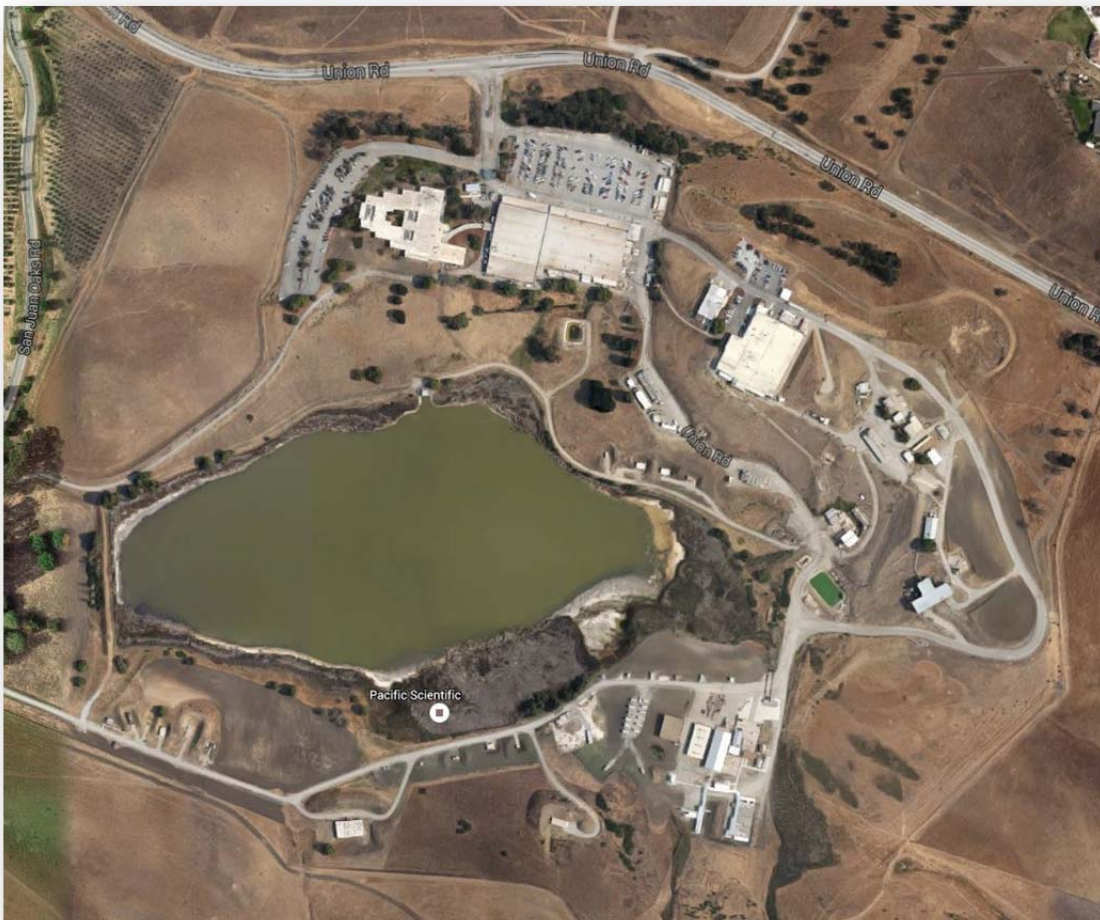
Part B Document

RCRA Hazardous Waste Facility Permit
(Renewal Application)

Pacific Scientific Energetic Materials

3601 Union Road, Hollister

March 2015



Prepared for:

Pacific Scientific Energetic Materials Company, Inc
3601 Union Rd
Hollister, California 95023

For Submittal To:

California Department of Toxic Substances Control
Permitting Division
8800 Cal Center Drive
Sacramento, California 95826

Table of Contents

Contents (continued)

Contents (continued)

Contents (continued)

Contents (continued)

Tables

(Imbedded at the end of specified text sections)

Attachments

(Imbedded at the end of specified text sections)

Figures

(Imbedded at the end of specified text sections)

Appendices

1. Typical Analysis Reports
2. Laboratory Certifications
3. Sampling Methods
4. Engineering Certification, TSU-1
5. Engineering Certification, TSU-3
6. Engineering Certification, TSU-8
7. PSEMC/MSI FHWOP Training Director's Qualifications
8. Relevant Environmental Control Permits
    a. 2006, DTSC, Hazardous Waste Facility Permit
    b. 1999, DTSC, Hazardous Waste Facility Permit & Modification
    c. 2000, DHS, Water Supply Permit
    d. 2013, CRWQCB, Cleanup & Abatement Order (Teledyne/Allegheny Technologies)
    e. 1999, CRWQCB, Monitoring & Reporting Program/ Waste Discharge Requirements
    f. 2007, MBUAPCD, Air Permit to Operate for TSU-1 and TSU-2
9. Engineering Certification, TSU-2
10. Screening Risk Assessment (1991, Ebasco) and Human Health and Ecological Risk Assessment Work Plan (Draft, November 2015).
11. RCRA Facility Assessment Reports (2005, 2002, and 1991)

Acronyms

AR	Agriculturally Zoned
AADT	Annual Average Daily Traffic
AP	Agricultural Productive
AP/PUD	Agricultural Production/Planned Unit Development
AR	Agricultural Rangeland
ASTM	American Society for Testing & Materials
ATF (BATF)	Bureau of Alcohol, Tobacco, Firearms and Explosives
CAP	Corrective Action Plan
CCR	California Code of Regulations
CDF	California Department of Forestry
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CHMM	Certified Hazardous Materials Manager
CIH	Certified Industrial Hygienist
CMS	Corrective Measures Study
CSP	Certified Safety Professional
DCE	Dichloroethene
DIPAM	Diaminohexanitrodiphenyl
DOT	Department of Transportation
DOD	Department of Defense
DTSC	Department of Toxic Substances Control
EHW	Explosive Hazardous Waste
EHWS	Explosive Hazardous Waste in Solvent
EISB	Enhanced In-Situ Bioremediation Pilot Study
EMT	Emergency Medical Team
EPA	U.S. Environmental Protection Agency
ERT	Emergency Response Team
FHWOP	Facilities Haz-Waste Operations Plan
FS	Feasibility Study
HAZMAT	Hazardous Material
HFD	Hollister Fire Department
HHERA	Human Health and Ecological Risk Assessment
HMX	High Melting Explosive
HNBB	Hexanitrobibenzyl
HNS	Hexanitrostilbene
HRS	Hydrogen Release Compound
HW	Hazardous Waste
HWFP	Hazardous Waste Facility Permit
IT	International Technology Corporation
LDR	Land Disposal Restriction
LDRN	Land Disposal Restriction Notifications
M1	Light Industrially Zoned
MSDS	Material Safety Data Sheets
MSI	McCormick Selph Incorporated
NEW	Net Explosive Weight
OB/OD	Open-Burned/Open-Detonated
OJT	On the Job Training
ORP	Oxidation-reduction Potential
OSHA	Occupational Safety and Health Administration
P	Publically Zoned
PCB	Poly chlorinated Biphenyl
PCEI	Pacific Crest Engineering Inc.
PE	Professional Engineer
PETN	Pentaerythritol Tetranitrate
PES	PES Environmental, Inc.
PPE	Personal Protective Equipment
PRGs	Preliminary Remediation Goals
PSEMC	Pacific Scientific Energetic Materials Company
PSI	Piland Structural Engineering Inc.
RCRA	Resource Conservation and Recovery Act
RDX	Research Department Explosive
RFI	RCRA Facility Investigation
RI	Remedial Investigation
RP	Resource Protection
RPP	Resource Protection Patrol
RPS	Resource Protection Specialist
RWQCB	Regional Water Quality Control Board
SBW	Safety Bucket Water
SC	Site Characterization
SC	Security Central
SJR	San Justo Reservoir
SRA	Service Risk Assessment
TCA	Tri chloro ethane
TCE	Tri chloro ethylene
TSD	Treatment, Storage and Disposal
TSP	Tri sodium phosphate
TSUs	Treatment Storage Units
UBC	Uniform Building Code
USBR	United States Bureau of Reclamation
VOCs	Volatile Organic Compounds
WDID	Waste Discharger Identification
WDRs	Waste Discharge Requirements

Chapter I - RCRA Application

A. RCRA Part B Application

This *Facilities Hazardous Waste Operations Plan* (RCRA **Part B** Application) is intended to be filed and used with the RCRA **Part A** Application, which was originally filed with the DTSC on October 28, 1990, and most recently updated on August 31, 2005. It is formatted to the extent possible to correspond to the latest versions of the California Department of Toxic Substances Control *Permit Applicant Handbook and the Completeness Checklist.* There are no significant changes to the facility's hazardous waste operations since the previous renewal in May 2006.

B. Owner/Operator Certification

Per the requirements of California Code of Regulations, Title 22, Section 66270.11:

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

Pacific Scientific Energetic Materials Company, Inc.

____ ______________________________

Charles Martin — Date

Security and Environmental Affairs Manager

Chapter II - Facility

A. Introduction

The Pacific Scientific Energetic Materials Company (PSEMC) site is situated in a sparsely occupied, rural area of San Benito County, approximately 3 miles southwest of the City of Hollister. Properties adjoining the PSEMC site are zoned for agricultural use (Zoning Map included as Figure II-7) and the nearest residences are located approximately 1,300 feet east and 400 feet north of the property boundary. San Justo Reservoir is located approximately 1,000 feet southeast of the property boundary. San Justo Reservoir has been closed to recreational use over the last 8 years after invasive zebra mussels were discovered in January 2008.

The PSEMC facility is located within an approximately 270 acre property located at 3601 Union Road, Hollister (see Topographic Location Map, Figure II-1). The bulk of the property (251.35 acres) is zoned for light industrial (M1) land use while the southern 20 acre buffer parcel is zoned as agricultural (AR). The exact boundaries are presented in the Assessor's Parcel Map, included as Figure II-5.

The subject property is situated within two, generally west-facing valleys which contain a centrally-located, 35-acre man-made lake (Teledyne Lake) that is used to store fire suppression waters (see Aerial Site Map, Figure II-4). The site improvements include 200,000 ft^2 of office and manufacturing space (33 buildings), hazardous waste processing and storage areas, and a network of internal roads. The ordnance manufacturing structures are mostly located along the northern portion of the as shown in Figure II-3. Ordnance storage bunkers are located in the central portion of the site adjacent to Teledyne Lake.

The PSEMC facility manufactures explosives and explosive devices for aerospace, military, and commercial applications and produces specialty chemicals on a contract basis. Proprietary and generic explosives and pyrotechnics are manufactured, blended, and/or modified at research and development, pilot plant, and production scales. Hazardous wastes generated during manufacturing activities at the PSEMC facility, including solvents, hazardous chemicals, metal powders, reactive components, explosives, flammable liquids, and corrosive solids and liquids, are either treated on site or transported off-site for treatment or disposal. The hazardous wastes being generated and treated on-site are byproducts of producing explosives and are listed in Table III-1. On-site treatment of hazardous waste focuses on manufacturing wastes that contain explosive materials and which may present a greater hazard during transport if shipped off site. No hazardous wastes are accepted from off-site sources.

The Union Road facility was originally built in 1971 by Teledyne, Incorporated, (Teledyne) which purchased McCormick Selph Incorporated, (MSI) seven years prior (1964).

- Teledyne applied for permitted hazardous waste treatment and storage in November 1980, was issued an *Interim Status Document* (ISO) in April 1981 and a permit to store hazardous waste in tanks and containers in November 1983. Additional hazardous waste activities such as treatment in tanks, storage and treatment in surface impoundments, and thermal treatment of explosive wastes continued under the ISO.

- In 1993, MSI was realigned with Ryan Aeronautical and became Teledyne Ryan Aeronautical/ McCormick Selph Ordnance (Teledyne Ryan).
- And in July 1993, a Hazardous Waste Facility Permit was issued to Teledyne Ryan to operate the following hazardous waste management, Treatment Storage Units (TSUs):
    - **TSU-1 (remains active):** TSU-1 is an open air burning and detonation unit (storage and treatment code X01) used to dispose of ordnance parts, scrap and explosive raw materials. The maximum hazardous waste (HW) treatment capacity of TSU-1 is 500 pounds gross weight per day for open burning, and 100 pounds Net Explosive Weight (NEW) per day for detonation.
        - Note: a part of TSU-1a pit for detonation of solid reactive waste was closed in June 2000;
    - **TSU-2 (remains active**): TSU-2 is an open-air burning unit (X01) that disposes of solvents used in making explosives that have become contaminated with explosive materials. The maximum treatment capacity of TSU-2 is 300 gallons per day.
    - **TSU-3 (remains active):** TSU-3 is a roofed, 4 bay storage unit that holds the containers of hazardous waste created at the facility (S01).
        - TSU-3's Bay D (active) also houses the treatment of two-part epoxy compounds (mixing within containers);
    - **TSU-8 (remains active):** TSU-8 is a volume reduction unit (T01) that evaporates the water used to collect hazardous waste in order to concentrate it.
    - TSU-4 (DTSC-certified closed, July 2003): three aboveground hazardous waste storage tanks;
    - TSU-5 (DTSC-certified closed, April 1992); three aboveground hazardous waste storage tanks
    - TSU-6 (DTSC-certified closed, October 2000), a silver recovery reactor;
    - TSU-7 (DTSC-certified closed, October 2001), a water evaporation unit;
    - TSU-9 (DTSC-certified closed, July 2003): treatment reactor; and
    - TSU-10 (*unregulated,* as of January 1999): a waste photographic silver recovery unit;

  In July 1999, MSI became part of J. F. Lehman and Company, as MSI. In July 2003, MSI was acquired by Pacific Scientific Energetic Materials Company.

Although the July 1993 Permit expired in July 2003, it continued to be in effect under an interim status while DTSC processed permit renewal of the Facilities Haz-Waste Operations Plan (FHWOP), which was renewed in 2006. As listed above, only four of the original TSUs remain currently active (TSU-1, TSU-2, TSU-3, and TSU-8), which includes treatment of two-part epoxy compounds within the haz-waste container storage area at TSU-3 (Bay D). The current permit is set to expire in May 2016 and there are no significant changes regarding the generation and handling of hazardous waste at the facility from those described in the earlier permit. These four remaining, active units are described in detail in Chapter IV and the locations are shown on Figure II-4.

B. USGS Hollister Quadrangle Topographic Map

Figure II-2 contains the USGS Hollister Quadrangle Topographic Map (7.5' Series). It shows:

1. Site property boundaries and areas beyond the current Pacific Scientific Energetic Materials Company, Hollister Division property line (at least two miles).

2. Surface water bodies, springs & drainages.

Figure II-3 provides and overview of site infrastructure including utilities, water supply wells, and easements. This figure shows all buildings, treatment and storage operations, and other structures.

There are no injection wells or intake/discharge structures associated with hazardous waste operations at this site.

C. Detailed Topographic Map

Figure II-1 is a topographic location map of the PSEMC site (scale of 1" = 1,250'), Figure II-3 is a topographic site map of the facility (scale of 1" = 500'), and Figure II-4 is an aerial view of the facility (scale of 1" = 675').

1. Map Layout:

a. The property is made up of two parcels: assessor parcel number’s 021-140-001 (251 acres) and 021-140-048 (subsequent addition of 20-acres along the south of the property). The San Benito County assessor’s parcel map showing acreage and boundaries is included as Figure II-5.

b. Site location is defined as: Latitude 36^{o} 50' 12"N; Longitude 121^{o} 27' 07"W

c. Hazardous Waste Units are depicted on the facility topo (Figure II-3) and the site aerial (Figure II-4). Waste process codes included in Part A of the application.

