil	2700	ND	Yes
36A	1-B	Oil	2700	ND	Yes
36A	1-C	Oil	2700	ND	Yes
36A	1-Spare	Oil	2700	ND	Yes
36A	2-A	Oil	2700	ND	Yes
36A	2-B	Oil	2700	ND	Yes
36A	2-C	Oil	2700	ND	Yes
36A	2-Spare	Oil	2700	ND	Yes
37A	218	Oil	178	ND	Yes
46	49	Silicone oil	161	ND	Yes
50	25	Oil	265	ND	Yes
50A	35	Silicone oil	412	ND	Yes
50B	38	Silicone oil	190	ND	Yes
58	36	Oil	350	ND (new 1/94)	Yes
58	158	Oil	680	7	Yes
62	66	Oil	485	4	Yes
66	215	Oil	199	ND	Yes
69 SUB	217	Oil	285	ND	Yes
70	30	Oil	129	ND	Yes
70	70	Oil	219	ND	Yes
70A	31	Oil	360	ND	Yes

Table D-1: Oil-Filled Transformers (cont'd)

Building	Bank	Fluid	Capacity (gallons)	PCB Concentration (ppm)	Secondary Containment Provided
71	PE 92	Oil	460	ND	Out of service
77	72	Oil	428	ND	Yes
88	80	Oil	1060	13	Yes
88	81	Oil	80	13	Yes
88	81	Oil	98	10	Yes
88	81	Oil	80	17	Yes
88	198	Oil	274	ND	Yes
88	GE 100	Oil	150	3	Yes
88	GE 20	Oil	405	20	Yes
88	GE 60	Oil	550	6	Yes
88	GT 0	Oil	430	13	Yes
88	RV-1-88	Oil	1140	5	Yes
88	RV-1-88	Oil	165	4	Yes
88	RV-1-88	Oil	175	4	Yes
88	SPARE	Oil	430	11	Yes
90	90	Oil	330	ND	Yes

Table D-2: Oil-Filled R & D Electrical

Building	Equipment	Fluid	Capacity(gallons)
58	Marx Tank	Diala oil	500
58	Marx Tank	Diala oil	300
58	Marx Tank	Diala oil	50
58	Marx Tank	Diala oil	50
71	Power Supply 85 kV	Diala oil	660
71	Glystrom Tube	Diala oil	440
58	Pulse Forming Network	Diala oil	300
58	Induction Cells	Diala oil	200

APPENDIX E

RAINWATER DISCHARGE PROCEDURE AND FORM

RAINWATER DISPOSAL

OPERATING PROCEDURE

APPLICATION

Evaluating and disposing of rainwater collected in secondary containment structures. Following a rain storm, it must be determined whether liquid found in a secondary containment structure open to precipitation can be considered only rainwater and disposed of accordingly. If liquid thought to be rainwater is discovered in a secondary containment structure, a thorough inspection of the system must be performed to determine whether the liquid is rainwater or is the result of a spill from the tank system, containers, or oil-filled equipment.

EH&S will notify the Maintenance Supervisor after 3 in. of rainfall.

SPECIAL INSTRUCTIONS

- **Special skills required:** Up-to-date training in spill prevention control countermeasures (SPCC).
- Personnel scheduled to perform this procedure: Plant Maintenance Technicians are responsible for all secondary containments.

WORK STEPS

1. Possible contaminants for each secondary containment structure are listed in the information table accompanying this procedure. Review before examining secondary containments.
2. Check for any evidence of rainwater contamination (e.g., color, clarity, odor, oil sheen). IF there is no evidence of contamination, go to step 3. IF there is evidence of contamination, go to step 5. Record results in the rainwater disposal log.
3. IF there is no evidence of rainwater contamination or a release from tank system, release rainwater from containment onto ground, or pump or drain it into storm water system. If rainwater is drained through a berm drain, replace the drain cap and shut and lock the drain valve after discharging the rainwater.
4. Record discharge and operator name and signature in the Rainwater Disposal log.
    - Record must include:
        - Time and date of discharge
        - Tank/equipment identification, location, and contents
        - Results of visual inspection of contents
    - Records must be kept for at least three years and be made available for review at request of EH&S or regulatory personnel.
5. IF there is evidence of rainwater contamination, follow steps 6 - 11 below. IF hazardous constituents are present, immediately initiate spill response procedures and notify EH&S (Step 10).
6. Check for visual or audio alarms on equipment.
7. Check leak monitoring equipment, overfill protection devices, and spill prevention devices for signs of system malfunctions.
8. Check tank(s), drum(s), piping, pump(s), valve(s), and joints for signs of leakage (e.g., drips, stains, wet spots, cracks, bulges).
9. Check level in tank(s) or drum(s) for unexplained level changes or exceptionally high level(s).
10. Record inspection results, EH&S notification, and signature in the Rainwater Disposal Log.
11. Notify EH&S (x5251) of rainwater contamination. IF inspection is inconclusive, an EH&S representative must sample and analyze the liquid, which must be disposed of properly based on results.

12. If applicable, an EH&S representative must record the results of chemical analysis and final disposition of contaminated rainwater. The Facilities Maint Supt and an authorized EH&S representative must sign log sheets regarding contaminated rainwater.

INFORMATION TABLE			
Secondary Containment	**Possible Contaminants**	**Release By**	**Location of Valves or Pump**
Bldg 6 Transformer Pad Lower Sump	Transformer oil No PCBs	Portable trash pump to be installed	East end of the Bldg.
Bldg 6 Transformer Pad Upper Sump	Transformer oil No PCBs	1 locked valve	East end of the Bldg
Bldg 16 Transformers, Banks 10 & 16	Diala AX transformer oil Possible PCBs to 3 ppm	1 locked valve	West side of containment Area
Bldg 25, Bank 14	Transformer oil	Locked valve	
Bldg 27, Transformer CTS-HVPS-1, Sump	Transformer oil No PCB	1 valve	Northwest corner of containment pad.
Bldg 37, Bank 218	Transformer oil	Locked valve	Upper pad
Bldg 46 So. End, Bank 49 Sump	Silicone transformer oil No PCBs	Portable trash pump to be installed	
Bldg 50, Bank 25 Pad Sump	Transformer oil No PCBs	Pump	West end of containment pad.
Bldg 58, Bank 36 & 158	Possible PCBs to 7 ppm		Locked valve bottom of containment sump
Bldg 62, Bank 66	Possible PCBs up to 6 ppm	Locked valve	
Bldg 66, Bank 215	Transformer oil	Locked valve	
Bldg 69 Sub	Silicone transformer oil No PCBs.	1 locked valve	East side of containment pad.

INFORMATION TABLE, *continued*			
Secondary Containment	**Possible Contaminants**	**Release By**	**Location of Valves or Pump**
Bldg 70, Bank 70, OS-1-70, Bank 30	Transformer oil	Locked valve Valve & pump	
Bldg 70A, Bank 31	Diala AX transformer oil No PCBs	2 locked valves	East end of containment pad.
Bldg 77, Bank 72	Diala AX transformer oil No PCBs	1 locked valve	Down pipe for valve handle within sump under transformers (Southwest side of pad)
Bldg 88, Bank 80; Oil Separation Sump	Diala AX transformer oil Possible PCBs, up to 17 ppm		West end of containment pad.
Bldg 90, Bank 90	Diala AX transformer oil No PCBs	1 locked valve	West end of containment pad.

FIGURE 1: Secondary Containment Locations

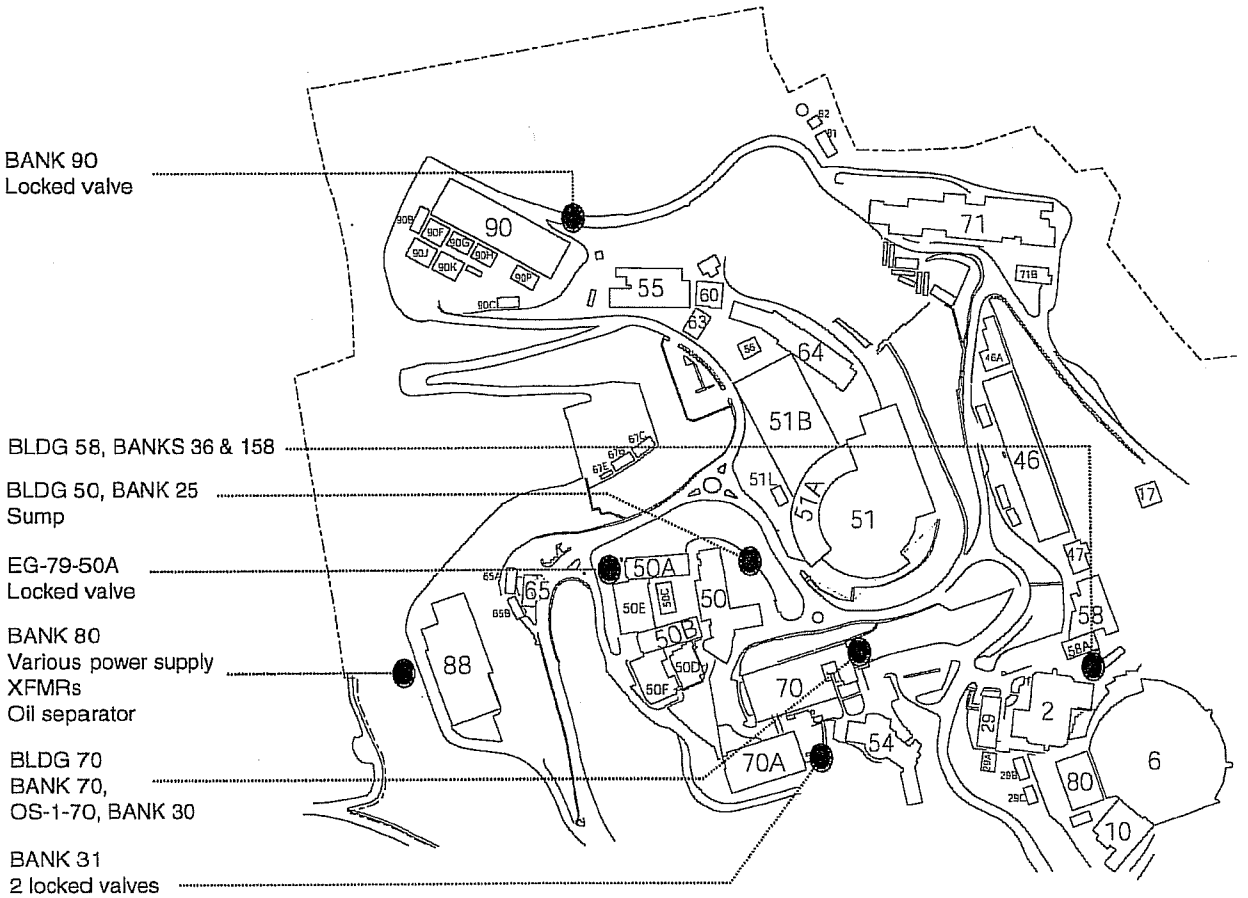
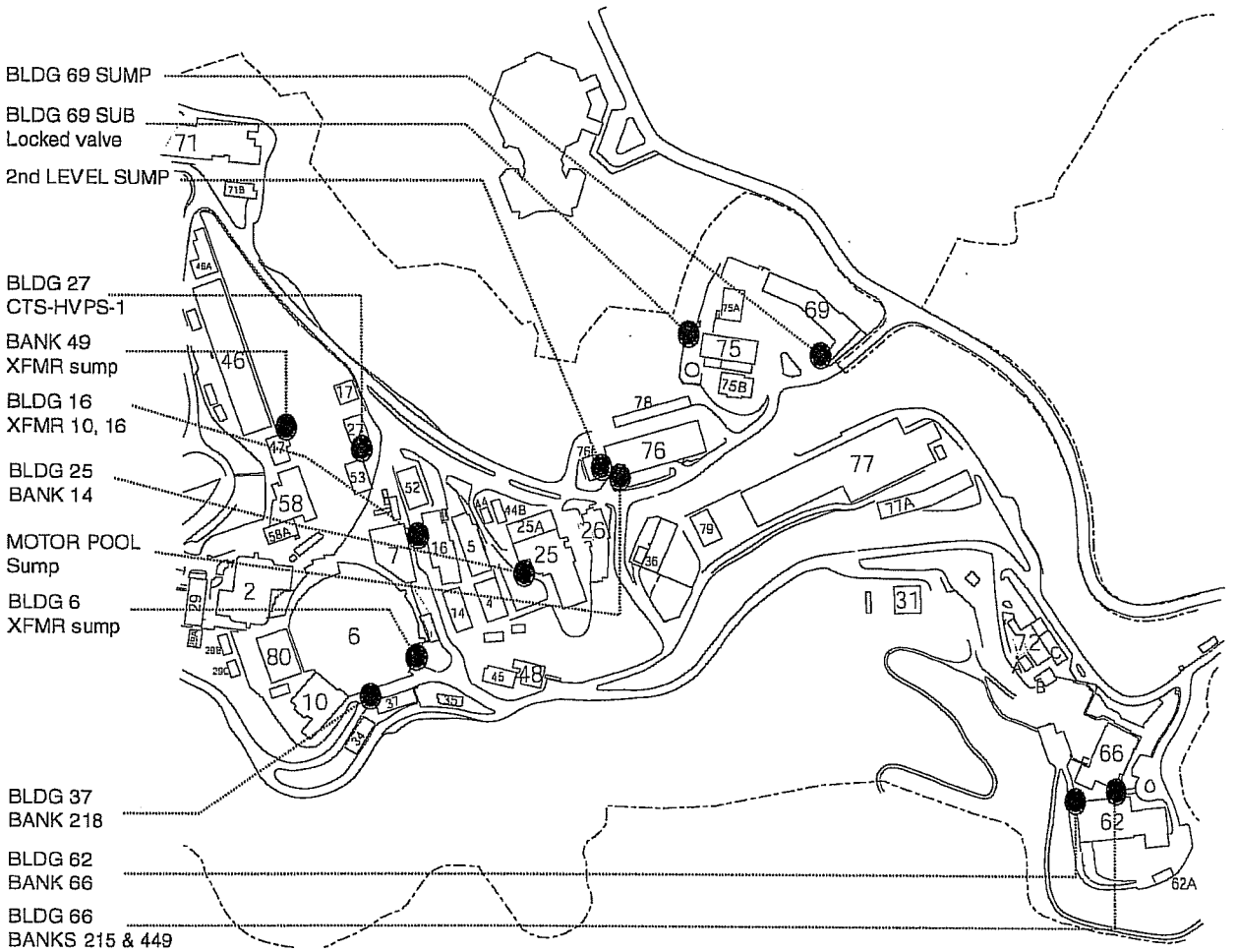


FIGURE 1: Secondary Containment Locations (Continued)



RESPONSIBILITIES AND CONTROLS

REV NO.	SME/Title	APPROVER/Title	DATE	EFFECTIVE DATE
2				
	John E. Hutchings (Print)	Don Weber/ Mgr. (Print)	4/29/05	4/29/05

ATTACHMENT: **Rainwater Disposal Log—Inspection Checklist**

Complete log entries in accordance with Facilities Dept procedure OPER-056.

SECONDARY CONTAINMENT UNIT:_____

UNIT LOCATION:_____

POSSIBLE CONTAMINANTS (Refer to table in OPER-056):_____

_____

DATE:_____ **OPERATOR NAME:**_____

1. Is there any evidence of rainwater contamination (e.g., color, clarity, odor, oil sheen?)
   If yes, describe:_____
   _____

Rainwater Discharge Information (not contaminated)

2. Rainwater discharged (if there is no evidence of contamination):
   Time of discharge:_____am / pm
   Operator signature:_____

Contaminated Rainwater Information

3. Describe results of inspection from steps 6-9 of Oper-056 (if there is no evidence of contamination):
   _____
   _____
   _____
   _____
   _____
   _____
   Operator signature:_____
4. Results of chemical analysis of rainwater, if any:_____
   _____
   _____
5. Final disposition of rainwater:_____
   _____
   _____

Authorization

6. Facilities Maint Supt and authorized EH&S representative must sign here to approve of contaminated rainwater:

Name: _____	Name:_____
Title: _____	Title:_____
Signature: _____	Signature:_____
Date: _____	Date:_____

APPENDIX F

INSPECTION PROCEDURE AND FORMS

ATTACHMENT F-1 TANK SCHEDULED MAINTENANCE AND INSPECTION OPERATING PROCEDURE

TANK SCHEDULED MAINTENANCE AND INSPECTION OPERATING PROCEDURE

PURPOSE

Visual inspection to ensure integrity of tanks and associated equipment.
APPLICATION: 26 week tank inspection.
SCOPE: All tanks.

SPECIAL INSTRUCTIONS

1. Make a photocopy of this page that you can write on.

WORK STEPS

1. Check TANK MONITOR / LEAK DETECTOR for proper functioning, where applicable.
2. Initial and date log book and/or printout, where applicable.
3. Check the following.

   Foundation for corrosion and cracks

   Structural supports for corrosion and cracks

   Tank walls and casing for corrosion, cracks, and leaks

   Pipelines, plumbing, and valves for corrosion, cracks, and leaks

1. Using the photocopy of this procedure, record your name, the tank number, date of inspection, condition code, and description of any defect In the following table:

INSPECTED BY (NAME):	
DATE:	DESCRIPTION OF DEFECT:
TANK No.:	
• 10 – No defects found.	
• 11 – Minor repair required	
• 12 – Major repair required	
• 13 – Replacement required	

1. Submit the commented photocopy of this procedure to your supervisor. The photocopy is the record of this inspection and must be retained for auditing purposes.

RESPONSIBILITIES AND CONTROLS

REV NO.	SME/Title	APPROVER/Title	DATE	EFFECTIVE DATE
0				
	(Print)	Don Weber/ Mgr. (Print)	7/2/02	7/2/02

APPENDIX G

PROCEDURES FOR TANK INTEGRITY TESTING

ATTACHMENT G-1	STEEL TANK INSTITUTE STANDARD SPOO1 – STANDARD FOR THE INSPECTION OF ABOVEGROUND STORAGE TANKS
ATTACHMENT G-2	CONVAULT MANUFACTURERS RECOMMENDATION

STANDARD FOR THE INSPECTION OF ABOVEGROUND STORAGE TANKS

SP001
ISSUED JULY 2006
4th EDITION

Steel Tank Institute
A Division of STI/SPFA
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Lake Zurich, IL 60047
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PREFACE

The Steel Tank Institute (STI), formed in 1916, is a not-for-profit organization whose purpose is to secure co-operative action in advancing by all lawful means the common purposes of its members and to promote activities designed to enable the industry to conduct itself with the greatest economy and efficiency. It is further the purpose of STI to cooperate with other industries, organizations and government bodies in the development of reliable standards which advance industry manufacturing techniques to solve market-related problems.

This Standard was developed by the Steel Tank Institute AST Inspection Standard Committee comprised of the following members and alternates:

Chuck Travelstead, Chair
Brown-Minneapolis Tank
Innovative Tank Solutions
Albuquerque, NM

Bill Herdman, Co-Chair
Kennedy Tank & Manufacturing Co.
Indianapolis, IN

John Albert
Missouri Department of Agriculture
Weights and Measures Division
Jefferson City, MO

Steve Allwein
Morrison Brothers Co.
Severna Park, MD

Alan Bakeberg
South Dakota Petroleum Release
Compensation Fund
Pierre, SD

Bill Baker
Pa. Department of Environmental Protection
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Wisconsin Department of Commerce
Bureau of Storage Tank Regulation
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Department of Environmental Quality
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Staff Liaison, Steel Tank Institute
Lake Zurich, IL

1.0 GENERAL

1.1 This standard provides inspection and evaluation criteria required to determine the suitability for continued service of aboveground storage tanks until the next scheduled inspection. The purpose of conducting inspections is to identify the condition of and changes to the AST.

1.2 This Standard is intended for use by organizations and/or individuals who are knowledgeable and experienced in aboveground tank inspection. Note that the requirements included in this standard are minimum requirements and these other documents may have requirements that are more stringent. When applicable federal, state and local laws, and regulations concerning tank inspection are more stringent than the requirements of this standard, then these laws and regulations shall apply.

1.3 **OTHER STANDARDS**

1.3.1 Only aboveground tanks included in the scope of this standard are applicable for inspection per this standard.

1.3.2 Other standards, recommended practices and other equivalent engineering and best practices exist that provide alternative inspection requirements for tanks defined within the scope of this standard and for tanks outside the scope of this standard. For example, see API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction*, for additional information pertaining to tanks built to API Standard 650 and API Specification 12C tanks and API 12R1, *Recommended Practice for Setting, Maintenance, Inspection, Operation, and Repair of Tanks in Production Service*, for tanks employed in production service or other similar service.

1.4 **OWNER'S RESPONSIBILITY**

1.4.1 The owner is responsible for compliance with fire codes, local ordinances, and other applicable rules and regulations. The owner may want to retain assistance from specialists to aid in regulatory compliance, safe operations and installations in accordance with recognized industry standards.

1.4.2 The owner shall verify that persons working on ASTs understand and address the hazards associated with the contents of the ASTs as well as safe entry and procedures associated with those ASTs.

1.4.3 The owner's inspector is responsible for performing the periodic AST inspections and documenting the results in accordance with this standard.

1.4.4 The owner has the responsibility to address corrective actions identified in inspection reports.

1.5 **SCOPE**

1.5.1 This standard applies to the inspection of aboveground storage tanks. These storage tanks include shop-fabricated tanks, field-erected tanks and portable containers as defined in this standard, as well as the containment systems. The requirements for field-erected tanks are covered separately in Appendix B.

1.5.2 This standard applies to ASTs storing stable, flammable and combustible liquids at atmospheric pressure with a specific gravity less than approximately 1.0.

1.5.3 This standard applies to ASTs storing liquids with operating temperatures between ambient temperature and 200 degrees F (93.3°C).

1.6 At a minimum, the following tank components shall be inspected (as applicable):

- Primary tank
- Secondary tank
- Tank supports
- Tank anchors
- Tank foundation and external supports
- Tank gauges and alarms
- Insulation covering
- Tank appurtenances
- Normal vents
- Emergency vents
- Release Prevention Barriers
- Spill Control Systems

2.0 DEFINITIONS

ABOVEGROUND STORAGE TANK (AST) – a tank or container designed to operate at pressures from atmospheric pressure through a gauge pressure of one psig measured at the top of the tank. The tank may be sitting on the ground, or set on supports, such as saddles, skids or legs, etc. and may be installed in a vault. Included are shop-fabricated tanks, field-erected tanks, and portable containers with a capacity of 55 U.S. gallons (208 liters) or greater.

CONTINUOUS RELEASE DETECTION METHOD (CRDM) – a means of detecting a release of liquid through inherent design. It is passive because it does not require sensors or power to operate. Liquid releases are visually detected by facility operators. The system shall be designed in accordance with good engineering practice. Several acceptable and commonly used CRDM systems are as follows:

- Release prevention barrier (RPB) described in definition of release prevention barrier.
- Secondary containment AST including double-wall AST or double-bottom AST
- Elevated AST with release prevention barrier described in definitions of elevated AST and release prevention barrier.

CORROSION RATE – the rate of degradation of materials due to chemical reactions with their environment. The rate of corrosion is established by the certified inspector as the maximum shell thickness loss divided by the operational service time.

CERTIFIED INSPECTOR – a tank inspector who meets the certification requirements identified in Section 4.2 of this standard.

DOUBLE-WALL AST – an AST with a primary tank contained within a secondary containment tank forming an interstitial (annular) space. An interstitial (annular) space between the two tanks is formed that is capable of being tested and monitored for leakage into the interstice

ELEVATED AST – an AST which is not in contact with the ground and which is raised above the surface of the ground or bottom of a vault using tanks supports. It allows for a visual external inspection of the bottom of the primary tank. Examples of elevated tanks are tanks constructed on grillage or grating, or tanks on supports.