2. Land Characteristics:

a. Regional 20-ft contours and elevations are shown on Figure II-1 and II-2, and higher resolution 10-ft contours are provided in the site topographic map (Figure II-3).

b. The nearest 100-year flood plain is approximately 1 miles northeast of the facility. It is separated from the facility by major changes in elevation (See Figure II-6). The closest active fault (movement less than 15,000 years) mapped by the USGS is located approximately 2 miles east of the facility, also pictured on Figure II-6.

c. Two surface water bodies are located within one-fourth mile of the site. A farm pond and the San Justo Reservoir (SJR) are to the east. Both are up gradient geographically and hydrologically from the site. A ridgeline and a small dike separate the site entirely from the catch basin and potential spillway drainage of the SJR. The SJR is designed as a storage site for water from the San Luis Reservoir. As noted above, the San Justo Reservoir has been closed to recreational use over the last 8 years after invasive zebra mussels were discovered in January 2008. The United States Bureau of Reclamation has previously stated that a 100-year rain will not cause flood discharge from the reservoir because of the very small catchment area for the San Justo Reservoir.

d. Prevailing wind at the site is generally from the west. A “wind rose” depicted on Figure II-3, shows that winds come from the southwest, west, and northwest approximately 63.6% of the time.

3. Facility Characteristics:

The following describes facility characteristics and the reference.

a. Site legal boundaries are shown on the Assessor's Parcel Map (Figure II-5).

b. Union Road is the only permanent street access to the site (Figures II-1). Permanent internal site roads, power lines, pipelines, and easements are shown in Figure II-3.

c. Site access is controlled through a single entry point (Figure II-3) and security fencing is discussed in Chapter V.

d. All past and present treatment, storage, and disposal facilities are shown in Figure II-3 Treatment/ Storage Units (TSUs) 1, 3, and 8 are located within containment structures.

e. Loading/unloading of materials and container and equipment cleaning is discussed in Chapter VI, Management Practices.

f. There are no injection or withdrawal wells associated with hazardous waste operations and no environmental monitoring stations.

g. The drainage/runoff flow from the facility as well as the surrounding watershed is controlled by surface topography, flows into Lake Teledyne (Figure II-3).

D. Information Associated with Maps

1. Legal Description of PSEMC Site:

a. Historical Site: The Historical Site encompasses approximately 270 acres, and is located on the south side of Union Road at 3601 Union Road, near the intersection of Union Road and Highway 156 in what has historically been a sparsely developed area bounded by agricultural and grazing lands.

The full legal description of the PSEMC site is described below. Note that the terms Range, Township, Section, and Principal Meridian are not used in the legal description of this property (as shown on figure 11-5, it is listed with the San Benito County Assessor's Office as Hill Lots 6 and 7, San Justo Rancho).

> All that certain real property, situate, lying and being in the County of San Benito, State of California, particularly described as follows.
>
> That part of Hill Lots 6 and 7 of the San Justo Rancho, according to the map thereof, filed July 21, 1876, in Vol. 1 of Maps at page 64, San Benito County Records, bounded and particularly described as follows:
>
> Beginning at a 4" x 4" stake marked 6 standing in the northern-most corner of the Scully Ranch - so called – said stake being in the partition line of the San Justo Rancho as made between Flint Bixby & Co. and W. W. Hollister, and said stake also being in the southern line of the old San Juan and New Idria Road (sometimes known as and called the San Justo Road), and running thence along the southern side of said Road South 65°37' East 1.968 chains to a 4" x 4" stake; North 88°16' East 9.717 chains to a 4" x 4" stake; North 87°06'
>
> East 8.814 chains to a 4" x 4" stake; South 56°55' East 3.41 chains to a 4" x 4" stake; South 70°45' East 9.94 chains to a 4" x 4" stake; South 60 1/2°East 21.49 chains to a 4" x 4" stake marked J14 and L11; and thence leaving the southerly line of said Old San Juan and New Idria Road South 18°44' West 9.75 chains to a 3 x 3 stake marked J13 & L10; south 4°48' East 6.63 chains to a 4 x 4 stake marked J12 & L9; South 45°33' West 15.80 chains to a 3 x 3 stake marked J11 & L8; South 35°36' West 11.30 chains to a 3 x 3 stake marked J10, L7 and C8, South 25°33' West 1.41 chains to a 3 x 3 stake marked J9 & C9; South 23° 42' West 13.87 chains to a 3 x 3 stake marked J8 & C10; South 30°53' West 7.423 chains to a 3 x 3 stake marked J7, C11 & J7; North 57°58' West 7.08 chains to a 3 x 3 stake marked J6 & J6; North 50°53' West 20.254 chains to a 3 x 3 stake marked J5 & J5; North 18°55' West 10.927 chains to a 3 x 3 stake marked J4

& J4; North 5°West 5.41 chains to a 3 x 3 stake marked J3; & J3; North 36°24' West 2.52 chains to a 3 x 3 stake marked J2 & J2; North 63°30' West 2.30 chains to a 3 x 3 stake marked J1 & J1 standing in the partition line of the San Justo Rancho as made between Flint Bixby & Co. and W. W. Hollister, thence along said partition line North 26°33' East 38.00 chains to the point of beginning.

EXCEPTING THEREFROM all that portion thereof conveyed to the County of San Benito from Chas. P. Scully and others by deeds, re-corded May 5, 1922 in Vol. 68, page 267 of Deeds, and in Vol. 68, page 269 of Deeds, more particularly described as follows:

Commencing at a stake in the fence along the southerly line of the San Juan & New Idria Road, from which a 4" x 4" redwood stake marked "J.15" standing in the fence along the partition line of the San Justo Rancho as made between Flint, Bixby & Co. and W. W. Hollister, bears N. 79°22' W. - 272.8 feet distant and running thence along said southerly line fence the following courses and distances:

N. 88 °16' E. - 492.5 feet, N. 87°06' E. - 581.0 feet, S. 56°55' E. - 225.0 feet, S. 70°45' E.

61.8 feet and S. 60°30' E. - 220.0 feet to stake, from which a 4" x 4" redwood stake marked "16 - 17" standing in the aforesaid southerly line fence of said San Juan and New Idria Road bears S. 60°30' E. 125.0 feet distant, thence leaving said San Juan and New Idria Road and running across lands of Grantors the following courses and distances, N. 81°38' W. - 180.0 feet, N. 78°30' W. - 129.0 feet, N. 55°40' W. - 242.0 feet, N. 84°26'W. - 196.0 feet, S. 76°47' W. 210.4 feet, S. 89°00' W. - 367.0 feet and N. 75°26' W. - 245.0 feet to the place of beginning.

b. Additional Twenty-Acre Site: In 1992, the property owner acquired an additional 20-acre plot adjacent and to the south of the property discussed above, identified on the site map as a "20 acre safety buffer zone" (for TSU-1). The full legal description of the additional property is:

20.00 Acres, San Juan Valley to Teledyne.

Certain real property situate in the unincorporated area of the County of San Benito, State of California, being a portion of the parcel of land described in deed from Silver Creek Valley, a California Limited Partnership, to San Juan Valley, a California Limited Partnership, dated July 11, 1991 and filed for record in the office of the County Recorder of said County of July 11, 1991 under Recorder's Instrument Number 9105641, particularly described as follows:

Beginning at the angle point connecting courses numbered (19) and (20) of the boundary of said parcel described in deed to San Juan Valley, said point being the most southerly corner of the parcel of land described in deed from Teledyne, Inc. to Teledyne Industries, Inc., dated October 165, 1990 and filed for record on October 23, 1990 in the office of the County Recorder of said County under Recorder's Instrument Number 9009166, said point also being an angle point of the boundary of the parcel of land described in deed from Klauman to Indart, filed for record on February 3, 1961 in Volume 264 of Official Records of said County at Page 228; thence along said Indart boundary and boundary of said San Juan Valley parcel.

- S. 46°58' 35" E., 308.31 feet (in said San Juan Valley deed S. 46°19' E., 308.22 feet); thence
- S. 46°35' 10" E., 667.69 feet (in said San Juan Valley deed S. 46°50' E., 668.58 feet); thence
- S. 56°15' 55" E., 476.77 feet (in said San Juan Valley deed S. 56°38' E., 478.04 feet); thence
- S. 26°19' 55" E., 170.12 feet (in said San Juan Valley deed S. 28°40' E., 190.74 feet), to an angle point of the boundary of the parcel of land described as Tract One in Exhibit A in deed from Indart to the United States of America, filed for record on May 27, 1983 in the office of the County Recorder of said County in Volume 494 of Official Records at Page 736; thence, continuing along said Indart and San Juan Valley boundaries and along the boundary of said parcel described in deed to U.S.A
- S. 62°59' 40" W. (in said deed to U.S.A. S. 64°29' 56" W., in said San Juan Valley deed S. 63°00' W.), 246.57 feet; thence, leaving said boundary of said Indart, U.S.A. and San Juan Valley parcels

- N. 55°22’ 57” W., 528.46 feet; thence
- N. 47°15’ 38” W., 691.43 feet; thence
- N. 46°58’ 35” W., 278.52 feet; thence
- N. 57°56’ W., 456.51 feet; thence
- N. 50°46’ W., 888.89 feet; thence
- N. 26°43’ E., 307.30 feet, to the southwesterly boundary of said Teledyne parcel, said boundary being the same as the boundary of the “252.353 Acres” parcel shown on Record of Survey Map filed for record on October 2, 1970 in Book 7 of Maps at Page 65,
- Records of said County; thence along said Teledyne boundary
- S. 50°46’ E (in said Teledyne deed S. 50°53’ E.), 936.70 feet, to angle point of said boundary; thence
- S. 57°56’ E., 466.50 feet (on said Record of Survey S. 58°00’ E., 466.35 feet, in said Teledyne deed S. 57°58’ E., 7.08 chains), to the point of beginning, containing 20.00 acres, more or less.

2. Access Road Characteristics and Estimated Traffic Volumes:

a. Off-Site. The PSEMC facility is within one-half mile of State Highway 156 (SH 156). SH 156 is a two lane asphaltic roadway (near PSEMC) which will bear vehicles of maximum legal size and weight. Annual Average Daily Traffic (AADT) of California Route 156 at Union Road is 14,000 vehicles per day and peak hourly traffic is 1,400 vehicles (CalTrans, 2013[1]). Peak hours generally occur during morning and evening local commutes.

Street access to the facility is directly served only by Union Road, a two lane road connecting Highway 156 with the City of Hollister. Union Road is constructed with asphaltic concrete surfacing, will bear vehicles of maximum legal weight and size and is maintained by San Benito County. Existing AADT is 8,110 vehicles and the allowable ADT is 20,000 vehicles (San Benito County General Plan, Transportation and Circulation, Department of Public Works, 2010).

Hazardous Waste (HW) is transported off-site approximately twelve times a year by registered HW haulers or HW permitted PSEMC vehicles at a schedule intended to minimize on-site storage time and the related hazards. Figure II-3 shows the internal roadways to TSU-3, where HW generated from the facility is stored. HW is almost always hauled via Union Road to SH 156, where there is a fully signalized at the intersection. Left turn signals exist for left turn movements in all four (4) directions; left turns from Highway 156 onto Union Road have dedicated left turn lanes. There is a stop sign at the PSEMC facility entrance onto Union Road. There are no specific controls on Union Road for entry into the PSEMC facility entrance.

[1]: CalTrans report: *2013 Traffic Volumes on California State Highways,* 2014

b. On-Site. All traffic enters and leaves the facility through a single control point, Security Central (see Chapter V for details.). Daily vehicles traffic to and from the facility continues to average approximately 250 vehicles. 90% of the traffic terminates in the parking lots west of Building 101 and north of Building 102. And typical vehicle distribution continues to be approximately 2% large trucks, 3% other commercial vehicles, and 95% privately-owned vehicles. With the exception of a 2,600-ft dirt access road linking TSU-1 to the southwest corner of the perimeter security fence, all on-site roads are constructed to support vehicles of maximum legal weight, and have demonstrated the capability to support the arrival of occasional, permitted over-weight vehicles. The dirt road to TSU-1 is intended for use of all vehicles when dry, and for use by Support Services' 4-wheel drive truck at all times. Vehicles other than 4-wheel drive are restricted from this road under wet conditions by locking Gate 2, located at the southwest corner of the perimeter security fence. Support Services employees have access to keys for this lock.

3. Easements:

There are no temporary easements at the site. A permanent easement has been granted the United States Bureau of Reclamation for the flow of San Justo Reservoir leakage waters from PSEMC's eastern boundary to Lake Teledyne. The easement is located near/at the eastern property boundary (see Figure II-3, Site Utilities and Easements) and does not affect any of hazardous waste units.

4. Future Hazardous Waste Facilities

The four, currently active and 6 former/closed TSUs are shown in Figures II-3 and IV-10. PSEMC has no current plans for additional future hazardous waste facilities not listed in this plan, or to relocate any existing facilities, or to reestablish any closed facilities. Chapter IV (Facilities), contains references that include photographs and engineered construction drawings that fully describe the four active HW units.

E. Geological Information

Complete geological information for the site is contained in the following documents:

(1) The approved Geological, Hydrological, and Chemical Site Characterization (SC), prepared by International Technology Corporation (IT), and dated 29 October 1985. This document is on file with the California Department of Toxic Substances Control in Sacramento, California.

(2) A series of investigation, groundwater monitoring, and remedial action reports prepared by PES Environmental, Inc. (PES) and Arcadis, dated from July 1999 to February 2016. Hard copies of these reports are available at the California Regional Water Quality Board, Central Coast region offices in San Luis Obispo, California. PDF copies of selected documents from this series are available via the State Water Board's electronic archive (GeoTracker[2]) website. A recent "Annual Cleanup Status Report", is included as part of Section XI of this report (Corrective Action), which includes a summary of shallow subsurface conditions investigated in recent years. See Attachment XI-2.

[2]: McCormik Selph Case #SL203381276:

- http://geotracker.waterboards.ca.gov/profile_report.asp?global_id=SL203381276

1. Geology of the Facility

The structural geology in the area of the facility includes gentle folding, and faulting. The folds trend north-northwest--south-southeast and the fault zone trends northwest-southeast. IT concluded that the geology of the facility location is characterized by uniformly dipping sandstone and claystone beds, and gently folded anticlinal structure which is cut by a fault in the northeast quadrant of the site. The sandstone and claystone units for the middle member of the Purisima Formation are of Tertiary Age and are locally covered by Quaternary alluvial deposits.

The shallow alluvial deposits which underlie Lake Teledyne and adjacent contiguous areas are composed of flat-lying lenticular beds of clay, silt, and sand. The alluvial deposits are likely derived from erosion of the Purisima Formation present in hills north, south, and west of the Site. Alluvial deposits have filled the east-west trending San Juan Valley to thicknesses ranging from 5 feet (near the hills) to greater than 100 feet in the vicinity of the lake-filled depression. The upper 30 to 150 feet of the alluvium ("upper alluvium") are predominantly comprised of low permeability silt and clay with thin discontinuous lenses of silty sand, while the "lower alluvial deposits" are predominantly silty and well-graded sands with minor amounts of gravel.

The underlying sedimentary Purisima Formation crops out in the hills within the facility surrounding Lake Teledyne. The Purisima Formation bedrock consists of middle member sandstone beds that are composed of semi-consolidated, well-bedded, massive, poorly cemented sands with claystone inclusions. The sandstones and claystones occur as laterally discontinuous beds that individually range in thickness from 2 to 30 feet but as a group are as much as 1,000 feet in thickness. Beneath the facility, these Purisima beds generally have a uniform attitude and the direction of groundwater movement parallels the bedding-plane strike (see Figure II-8).

Detailed drilling at the site has refined the understanding of subsurface conditions. The subsurface geology at the site is very complex and correlating geologic logs (drilling depths up to 200 ft) across the site is difficult. In general, the subsurface is comprised of unconsolidated to semi-consolidated gravel, sand, silt, and clay and is defined by the following 5 soil units:

- Units 1 and 2 are Post-Purisima basin fill, comprised of sand and silt (Unit 1) and clay (Unit 2).
- Unit 3 is Purisima sand with variable degrees of consolidation between layers. Unit 3 is mostly sand, and is characterized by stratification and the presence of siltstone fragments.
- Unit 4 is Purisima sand with variable degrees of consolidation observed in different borings. Unit 4 is predominantly sand with occasional claystone.
- Unit 5 (Purisima) is a very hard, highly reduced clay, claystone, or silt, ranging from greenish-gray to black in color. Drill breaks and bedding planes commonly have a glossy surface. Water levels in wells screened below Unit 5 have higher water levels than wells screened above Unit 5, indicating that Unit 5 is an effective aquitard.
- Unit 6 (Purisima) included water-bearing silt, sand, and sandstone.

2. Hydrology of the Facility

IT reported that the facility is regionally located within the Bird Creek Hills in the southeast part of the San Juan Valley, west from Hollister, California. The Calaveras fault system divides the region into the Hollister and San Juan Valley subbasins. The PSEMC facility reportedly straddles the San Juan Valley and

Hollister Valley hydrologic areas. The waste management facilities are located on the San Juan Valley hydrologic area side of the fault (a fault trace passes through the northeast corner of the PSEMC facility). That fault is a barrier to transverse groundwater movement as evidenced by groundwater levels that are about 50 feet higher on the Hollister Valley side of the fault than on the San Juan Valley side.

Regionally, groundwater moves parallel to the northwest trending fault on the San Juan Valley side, and it moves away from the fault on the Hollister Valley side. A differential in water levels and the noted non-conforming directions of groundwater movement imply that groundwater on the San Juan Valley side of the fault do not mix with those on the other side. The general pattern of groundwater movement within the San Juan Valley hydrologic area is toward the northwest, moving from groundwater recharge zones (i.e., precipitation infiltration in the Bird Creek Hills) to discharge areas (i.e., lower San Benito River).

Locally, shallow groundwater gradient is affected by Lake Teledyne, a 35-acre, shallow (2-7 feet deep) reservoir within natural, topographic basin located in the middle of the PSEMC facility (see aerial, Figure II-4). The on-site lake was constructed in 1976 mainly to provide readily available water supply for fire-fighting needs and its water level is maintained above a prescribed level with water supplied from the San Justo Reservoir and, if needed, pumping from two water supply wells located near the western edge of the lake. Percolation waters from this lake locally alters the hydraulic head of the underlying groundwater system (i.e. creates limited mounding beneath the lake itself).

In addition to the on-site influence from Lake Teledyne, similar percolation of water from the San Justo Reservoir has been documented to influence groundwater levels in onsite wells. Following the reservoir's 1986 installation in the adjacent (and higher elevation) valley to the southeast, groundwater levels in the onsite monitoring wells reportedly increased an average of approximately 15 feet. Additional anecdotal evidence of a hydraulic connection from San Justo Reservoir "leakage" include the presence of post-reservoir construction surface outcrops of water flows on the PSEMC facility. As noted in section D-3, the site maintains an easement along PSEMC's eastern boundary for San Justo Reservoir leakage waters to Lake Teledyne.

Groundwater within the alluvial deposits is assumed to be in hydraulic connection with Lake Teledyne. Past measurements have shown that Lake Teledyne is recharging groundwater within the alluvial deposits beneath the western portions of the lake. The effect of hydraulic mounding from Lake Teledyne produces vertical differences locally with the areal distribution of hydraulic head in the groundwater system. This mound causes groundwater movement generally radially outward in all directions from the periphery of the lake, but only for a short distance. Since 1999, water-level contour maps have been prepared periodically to provide groundwater flow information. The depth-to-water measurements have been converted to elevation in feet above mean sea level (msl) and used to prepare water-level contour maps. Groundwater beneath the PSEMC facility occurs in two principal geologic units:

1) <u>Shallow Alluvial Materials</u> (valley fill and terrace deposits): The hydraulic gradient between the shallow wells near the lake is relatively high at 0.045 foot per foot (1 foot of elevation drop over 22 feet of lateral flow distance).

2) <u>Permeable Units of the Purisima Sandstone and Claystone</u>: Water levels in the monitoring wells screened below Unit 5 (Purisima) are approximately 10 feet higher than the water levels measured in the shallow water bearing units (i.e., there is an upward hydraulic gradient which indicates Unit 5 appears to be an effective aquitard). The deeper groundwater flow beneath the

PSEMC facility is toward the northwest, which is consistent with regional groundwater flow. Generally, water-level gradient across the facility is about 0.01 foot per foot (1 foot of elevation drop over 100 feet of lateral flow distance).

Early reporting by IT concluded that seasonal influences on regional flow rate and direction were very limited, with the exception of agricultural groundwater pumping beyond the PSEMC property. In 2002, PES assessments indicated that groundwater pumping from the on-site water supply wells (W-1 and W-2) located immediately west of Lake Teledyne locally influence groundwater flow directions (i.e., from northwest to southwest) within the Purisima Formation. Based on historical groundwater elevation maps, the groundwater gradient in the upper and lower alluvium and the Purisima Formation is generally toward the northwest[3] although recent reports show variable flow gradients to the west and southwest that are influenced by the lake and pumping[4].

Groundwater within the alluvial deposits is assumed to be in hydraulic connection with Lake Teledyne. Past measurements have shown that Lake Teledyne is recharging groundwater within the alluvial deposits beneath the western portions of the lake. Monitoring in 2012-2013 reported Lake Teledyne's water elevation ranged from 235-238 feet msl and groundwater elevations within the alluvial deposits were in the 235-248 msl. In general, groundwater within the alluvial deposits flows in a west to northwest direction.

In the Purisima Formation, water elevations are segregated into multiple zones identified as A- and B-zone wells and deeper C-zone wells (see cross-section, Figure II-8). The A- and B-zones are generally associated with saturated sands in Purisima lithologic units, Unit 3 and 4. Tables of well construction screen intervals targeting these lithologic units as well as historical groundwater elevations are included in Attachment XI-2 It should be noted that groundwater elevations in the deepest, C-zone wells, which are screened below Unit 5, are approximately 6 feet higher than the water levels measured in the A- and B-zone wells screened above Unit 5. These data show that there is a consistent upward hydraulic gradient from Unit 6 and that Unit 5 is an effective aquitard. Groundwater flow directions within the Purisima formation are nominally west to northwest but are directly influenced by local faulting (barriers to flow) and groundwater pumping from the water supply wells located immediately west of Lake Teledyne.

3. Geologic Hazards

a. Regional Seismic Setting

Based on the work performed by Pacific Crest Engineering Inc. (PCEI) in mid-2005 (and summarized in their report entitled "*Geologic Hazards Assessment* for TSU-1, 2, 3 and 8", dated August 4, 2005—see attachment II-1 at the end of this Chapter), the seismic setting of the site is one in which it is reasonable to assume that the site will experience significant seismic shaking during the lifetime of the project. Based upon our review of the *Maps of Known Active Fault Near-Source Zones in California* and adjacent portions of Nevada (California Division of Mines and Geology, 1998)[5], active or potentially active faults

---

[3]: Arcadis report: *Water Supply Well Investigation Report and Interim Conceptual Site Model,* 10/23/2013.

[4]: Arcadis report: *2nd Supplemental Water Supply Well Investigation Report & Updated Conceptual Site Model,* 2/26/2016*,* (see Figures 8 & 9, in Attachment XI-3).

[5]: California Department of Conservation, Division of Mines & Geology (CDMG) report: *Maps of Known Active Fault*

which may significantly affect the site include those listed in Table II-1, below:

TABLE II-1 -- MINIMUM DISTANCES TO FAULTS FROM PSEMC TSUs (also see Figure II-6)

Fault Name	Distance (miles)	Distance (km.)	Direction	Type*	Slip Rate*, (mm/yr.)	MG Max*.
San Andreas (1906 Segment)	2.5	4	SW	A	24	7.9
Calaveras South	2.5	4	NE	B	15	6.2
Quien Sabe	7.5	12	NE	B	1	6.5
Sargent	2.5	4	N	B	3	6.8
Zayante- Vergeles	5.0	8	SW	B	0.1	6.8

**Source: CDMG, February, 1998*

In addition to the assemblage of active mapped faults outlined above, the region contains a number of fault splays that emanate off the assemblage which form the hills and valleys of the Hollister and San Juan Valleys. A previously unnamed fault (locally identified as the Flint Hills West fault) crosses the eastern perimeter of the property, approximately 700 feet east of TSU-3. This fault is not considered an active fault (Holocene age) as it has been identified in literature dated as early as 1985, and is not identified in the San Benito County Planning maps (Figure II-6) and is not mapped as active in the California Division of Mines and Geology's *"Maps of Known Active Near-Source Zones in California and Adjacent Portions of Nevada"*.

The PSEMC facility is located in a region of active faulting with the San Andreas Fault Zone beyond the facility on the west and northwest side, and the Calaveras Fault system beyond the east side. San Benito County Planning maps (Figure II-6) show the nearest active fault to the subject site is the Calaveras Fault which runs through Hollister at a distance of 2.5 miles away. The Calaveras fault reportedly separates the San Juan and Hollister groundwater subbasins. This agrees with the estimates reported by Pacific Crest Engineering reported (see Attachment II-1).

Several fault traces had been reported in the vicinity of the PSEMC site prior to the IT study in 1985, although IT was unable to confirm the fault traces using trenching and exploration pits. Subsequent exploratory drilling and research by Arcadis identified four, local vertical faults (a topographic maps showing these local fault traces is included in Attachment IV-3, Figure 1). This includes the Flint Hills West fault[6] (Rogers 1993; previously referred to as the northwest-southeast trending, "Unnamed Fault") that trends across the northeastern corner of the Site. It apparently is a regional feature and its trace has been mapped through the Flint Hills, across the San Juan Valley, and into the Bird Creek Hills. On the PSEMC facility, this Flint Hills West fault acts as a subsurface "dam" that is a barrier to groundwater movement.

Near-Source Zones in California and adjacent portions of Nevada, April 15, 1998.

[6]: CDMG report: *Geology of the Hollister and San Felipe Quadrangles, San Benito, Santa Clara, and Monterey Counties*. Geology Open-File Report 93-01, 26 p., plate 1, scale 1:24,000 (Rogers, 1993).

b. Seismic Hazards

Seismic hazards which may affect the project site include ground shaking, ground surface fault rupture, liquefaction and lateral spreading, and seismically induced slope instabilities.

Ground Shaking

Ground shaking will be felt on the site. Structures founded on thick soft soil deposits are more likely to experience more destructive shaking, with higher amplitude and lower frequency, than structures founded on bedrock. Generally, shaking will be more intense closer to earthquake epicenters. Thick soft soil deposits large distances from earthquake epicenters, however, may result in seismic accelerations significantly greater than expected in bedrock. Structures built in accordance with the latest edition of the Uniform Building Code for Seismic Zone 4 have an increased potential for experiencing relatively minor damage which should be repairable.

Ground Surface Fault Rupture

Ground surface fault rupture occurs along the surficial trace(s) of active faults during significant seismic events. The nearest known active or potentially active fault is mapped approximately 2.5 miles (approximately 4 km) from the site, therefore, the potential for ground surface fault rupture at this site is considered low.

Liquefaction

For their review, PCEI relied on several sources of information on the subsurface lithology surrounding the facility. Most notable of these was the Corrective Action Plan (CAP) prepared by PES Environmental, Inc. dated December 19, 2002. This report included three subsurface cross-sections, based on monitoring well data across the facility. Cross-sections A-A, B-B and C-C (Plates 3-5) were most helpful in gaining an overall perspective on the subsurface geology beneath the site. As noted previously, the area surrounding Lake Teledyne is underlain by alluvial deposits. These include layers of clay, silt and sand. The cross-sections provided in the CAP indicate that the majority of these alluvial soils consists of clay and silt soils. Sand layers (most susceptible to liquefaction) appear to be very thin, and layered in discontinuous lenses.

Liquefaction tends to occur typically in soils composed of loose sands and non-cohesive silts of restricted permeability. In order for liquefaction to occur there must be the proper soil type, soil saturation, and cyclic accelerations of sufficient magnitude to progressively increase the water pressures within the soil mass. Non-cohesive soil shear strength is developed by the point to point contact of the soil grains. As the water pressures increase in the void spaces surrounding the soil grains the soil particles become supported more by the water than the point to point contact. When the water pressures increase sufficiently, the soil grains begin to lose contact with each other resulting in the loss of shear strength and continuous deformation of the soil where the soil appears to liquefy.

Although the lack of significant sand layers indicates a lower potential for liquefaction to occur, it cannot be ruled out entirely. A paper (“Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework”, by Ray Seed and others, presented at the ASCE Los Angeles Geotechnical Spring Seminar in 2003) is reported as the “state of practice” for seismic design in regards to liquefaction analysis. The 2003 method incorporates the potential for silts and silty clays to liquefy in addition to clean sands and gravels. A site specific geotechnical study would be required to identify which of the alluvial soil layers are susceptible to liquefaction, including silt and clay layers.

Areas built away from Lake Teledyne (outside the zone of alluvial soil deposits, on the surrounding hills) are considered to have a low potential for liquefaction.

Liquefaction Induced Lateral Spreading

Liquefaction induced lateral spreading occurs when a liquefied soil mass fails toward an open slope face, or fails on an inclined topographic slope. This is usually most evident along river channel environments. There may be some potential for lateral spreading to occur in the near- vicinity of Lake Teledyne, assuming liquefaction did occur beneath the site. However, given the relatively shallow nature of this lake the lateral spreading potential is considered relatively low.

Landsliding

Landsliding is a hazard which may affect the slopes on this property. This hazard may be the result of seismic shaking, prolonged intense rainfall, saturation of subsurface soils by the adjacent San Justo Reservoir, or a combination of these factors.

A landslide is evident in the vicinity of TSU-3. This landslide is reported to have occurred sometime after the IT report in 1985 and appears to be a rotational or slump type of slide failure. This slide is located about 300 to 400 feet south-southeast of TSU-3. The volume of soil involved in the landslide would be roughly estimated at 5,000 to 10,000 cubic yards. Apparently, this slide is likely the result of saturation of subsurface soil layers by the adjacent San Justo Reservoir, which was constructed in 1986.

A PCEI Geotechnical Engineer reviewed the setback of TSU-3 from the slide area and believes there is a reasonable safety factor in the setback distance of the unit from the slide area, and from the slope areas (which have not failed) directly to the south (Attachment II-1). However, no detailed slope stability analyses for this slide were located/have been performed to date, and the possibility of a potential landslide affecting TSU-3 cannot be ruled out without obtaining additional information from the United States Bureau of Reclamation (USBR; the managers of the San Justo Reservoir).

The same PCEI Geotechnical Engineer also reviewed the location of TSU-1, TSU-2, and TSU-8. TSU-2 and TSU-8 were judged to be relatively well set-back from the slope areas to the south. The slope areas to the south did not exhibit any signs of slope failure, and were not located adjacent to the San Justo Reservoir. TSU-1 is located on a level cut pad, on a sloping hillside. The cut side of the pad buttresses the hillside area using a concrete retaining wall, which was about 12 inches thick. No evidence of landsliding, soil slumping or other movement was observed on the hillside area surrounding TSU-1. There also was no evidence of the wall leaning, cracking or exhibiting any signs of wall rotation or failure due to movement of the adjacent hillside. The hillside area above TSU-1 is not located adjacent to the San Justo Reservoir (as is the case for TSU-3).

F. Elevations and Contours of Ground Water

Ground water elevations in on-site wells and typical groundwater contours are discussed in detail in in Section E.2 above and are shown in maps included in Attachment XI-3. In summary:

> Groundwater within the alluvial deposits is assumed to be in hydraulic connection with Lake Teledyne. Past measurements have shown that Lake Teledyne is recharging groundwater within the alluvial deposits beneath the western portions of the lake. Monitoring in 2012-2013 reported Lake Teledyne’s water elevation ranged from 235-238 feet msl and groundwater elevations within the alluvial deposits were in the 235-248 msl. In general, groundwater within the alluvial deposits flows in a west to northwest direction.

In the Purisima Formation, water elevations are segregated into multiple zones identified as A- and B- zone wells and deeper C-zone wells (see cross-section, Figure II-8). The A- and B-zones are generally associated with saturated sands in Purisima lithologic units, Unit 3 and 4. Tables of well construction screen intervals targeting these lithologic units as well as historical groundwater elevations are included in Attachment XI-2 It should be noted that groundwater elevations in the deepest, C-zone wells, which are screened below Unit 5, are approximately 6 feet higher than the water levels measured in the A- and B-zone wells screened above Unit 5. These data show that there is a consistent upward hydraulic gradient from Unit 6 and that Unit 5 is an effective aquitard. Groundwater flow directions within the Purisima formation are nominally west to northwest but are directly influenced by local faulting (barriers to flow) and groundwater pumping from the water supply wells located immediately west of Lake Teledyne.

Attachment XI-3 contains tabulated historical groundwater elevation data and gradient maps.