FIELD-ERECTED AST – a welded carbon or stainless steel AST erected on-site where it will be used. For the purpose of this standard, ASTs meeting either of the following descriptions are to be inspected as field-erected ASTs:

a. An AST where the nameplate (or other identifying means such as accurate drawings) indicates that it is a field-erected AST. These are limited to a maximum shell height of 50 feet (15.24 meters) and a maximum diameter of 30 feet (9.14 meters).
b. An AST without a nameplate (or other identifying means such as accurate drawings) that is more than 50,000 U.S. gallons (189,271 liters) and a maximum shell height of 50 feet (15.24 meters) and a maximum diameter of 30 feet (9.14 meters).

FORMAL EXTERNAL INSPECTION (FEI) – a documented external inspection conducted by a certified inspector to assess the condition of the AST and determine its suitability for continued service without entry into the AST interior.

FORMAL INTERNAL INSPECTION (FII) - a documented internal inspection conducted by a certified inspector to assess the internal and external condition of the AST and determine its suitability for continued service. This includes the inspection requirements of a formal external inspection. A formal internal inspection satisfies the requirements of a formal external inspection and shall be considered equivalent to or better than a formal external inspection for the purposes of scheduling.

INSPECTION PLAN – a written plan developed by the owner or a Professional Engineer that details the inspection requirements for a facility.

INTERSTICE – in a double-wall AST, the space between the primary tank and secondary tank. In a double-bottom AST, the space or void between the two bottoms. This space may be open or closed to the atmosphere and may be monitored or tested by vacuum or leak detection equipment or by visual inspection.

LEAK TESTING METHOD (LTM) – a point in time test method to determine if an AST is liquid tight. Leak testing is not preventive in the sense that it provides an indication only if the AST integrity has already been breached. Therefore, it may be used as a tank integrity measure or as a supplement to other inspection procedures. LTMs may include the following technologies:

- Gas pressure decay (includes vacuum decay)
- Gas pressure soap bubble testing
- Gas tracers (e.g., helium tracer)
- Soil tracers (chemical marker)
- Mass measurement
- Level measurement
- Hydrostatic test

LOCKOUT/TAGOUT – a procedure for affixing lockout or tagout devices to energy isolating equipment and for otherwise disabling machines or equipment to prevent unexpected energization, startup, or release of stored energy. Its intent is to prevent injury to employees, and to comply with the following OSHA (Occupational Safety & Health Administration) regulations or their equivalent:

- 29 CFR part 1910.147, *The Control of Hazardous Energy (Lockout/Tagout)*
- 29 CFR part 1910.331 to 1910.333, *Electrical Lockout/Tagout.*

MAGNETIC FLUX LEAKAGE (MFL) – a method used to nondestructively inspect ferromagnetic materials such as a carbon steel floor plate. A magnetic field is applied to steel to near saturation, so that it cannot hold any additional field. In the presence of a flaw (wall thinning), some of the magnetic flux escapes or "leaks" into the surrounding environment, where magnetic sensors detect it and quantitatively report a flaw signal. Once the flaw is detected and identified, an ultrasonic thickness scan (UTS) is required in the area to quantify the flaw. This method is commonly used on AST floors (MFL Floorscan) to determine the underside condition of the tank floor.

MANWAY – an AST opening designed to allow personnel entry into an AST.

MICROBIAL INFLUENCED / INDUCED CORROSION (MIC) – corrosion accelerated/caused by certain microbes. Depending on the type of bacteria, the degree of microbial activity, and the thickness and type of AST material, MIC is characterized by a high rate of corrosion. It sometimes penetrates tank walls and bottoms in two years or less. It is typically characterized by a ring-like pattern of cone or crater-shaped penetrations.

NONDESTRUCTIVE EXAMINATION (NDE) – the development and application of technical methods to examine materials and/or components in ways that do not impair future usefulness and serviceability in order to detect, locate, measure, interpret, and evaluate flaws.

OWNER - the legal entity having control and responsibility for the operation of the existing AST and storage facilities.

OWNER'S INSPECTOR – the owner or owner's designee responsible for conducting owner's periodic AST inspections.

PAINT FAILURE – significant peeling, cracking, spalling, blistering, pitting and chipping etc. of the paint or coating on an AST resulting in the exposure of the metal surface and corrosion of the tank shell.

PERIODIC AST INSPECTION - a visual, documented inspection conducted by an owner's inspector, to assess the general AST conditions, as best as possible, without suspending AST operations or removing the AST from service.

PORTABLE CONTAINER - a closed AST having a liquid capacity equal to or greater than 55 U.S. gallons and not intended for fixed installation.

PRIMARY TANK – the tank in direct contact with the liquid stored.

PROFESSIONAL ENGINEER (PE) – a person who has fulfilled the education and/or experience requirements under state licensure laws and has received a license to practice engineering.

RELEASE PREVENTION BARRIER (RPB) – a liquid containment barrier that is sufficiently impervious to the liquid being stored and is installed under the AST. Its purpose is to divert leaks toward the perimeter of the AST where they can be easily detected as well as to prevent liquid from contaminating the environment. RPBs are composed of materials compatible with the liquid stored in the AST and meet proper engineering standards. Examples are steel (such as in steel double-bottom tanks), concrete, elastomeric liners, or other suitable materials provided the above criteria are met.

REMOTE IMPOUNDING - a spill control system that uses a sloped spillway to channel liquid releases away from an AST to a contained collection area that is remote from important facilities, adjoining property, or waterways. The containment area is sized for the capacity of the largest AST plus sufficient freeboard to allow for precipitation. For the purposes of this standard, remote impounding is equivalent to secondary containment. Remote impounding is further defined in NFPA 30.

SECONDARY CONTAINMENT SYSTEM - provides a secondary means of containment for the entire volumetric capacity of the largest single AST within a common dike/berm and sufficient freeboard to contain precipitation. The secondary containment system is to be designed to contain a spill until it can be discovered and cleaned up. It must be constructed to good engineering practices. (Note: See NFPA 30 and/or 40 CFR Part 112 and other local requirements for additional definitions.)

SECONDARY CONTAINMENT DIKE/BERM – a spill control system consisting of walls and a floor completely surrounding single/multiple ASTs. It provides a secondary means of containment for the entire capacity of the largest single AST and sufficient freeboard to contain precipitation and the displacement volume present below the dike wall of other ASTs in the containment area. The secondary containment dike/berm is to be constructed to good engineering practices.

SECONDARY CONTAINMENT AST – an AST with an integral secondary containment dike. These integral secondary containment dikes may be pans, boxes or containers and are designed to contain the contents of the primary tank if the primary tank fails. A secondary containment AST may be open or closed to the atmosphere. If precipitation cannot readily enter the integral secondary containment, then the containment need only be sized for the primary tank volume. If precipitation can enter the secondary containment, then the secondary containment is sized to contain the primary tank volume and with sufficient freeboard to contain precipitation.

SECONDARY TANK – the outer wall of a double-wall AST.

SHELL – for the purposes of this standard, the AST shell includes the roof, bottom, head or wall of the AST.

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 (189,271 liters).

SINGLE-WALL AST – an AST with only one wall or shell.

SPILL CONTROL - a means of preventing a release of liquid to the environment including adjoining property and waterways. Methods include the following:

- Remote impounding
- Secondary containment dike/berm
- Secondary containment AST
- Secondary containment system

SUFFICIENTLY IMPERVIOUS - Sufficient resistance to diffusion and transport of hydrocarbon or other chemical substances to prevent contamination of the environment until clean-up occurs. Determination of "sufficiently impervious" is a technical consideration that a Professional Engineer or other qualified professional (such as Professional Geologist, Environmental Professional, etc.) must make. This determination is to be based on sound technical considerations, the site specific conditions, as well as risk based considerations, such that ground and groundwater contamination is prevented, using current normally accepted engineering practices and principles. Sufficiently impervious does not necessarily mandate the use of a liner. Additional information about liners is found in API 341, *A Survey of Diked-area Liner Use at Aboveground Storage Tank Facilities.*

SUITABILITY FOR CONTINUED SERVICE – the determination that an AST's condition is adequate for continued use based on the criteria presented in this standard.

TANK IN CONTACT WITH THE GROUND – an AST that does not include a release prevention barrier and has some part of its primary tank shell in direct contact with the ground or soil. Therefore, direct inspection of all exterior surfaces of the AST cannot be conducted from the tank exterior.

TANK SUPPORTS – structures designed to elevate an AST above the ground. These include saddles, skids, beams, legs, and similar structures.

ULTRASONIC TESTING SCAN (UTS) – an ultrasonic scan to evaluate the corrosion on the opposite side of the inspection surface using an ultrasonic flaw detector. This inspection is to be performed by an NDT examiner certified in accordance with ASNT-TC-1A (or equivalent) per paragraph 4.3.2.

ULTRASONIC THICKNESS TESTING (UTT) – a point thickness reading taken by a competent person, per paragraph 4.3.3, utilizing a digital ultrasonic thickness meter.

3.0 SAFETY CONSIDERATIONS

3.1 The hazards associated with the cleaning, entry, inspection, testing, maintenance or other aspects of ASTs are significant. Safety considerations and controls should be established prior to undertaking physical activities associated with ASTs.

3.2 This standard does not address all applicable health and safety risks and precautions with respect to particular materials, conditions or procedures. Information concerning safety and health risks and precautions should be obtained from the applicable standards, regulations, suppliers of materials and material safety data sheets.

3.3 The following activities may be regulated and consideration to the relevant requirements and best management practices shall be included in an inspection:

- Breaking Lines, Isolating, and Release of Equipment
- General Work Permit
- Hot Work
- Lockout/Tagout
- Gas Testing
- Contractor Safety
- Respiratory Protection
- Tank Cleaning, Repair, and Dismantling
- Confined Space Entry

3.4 Plans to enter an AST require development or use of appropriate safety procedures, precautions and requirements. The owner, the contractors and all persons associated with the AST inspection, cleaning or entry, shall review these prior to the start of work.

3.4.1 Before the inspection begins, check for the accumulation of harmful vapors around and in the AST. Refer to the following documents for additional information:

- NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning or Repair*
- API RP 2015, *Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks*
- API RP 2016, *Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks*

3.4.2 Each AST entry requires an Emergency Action Plan. The owner and contractor must develop the Plan together. This Plan describes the actions required for personal safety from fire and other emergencies. This plan includes the following requirements as well as others:

- SCBA (Self Contained Breathing Apparatus) and lifelines on site, as well as rescuers trained in their use.
- Establishment of and review of emergency escape routes and procedures with authorized entrants.
- Establishment of an assembly area and procedures to account for all authorized entrants after emergency evacuation is complete.
- Establishment of rescue and first-aid duties for those authorized entrants assigned to perform them.

3.4.3 After plans, procedures and administrative controls are in place and before entering the AST, isolate the AST by locking out and tagging all energy sources associated with the AST. Line isolation shall be at the closest flange practical to the equipment or space. Lockout/Tagout establishes a procedure for affixing lockout or tagout devices to energy-isolating equipment and for otherwise disabling machines or equipment to prevent unexpected energization, startup, or release of stored energy. Its intent is to prevent injury to employees, and to comply with the following OSHA regulations or their equivalent:

- 29 CFR part 1910.147, *The Control of Hazardous Energy (Lockout/Tagout)*
- 29 CFR part 1910.331 to 1910.333, *Electrical Lockout/Tagout*
- 29 CFR part 1910.146, *Permit-required Confined Spaces*

3.4.4 The atmosphere inside the space must be tested and confirmed safe before authorized entrants may enter without wearing supplied-air respiratory protection or SCBA. Continuous atmospheric monitoring is best. At a minimum, test the space for the following, and in the following order:

3.4.4.1 Oxygen

3.4.4.2 Flammable vapors

3.4.4.3 Toxics

3.5 Inspect the roof and support structures for soundness. Inspect stairs, ladders and platforms to determine that they can safely support equipment and people before accessing them. Corrosion may attack the deck plate at the edge of a fixed roof and at the rafters in the center of the roof first. Therefore, in addition to entry hazards, there are those associated with the access to AST roofs. For AST roofs where one side is not visible, it may be necessary to check the plate thickness with ultrasonic instrument or hammer test it to verify its adequacy. If there is a doubt, place planks on the roof that span structural members and walk on the planks instead of directly on the roof. These same hazards may also apply to other AST walking surfaces, such as the surfaces of floating roofs. Guidance for this is covered in API RP 2016, *Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks*.