G. 100-Year Flood Plain

The PSEMC site is located 1.2 miles from the closest 100-year flood plain. See Figure II-6, Flood Plain Map, for site location relative to the flood plain. Also seen on the Figure II-6, are surface water within 1,000 feet of the PSEMC's manufacturing facility includes the San Justo Reservoir (to the southeast), a farm pond, two stock ponds, and a dry creek. The main drainage for the area is the northwest flowing San Benito River, located approximately 1.3 miles north and west of the subject site.

The on-site lake, Lake Teledyne, was constructed within a natural, topographic basin in 1976 mainly to provide readily available water supply for fire-fighting needs and its water level is maintained above a prescribed level with water supplied from the San Justo Reservoir and, if needed, pumping from two water supply wells located near the western edge of the lake. The stormwater runoff from the facility, as well as the surrounding watershed, flows into Lake. Teledyne.

H. Zoning of Adjoining Properties

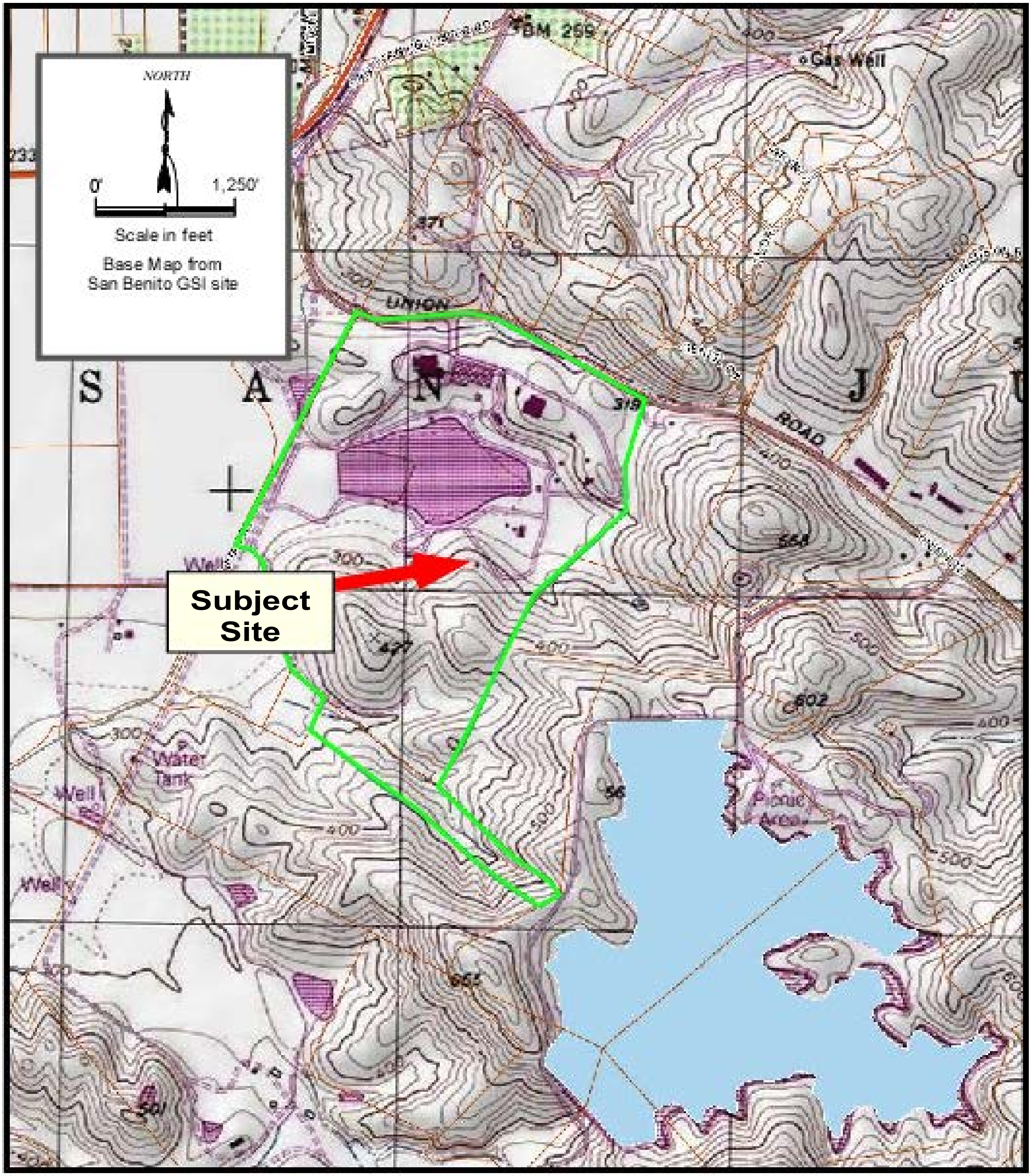
See Figure II-6, presents land use in the vicinity of the PSEMC facility. The information was sourced from the San Benito County Planning Department and based on the County's zoning ordinance map. The information shows properties adjoining the site on the east, north, and west are zoned for Agricultural Productive (AP). Properties adjoining the site to the south are zoned for Agricultural Rangeland (AR). Property northeast of the site (but not adjoining the site) is zoned for Agricultural Production/Planned Unit Development (AP/PUD). Property to the southeast (but not adjoining the site) is zoned Public (P).

Chapter II Attachments

- *Site Maps*
- *Geological Hazards*

Chapter II Site Maps

- *Figure II-1: Site Location Map (Topographic)*
- *Figure II-2: USGS Topographic Quadrangle Map*
- *Figure II-3: Site Utilities and Easements*
- *Figure II-4: Site Aerial*
- *Figure II-5: Assessor's Parcel map*
- *Figure II-6: Earthquake Fault & Flood Plain Map*
- *Figure II-7: Zoning Map*
- *Figure II-8: Shallow Geology & Groundwater*

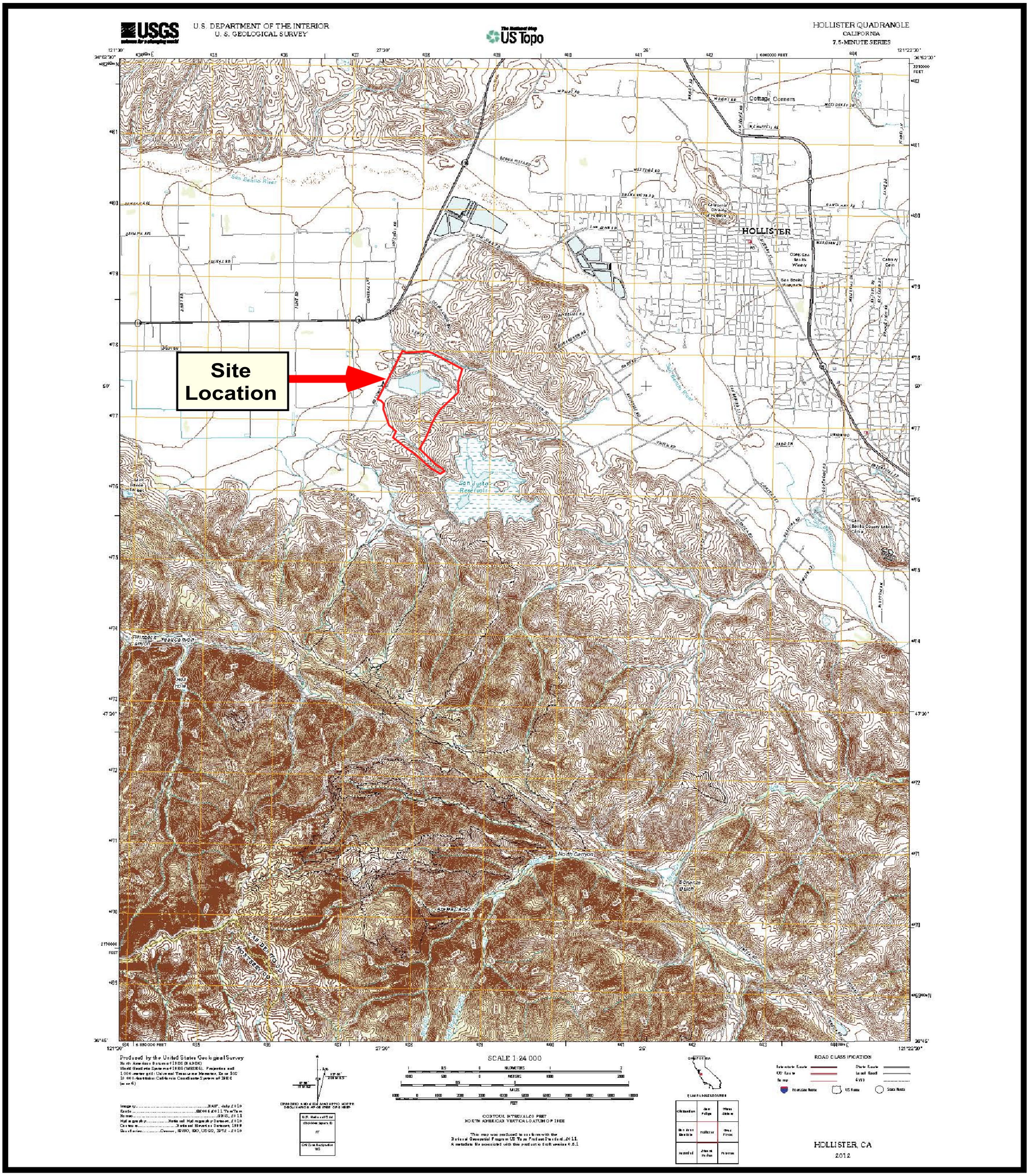


\2x502.Pac-Sci-RCRA Permit\Figures\1-Location.cvx

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

Location Map
Pacific Scientific Energetic Materials Company
3601 Union Road
Hollister California

FIGURE II-1
Project 2X502

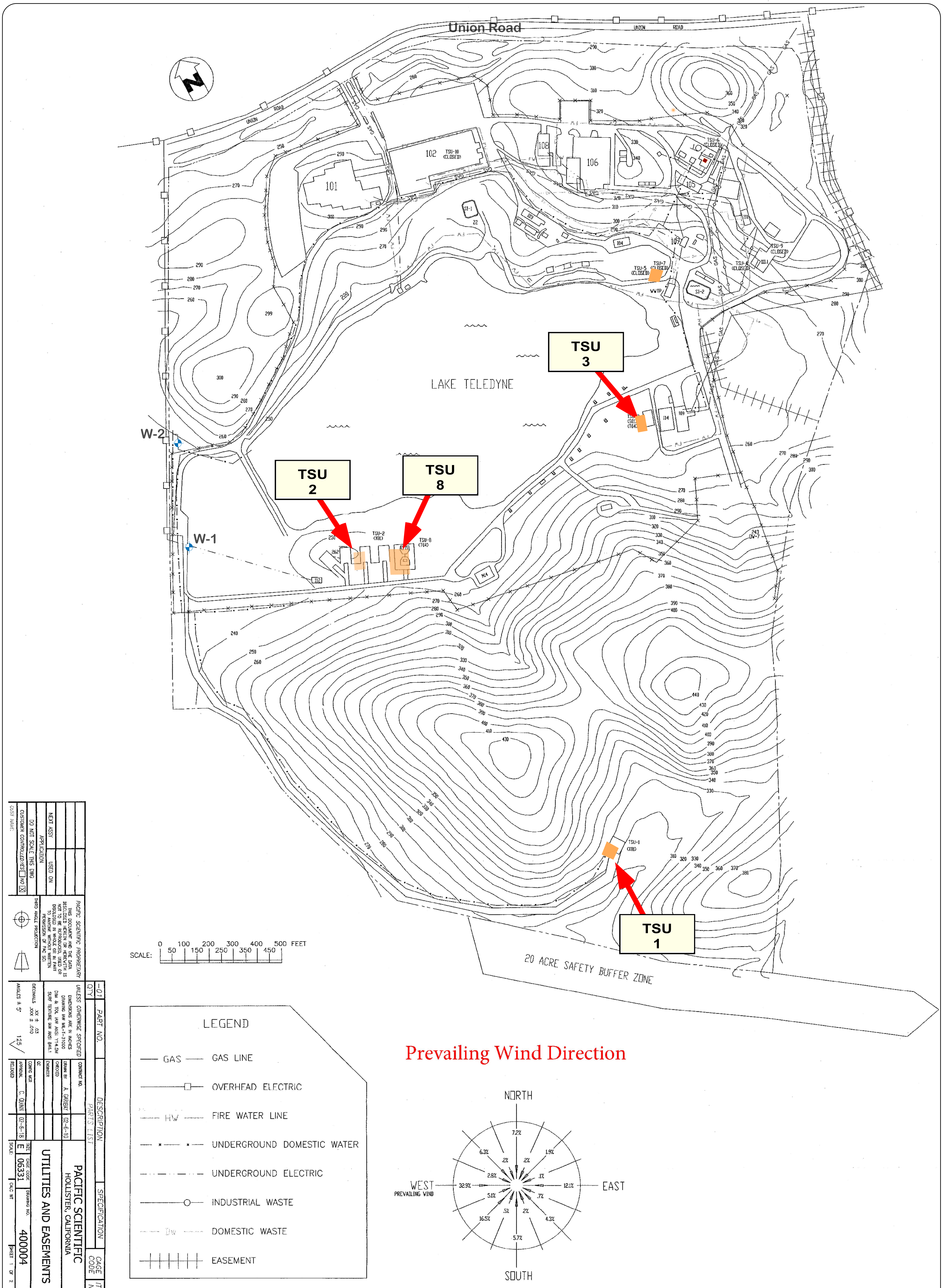


\2x502.Pac-Sci-RCRA Permit\Figures\2-Site Map.cvx

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

USGS Topographic Quadrangle Map
Pacific Scientific Energetic Materials
3601 Union Road
Hollister, California

FIGURE
II-2
Project
2X502



WEBER, HAYES & ASSOCIATES
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

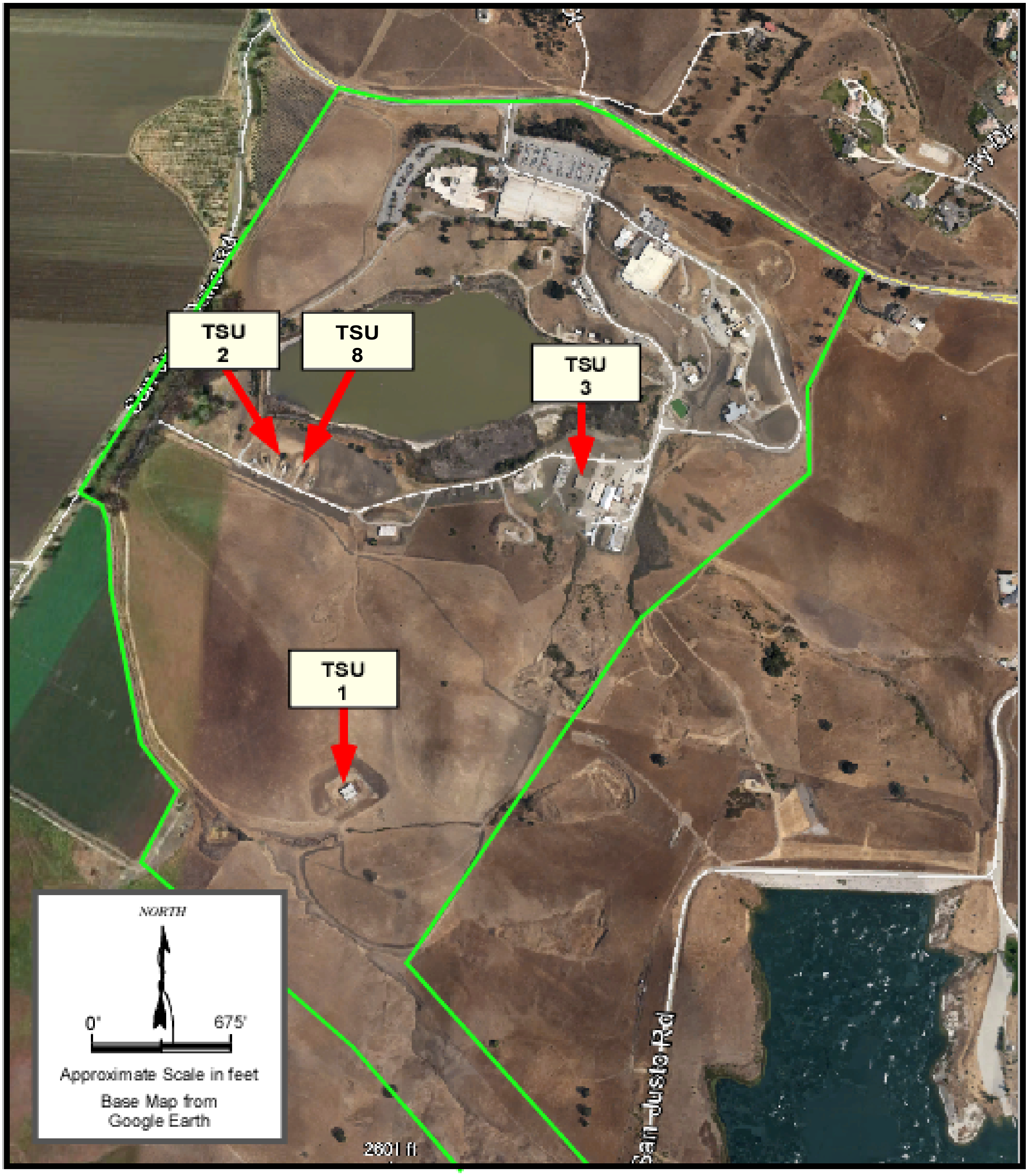
SITE UTILITIES

SITE: PACIFIC SCIENCE ENERGETIC MATERIALS COMPANY
ADDRESS: 3601 UNION ROAD. HOLLISTER, CA

DATE: MARCH 2016

REVISIONS/NOTES:

FIGURE II-3
Project 2X502

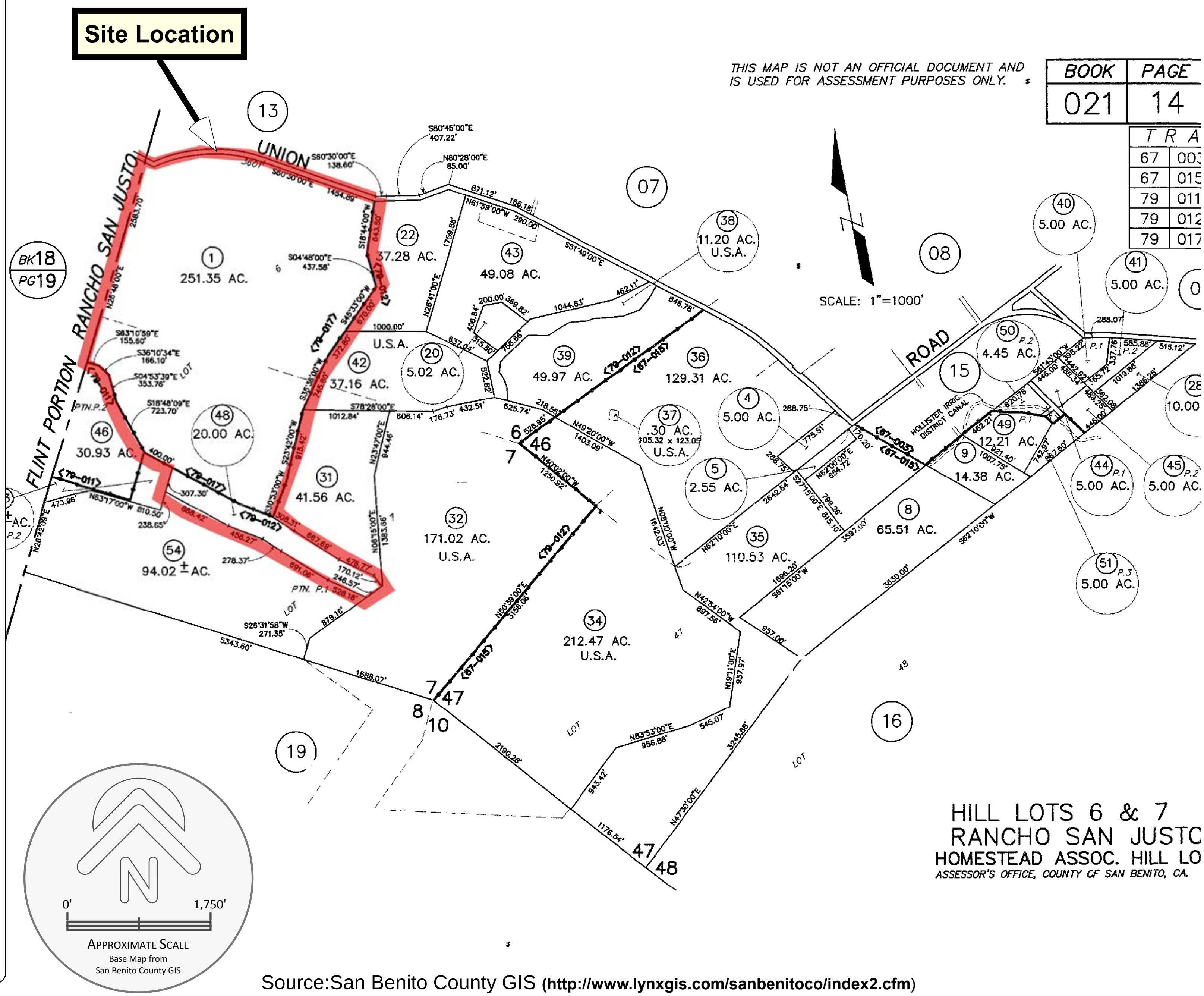


\2x502.Pac-Sci-RCRA Permit\Figures\2-Site Map.cvx

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

Site Aerial
Pacific Scientific Energetic Materials
3601 Union Road
Hollister, California

FIGURE II-4
Project 2X502



Source:San Benito County GIS (http://www.lynxgis.com/sanbenitoco/index2.cfm)

Assessor's Parcel Map

Site: Pacific Scientific Energetic Materials Company

Address: 3601 Union Road, Hollister, California

Date: December 2015

Revisions/Notes:

Figure II-5

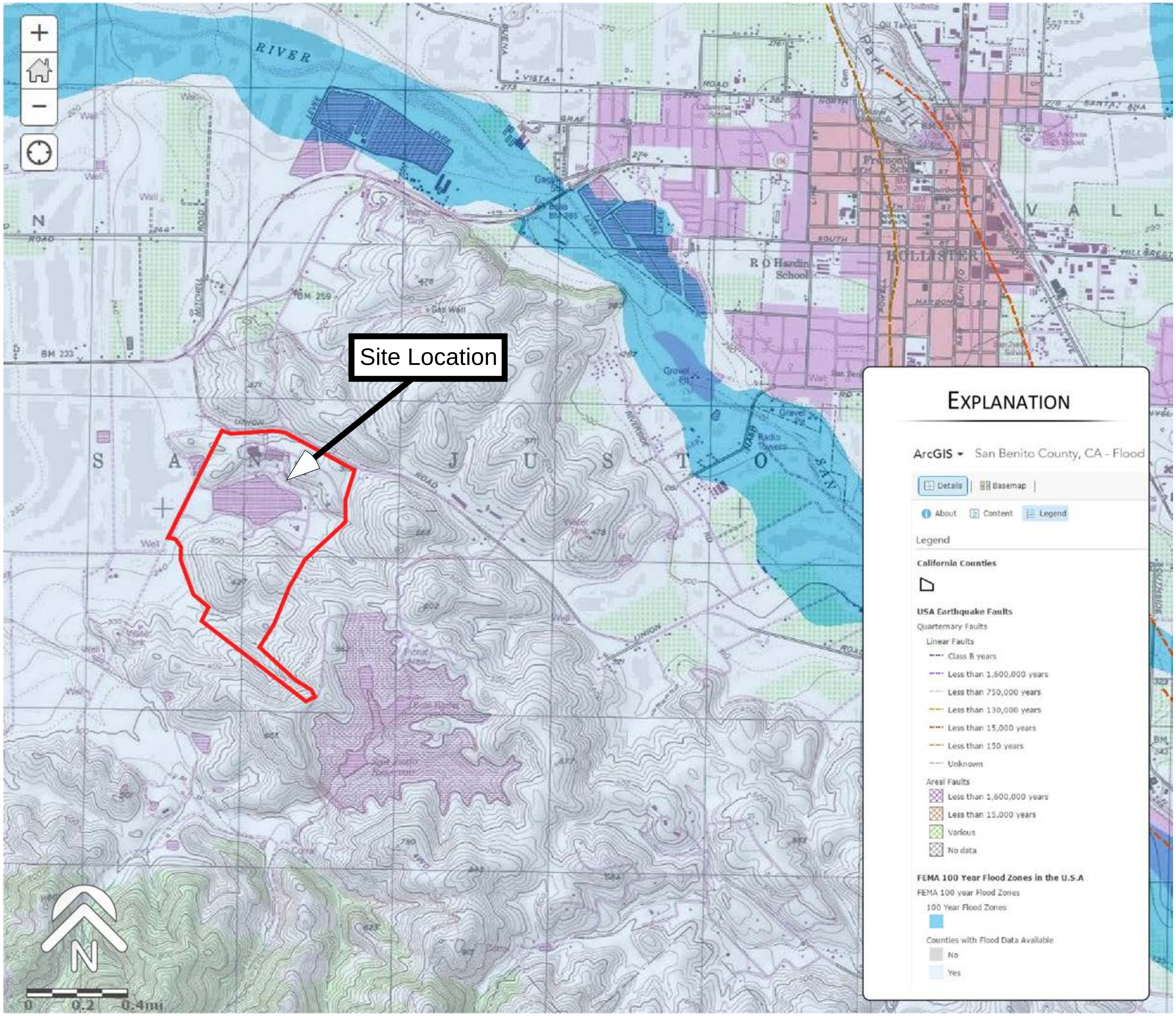
Project 2X502

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

EARTHQUAKE FAULT & FLOOD PLAIN MAP

SITE: **Pacific Scientific Energetic Materials Company**

ADDRESS: 3601 Union Road, Hollister, California



WEBER, HAYES & ASSOCIATES
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

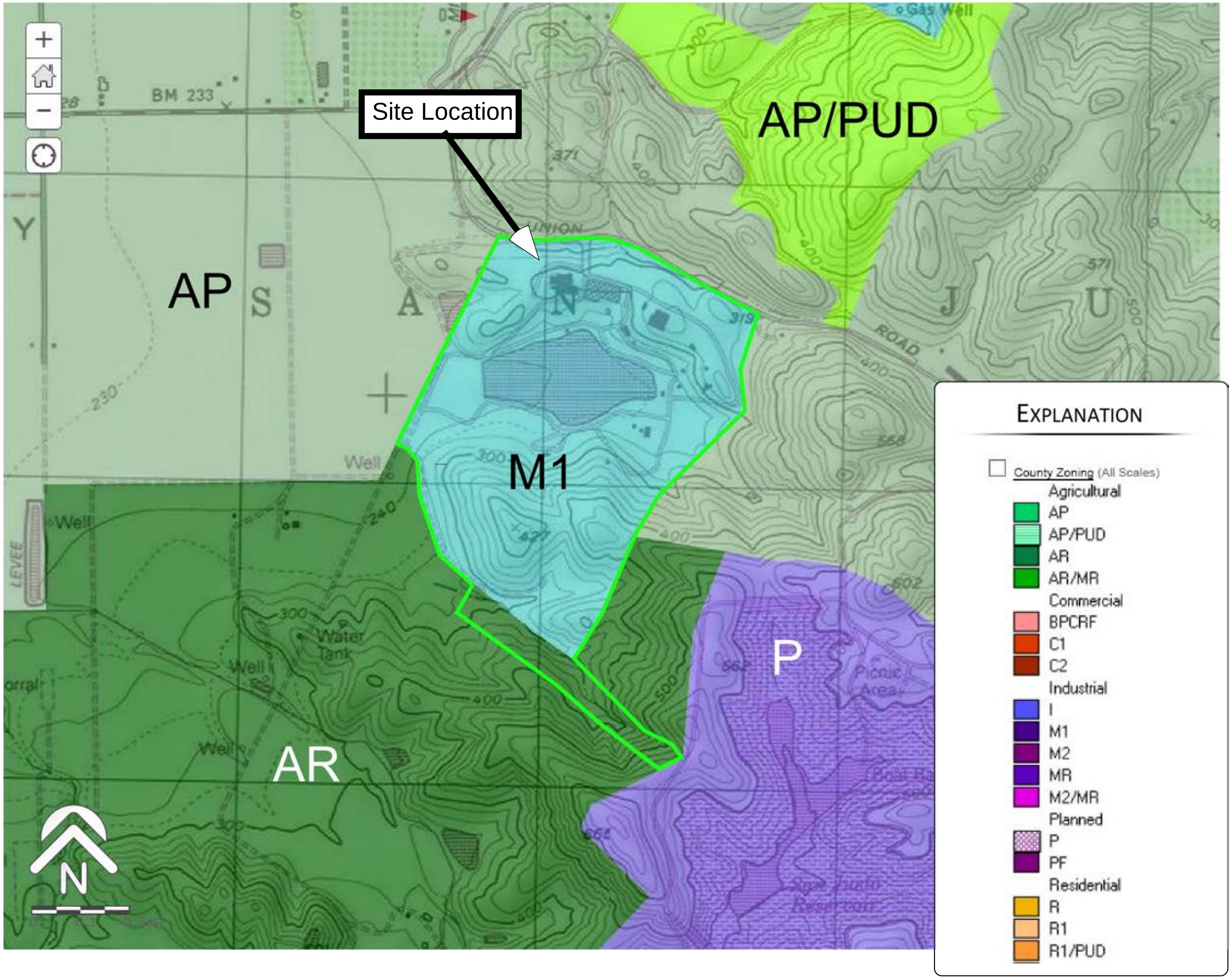
DATE: DECEMBER 2015

REVISIONS/NOTES:

FIGURE II-6

Project 2X502

Source:San Benito GIS (https://cosb.maps.arcgis.com/home/webmap/viewer.html?webmap=119fc58254c749ad95c1f1ecd99f7d6c)



WEBER, HAYES & ASSOCIATES
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

ZONING MAP

SITE: **Pacific Scientific Energetic Materials Company**

ADDRESS: 3601 Union Road, Hollister, California

DATE: DECEMBER 2015

REVISIONS/NOTES:

FIGURE II-7

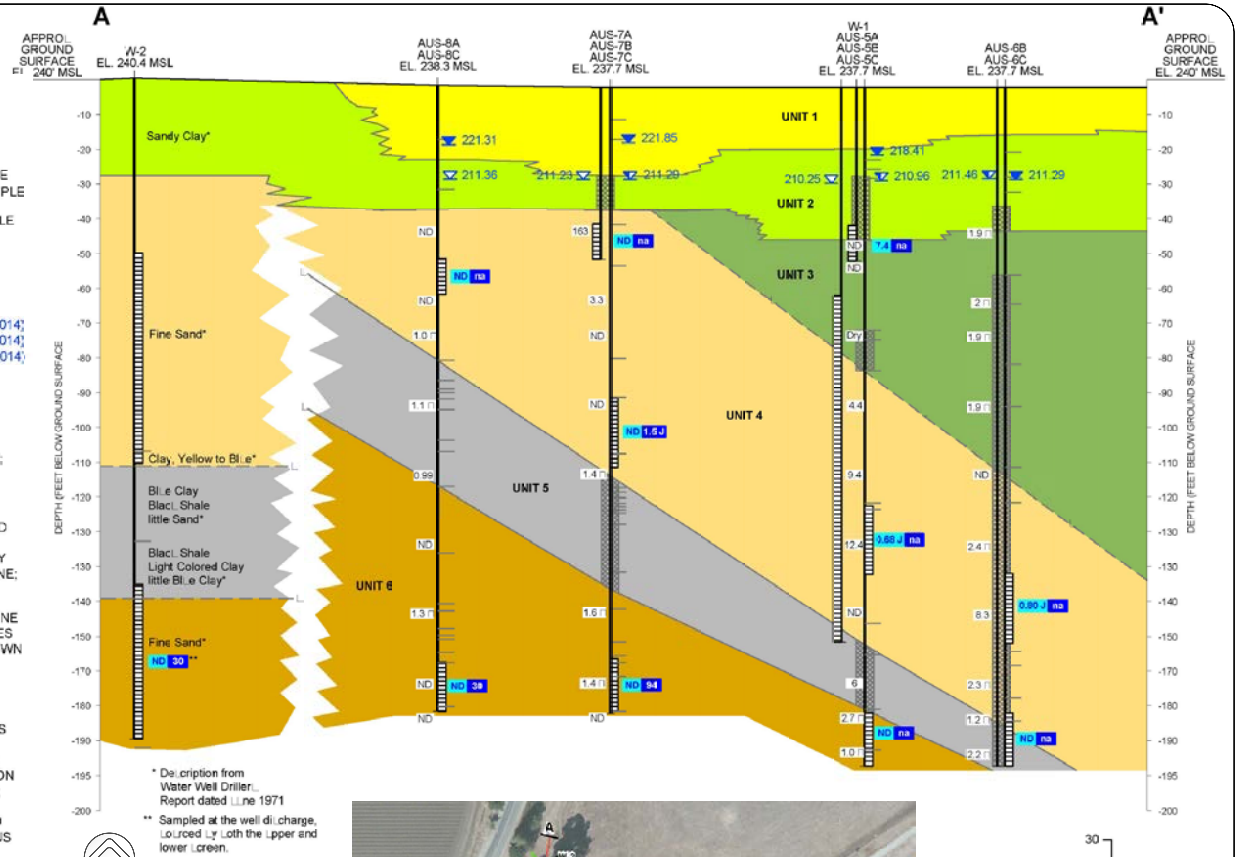
Project 2X502

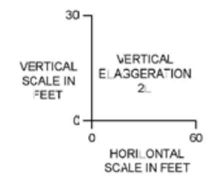
Explanation

AUS-6 EL. 237.7 MSL	BORING IDENTIFICATION / GROUND SURFACE ELEVATION
	GEOLOGICAL CONTACT
	SCREENED INTERVAL
7.4 na	NDMA CONCENTRATION IN WELL SAMPLE / PERCHLORATE CONCENTRATION IN WELL SAMPLE
1.9 J	PERCHLORATE CONCENTRATION IN GRAB SAMPLE
	BOTTOM OF BORING
ND	<0.31 µg/L (MICROGRAMS PER LITER)
na	NOT ANALYZED
J	ESTIMATED CONCENTRATION
	WATER LEVEL - A WELLS (MEASURED 5/29/2014)
	WATER LEVEL - B WELLS (MEASURED 5/29/2014)
	WATER LEVEL - C WELLS (MEASURED 5/29/2014)

SOIL CLASSIFICATION:

UNIT 1	BASIN FILL; SAND AND SILT; THICKNESS 20 TO 30 FEET
UNIT 2	BASIN FILL; CLAY, HARD GENERALLY BLACK; THICKNESS 8 TO 20 FEET
UNIT 3	"PURISIMA", SAND WITH INCLUSIONS OF SANDSTONES AND SILTSTONES; LAMINATED TO THIN BEDDED, FRIABLE, SEMI-CONSOLIDATED; GRADING TO WEAKLY CONSOLIDATED SILTSTONE AND SANDSTONE; THICKNESS AT LEAST 64 FEET
UNIT 4	"PURISIMA"; SILTY SAND AND SAND, VERY FINE TO VERY COARSE GRAINED, LOOSE; GRADES INTO SEMI-CONSOLIDATED SANDSTONE DOWN DIP; CONTAINS CLAY CLASTS AND OCCASIONAL PEBBLES NEAR THE BASE; THICKNESS APPROXIMATELY 90 FEET
UNIT 5	"PURISIMA"; CLAY, HARD, VARIABLE COLORS INDICATING REDUCED OXIDATION STATES, INCLUDING BLACK, GRAY, BLUE OR GREEN; HARD, OCCASIONALLY PLATY, BIOTURBATION FEATURES, LAMINATED SILT OR FINE SAND; LOWER THIRD TO HALF CONTAINS BLACK RESINOUS HARD MATERIAL OF SUSPECTED ORGANIC ORIGIN, POSSIBLY DIATOMACEOUS MATERIAL; THICKNESS 42 FEET (AUS-8), 38 FEET (AUS-7), AND 21 FEET (AUS-5). THE BASE OF UNIT 5 IS NOT ENCOUNTERED IN AUS-6.
UNIT 6	"PURISIMA"; SANDY CLAY, SILTY CLAY (YELLOW BROWN), FINE SAND, SANDSTONE; THICKNESS UP TO 81 FEET AT AUS-8.





Source: Water Supply Well Investigation Area Supplemental Investigation Work Plan (Arcadis, July 2015)

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

Shallow Geology & Groundwater

Site: **Pacific Scientific Energetic Materials Company**
Address: 3601 Union Road, Hollister, California

Date: December 2015

Revisions/Notes:

Figure II-8
Project 2X502

Attachment II-1

"*Geologic Hazards Assessment for TSU-1, 2, 3, and 8*",
Pacific Crest Engineering Inc., 8/4/05, 4 pages

Pacific Crest Engineering Inc. www.4pacific-crest.com

Geotechnical Group
444 Airport Blvd, Suite 106
Watsonville, CA 95076
Phone: 831-722-9446
Fax: 831-722-9158

Chemical Process Group
195 Aviation Way, Suite 203
Watsonville, CA 95076
Phone: 831-763-6191
Fax: 831-763-6195

May 4, 2005

Project No. 0529-M87A-F61

Mr. Doug Cook
D.A. Cook & Associates
1130 Denise Drive
Calistoga, CA 94515

Subject: Geologic Hazards Assessment for TSU-1, 2, 3 and 8
Pacific Scientific Energetic Materials Company, Hollister Division
3601 Union Road, Hollister, San Benito County, California

Dear Mr. Cook,

Pacific Crest Engineering Inc. (PCEI) is pleased to present this Geologic Hazards Assessment for the above referenced sites located in San Benito County, California.

It is our understanding that the facility is undergoing a permit renewal application for a Part B permit from the Department of Toxic Substances Control (DTSC). As part of this renewal effort, an updated Geologic Hazards Assessment is being requested by the DTSC for the four Treatment\Storage Units (TSU's) being operated on-site.

GEOLOGIC HAZARDS ASSESSMENT

a. *Regional Seismic Setting*

The seismic setting of the site is one in which it is reasonable to assume that the site will experience significant seismic shaking during the lifetime of the project. Based upon our review of the Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada (CDMG, 1998), active or potentially active faults which may significantly affect the site include those listed in the Table No. 1, below.

TABLE No. 1. Faults in the Hollister Area

Fault Name	Distance (miles)	Distance (km.)	Direction	Type*	Slip Rate* (mm/yr.)	MG Max*.
San Andreas – 1906 Segment	2.5	4	SW	A	24	7.9
Calaveras South	2.5	4	NE	B	15	6.2
Quien Sabe	7.5	12	NE	B	1	6.5
Sargent	2.5	4	N	B	3	6.8
Zayante-Vergeles	5.0	8	SW	B	0.1	6.8

*Source: CDMG, February, 1998

In addition to the mapped faults noted on the previous page, there is an unnamed fault which crosses the eastern perimeter of the property, approximately 700 feet east of TSU-3. Since this fault appears on literature we have reviewed dated as early as 1985, and since this fault is not mapped on the most current (1997) "*Maps of Known Active Near-Source Zones in California and Adjacent Portions of Nevada*" we assume this fault is considered inactive.

b. *Seismic Hazards*

Seismic hazards which may affect the project site include ground shaking, ground surface fault rupture, liquefaction and lateral spreading, and seismically induced slope instabilities.

Ground Shaking

Ground shaking will be felt on the site. Structures founded on thick soft soil deposits are more likely to experience more destructive shaking, with higher amplitude and lower frequency, than structures founded on bedrock. Generally, shaking will be more intense closer to earthquake epicenters. Thick soft soil deposits large distances from earthquake epicenters, however, may result in seismic accelerations significantly greater than expected in bedrock. Structures built in accordance with the latest edition of the Uniform Building Code for Seismic Zone 4 have an increased potential for experiencing relatively minor damage which should be repairable.

Ground Surface Fault Rupture

Ground surface fault rupture occurs along the surficial trace(s) of active faults during significant seismic events. The nearest known active or potentially active fault is mapped approximately 2.5 miles (approximately 4 km) from the site, therefore, the potential for ground surface fault rupture at this site is considered low.

Liquefaction

For this review we relied on several sources of information on the subsurface lithology surrounding the facility. Most notable of these was the Corrective Action Plan prepared by PES Environmental, Inc. dated December 19, 2002. This report included three subsurface cross-sections, based on monitoring well data across the facility. Cross-sections A-A, B-B and C-C (Plates 3-5) were most helpful in gaining an overall perspective on the subsurface geology beneath the site. As we have noted previously, the area surrounding Lake Teledyne is underlain by alluvial deposits. These include layers of clay, silt and sand. The cross-sections provided in the CAP indicate that the majority of these alluvial soils consists of clay and silt soils. Sand layers (most susceptible to liquefaction) appear to be very thin, and layered in discontinuous lenses.

Liquefaction tends to occur typically in soils composed of loose sands and non-cohesive silts of restricted permeability. In order for liquefaction to occur there must be the proper soil type, soil saturation, and cyclic accelerations of sufficient magnitude to progressively increase the water pressures within the soil mass. Non-cohesive soil shear strength is developed by the point to point contact of the soil grains. As the water pressures increase in the void spaces surrounding the soil grains the soil particles become supported more by the water than the point to point contact. When the water pressures increase sufficiently, the soil grains begin to lose contact with each other resulting in the loss of shear strength and continuous deformation of the soil where the soil appears to liquefy.

Although the lack of significant sand layers indicates a lower potential for liquefaction to occur, it cannot be ruled out entirely. A recent paper was published in 2003 which is the current "state of practice" for seismic design in regards to liquefaction analysis. The paper is titled "Recent Advances in Soil Liquefaction Engineering: A Unified and Consistent Framework." The paper was prepared by Ray Seed and others for a presentation at the ASCE Los Angeles Geotechnical Spring Seminar in 2003. The 2003 method incorporates the potential for silts and silty clays to liquefy in addition to clean sands and gravels. A site specific geotechnical study would be required to identify which of the alluvial soil layers are susceptible to liquefaction, including silt and clay layers.

Areas built away from Lake Teledyne (outside the zone of alluvial soil deposits, on the surrounding hills) are considered to have a low potential for liquefaction.

Liquefaction Induced Lateral Spreading

Liquefaction induced lateral spreading occurs when a liquefied soil mass fails toward an open slope face, or fails on an inclined topographic slope. This is usually most evident along river channel environments. There may be some potential for lateral spreading to occur in the near-vicinity of Lake Teledyne, assuming liquefaction did occur beneath the site. However, given the relatively shallow nature of this lake the lateral spreading potential is considered relatively low.

Landsliding

Landsliding is a hazard which may affect the slopes on this property. This hazard may be the result of seismic shaking, prolonged intense rainfall, saturation of subsurface soils by the adjacent San Justo Reservoir, or a combination of these factors.

A landslide is evident in the vicinity of TSU-3. This landslide occurred sometime after 1985 and appears to be a rotational or slump type of slide failure. This slide is located about 300 to 400 feet south-southeast of TSU-3. The volume of soil involved the in landslide would be roughly estimated at 5,000 to 10,000 cubic yards. Apparently, this slide is likely the result of saturation of subsurface soil layers by the adjacent San Justo Reservoir.

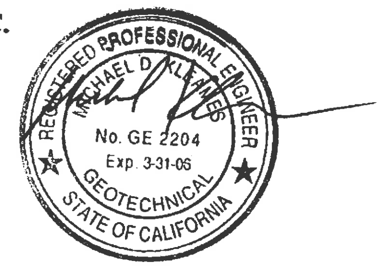
A Geotechnical Engineer reviewed the setback of TSU-3 from the slide area and believes there is a reasonable safety factor in the setback distance of the unit from the slide area, and from the slope areas (which have not failed) directly to the south. However, no detailed slope stability analyses have been performed to date and the possibility of a potential landslide affecting this facility cannot be ruled out without additional information from the United States Bureau of Reclamation.

A Geotechnical Engineer also reviewed the location of TSU-1, 2 and 8. TSU-2 and 8 were judged to be relatively well set-back from the slope areas to the south. The slope areas to the south did not exhibit any signs of slope failure, and were <u>not</u> located adjacent to the San Justo Reservoir. TSU-1 is located on a level cut pad, on a sloping hillside. The cut side of the pad buttresses the hillside area using a concrete retaining wall, which was about 12 inches thick. No evidence of landsliding, soil slumping or other movement were observed on the hillside area surrounding TSU-1. There also was no evidence of the wall leaning, cracking or exhibiting any signs of wall rotation or failure due to movement of the adjacent hillside. The hillside area above TSU-1 is <u>not</u> located adjacent to the San Justo Reservoir (as is the case for TSU-3).

We hope this brief assessment of the geologic hazards which may affect the TSU's is considered adequate for your permit renewal application. Should you have any questions we can be reached at (831) 722-9446.

Sincerely,

PACIFIC CREST ENGINEERING INC.



Michael D. Kleames, G.E.
President\Principal Geotechnical Engineer
GE 2204
Expires 3/31/06

Copies: 1 – Client
5 – Mr. Charlie Martin, PSEMC

Chapter III - Characteristics of Wastes Treated and/or Stored at PSEMC

PSEMC and predecessor companies have manufactured explosives and explosive devices for aerospace, military, and commercial applications and produced specialty chemicals on a contract basis at the Facility since 1971. Hazardous waste generated from these activities include: solvents, toxic chemicals, metal powders, reactive compounds, explosives, flammable liquids, and corrosive solids and liquids.

Hazardous wastes generated at the Facility are either treated at the Facility or sent to an approved off-site treatment or disposal site. PSEMC does not accept any hazardous wastes generated at off-site locations. The following hazardous waste management activities at the Facility are governed by the Hazardous Waste Facility Permit:

- TSU-1: open burning/open detonation of reactive (explosive) materials;
- TSU-2: burning of organic liquids (solvents) containing explosives;
- TSU-3: storage of containers of hazardous waste for up to one year and mixing two-part epoxy compounds in containers at Bay D;
- TSU-8: volume reduction of explosives contaminated water by evaporation in open tanks;

Table III-1 at the end of this chapter presents a list the possible wastes that could require on-site storage in excess of 90 days and/or on-site treatment, which include:

1. Ordnance parts and scrap
2. Explosive/reactive raw materials and residues
3. Solvent and solvent/water mixtures containing explosive waste particles
4. Caustic solids and liquid solutions
5. Cyanide-containing solids and liquid solutions
6. Sulfide-containing solids and liquid solutions
7. Halogenated hydrocarbons
8. Toxic solids and aqueous solutions
9. Acids
10. Flammable and combustible liquids and fuels
11. Reducing agents
12. Metal catalysts
13. Carbon
14. Water containing explosive waste particles (Safety Bucket Water)
15. Two-part epoxy compounds (paints, potting compounds, adhesives, and insulating materials)

Support Services, Department 37, determines appropriate waste treatment or disposal strategies as quickly as possible. This is intended to minimize on-site storage time and the related hazards. HW accumulation times may extend beyond 90 days in order to reach the quantities required for cost effective treatment and disposal. Additional time may also be required to identify an authorized treatment or disposal method or vendor.

A. Hazardous Waste Analysis Plan

Almost all of the hazardous wastes generated at PSEMC are from production processes where the constituents and concentrations are known. Information comes from material safety data sheets (MSDSs), production plans, standard operating procedures, and other production guidance documents. Table III-1 at the end of this chapter identifies each HW anticipated to be stored or treated.