3.6 A safety analysis shall be conducted prior to a leak test. Some leak testing scenarios may be hazardous. For example, the leak test methods referenced in 9.1.1 requires that either an inert gas be used or that the tank be thoroughly cleaned and gas free prior to testing and pressurizing an AST. Combining hydrocarbons with air provides a potentially hazardous atmosphere. Each test method may have unique hazards and these shall be considered and addressed in a pre-test safety plan prior to testing activities. A qualified person shall review the safety plan.

4.0 AST INSPECTOR QUALIFICATIONS

4.1 **OWNER'S INSPECTOR QUALIFICATIONS**

4.1.1 Periodic inspections are to be performed by an owner's inspector.

4.1.2 The personnel performing these inspections shall be knowledgeable of storage facility operations, the type of AST and its associated components, and characteristics of the liquid stored.

4.2 **CERTIFIED INSPECTOR QUALIFICATIONS**

4.2.1 Formal external and formal internal tank inspections are to be performed by a certified inspector.

4.2.2 A Certified inspector shall be certified by one or more of the following:

4.2.2.1 American Petroleum Institute (API) Standard 653 Authorized Inspector Certification with STI SP001 Adjunct Certification.

4.2.2.2 Steel Tank Institute (STI) Certified SP001 AST Tank System Inspector

4.2.2.3 Additional certifications as may be required by individual states or other governing bodies.

4.3 **NDT EXAMINER QUALIFICATIONS**

4.3.1 Non-destructive test (NDT) examiner - Personnel performing non-destructive examinations shall meet the qualifications described below, but need not be certified in accordance with paragraph 4.2. The results of NDE work, however, must be considered in the evaluation of the tank by the certified inspector.

4.3.2 Testing personnel referenced within this standard shall be qualified in accordance with their employer's written practice which must be in accordance with the American Society for Nondestructive Testing's (ASNT) document SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing" unless otherwise noted within this standard.

4.3.2.1 Referenced within this standard are the following nondestructive techniques. All inspectors performing the following inspection methods shall be certified per 4.3.2.

- MT – Magnetic Particle Testing
- RT – Radiographic Testing
- UT – Ultrasonic Testing
- MFL – Magnetic Flux Leakage
- PT – Penetrant Testing

4.3.3 Testing personnel performing ultrasonic thickness (UTT) point readings are required to have the minimum training described in this paragraph to operate a Digital Ultrasonic Thickness Meter. A Digital Ultrasonic Thickness Meter is an ultrasonic unit which is only used to obtain a point thickness reading displaying the resulting specimen thickness. This does not cover the use of ultrasonic flaw detectors. It does not cover the interpretation of an A, B or C scan unit readout.

4.3.3.1 Training - The operator of the digital ultrasonic thickness unit must be trained by a competent person in the operation, calibration and set-up of the unit. This should be a minimum of one hour and is usually performed by the manufacturer, or manufacturer's representative upon delivery of the unit. This training shall be documented and specifically state that the trainee has received at least one hour of training in the proper operation, calibration and set up of the unit. The unit type shall be noted on the documentation (manufacturer and model). The trainer shall sign his name to attest that the training has been completed and the trainee is now proficient in the use of that ultrasonic digital meter. At the time of training, the trainee shall have all of the tools and materials needed to carry out the proper function of the meter. These tools and materials are as follows:

- Step wedge of the right thickness range and material for the desired application.
- Ultrasonic couplant of the type that would be needed for the desired application.
- Ultrasonic transducer of the right type, frequency and diameter for the desired application.

4.3.3.2 Testing personnel should be aware that there are many factors that affect the performance and accuracy of a digital thickness meter, such as listed below:

- Equipment calibration
- Surface roughness of test specimen
- Coupling technique
- Couplant
- Curvature of test piece
- Taper or eccentricity of the test specimen
- Acoustic properties of the material to be tested
- Temperature of the test specimen

4.3.3.3 Surface coatings can have a significant effect on the performance and accuracy of the thickness reading. It is recommended that the surface coating be removed in test areas. There are digital thickness meters specifically made for the inspection of metal through coatings and these can be used without removal of the coating.

5.0 INSPECTION SCHEDULE

5.1 The owner shall use the AST's type, size, and type of installation, corrosion rate and previous inspection history, if any, to develop a schedule of applicable types of inspections for each AST per Table 5.5.

5.2 Owners who have an inspection plan shall use this standard to establish the inspection criteria for ASTs described in this standard using the AST type, size, and previous inspection history, type of installation and corrosion rate.

5.3 Certified inspectors using this standard to conduct inspections, shall use the AST type, size, previous inspection history, type of installation, corrosion rate and the schedule determined by the owner, so long as the information is correct and in accordance with the requirements of this standard.

5.4 **AST CATEGORIES USED IN TABLE 5.5**

5.4.1 Category 1 - ASTs with spill control, and with CRDM

5.4.2 Category 2 - ASTs with spill control and without CRDM

5.4.3 Category 3 - ASTs without spill control and without CRDM

5.4.4 Table 5.4 shows some typical tank types and their corresponding AST category

TABLE 5.4 EXAMPLE TANK CONFIGURATION AND AST CATEGORY

TANK CONFIGURATION	TANK HAS CRDM?	AST CATEGORY
AST in contact with ground	no	2 or 3
Elevated tank with spill control and with no part of AST in contact with ground	yes	1
Vertical tank with RPB and spill control	yes	1
Vertical tank with double bottom and spill control	yes	1
Vertical tank with RPB under tank and spill control	yes	1
Double-wall AST	yes	1
AST with secondary containment dike/berm	yes	1

5.5 **IN TABLE 5.5 USE THE FOLLOWING DESIGNATIONS:**

5.5.1 P – Periodic AST inspection
Refer to Section 6

5.5.2 E – Formal external inspection by certified inspector
Refer to Section 7

5.5.3 I – Formal internal inspection by certified inspector
Refer to Section 8

5.5.4 L – leak test by owner or owner's designee
Refer to Section 9

5.5.5 ( ) indicates maximum inspection interval in years. For example, E (5) indicates formal external inspection every 5 years.

TABLE 5.5 TABLE OF INSPECTION SCHEDULES

AST Type and Size (U.S. gallons)		Category 1	Category 2	Category 3
Shop-Fabricated ASTs	0 – 1100 (0-4164 liters)	P	P	P, E&L(10)
	1101 - 5,000 (4168-18,927 liters)	P	P, E&L(10)	[P, E&L(5), I(10)] or [P, L(2), E(5)]
	5,001 - 30,000 (18,931-113,562 liters)	P, E(20)	[P, E(10), I(20)] or [P, E(5), L(10)]	[P, E&L(5), I(10)] or [P, L(1), E(5)]
	30,001 - 50,000 (113,566-189,271 liters)	P, E(20)	P, E&L(5), I(15)	P, E&L(5), I(10)
Portable Containers		P	P	P**

** Owner shall either discontinue use of portable container for storage or have the portable container DOT (Department of Transportation) tested and recertified per the following schedule (refer to Section 9.0):
Plastic portable container - every 7 years
Steel portable container - every 12 years
Stainless Steel portable container - every 17 years

6.0 PERIODIC AST INSPECTIONS

6.1 Periodic AST inspections are to be conducted by owner's inspector. Checklists for periodic AST inspections are found in Appendix C of this standard. These are to be used as a guide for recording inspection data.

6.2 The owner's inspector must meet the requirements of paragraph 4.1.

6.3 Review prior inspection, repair and alteration data before each inspection. Note special conditions for a particular AST.

6.4 The owner's inspector is to complete the STI SP001 AST Record for each AST or tank site as designated in the checklists. Note special conditions and changes or alterations to the tank.

6.5 The owner's inspector is to complete the STI SP001 Monthly Inspection Checklist each month. Take note of instructions on the checklist. Note special conditions.

6.6 The owner's inspector is to complete the STI SP001 Annual Inspection Checklist each year. Take note of instructions on the checklist. Note special conditions.

6.7 For portable containers, the owner's inspector is to complete only the STI SP001 Portable Container Monthly Inspection Checklist each month. Take note of the instructions on the checklist. Note special conditions.

6.7.1 As an alternative, if documentation is kept on-site for each portable container that indicates how long each has been kept at the facility, then the owner's inspector is to complete only the STI

SP001 Portable Container Monthly Inspection Checklist each month for containers on-site for 91 days or more. Take note of the instructions on the checklist. Note special conditions.

6.8 Additional requirements for field-erected tanks are included in Appendix B.

6.9 Refer to Section 10.0 for conditions that warrant immediate action.

6.10 By removing water or taking other corrective action on a regular basis, harmful MIC is prevented. Monitor for water accumulation monthly. If corrosion is found due to MIC, treat the AST with a proper biocide or otherwise sterilize the AST. In addition, take necessary steps to repair or remove the AST from service, if warranted by the extent of the corrosion (per Section 10.0).

7.0 FORMAL EXTERNAL INSPECTION GUIDELINES

7.1 GENERAL

7.1.1 Formal external inspections are to be performed by certified inspectors per paragraph 4.2.

7.1.2 These guidelines are minimum inspection requirements. There are numerous AST configurations and components and it is the responsibility of the certified inspector to identify and properly inspect them to conform to the owner's requirements and/or industry standards. The inspector or the inspection company shall develop detailed checklists that identify, record and document all aspects of each inspection.

7.1.3 Review prior formal and periodic inspections, repair and alteration data before each inspection.

7.1.4 Record AST nameplate data, if available, and check the information included for accuracy against actual conditions. Record AST data, inspection findings, and problems identified.

7.1.5 Inspect the fabrication of the AST against applicable industry standards.

7.1.6 Inspect the AST foundations for indications of settlement, cracking, exposed rebar, or general disrepair. Inspect for areas of wash-out and voids under the AST. Confirm that the ground is sloped away from the AST and that there is no soil resting against the side of the AST covering parts of the shell or bottom extension. Inspect for standing water against the AST or the indication of drainage problems.

7.1.7 Visually inspect the AST support condition. Severe cracking or spalling of concrete supports shall be noted and evaluated. If there are pad plates between the supports and the shell, inspect the condition. Inspect the supports to be sure that they are sitting securely on the foundation or grade. If the supports are welded to the shell, inspect the welds for visible signs of stress or deterioration.

7.1.8 Identify and record the type of and the condition of the secondary containment, spill control, and CRDM, if present.

7.1.8.1 Visually inspect the general condition of the containment area to be sure that it is in good condition and that there is not a breach in the containment structure. Note changes from the original design and installation information if available.

7.1.8.2 Inspect for foreign materials in the containment area. Inspect for liquid in the containment system and CRDM. If liquid is present, find the source and report findings. Record other ASTs or containers within the same containment area.

7.1.8.3 Make sure that the drain valves are operable and in good condition. Report penetrations through the secondary containment that may compromise the integrity of the containment area. Report penetrations that are likely to lead to failure of the secondary containment should the liquid level of water or liquid rise to these penetrations.

7.1.9 Inspect and verify the operability of ancillary equipment including the following items:

7.1.9.1 Piping and piping connections for visible signs of stress or leakage such as severe corrosion, rusted bolted connections, or other severe degradation.

7.1.9.2 Normal and emergency vents and pressure/vacuum devices. Verify that the devices are of adequate size and capacity, operable, and in good condition. Refer to the device manufacturer's literature, typical industry venting requirements, and other appropriate resources. Record the types and locations of these devices.

7.1.9.3 Primary tank level gauge and secondary tank interstitial gauge for free movement and the floats, guides and attachments are in working order. Check that the liquid level gauge length is sized correctly for the tank diameter. Inspect the alarms connected to the level gauge for operability and for a complete loop and circuit from the primary sensor to the final annunciation or alarm point.

7.1.10 Inspect the bonding and grounding system of the AST, if present. (Refer to NFPA 780 *Standard for the Installation of Lightning Protection Systems.*)

7.1.11 Inspect stairways, handrails and platforms for broken welds, bent members, and corrosion.

7.1.12 Inspect the coating on the AST shell, heads, and supports for paint failure.

7.2 **DETERMINE THE ORIGINAL SHELL THICKNESS OF THE AST**. Suggested methods of determining this are as follows:

7.2.1 Review the original tank documentation, such as drawings and packing lists.

7.2.2 Consult the tank manufacturer.

7.2.3 Examine the tank labels for evidence of a widely accepted tank standard, such as Underwriters Laboratories Standard UL 142, etc. Consult the referenced standard to determine the minimum design shell thickness.

7.2.4 Measure the tank thickness of several areas of the tank that have no visible corrosion or pitting. The average of these measurements will result in a minimum shell thickness that can be used.

7.3 **HORIZONTAL AST**- Requirements in addition to the applicable items in 7.1

7.3.1 Inspect shell plates and welds for indications of exterior corrosion, buckling or distortion, as well as for cracking, pinholes or mechanical damage. Inspect the shell of the AST and the ancillary equipment for signs of distortion and stress.

7.3.1.1 Take and record UTT readings and the location of the reading of each plate or shell course in areas accessible without entering the AST. Readings must be concentrated in areas where corrosion is likely to occur. If significant internal corrosion is detected, further investigation using Ultrasonic Testing Scans (UTS) is required. If applicable, include areas marked from previous readings. Refer to Section 10.0.

7.3.2 Inspect shell attachments for changes made after the AST was fabricated. Refer to previous drawings or make new sketches that show all the appurtenances, attachments and nozzle locations on the AST shell and heads or roof. Record repads (reinforcing plates) and/or insert plates. Inspect attachment welds for signs of stress and corrosion.

7.4 **VERTICAL OR RECTANGULAR AST** - Requirements in addition to the applicable items in 7.1

7.4.1 Shell Surface – Refer to 7.3.1 and 7.3.2

7.4.2 Shell Attachments – Refer to 7.3.3

7.4.3 Vertical AST Roof - Inspect for low areas on the roof and standing water that may corrode the roof areas. Inspect for paint failure, holes and corrosion. Take UTT readings on the roof and record results. If possible, measure thicknesses in previously measured areas for corrosion rate determination. If significant corrosion is detected, further investigation using Ultrasonic Testing Scans (UTS) is required. Refer to Section 10.0

7.4.4 **DOUBLE WALL AND DOUBLE BOTTOM AST** - Requirements in addition to the applicable items in 7.1:

7.4.5 Verify that the leak detection equipment or method is operating if the tank is so equipped.

7.4.6 Check for a leak or the presence of liquid in the interstice.

7.4.7 Double-bottom ASTs require UTT readings of areas that are single-wall as described in paragraph 7.3.1.1 above. Double-wall ASTs do not require UTT readings.

7.5 **INSULATED AST** - Requirements in addition to the applicable items in 7.1 to 7.4

7.5.1 Remove the insulation in areas where mold or moisture is present or points where moisture is likely to accumulate and examine the metal surface for signs of signification corrosion. Consider the wicking effect of water in the insulation, particularly in the lower exterior portion of the tank shell.

7.5.2 If insulation damage is suspected, remove sections of the insulation to check for corrosion. Continue removing the insulation until the extent and nature of the corrosion has been established.

7.5.3 Take UTT readings of the shell and record results including, if applicable, areas marked from previous readings. If significant internal corrosion is detected, further investigation using Ultrasonic Testing Scans (UTS) is required. Refer to Section 10.0

7.6 Additional requirements for field-erected ASTs are included in Appendix B.

7.7 In the final report, include field data, measurements, pictures, drawings, tables and an inspection summary. In the summary, identify unacceptable conditions and recommended corrective actions. Determine the suitability for continued service of the AST per Section 10.0. Include the next

scheduled formal external inspection or formal internal inspection, as applicable. Include the inspector's name and certification number in the report.

8.0 FORMAL INTERNAL INSPECTION GUIDELINES

8.1 **GENERAL**

8.1.1 Formal internal inspections are to be performed by certified inspectors per paragraph 4.2.

8.1.2 These guidelines are minimum inspection requirements. There are numerous AST configurations and components and it is the responsibility of the certified inspector to identify and properly inspect them to conform to the owner's requirements and/or industry standards. The inspector or the inspection company shall develop detailed checklists that identify, record and document all aspects of each inspection.

8.1.3 A formal internal inspection includes the requirements of a formal external inspection with the addition of the requirements described below. Refer to paragraphs 7.1 to 7.7 for formal external inspection requirements.

8.1.4 Double wall tanks and secondary containment tanks may be inspected by checking the interstice for liquid or by other equivalent methods.

8.1.5 For elevated ASTs where all external surfaces of an AST are accessible, the internal inspection requirements may be satisfied with an examination from the exterior by using such methods as UTS. For all other situations, entry into the interior of the AST is necessary to assess the condition of all surfaces.

8.2 **HORIZONTAL AST INTERNAL INSPECTION**

8.2.1 Identify, measure, inspect and record all AST internal appurtenances. Inspect for mechanical damage, corrosion, cracking, etc. Inspect for deteriorating or corroding internal attachments and piping. Take thickness readings of internal structures and record the readings.

8.2.2 Inspect the welds for cracking by visual inspection or if necessary, by magnetic particle (MT) inspection or equivalent method.

8.2.3 Internal NDT Inspection

8.2.3.1 AST assessment:

8.2.3.1.1 Ultrasonic testing equipment that is capable of scanning the tank (UTS), rather than measuring only individual points (UTT), is the preferred method of testing. Personnel performing UTS are to be qualified per paragraph 4.3.2.

8.2.3.1.2 If ultrasonic testing equipment that is capable of scanning the tank (as described in 8.2.3.1.1) is not practical, use equipment that tests individual points. In this case, take UTT measurements of at least 15 points per each 12 inches x 12 inches (0.3 meters x 0.3 meters) square area of the shell that is in contact with the ground. Any questionable areas are to be assessed by UTS per 8.2.3.1.1.

8.2.3.2 Perform a vacuum box (VB) examination of questionable welds to check for leaks.

8.2.3.3 Refer to Section 10.0 for criteria for suitability for continued service.

8.3 **VERTICAL AND RECTANGULAR AST INTERNAL INSPECTION**

8.3.1 Identify record, inspect and measure all AST internals. Inspect AST internals to check for mechanical damage, corrosion, cracking, etc. Check for deteriorating or corroding internal attachments and piping. Take thickness readings of internal structures and record the readings.

8.3.2 Inspect the welds for cracking by visual inspection or if necessary, by magnetic particle (MT) inspection or equivalent method.

8.3.3 Internal NDT Inspection

8.3.3.1 AST floor thickness assessment is required as follows:

8.3.3.1.1 Complete coverage of the AST floor is recommended due to random corrosion characteristics of metal in contact with ground. Inspection of the AST floor is recommended using inspection methods capable of determining the underside floor condition such as UTS, MFL followed by UTS of questionable areas, or other equivalent methods.

8.3.3.1.2 If ultrasonic testing equipment that is capable of scanning the tank (as described in 8.3.3.1.1) is not practical, use equipment that tests individual points. In this case, take UTT measurements of at least 15 points per each 12 inches x 12 inches (0.3 meters x 0.3 meters) square area of the

shell that is in contact with the ground. Any questionable areas are to be assessed by UTS per 8.3.3.1.1.

8.3.3.2 Perform a vacuum box (VB) examination of questionable welds to check for leaks.

8.3.4 Refer to Section 10.0 for criteria for Suitability for Continued Service.

8.4 Additional requirements for field-erected ASTs are included in Appendix B.

8.5 **REPORT** - In the final report, include field data, measurements, pictures, drawings, tables and an inspection summary. Identify in the summary unacceptable conditions and recommended corrective actions. Determine the suitability for continued service of the AST. Include the time until the next scheduled formal external and/or formal internal inspection, as applicable. Include the inspector's name and certification number in the report.

9.0 LEAK TESTING METHODS (LTM)

9.1 **SHOP-FABRICATED AST LEAK TESTING PROCEDURE.**

9.1.1 Consult the Steel Tank Institute Recommended Practice R912, *Installation Instructions for Shop Fabricated Stationary Aboveground Storage Tanks for Flammable, Combustible Liquids.* Air should not be used for a pressure test and an inert gas should 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.

9.1.2 Vacuum testing of the interstice of double-wall or double-bottom tanks is an option. Refer to the Steel Tank Institute Recommended Practice R912, *Installation Instructions for Shop Fabricated Stationary Aboveground Storage Tanks for Flammable, Combustible Liquids.*

9.2 **PORTABLE CONTAINERS LEAK TESTING PROCEDURE.** Refer to DOT Sections 49 CFR 173.28 (Reuse, reconditioning and remanufacturing of packagings - mainly for drums) and Part 178 - 49 CFR Subpart O - Testing of IBC's (section 178.803 Testing and certification of IBC's) and 49 CFR 180.605, or equivalent, for portable container testing and recertification.

9.2.1 See the definition of Leak Testing Methods for more information.

10.0 SUITABILITY FOR CONTINUED SERVICE

10.1 Evaluation for suitability for continued service is a result of formal internal and/or external inspections performed by a certified inspector. This section describes the recommended actions to be taken by the owner as a result of these inspections. These conditions and others found during these inspections may require additional inspections or evaluations.

10.2 **FORMAL EXTERNAL AND INTERNAL INSPECTIONS** (refer to AST categories in Section 5.0)

10.2.1 MIC – For all tanks in Table 5.5, if evidence of MIC is found at any time, then corrections and repairs should be promptly made to the AST. Refer to Steel Tank Institute SP031 *Standard for Repair of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids* for alterations or repairs to an AST. Conduct the next formal internal or formal external inspection no more than two years after the discovery of MIC.

10.2.1.1 When Table 5.5 allows formal external inspections to be performed in lieu of formal internal inspections, then conduct the next formal external inspection no more than two years after the discovery of MIC.

10.2.1.2 If the re-inspection shows that sufficient measures have been taken to eliminate MIC, such as regular and careful water removal and sterilization of the tank and piping systems, then the AST may be inspected according to Table 5.5.

10.2.2 Category 3 ASTs - If the shell thickness has been reduced to less than 75% of the original shell thickness, then the AST should be taken out of service and repaired or replaced. Refer to Steel Tank Institute SP031 *Standard for Repair of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids* for alterations or repairs to an AST. The certified inspector shall document in the report that the next formal external or formal internal inspection shall be within 5 years and each subsequent 5 years.

10.2.3 Category 2 ASTs – The AST shall be repaired or replaced if more than 3 square inches of any one square foot of the tank shell (i.e. approximately 2%) is found to be less than 75% of the original shell thickness or if the remaining shell thickness of an area is less than 50% of the

original shell thickness at any point. Refer to Steel Tank Institute SP031 *Standard for Repair of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids* for alterations or repairs to an AST. The certified inspector shall document in the report that the next formal external or formal internal inspection shall be within 5 years and each subsequent 5 years.

10.2.4 Category 1 ASTs - The AST shall be repaired or replaced if more than 3 square inches of any one square foot of the tank shell (i.e. approximately 2%) is found to be less than 50% of the original shell thickness or if the remaining shell thickness of an area is less than 25% of the original shell thickness at any point. Refer to Steel Tank Institute SP031 *Standard for Repair of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids* for alterations or repairs to an AST. The certified inspector shall document in the report that the next formal external or formal internal inspection shall be within 5 years and each subsequent 5 years.

10.2.4.1 For Category 1 ASTs, alternatively, if the certified inspector establishes and documents a corrosion rate, the inspector may determine the next formal internal inspection based upon corrosion rates. The calculated time until the next formal internal inspection interval or the next formal external inspection, as applicable may exceed the values listed in Table 5.5 if corrosion rates allow.

10.2.4.2 Refer to API 575, *Inspection of Atmospheric and Low-Pressure Storage Tanks*, for some acceptable methods of determining corrosion rates.

10.2.4.3 Further, if the shell thickness is reduced anywhere to less than 25% of the original shell thickness, the AST should be repaired or replaced. Refer to Steel Tank Institute SP031 *Standard for Repair of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids* for alterations or repairs to an AST.

10.3 **OTHER TANK DAMAGE** – An AST subjected to damage caused by the following conditions requires evaluation by an engineer experienced in AST design or a tank manufacturer who will jointly with the owner determine if an immediate formal external or internal inspection 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

10.4 If a leak is discovered at any time by the owner or the inspector, the tank must be repaired, replaced or closed and removed from service in accordance with good engineering practice.