1. Column 1: Lists the hazardous wastes included as Section 11 of Part A (there are no significant changes since the previous permit was issued).
2. Column 2: Lists the EPA Waste Codes.
3. Column 3: Lists the California Waste Codes. California State-restricted wastes are identified with an asterisk (*).
4. Column 4: Lists the description of the waste, including physical state (L - liquid, S - solid, G - gas).
5. Column 5: Describes the process that produced the waste.
6. Column 6: Lists the estimated annual quantities (in pounds) of waste produced (no significant changes since the previous permit was issued). Monthly figures are not shown because waste is typically generated in batches, rarely a continuous stream (dividing yearly estimates by months would be meaningless).
7. Column 7: Lists the storage location and on-site process(es) used for handling the waste. Also included is the Storage Bay (A, B, C, or D) at TSU-3 for on-site storage.
8. Column 8: Lists the containers used for handling the waste stream (cross referenced with Department of Transportation containers listed on Table IV-1).
9. Column 9: Lists the waste "hazard class".
10. Process design capacity and units of measure for processes used for handling waste are provided for each HW Storage Bay in Chapter IV (HW Facility Design).

    a. **Containerized Waste (TSU-3).** Wastes treated or stored in containers are listed in Table III-1. Container storage capacity is 15,800 gallons. For details of the container storage unit, see Chapter IV, Section B.

    b. **Waste to be Stored in Tanks**. The "less-than-90-days" waste storage capacity for tanks is 20,000 gallons. Such storage is not regulated under a Part B Permit.

    c. **Waste Piles, Landfills, Incinerators, Boiler, Furnaces and/or Land Treatment Areas**. Waste piles, landfills, incinerators, boilers, furnaces and/or land treatment areas are not used for HW treatment or disposal at this facility.

    d. **Waste to be Treated in Tanks.** Safety Bucket Water (SBW; see Table III-1, Line No. 98) is treated in tanks at TSU-8. Treatment consists of volume reduction by evaporation. Safety bucket water evaporation capacity is three (3) gallons per day, on average. For details of the operation of this tank treatment unit, see Chapter IV, Section C.4.

    e. **Waste to be treated in Miscellaneous Units**. Open-Burned/Open-Detonated (OB/OD) wastes are treated at TSU-1 and TSU-2. Waste to be burned or detonated is handled in 5 or 55-gallon containers, or in Department of Transportation containers specifically designed for the explosive HW. These wastes are listed in Table III-1. The HW treatment capacity of TSU-1 is 500 pounds gross weight per day for open burning, and 100 pounds Net Explosive Weight (NEW) per day for detonation. Materials having a propensity to mass detonate should be limited to six (6) pounds NEW per operational tube at TSU-1. The treatment capacity of TSU-2 is 300 gallons per day. See Chapter IV, Sections C.1 and C.2 for additional details.

11. Results of Chemical and Physical Analyses: An example lab testing summary (typical) is provided in Appendix 1 (Typical Analysis Reports). No documented waste data, from other than waste analysis, is included in this plan.

B. Waste Sampling Procedures

1. Methods to be Used:

The sampling methods and equipment used for sampling waste materials will vary with the form and consistency of the waste materials to be sampled. Sampling protocols listed below (as updated), are considered to be representative for the waste described (having properties similar to the indicated materials):

a. Extremely viscous liquid - ASTM Standard D140-70

b. Crushed or powdered material – ASTM Standard D346-75

c. Soil or rock-like material – ASTM Standard D420-69

d. Soil-like material - ASTM Standard D1452-65

e. Fly ash-like material – ASTM Standard D2234-76

f. Containerized liquid wastes – "*Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods, SW-846, Third Edition, 1986*" (as updated), Chapter Nine. Note: No pits, ponds, and lagoons are used for liquid HW storage at PSEMC.

2. Level of Analysis Required:

Level of analysis required will be determined on a case-by-case basis in coordination with the laboratory selected to do the analysis. See Section C (Waste Analysis Procedures), below, for a discussion of procedure and methods.

As noted above, almost all of the hazardous waste generated at PSEMC is from production processes where the constituents and concentrations are known (MSDSs, production plans, standard operating procedures, and other production guidance documents). The controls used in producing these documents, along with a system of identification and labeling of waste containers, leave few, if any, batches of waste material requiring laboratory analysis.

When wastes require analysis to determine characteristics, a sampling and analysis plan is developed which will determine whether the waste is hazardous, along with other qualities, which must be known to properly ship and/or dispose of the waste. Appendix 2, Laboratory Certifications, provides copies of the State of California Certifications for off-site labs that may be used by PSEMC.

3. Parameters for Waste Analysis:

Analysis parameters to determine characteristics of specific wastes will be analyzed using the Test Methods listed in Table III-2, included at the end of this Chapter.

4. Rationale for Choosing These Parameters:

The waste will be examined to determine what the compound is, so that its characteristics and concentration can be determined. In some cases, the analysis would be for the hazardous criteria (e.g., pH for an acid) in order to determine that it is hazardous and to indicate the neutralization treatment that would be required.

5. Sampling Procedures:

Appendix 3 (Sampling Methods, Section B, “Procedures”) describes policy and requirements for developing specific sampling plans for individual waste batches at PSEMC. A typical plan is included.

6. Protective Gear Required:

Selection of protective equipment will depend on the hazards of the waste and the site where the sample is to be taken. The sampling plan must specify the minimum protective equipment that is required. Details are provided in Appendix 3 (Sampling Methods, Section B, “Procedures”, 4, “Sampling Plan Design”, Paragraph F, “Equipment”).

7. Sampling Device:

The sampling device selection will depend on the properties of the waste and the container or location of the material to be sampled. Details are provided in Appendix 3 (Sampling Methods, Table 1, “Sampling Equipment for Particular Waste Types”).

8. EPA Approval of Test Methods:

All State-certified laboratory analysis will conducted using EPA approved methods as described in "Test Methods of Evaluating Solid Waste, SW-846”.

9. Storage Instructions:

Sample storage will be conducted in accordance with EPA approved protocols for sample handling and chain of custody documentation established in “Test Methods of Evaluating Solid Waste, SW-846”.

10. Statistically Representative Sampling Technique:

The method of obtaining a representative sample of the waste will vary with the type and quantity of material in the waste batch. A drum of liquid waste may only require mixing and extraction of one or two samples, while an analysis of a material, from a suspected waste spill onto soil, will require a detailed statistical plan to obtain representative waste concentrations (see Appendix 3, Sampling Methods, B.4.c, “Statistics”).

11. Practicality of Statistically Representative Sampling:

Barriers may be present which limit the sampling from being statistically representative. Variability of the waste generation process that is not known is possible. However, almost all of the hazardous waste generated at PSEMC is from production processes where the constituents and concentrations are well known (i.e., from MSDSs, production plans, standard operating procedures, and other production guidance documents). Due to the lack of waste variability, statistically representative sampling is usually not applicable to waste evaluation.

12. Number of Sampling Sites:

The number and locations of sampling sites, if applicable, must be shown in the sampling plan (see Appendix 3, Sampling Methods, B.4.c, “Statistics”).

13. Waste Containment Devices When Sampling:

The sampling device selection will depend on the properties of the waste, and the container or location of the material to be sampled.

a. **Sample Containers**. Glass containers are relatively inert to most chemicals and can be used to collect and store almost all hazardous waste samples, except those that contain strong alkali and hydrofluoric acid. Plastic containers of polyethylene, polypropylene, and neoprene may be used for sampled materials that do not attack the specific plastic used. Glass or teflon containers must be used for waste samples that will be analyzed for organic compounds.

b. **Container Lids and Cap Liners**. The containers must have tight, screw-type lids. Cap liners are not usually required for plastic containers. Teflon cap liners should be used with glass containers supplied with rigid plastic screw caps.

c. **Sealing of Samples**. If the samples are to be submitted for analysis of volatile compounds, the samples must be sealed in air-tight containers.

d. **Containers.** Containers for samples shall be obtained from a qualified supplier with certification of an adequate level of cleanliness for the intended purpose. Containers may also be obtained from a state-certified testing laboratory.

14. Physical State/Layers of Waste:

When developing any waste characterization sampling plan, the waste container must be checked for stratification of the waste. If the container is small, the waste may be mixed to assure that the sample is representative. If not, an adequate number of samples must be taken to assure that the entire contents of the waste container are sampled and the proportions measured. The samples must represent the makeup of the waste.

15. Precision and Accuracy of Sampling Procedures:

The PSEMC employee writing the sampling plan must be experienced with the process materials used and the waste generated. Experience and judgment must be used to evaluate the degree of sampling accuracy and precision that is required to estimate, reliably, the chemical characteristics of a solid waste. Generally, high-accuracy and high- precision are required if one or more chemical contaminants of a solid waste are present at a concentration that is close to the applicable regulatory threshold. Alternatively, relatively low-accuracy and low precision can be tolerated if the contaminants of concern occur at levels far below or far above their applicable thresholds.

16. Rationale for Sampling Strategy Selected:

There are three basic sampling strategies: simple random, stratified random and systematic random sampling (as described in Section 9.1 of Test Methods for Evaluating Solid Waste, SW-846). Systematic random sampling and authoritative sampling strategies require a substantial knowledge of the waste to ensure that:

a. A cycle or trend in waste composition does not coincide with sampling locations, or;

b. In the case of authoritative sampling, all or most of the assumptions regarding waste composition or generation are true.

Because of the variabilities of waste composition and the waste generation processes are often unknown, systematic random and authoritative sampling strategies are usually not applicable to waste evaluation. For waste sampling, the usual options are simple or stratified random sampling. Of these two strategies, simple random sampling is typically the option of choice, unless:

a. There are known distinct strata in the waste, over time or in space, or;
b. One wants to prove or disprove that there are distinct time and/or space strata in the waste of interest, or;
c. One is collecting a minimum number of samples and desires to minimize the size of the area of high concentration that could go unsampled.

If any of these three conditions exists, it may be determined that stratified random sampling would be the optimum strategy.

17. Documentation of Sampling Procedures by Non-Facility People:

Samples taken by non-PSEMC personnel are not planned at this facility. In the unlikely event such action is required, the procedures contained in this chapter will be used, under the oversight of Support Services.

C. Waste Analysis Procedures

The State-certified laboratory that is to perform the tests on waste samples submitted by PSEMC will be consulted to determine the appropriate waste analysis procedures and test methods to be used. Laboratory certification indicates qualification to select the appropriate method and procedure to assure accurate results. Only EPA test methods will be used when available and applicable. Other methods, provided by standard setting organizations and professional societies, may be used when appropriate.

D. QA/QC Procedures

1. Goals of QA/QC:

To ensure that all data, and the decisions based on these data, are technically sound, statistically valid, and properly documented. Quality control procedures are developed as the tools used to measure the degree to which these quality assurance objectives are met.

a. Intended Use and Quantity of Data to be gathered:

Quality control procedures, used to document the accuracy and precision of sampling, are provided by the state certified laboratory that performs the test and analysis. The laboratory procedures shall include the use of trip blanks, field blanks, field duplicates, and field spikes when they are appropriate to assure quality control. Internal laboratory procedures, using split samples and check samples, shall also be used.

b. Acknowledgement of the QA/QC Requirements:

Quality control requirements for specific analytical methods are given in detail in each test method in SW-846. The laboratory shall follow these requirements.

c. Performance Evaluation of Persons Who Perform Sampling or Analytical Activities for Hazardous Waste Characterization:

Laboratories performing sampling or testing services shall have internal procedures for evaluating their employees. Procedures and written records of evaluations shall be available at the laboratory for review.

d. Chain-of-Custody Procedures:

For more information on Chain-of-Custody procedures, see Appendix 3, Sampling Methods, "Sampling Identification/Field Chain-of-Custody Record." NOTE: This procedure is for use in the analysis of hazardous waste that cannot be characterized through knowledge of the generation process.

- **Labeling and Seals**. Each sample container shall be labeled with a tag or gummed label. The label shall indicate the collection site or lot, project identification, analysis required, field identification number, date and time (24 hour clock), name of collector, number of containers, and the collector's signature. Labels must be fixed to the sample container at the time of the sampling.

  Sample seals of gummed paper must be attached to the sample container in such a way that it is necessary to break it in order to open the sample container. The seal must be in place before the sample leaves the custody of the sampling person. Seals should have the place of collection, log or project identification, field identification number, name of collector, and date and time of sampling.

- **Field Logbook.** All information pertinent to a field sampling must be recorded in a logbook. This should be bound, preferably with consecutively pre-numbered pages. Entries in the logbook must include:
  i. Location of sampling point.
  ii. Name and address of the sampling person. PSEMC employees may substitute employee number or department number for address.
  iii. Location where the waste sample was taken.
  iv. Type of process that is producing waste (if known).
  v. Physical form of the waste (e.g., sludge, wastewater, etc.).
  vi. Suspected waste composition, including concentrations.
  vii. Number and volume of samples taken.
  viii. Purpose of sampling.
  ix. Description of sampling point and sampling methodology
  x. Date and time of collection.
  xi. Collector's Sample Identification Number.
  xii. Sample distribution and how transported to lab.
  xiii. References, such as sketches or photos of the sampling site.
  xiv. Field observations.
  xv. Any field measurements made on the waste.
  xvi. Signatures of person(s) responsible for observations.

- **Receipt and Logging of Samples by Lab Personnel**. The State-certified testing laboratory shall use appropriate procedures and forms to assure identification and control of samples being submitted by PSEMC. PSEMC Chain-of-Custody Form 1588 has a designated space for laboratory information.

- **Chain-of-Custody Records**. The original Chain-of-Custody Form (PSEMC Form 1588) generated by PSEMC, shall be submitted to the lab with the samples after making a copy for the plant records. The internal lab sample number shall be written on the form to assure identification of the samples that are internal to the lab. PSEMC Form 1588 includes all information required to request appropriate sample analysis. A separate form is not used for that purpose. The first line of each sample block relates to the identity of the sample and required field information. This portion shall be completed in the field as a part of sampling activity. The second line of each sample block relates to the material and analysis method requested for each sample. This portion of the form may be completed before, during, or after sampling.

  The form, along with the sample label, shall be easily related to the Sampling Log Book through the Sample Identification Number. The records shall be completed at the appropriate time, and retained by Support Services for three years.

- **Method of Containment and Preservation**. Glass containers are relatively inert to most chemicals and can be used to collect and store almost all hazardous waste samples, except those that contain strong alkali and hydrofluoric acid. Plastic containers of polyethylene, polypropylene, and neoprene may be used for sampled materials that do not attack the specific plastic used. Glass or Teflon containers must be used for waste samples that will be analyzed for organic compounds.

  The containers must have tight, screw-type lids. Cap liners are not usually required for plastic containers. Teflon cap liners should be used with glass containers that are supplied with rigid plastic screw caps.

  If the samples are to be submitted for analysis of volatile compounds, the samples must be sealed in air-tight containers and refrigerated.

  Consult the State-certified testing laboratory for direction on the proper sample container and method of preservation when assistance is needed. The laboratory will check the specific test method for sample preservation instructions.

- **Confirmation Sheet of Sample Delivery**. In cases where a PSEMC employee personally delivers a sample to the State-certified testing laboratory, the laboratory person shall sign the "Laboratory Section" of the Sampling Analysis Request, and provide a copy for return to Support Services.

  When a courier service is used, suitable, specific receipts shall be maintained and provided to PSEMC, which verifies that the samples were delivered to the lab and who at the lab accepted the delivery.

e. **Laboratory Aspects of Chain-of-Custody:**

- **Documentation**. The laboratory shall have in use chain-of-custody procedures, with the minimum information required in the PSEMC form. The laboratory shall record, at the least, the name of the person receiving the sample, Laboratory Sample Number, date and time of sample receipt, and the analyses to be performed. Laboratory records shall provide complete chain-of- custody information from receipt of the samples, through completion of testing and analysis.

- **Numbering and Documenting Path of Samples through Laboratory**. Incoming samples will carry the PSEMC identification numbers. The lab- oratory should assign its own identification numbers and mark the sample containers with this number. The sample information is to be copied from the Sample Analysis Request Sheet on to the laboratory routing sheets. The Laboratory Technician, who receives the sample for analysis, should record in the Laboratory Notebook the identifying information about the sample, the date of receipt, and other pertinent information. The technician and the supervisor are responsible for the care and custody of the sample, and its related chain- of-custody records.

- **Destiny of Remaining Sample after Analysis**. The remainder of samples may be returned to PSEMC for disposal with the batch of waste. The laboratory may dispose of the unused portion of the sample, if they prefer, and can do so within all applicable regulations.