11.0 RECORDKEEPING

11.1 Retain each AST Record for the life of the AST.

11.2 Retain each Monthly Inspection Checklist for at least 36 months.

11.3 Retain each Annual Inspection Checklist for at least 36 months.

11.4 Retain each Portable Container Monthly Inspection Checklist for at least 36 months.

11.5 Retain all certified inspection reports for the life of the AST.

REFERENCES

American Petroleum Institute:

- API Standard 341, *A Survey of Diked-area Liner Use at Aboveground Storage Tank Facilities*
- API Standard 575, *Inspection of Atmospheric and Low Pressure Storage Tanks*
- API Standard 650, *Welded Steel Tanks for Oil Storage*
- API Recommended Bulletin D16, *Suggested Procedure for Development of a Spill Prevention Control and Countermeasure Plan*
- API 12R1, *Recommended Practice for Setting, Maintenance, Inspection, Operation and Repair of Tanks in Production Service*
- API Standard 653, *Tank Inspection, Repair, Alteration, and Reconstruction.*
- API RP 2015, *Requirements for Safe Entry and Cleaning of Petroleum Storage Tanks*
- API RP 2016, *Guidelines and Procedures for Entering and Cleaning Petroleum Storage Tanks*

American Society for Nondestructive Testing

- ANSI/ASNT Recommended Practice No. ASNT-TC-1A, *Guideline to Personnel Qualification and Certification in NDT*

National Fire Protection Association:

- NFPA 30, *Flammable and Combustible Liquids*
- NFPA 326, *Standard for the Safeguarding of Tanks and Containers for Entry, Cleaning, or Repair*
- NFPA 780, *Standard for the Installation of Lightning Protection Systems*

Steel Tank Institute:

- SP031, *Standard for Repair of In-Service Shop Fabricated Aboveground Tanks for Storage of Combustible and Flammable Liquids*
- STI-R893, *Recommended Practice For External Corrosion Protection of Shop Fabricated Aboveground Tank Floors*
- STI-R912, *Installation Instructions for Shop Fabricated Stationary Aboveground Storage Tanks for Flammable, Combustible Liquids*

Underwriters Laboratories Inc.

- UL 142, *Steel Aboveground Tanks for Flammable and Combustible Liquids*

United States Environmental Protection Agency:

- EPA 40 CFR part 112, *Oil Pollution Prevention and Response; Non-Transportation-Related Onshore and Offshore Facilities*
- EPA 510-K-95-002, *Musts for USTs.A Summary of Federal Regulations for Underground Storage Tank Systems*

United States Department of Labor, Occupational Safety & Health Administration (OSHA)

- 29 CFR Part 1910.147, *The Control of Hazardous Energy (Lockout/Tagout),*
- 29 CFR Part 1910.331 to 1910.333, *Electrical Lockout/Tagout*

United States Department of Transportation

- DOT Sections 49 CFR 173.28, *Reuse, Reconditioning and Remanufacturing of Packaging,*
- DOT part 178-49 CFR Subpart O, *Testing of IBC's*
- DOT 49 CFR part 178.803, *Testing and certification of IBC's*
- DOT 49 CFR part 180.605, *Portable container Testing and Recertification*

APPENDIX A
SUPPLEMENTAL TECHNICAL INFORMATION

1.0 TYPICAL AST DIAGRAMS

1.1 The diagram below shows terms commonly associated with ASTs. For the purposes of this standard, all of these surfaces are called the "shell" of the AST to avoid confusion.

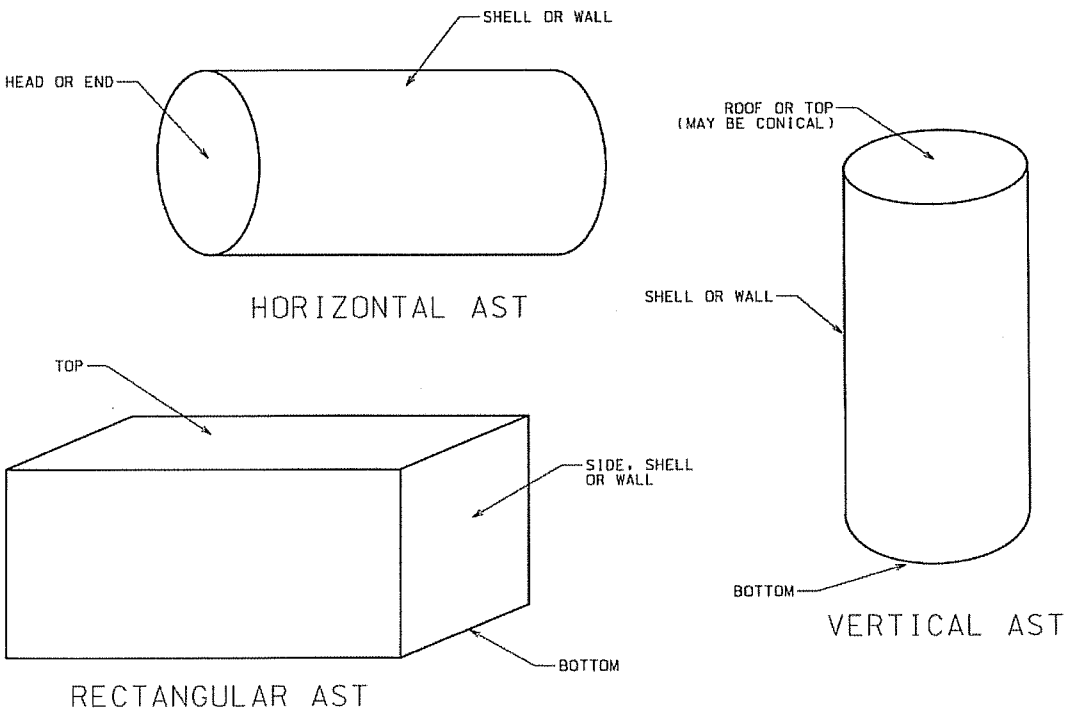

FIGURE A1.1

1.2 The diagram below is included to assist in the identification of the appurtenances of an AST. A specific tank may include some or all of these appurtenances.

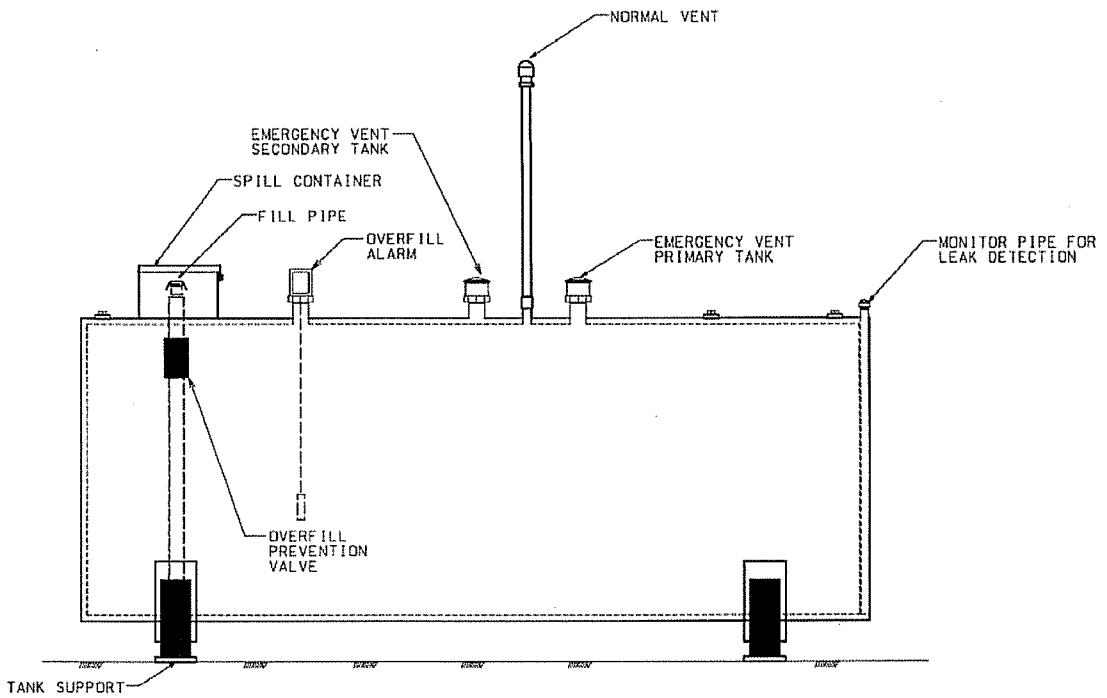

FIGURE A1.2

1.2.1 The purpose of these appurtenances is as follows:

1.2.1.1 Spill container – This tank accessory is designed to catch spills during tank filling operations. It typically has a lockable, hinged lid and allows spilled fluid to drain into the tank.

1.2.1.2 Tank vent – This tank accessory allows air to enter the tank when liquid is being withdrawn and exhausts air when the tank is being filled. This prevents damage to the tank due to too much pressure.

1.2.1.3 Overfill prevention valve – A specially designed device that provides positive shut-off at a predetermined value to prevent overfilling of an AST.

1.2.1.4 Overfill alarm – A device designed to alert personnel who are filling a tank when a predetermined level is reached.

1.2.1.5 Emergency vent (for primary and secondary tank)–These tank accessories prevent damage to the tank by allowing excess pressure to be vented. They are designed to relieve excess pressure in the event of an emergency, such as a fire.

1.2.1.6 Monitor pipe for leak detection –This pipe is installed in the air space (Interstice) between the primary tank and secondary tank of a double-wall tank. It is typically used with leak detection equipment to detect a leak in either the primary or the secondary tank.

1.2.1.7 Tank supports –These structures are used to elevate the tank off the ground.

2.0 WATER INSIDE ASTS

2.1 The functional life of an AST can be significantly extended by regularly checking for water accumulation inside an AST and interstice of a double-wall AST and removing it or taking other corrective action.

2.2 Water affects the quality of some stored liquids and therefore remove the water or take other corrective action on a regular basis.

2.3 Bacteria may develop in the water and in certain stored liquids, such as petroleum liquids, and initiate microbial activity. Microbial activity can cause the formation of undesirable by-products, such as sludge and slime. Such activity will corrode metals and deteriorate plastics and may affect product quality.

3.0 RELEASE MANAGEMENT SYSTEM (RMS)

3.1 One of the basic purposes of AST inspection standards is to minimize the likelihood and consequences of leaks. Even small leaks over extended periods may have considerable impacts on the environment. The use of industry standards to prevent leaks is a fundamental principle of pollution prevention. Industry standards cover the tank life cycle from construction, to ongoing inspection and maintenance, to final closure.

3.2 Applying RMS can reduce the likelihood and consequences of leaks. Typically, RMS is applied to provide additional integrity assurance against leaks.

3.3 In the context of this standard, RMS specifically refers to two basic methodologies as defined below:

- Leak Testing Methods (LTM)
- Continuous Release Detection Methods (CRDM)

3.4 Experience has shown long-term, slow leaks may develop and cause environmental damage with an AST that is in direct contact with the ground. These types of ASTs are subjected to the full hydrostatic pressure of the liquid on one side of the AST surface and are in direct contact with the ground on the other side of the AST surface. These ASTs may allow a slow leak over a long time with the full liquid hydrostatic pressure, which may go undetected and cause environmental damage. LTM is a layer of protection beyond conventional AST inspection practices that is most effective when applied to ASTs that are in direct contact with the soil and that do not have CRDMs. An LTM is ordinarily *not* necessary for tanks that have CRDMs (continuous release detection methods) such as elevated tanks, double-wall tanks, or tanks with release prevention barriers.

3.5 Figure A3.5 shows RMS graphically.

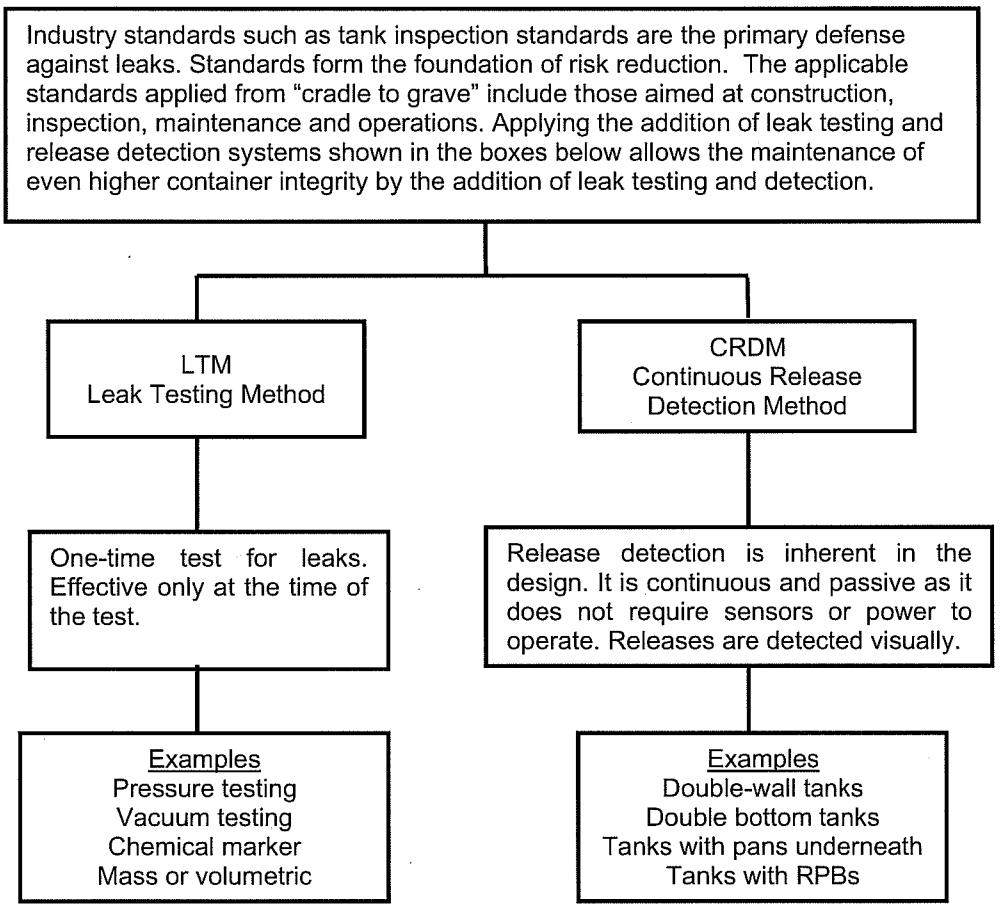

Figure A3.5
Release Detection Systems

4.0 REGULATIONS

4.1 The Federal EPA and some states have enacted regulations regarding the storage and handling of oils, both petroleum and non-petroleum, called the Spill Prevention Control and Countermeasures (SPCC) Rule under the authority of the Clean Water Act (40 CFR part 112). Entities regulated by these sections may use this standard or others to inspect and determine the fitness of their storage systems. Refer to http://www.epa.gov/oilspill/ for more information and The American Petroleum Institute's (API) Recommended Practice Bulletin D16, *Suggested Procedure for Development of a Spill Prevention Control and Countermeasure Plan,* (see: http://api-ep.api.org/)

APPENDIX B
INSPECTION OF FIELD-ERECTED ASTS

1.0 GENERAL

1.1 Purpose and Applicability – this Appendix addresses the additional and special inspection requirements of field-erected tanks. Tanks larger than 30 feet (9.1 meters) diameter or more than 50 feet (15.2 meters) high should be inspected according to an appropriate field-erected tank inspection standard. This Appendix is applicable only when specifically referenced by written contractual language between the owner and the inspector. Further, it is applicable only when not prohibited by the regulatory authority having jurisdiction. This appendix specifies only those requirements which modify or exceed the requirements of the main body of the standard.

1.2 Scope - This Appendix applies to steel ASTs that are as follows:

1.2.1 Welded and flat-bottom, cone-up or cone-down design

1.2.2 Up to 30 feet (9.1 meters) in diameter and with a height of less than 50 feet (15.2 meters).

1.2.3 Fabricated with full-fusion, butt-welded shells and with lap-welded or butt-welded bottom plates

1.2.4 Fabricated with a shell thickness of each course less than ½ inch and with original nominal bottom thickness plates equal to ¼ inch or 6 mm

1.2.5 Built to a nationally recognized standard.

1.3 Brittle Fracture Assessment - Because the tank shells are under ½ inch thick, the risk of brittle fracture is minimal. Brittle fracture assessments and documentation are not required for tanks that fall within the scope of this standard.

2.0 INSPECTIONS

2.1 Refer to the Table B2.1 below for the inspection timetable. Category 1, 2 and 3 as well as the P, E, I and L designations are described in the main body of the SP001 Standard. Note that the internal inspection intervals shown in this table are guiding values when corrosion rates are not determined in accordance with recognized and accepted industry principles and practice.

2.1.1 When corrosion rates are established, then the corrosion rates may govern the internal inspection interval which may be shorter or longer than the values shown.

2.1.2 For Category 1 tanks, the maximum internal re-inspection interval is 30 years.

2.1.3 For Category 2 tanks, the maximum internal re-inspection interval is 20 years.

2.1.4 For Category 3 tanks, the maximum internal re-inspection interval may not be longer than shown in Table B2.1.

TABLE B2.1 TABLE OF INSPECTION SCHEDULES

AST Type and Size	Category 1	Category 2	Category 3
Field-erected AST	P, E(5), I(10)	P, E&L(5), I(10)	P, E&L(5), I(10)

2.2 Follow the requirements found in the main body of the SP001 Standard for the requirements of periodic inspections, formal external inspections and formal internal inspections and any additional requirements in this Appendix. Also, follow all the requirements of the Safety Section. Leak testing methods for field-erected tanks currently under research by API and STI and requirements will be added to SP001 in the future.

2.3 Below are additional inspection requirements for field-erected ASTs

2.3.1 Vertical AST Floating Roof

2.3.1.1 For safety, make sure that the roof pontoons are free of liquid and harmful vapors and that the floating roof is properly stabilized against collapse. (see API 2016, *Guidelines and Procedures for*

Entering and Cleaning Petroleum Storage Tanks.) Inspect the vapor space on top of the floating roof before gaining access.

2.3.1.2 For formal internal inspections, inspect the seal for deterioration, holes, tears and cracks to determine the Suitability for Continued Service.

2.3.1.3 For external floating roofs, assess the condition of the outer roof rim plate by visual or ultrasonic methods. It may be necessary to assess the condition by performing ultrasonic inspection from the inside of the pontoon. Inspect that either the roof drain is open or the drain plug in the roof is open in case of unexpected rain. Inspect the roof legs for their contact with the floor and that the striker plates are present and in position. Inspect the roof legs for corrosion and damage.

2.3.1.4 Inspect for standing water on top of the roof and inspect the roof drainage system operation. Inspect the pontoons for presence of liquid.

2.4 Suitability for Continued Service

2.4.1 As an alternative to the criteria in the main body of SP001, and if the certified inspector is API 653 Certified, then the methods included in API 653 maybe used to evaluate the AST.

2.4.2 The minimum allowable remaining thickness is 0.1 inch (2.54 mm). In setting the next inspection interval based upon corrosion rates, neither the bottom nor the shell shall be allowed to corrode less than 0.1 inch.

2.4.2.1 The minimum required thickness of each shell course shall be according to

$$t_{\min} = \frac{(H-1)DG}{10{,}000}$$

t_{min} = the minimum acceptable average thickness, in inches, for each course as calculated from the above formula. However, t_{min} shall not be less than 0.1 inch (2.54 mm) for any tank course.

D = nominal diameter of tank, feet.

H = height from the bottom of the shell course under consideration to the maximum liquid level when evaluating an entire shell course, feet.

G = largest specific gravity of the contents.

2.4.3 One method of determining the interval between formal internal inspections required by the tank bottom assessment is as follows: (Corrosion rates shall be assumed constant for these calculations.)

$$MFIII = \frac{\min(RT_{bc}, RT_{ip}) - MRT}{(St\,\mathrm{Pr} + U\,\mathrm{Pr})}$$

MRT = minimum allowable remaining tank bottom thickness at the end of inspection interval which is 0.1 inch (2.54 mm).

MFIII = maximum formal internal inspection interval (years to next internal inspection) no to exceed that allowed in paragraph 2.1 of this Appendix.

RT_{bc} = minimum remaining thickness from bottom side corrosion after repairs.

RT_{ip} = minimum remaining thickness from internal corrosion after repairs.

St Pr = maximum rate of corrosion not repaired on the top side. This value is zero for coated areas of the bottom. The expected life of the coating must equal or exceed MFIII to use *St* Pr = 0.

U Pr = maximum rate of corrosion on the bottom side. To calculate the corrosion rate, use the minimum remaining thickness after repairs. For tanks that have proven cathodic protection, the corrosion rate from the underside shall be *U* Pr = 0.002 inches per year (0.05 mm per year).

Note: For areas of a bottom that have been scanned by the magnetic flux leakage (or exclusion) process, and do not have effective cathodic protection, the thickness used for calculating *U* Pr must be the lesser of the MFL threshold or the minimum thickness of corrosion areas that are not repaired. The MFL threshold is defined as the minimum remaining thickness to be detected in the areas inspected. This value should be predetermined by the owner based on the desired inspection interval.

2.4.4 Widely scattered pitting will not appreciably affect the strength of the tank shell and the tank may be allowed to continue operation provided that both of the following conditions are met:

2.4.4.1 Pit depths or thinning (with a diameter or maximum dimension of less than 2 inches (50.8 mm)) does not result in a remaining wall thickness of less than 0.05 inch (1.27 mm).

2.4.4.2 No pit or thinned area results in any area 2 inches (50.8 mm) in diameter or larger with a thickness less than 0.1 inch (2.54 mm).

APPENDIX C
PERIODIC INSPECTION CHECKLISTS

STI SP001 AST Record

OWNER INFORMATION	FACILITY INFORMATION	INSTALLER INFORMATION
Name	Name	Name
Number and Street	Number and Street	Number and Street
City, State, Zip Code	City, State, Zip Code	City, State, Zip Code

TANK ID _____

SPECIFICATION:

Design: ☐ UL _____ ☐ SWRI _____ ☐ Horizontal ☐ Vertical ☐ Rectangular

☐ API _____ ☐ Other _____

☐ Unknown

Manufacturer: Contents: Construction Date: Last Repair/Reconstruction Date:

Dimensions: Capacity: Last Change of Service Date:

Construction: ☐ Bare Steel ☐ Cathodically Protected (Check one: A. ☐ Galvanic or B. ☐ Impressed Current) Date Installed: _____

☐ Coated Steel ☐ Concrete ☐ Plastic/Fiberglass ☐ Other

☐ Double Bottom ☐ Double Wall ☐ Lined Date Installed: _____

Containment: ☐ Earthen Dike ☐ Steel Dike ☐ Concrete ☐ Synthetic Liner ☐ Other _____

CRDM: ☐ Date Installed: _____ Type: _____

Release Prevention Barrier: ☐ Date Installed: _____ Type: _____

TANK ID _____

SPECIFICATION:

Design: ☐ UL _____ ☐ SWRI _____ ☐ Horizontal ☐ Vertical ☐ Rectangular
☐ API _____ ☐ Other _____
☐ Unknown

Manufacturer: Contents: Construction Date: Last Repair/Reconstruction Date:

Dimensions: Capacity: Last Change of Service Date:

Construction: ☐ Bare Steel ☐ Cathodically Protected (Check one: A. ☐ Galvanic or B. ☐ Impressed Current) Date Installed: _____
☐ Coated Steel ☐ Concrete ☐ Plastic/Fiberglass ☐ Other
☐ Double Bottom ☐ Double Wall ☐ Lined Date Installed: _____

Containment: ☐ Earthen Dike ☐ Steel Dike ☐ Concrete ☐ Synthetic Liner ☐ Other _____

CRDM: ☐ Date Installed: Type:

Release Prevention Barrier: ☐ Date Installed: _____ Type: _____

TANK ID _____

SPECIFICATION:

Design: ☐ UL _____ ☐ SWRI _____ ☐ Horizontal ☐ Vertical ☐ Rectangular
☐ API _____
☐ Unknown ☐ Other _____

Manufacturer: Contents: Construction Date: Last Repair/Reconstruction Date:

Dimensions: Capacity: Last Change of Service Date:

Construction: ☐ Bare Steel ☐ Cathodically Protected (Check one: A. ☐ Galvanic or B. ☐ Impressed Current) Date Installed: _____
☐ Coated Steel ☐ Concrete ☐ Plastic/Fiberglass ☐ Other
☐ Double Bottom ☐ Double Wall ☐ Lined Date Installed: _____

Containment: ☐ Earthen Dike ☐ Steel Dike ☐ Concrete ☐ Synthetic Liner ☐ Other _____

CRDM: ☐ Date Installed: Type:

Release Prevention Barrier: ☐ Date Installed: _____ Type: _____

TANK ID _____

SPECIFICATION:

Design: ☐ UL _____ ☐ SWRI _____ ☐ Horizontal ☐ Vertical ☐ Rectangular
☐ API _____
☐ Unknown ☐ Other _____

Manufacturer: Contents: Construction Date: Last Repair/Reconstruction Date:

Dimensions: Capacity: Last Change of Service Date:

Construction: ☐ Bare Steel ☐ Cathodically Protected (Check one: A. ☐ Galvanic or B. ☐ Impressed Current) Date Installed: _____
☐ Coated Steel ☐ Concrete ☐ Plastic/Fiberglass ☐ Other
☐ Double Bottom ☐ Double Wall ☐ Lined Date Installed: _____

Containment: ☐ Earthen Dike ☐ Steel Dike ☐ Concrete ☐ Synthetic Liner ☐ Other _____

CRDM: ☐ Date Installed: Type:

Release Prevention Barrier: ☐ Date Installed: _____ Type: _____

TANK ID _____

SPECIFICATION:

Design: ☐ UL _____ ☐ SWRI _____ ☐ Horizontal ☐ Vertical ☐ Rectangular
☐ API _____
☐ Unknown ☐ Other _____

Manufacturer: Contents: Construction Date: Last Repair/Reconstruction Date:

Dimensions: Capacity: Last Change of Service Date:

Construction: ☐ Bare Steel ☐ Cathodically Protected (Check one: A. ☐ Galvanic or B. ☐ Impressed Current) Date Installed: _____
☐ Coated Steel ☐ Concrete ☐ Plastic/Fiberglass ☐ Other
☐ Double Bottom ☐ Double Wall ☐ Lined Date Installed: _____

Containment: ☐ Earthen Dike ☐ Steel Dike ☐ Concrete ☐ Synthetic Liner ☐ Other _____

CRDM: ☐ Date Installed: Type:

Release Prevention Barrier: ☐ Date Installed: _____ Type: _____

STI SP001 Monthly Inspection Checklist

General Inspection Information:

Inspection Date: _____ Retain Until Date: _____ (36 months from inspection date)

Prior Inspection Date: _____ Inspector Name: _____

Tanks Inspected (ID #'s): _____

Inspection Guidance:

- For equipment not included in this standard, follow the manufacturer recommended inspection/testing schedules and procedures.
- The periodic AST Inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection does not require a certified inspector. It shall be performed by an owner's inspector who is familiar with the site and can identify changes and developing problems.
- Upon discovery of water in the primary tank, secondary containment area, interstice, or spill container, remove promptly or take other corrective action. Before discharge to the environment, inspect the liquid for regulated products or other contaminants and disposed of it properly.
- (*) designates an item in a non-conformance status. This indicates that action is required to address a problem.
- 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.
- Retain the completed checklists for 36 months.
- **In the event of severe weather (snow, ice, wind storms) or maintenance (such as painting) that could affect the operation of critical components (normal and emergency vents, valves), an inspection of these components is required immediately following the event.**

Item	Status		Comments
1.0 Tank Containment			
1.1 Water in primary tank, secondary containment, interstice, or spill container?	☐Yes*	☐No	
1.2 Debris or fire hazard in containment?	☐Yes*	☐No	
1.3 Drain valves operable and in a closed position?	☐Yes	☐No*	
1.4 Containment egress pathways clear and gates/doors operable?	☐Yes	☐No*	

2.0 Leak Detection			
2.1 Visible signs of leakage around the tank, concrete pad, containment, ringwall or ground?	☐Yes*	☐No	
3.0 Tank Attachments and Appurtances			
3.1 Ladder and platform structure secure with no sign of severe corrosion or damage?	☐Yes	☐No*	
3.2 Tank Liquid level gauge readable and in good condition?	☐Yes	☐No*	
3.3 Check all tank openings are properly sealed	☐Yes	☐No*	
4.0 Other Conditions			
4.1 Are there other conditions that should be addressed for continued safe operation or that may affect the site SPCC plan?	☐Yes*	☐No	

Additional Comments:

STI SP001 Annual Inspection Checklist

General Inspection Information:

Inspection Date: _____	Retain Until Date: _____ (36 months from inspection date)
Prior Inspection Date: _____	Inspector Name: _____
Tanks Inspected (ID #'s): _____	

Inspection Guidance:

- For equipment not included in this standard, follow the manufacturer recommended inspection/testing schedules and procedures.
- The periodic AST Inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection does not require a certified inspector. It shall be performed by an owner's inspector who is familiar with the site and can identify changes and developing problems.
- Inspect the AST shell and associated piping, valves, and pumps including inspection of the coating for Paint Failure.
- Inspect:
  1. Earthen containment structures including examination for holes, washout, and cracking in addition to liner degradation and tank settling.
  2. Concrete containment structures and tank foundations/supports including examination for holes, washout, settling, paint failure, in addition to examination for corrosion and leakage.
  3. Steel containment structures and tank foundations/supports including examination for washout, settling, cracking, and for paint failure, in addition to examination for corrosion and leakage.
- Inspection of cathodic protection system, if applicable, includes the wire connections for galvanic systems and visual inspection of the operational components (power switch, meters, and alarms) of impressed current systems.
- Remove promptly upon discovery standing water or liquid in the primary tank, secondary containment area, interstice, or spill container. Before discharge to the environment, inspect the liquid for regulated products or other contaminants and disposed of it properly.
- In order to comply with EPA SPCC (Spill Prevention, Control and Countermeasure) rules, a facility must regularly test liquid level sensing devices to ensure proper operation (40 CFR 112.8(c)(8)(v)).
- (*) designates an item in a non-conformance status. This indicates that action is required to address a problem.
- 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.
- Retain the completed checklists for 36 months.
- Complete this checklist on an annual basis supplemental to the owner monthly-performed inspection checklists.
- **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.**

Item	Status	Comments
1.0 Tank Containment		
1.1 Containment structure in satisfactory condition?	☐Yes ☐No*	
1.2 Drainage pipes/valves fit for continued service	☐Yes ☐No* ☐ N/A	
2.0 Tank Foundation and Supports		
2.1 Evidence of tank settlement or foundation washout?	☐Yes* ☐No	
2.2 Cracking or spalling of concrete pad or ring wall?	☐Yes* ☐No	
2.3 Tank supports in satisfactory condition?	☐Yes ☐No*	
2.4 Water able to drain away from tank?	☐Yes ☐No*	
2.5 Grounding strap secured and in good condition?	☐Yes ☐No*	
3.0 Cathodic Protection		
3.1 CP system functional?	☐Yes ☐No* ☐n/a	
3.2 Rectifier Reading:		
4.0 Tank External Coating		
4.1 Evidence of paint failure?	☐Yes* ☐No	
5.0 Tank Shell/Heads		
5.1 Noticeable shell/head distortions, buckling, denting or bulging?	☐Yes* ☐No	
5.2 Evidence of shell/head corrosion or cracking?	☐Yes* ☐No	
6.0 Tank Manways, Piping and Equipment within Secondary Containment		
6.1 Flanged connection bolts tight and fully engaged with no sign of wear or corrosion?	☐Yes ☐No*	
7.0 Tank Roof		
7.1 Standing water on roof?	☐Yes* ☐No	
7.2 Evidence of coating cracking, crazing, peeling, blistering?	☐Yes* ☐No	
7.3 Holes in roof?	☐Yes* ☐No	

Item	Status		Comments
8.0 Venting			
8.1 Vents free of obstructions?	☐Yes	☐No*	
8.2 Emergency vent operable? Lift as required?	☐Yes	☐No*	
9.0 Insulated Tanks			
9.1 Insulation missing?	☐Yes*	☐No	
9.2 Are there noticable areas of moisture on the insulation?	☐Yes*	☐No	
9.3 Mold on insulation?	☐Yes*	☐No	
9.4 Insulation exhibiting damage?	☐Yes*	☐No	
9.5 Is the insulation sufficiently protected from water intrusion?	☐Yes	☐No*	
10.0 Level and Overfill Prevention Instrumentation of Shop-Fabricated Tanks			
10.1 Has the tank liquid level sensing device been tested to ensure proper operation?	☐Yes	☐No*	
10.2 Does the tank liquid level sensing device operate as required?	☐Yes	☐No*	
10.3 Are overfill prevention devices in proper working condition?	☐Yes ☐N/A	☐No*	
11.0 Electrical Equipment			
11.1 Are tank grounding lines in good condition?	☐Yes ☐N/A	☐No*	
11.2 Is electrical wiring for control boxes/lights in good condition?	☐Yes ☐N/A	☐No*	

Additional Comments:

STI SP001 Portable Container Monthly Inspection Checklist

General Inspection Information:

Inspection Date: _____ Retain Until Date: _____ (36 months from inspection date)

Prior Inspection Date: _____ Inspector Name: _____

Containers Inspected (ID #'s): _____

Inspection Guidance:

- For equipment not included in this standard, follow the manufacturer recommended inspection/testing schedules and procedures.
- The periodic AST Inspection is intended for monitoring the external AST condition and its containment structure. This visual inspection does not require a certified inspector. It shall be performed by an owner's inspector who is familiar with the site and can identify changes and developing problems.
- (*) designates an item in a non-conformance status. This indicates that action is required to address a problem.
- 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.
- Retain the completed checklists for 36 months.

Item	Area: _____		Area: _____		Area: _____		Area: _____	
1.0 AST Containment/Storage Area								
1.1 ASTs within designated storage area?	☐Yes	☐No*	☐Yes	☐No*	☐Yes	☐No*	☐Yes	☐No*
1.2 Debris, spills, or other fire hazards in containment or storage area?	☐Yes*	☐No	☐Yes*	☐No	☐Yes*	☐No	☐Yes*	☐No
1.3 Water in outdoor secondary containment?	☐Yes*	☐No	☐Yes*	☐No	☐Yes*	☐No	☐Yes*	☐No
1.4 Drain valves operable and in a closed position?	☐Yes	☐No*	☐Yes*	☐No	☐Yes*	☐No	☐Yes*	☐No
1.5 Egress pathways clear and gates/doors operable?	☐Yes	☐No*	☐Yes*	☐No	☐Yes*	☐No	☐Yes*	☐No

Item	Area: _____	Area: _____	Area: _____	Area: _____
2.0 Leak Detection				
2.1 Visible signs of leakage around the container or storage area?	☐Yes* ☐No	☐Yes* ☐No	☐Yes* ☐No	☐Yes* ☐No
3.0 Container				
3.0 Noticeable container distortions, buckling, denting or bulging?	☐Yes* ☐No	☐Yes* ☐No	☐Yes* ☐No	☐Yes* ☐No

Comments:

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Date: August 19, 2002

TO WHOM IT MAY CONCERN

Subject: Integrity Testing of Convault Tanks

Convault shop fabricated aboveground storage tanks have 4 to 6 inch high legs, which make them visible from the bottom and all sides. Furthermore, Convault tanks have secondary containment with leak detection capability and are expected to be checked and inspected on regular basis. The probability of any fuel discharge from Convault tank due to primary tank failure is highly minimal as any discharge will be detected in the leak detector tube and the fuel will be contained in the integral secondary containment.

In view of the above, Convault does not recommend an integrity test on its tanks when preparing, updating or revising the SPCC plans. Convault recommends an integrity test on its tank only if there is a substantial reason to carry out such a test. Typical reasons would include the detection of fuel in the secondary containment, the tank surviving a catastrophic event such as a fire or a heavy vehicle impact, or the Authority Having Jurisdiction (such as a fire marshal) specifically requiring an integrity test. If testing is required, please refer to Convault owner manual testing protocol.

Should you have any questions, please contact the undersigned.

Very Truly Yours,

John Ekhtiar
Vice President, Engineering