- **Documentation and Forwarding of Test Results to Manager for Filing**. The State-certified testing laboratory must provide a copy of the sample test results, with certification from authorized lab personnel, to the designated PSEMC manager.

f. **Documentation that Lab Equipment is Inspected, Maintained, and Serviced Periodically:**

PSEMC shall only use state-certified laboratories for analysis of waste. Laboratory procedures and activities, required to obtain and maintain certification, must be carried out, including equipment maintenance and servicing.

g. Frequency at which Waste Analysis will be Repeated or Reviewed:

Mixed waste streams shall be tested as often as necessary to assure proper characterization and management of the waste stream. Additionally, any time the generating process changes, the need for testing shall be reviewed. This procedure is seldom required because most PSEMC waste streams are process and product specific. Constituents are well documented in production documents and process literature.

h. Methods Used for Insuring Compatibility of Wastes with Handling Methods:

Before new processes and/or ingredients are put into use, Support Services and the Program Manager (or department manager of the producing department) jointly resolve waste handling issues that may arise, including the cost of HW treatment and/or disposal. Support Services designates the container that may be safely used to handle the wastes. Cleanup methods shall also be defined to assure incompatible materials will not be mixed [see Chapter VI (Management Practices), Section B (Control of HW, for details].

i. Waste Analysis Plan Reviews:

The Manager, Support Services, shall annually review the waste analysis plan for adequacy. Revisions shall be made when necessary, and communicated to technicians and others who carry out the plan. A record of the annual review shall be kept in the Operating Record.

E. Wastes From Outside the Facility

PSEMC does not accept wastes from off-site generators.

F. Waste Analysis Requirements Pertaining to Land Disposal Restrictions

1. Waste Characterization:

a. Solvent Wastes and Dioxin Containing Wastes. Spent solvent wastes identified as EPA Hazardous Waste Numbers: F001, F002, F003, F004, F005, F020, F021, F022, F023, F026, F027, and F028 are prohibited from land disposal (See CCR Title 22, Section 66268.31), with few exceptions. PSEMC wastes that may contain these materials shall be sampled, tested, and a content determination made, if it is not already known from production documents and literature.

b. Non-RCRA, California Wastes. Metal containing aqueous wastes, listed in CCR Title 22, Section 66261.24), in concentrations over the listed Soluble Threshold Limit Concentration, are prohibited from land disposal (CCR Title 22, Section 66269.29). Wastes containing PCBs are prohibited from land disposal. Wastes that may contain these materials shall be sampled and tested to determine if the waste is restricted from land disposal, if not already known from existing documentation.

c. Notification and Certification Requirements:

- **i. File Retention**. Support Services shall retain, on-site, a file of all notices, certifications, demonstrations, waste analysis data, and other documentation produced regarding restricted wastes. All documents shall be retained for at least five years from the date that the waste was sent to on-site or off-site treatment, storage, or disposal. Additionally, records shall be retained during the course of any unresolved enforcement action by a regulator.
- **ii. Notification of Need for Further Management**. If PSEMC determines that a generated waste is restricted waste, and in addition does not meet the applicable treatment standards of CCR Title

22, Sections 66268.40 ff, PSEMC shall notify the treatment facility, in writing, of appropriate treatment standards set forth in the above sections, with each shipment of the said waste. The notice shall include the following information:

- EPA Hazardous Waste Number or California Waste Code, and non-RCRA hazardous waste listed in CCR Title 22, Section 66268.29;
- The corresponding treatment standard;
- The manifest number associated with the shipment of waste, and;
- Waste analysis data, where available.

2. Notification for Wastes Not Subject to California List Prohibitions.

If PSEMC determines that a generated waste is a restricted waste, and determines that the waste can be land disposed without further treatment, PSEMC shall submit to the treatment, storage, or land disposal facility, with each shipment of waste, a notice and certification stating that the waste meets the applicable treatment standards. The notice shall include:

- EPA Hazardous Waste Number or California Waste Code, and non-RCRA hazardous waste listed in CCR Title 22, 66268.29;
- The corresponding treatment standard;
- The manifest number associated with the shipment of waste; and
- Waste analysis data, where available.

a. Additional Notification and Certification Requirements for Treatment Facilities. For residues of restricted wastes that are treated at PSEMC facilities (which constitute a hazardous waste that must be disposed of by off-site land disposal), the waste residue must be tested as follows:

i. For wastes with treatment standards expressed as concentrations in the waste extract (CCR Title 22, Section 66268.40ff), test the treatment residues, or an extract of such residues developed: 1) using the test method described in Appendix I of CCR Title 22, Section 66268.40 for RCRA hazardous waste, or 2) using the Waste Extraction.

ii. Test (WET) for non-RCRA hazardous waste to assure that the treatment residues or extract meet the applicable treatment standards.

iii. For wastes with treatment standards expressed as concentrations in the waste, test the treatment residues to assure that the treatment residues meet the applicable treatment standards.

iv. A notice shall be sent with each waste shipment to the land disposal facility which includes the following information:

v. EPA Hazardous Waste Number or California Waste Code, and non-RCRA hazardous waste listed in CCR Title 22, Section 66268.29;

vi. The corresponding treatment standard;

vii. The manifest number associated with the shipment of waste, and;

viii. Waste analysis data, where available.

ix. The treatment facility shall submit a certification with each shipment of waste, or treatment residue of a restricted waste, to the land disposal facility stating that the waste or treatment residue has been treated in compliance with the applicable treatment standards (See CCR Title 22, Section 66268.40 ff).

b. Land Disposal Restriction. The hazardous wastes, restricted from land disposal, may only be accumulated at PSEMC for the purpose of attaining a quantity that is necessary to facilitate proper recovery, treatment, or disposal. In no case may the storage be more than one year.

G. Waste Analysis Requirements for Wastes to be Incinerated

PSEMC does not treat waste by incineration.

H. Additional Requirements for Ignitable, Reactive, or Incompatible Wastes

PSEMC will take necessary precautions to prevent accidental ignition or reaction of ignitable or reactive waste. This waste will be separated and protected from sources of ignition or reaction including open flames, smoking, cutting, welding and all other potential sources listed in CCR Title 22, Section 66264.17. Any such precautions will be documented by PSEMC.

I. Waste Compatibility

As described in Chapter IV (Hazardous Waste Facility Design), to the maximum extent possible, HW is managed in DOT approved containers designed to hold the hazardous constituents of the waste, generally in a container that raw component of the HW was received. Waste types are segregated by TSU-3 Bays A through D to prevent potential reactions between incompatible wastes in the event of a spill.

As described in Section A (Hazardous Wasted Analysis Plan, above, almost all of the hazardous wastes generated at PSEMC are from production processes where the constituents and concentrations are known. Information comes from material safety data sheets (MSDSs), production plans, standard operating procedures, and other production guidance documents. Tables III-1 and Table III-2, included at the end of this chapter identify each HW anticipated to be stored or treated and the analysis parameters used to determine characteristics of specific wastes.

Chapter III Table

Hazardous Waste in Containers

Table III-1.
Hazardous Waste Stored in Containers

Part A XIV Line No.	EPA Waste Code	Calif. Waste Code	Description of Waste and Physical State	Waste Source	Annual Quantity (lbs)	Storage Location	Onsite treatment	Container Selection (Table IV-1)	Hazard Class
1	D001 D003 F003 U002	212 214 343	Acetone cont. various explosives (L)	Manufacturing of chemicals/ explosives	2600	TSU-3, Bay D	TSU-2 TSU-1	Line 1	Reactive, Toxic, Ignitable
2	D001 D003 F003 F005 U003	212 343	Acetonitrile cont. various explosives (L)	Manufacturing of chemicals/ explosives	2000	TSU-3, Bay D	TSU-2 TSU-1	Line 1	Reactive, Toxic, Ignitable
3	D001 F003 U031	212	N-butyl alcohol (L)	Chemical & Ordnance Mft.	2000	TSU-3, Bay D	N/A	Line 2	Toxic, Ignitable, Irritant
4	D022 U044	211 741	Chloroform (L)	Chemical maunfacturing	5000	TSU-3, Bay B	N/A	Line 3	Toxic
5	D001 U056	213	Cyclohexane (L)	Chemical & Ordnance Mft.	2000	TSU-3, Bay D	N/A	Line 1	Toxic, Ignitable
6	D003	213	Dinitrotoluene (S)	Chemical & Ordnance Mft.	2000	Magazine storage under 90 days/TSU-3 after treatment	TSU-1	Line 6	Reactive, Toxic, Ignitable
7	D001 D003 F003 U154	212 343	Methanol/ Methanol cont. various explosives (L)	Chemical & Ordnance Mft.	6300	TSU-3, Bay D	TSU-2 TSU-1	Line 1	Reactive, Toxic, Ignitable
8	D035 F005 U159	212	Methyl ethyl ketone (L)	Chemical & Ordnance Mft.	2000	TSU-3, Bay D	N/A	Line 1	Toxic, Ignitable
9	D003 U160	214	MEK peroxide (L)	Ordnance Manufacturing	400	Magazine storage under 90 days/TSU-3 after treatment	TSU-1	Line 4	Reactive, Toxic
10	F003 U161	212	Methyl iso-butylketone (L)	Chemical & Ordnance Mft.	2000	TSU-3, Bay D	N/A	Line 1	Toxic, Ignitable
11	D003 F001 U213	214	Tetrahydro-furan (L)	Chemical & Ordnance Mft.	3300	TSU-3, Bay D	TSU-2	Line 1	Toxic, Ignitable, Irritant
12	D001 F005	213	Toluene (L)	Chemical & Ordnance Mft.	4000	TSU-3, Bay D	N/A	Line 1	Toxic, Ignitable
13	D003 U234	213	1,3,5 Trinitro-benzene (S)	Ordnance Manufacturing	2000	Magazine storage under 90 days/TSU-3 after treatment	TSU-1	Line 4	Reactive, Toxic

Table III-1.
Hazardous Waste Stored in Containers

Part A XIV Line No.	EPA Waste Code	Calif. Waste Code	Description of Waste and Physical State	Waste Source	Annual Quantity (lbs)	Storage Location / Onsite treatment	Container Selection (Table IV-1)	Hazard Class
29	D001 D003 D005 D007 D008 F003	213 343	N-Butyl acetate (L)	Chemical & Ordnance Mft.	2000	TSU-3, Bay D TSU-2 TSU-1	Line 1	Reactive, Toxic, Ignitable
30	D001	213	Cycloheptane (L)	Chemical & Ordnance Mft.	5200	TSU-3, Bay D N/A	Line 1	Ignitable
31	D001 D003	213 214	Ethyl alcohol (L)	Chemical & Ordnance Mft.	5200	TSU-3, Bay D TSU-2	Line 3	Ignitable, Reactive
32	D001	213 221	Petroleum Hydrocarbon (L)	Chemical & Ordnance Mft.	5200	TSU-3, Bay D N/A	Line 10	Ignitable
33	Not listed	343	Polyoxyalkylene (L)	Air Compressor	5200	TSU-3, Bay D N/A	Line 10	Ignitable
34	D001 D035 F003 F005	212 213	Axarel, acetone (L)	Parts cleaning	5200	TSU-3, Bay D N/A	Line 1	Toxic, Ignitable
35	D001	213 343	Sedlsperse (L)	Parts cleaning	5200	TSU-3, Bay D N/A	Line 1	Ignitable
36	D001	213 343	Off spec. diesel (L)	Contaminated with water	5200	TSU-3, Bay D N/A	Line 1	Ignitable
37	D001 D008	213	Heptane/grease (L)	Tube cleaning	5200	TSU-3, Bay D N/A	Line 1	Ignitable
38	D001 D008	213 214	n-Heptane (L)	Chemical & Ordnance Mft.	6000	TSU-3, Bay D N/A	Line 10	Ignitable
39	D001 D003	213	Isopropanol (L)	Chemical & Ordnance Mft.	5200	TSU-3, Bay D TSU-2	Line 10	Ignitable, Reactive
40	D001	213	n-Propyl Alcohol (L)	Chemical & Ordnance Mft.	5200	TSU-3, Bay D N/A	Line 10	Ignitable
41	D001	213	Paint/varnish remover (L)	Chemical & Ordnance Mft.	5200	TSU-3, Bay D N/A	Line 10	Ignitable
42	D001 D006 D007 D008 D035 F003 F005	213 343 352 461	Paint/Thinners (L) (S)	Painting operations	5200	TSU-3, Bay D N/A	Line 11	Ignitable, Toxic

Table III-1.
Hazardous Waste Stored in Containers

Part A XIV Line No.	EPA Waste Code	Calif. Waste Code	Description of Waste and Physical State	Waste Source	Annual Quantity (lbs)	Storage Location / Onsite treatment	Container Selection (Table IV-1)	Hazard Class
60	D002	122	Potassium hydroxide (S)	Chemical & Ordnance Mft.	50000	TSU-3, Bay A / N/A	Line 1	Corrosive
61	D002	122	Sodium hydroxide lye (S)	Chemical & Ordnance Mft.	50000	TSU-3, Bay A / N/A	Line 20	Corrosive
62	D002	122	Potassium carbonate (S)	Chemical & Ordnance Mft.	50000	TSU-3, Bay A / N/A	Line 1	Corrosive
63	D002	122	Sodium carbonate (S)	Explosives & Ordnance mft.	50000	TSU-3, Bay A / N/A	Line 1	Corrosive
64	D002	791**	Sulfuric acid (L)	Explosives & Ordnance mft.	50000	TSU-3, Bay C / N/A	Line 21	Corrosive
65	D002	791**	Acid and water (L)	Explosives & Ordnance mft.	50000	TSU-3, Bay C / N/A	Line 21	Corrosive
66	D002	122 791**	Alkaline/caustic (L) (S)	Explosives & Ordnance mft.	50000	TSU-3, Bay A / N/A	Line 22	Corrosive
67	D002	122 791**	Alkaline/ caustic (L) (S)	Off specification chemicals	50000	TSU-3, Bay A / N/A	Line 22	Corrosive
68	D002	791**	Spent acid (L)	Off specification chemicals	50000	TSU-3, Bay C / N/A	Line 22	Corrosive
69	D001 D007	343 792	Spent acid (L)	Metal etching	50000	TSU-3, Bay C / N/A	Line 22	Corrosive
70	D002 D009	792	Cont. mercury (L) (S)	Cleaning of equipment	500	TSU-3, Bay A / N/A	Line 22	Corrosive, Toxic
71	D002	122	Spent caustic (L) (S)	Cleaning of equipment	50000	TSU-3, Bay A / N/A	Line 23	Corrosive
72	D003	352	Obsolete or retrograde explosives (S)	Explosives & Ordnance mft.	5000	Magazine storage under 90 days/TSU-3 after treatment / TSU-1	Line 24	Reactive (Explosive)
73	D003	352	Benzoyl peroxide (S)	Explosives & Ordnance mft.	5000	Magazine storage under 90 days/TSU-3 after treatment / TSU-1	Line 25	Reactive (Explosive)
74	D003	352	Nitrocellulose/ guncotton (S)	Explosives & Ordnance mft.	5000	Magazine storage under 90 days/TSU-3 after treatment / TSU-1	Line 24	Reactive (Explosive)
75	D003	352 791**	Picric acid (L)	Explosives & Ordnance mft.	5000	Magazine storage under 90 days/TSU-3 after treatment / TSU-1	Line 26	Reactive (Explosive)
76	D003 D008 D011	352	Retrograde/ obsolete ordnance (S)	Explosives & Ordnance mft.	5000	Magazine storage under 90 days/TSU-3 after treatment / TSU-1	Line 24	Reactive (Explosive)

Table III-1.
Hazardous Waste Stored in Containers

Part A XIV Line No.	EPA Waste Code	Calif. Waste Code	Description of Waste and Physical State	Waste Source	Annual Quantity (lbs)	Storage Location / Onsite treatment	Container Selection (Table IV-1)	Hazard Class
94	D003	352	Cellulose cont. with various explosives (S)	Manufacture of ordnance	4000	Accumulation only / TSU-1	N/A	Reactive
95	D003	343	Water contam. with explosives (L)	Manufacture of explosives manufacturing	5000	TSU-3, Bay D / TSU-2	Line 1	Reactive
96	D003	343	And traces of pyridine, acetone, methanol, acetonitrile, and butyl acetate (L)	Manufacture of explosives	5000	TSU-3, Bay D / TSU-2 TSU-1	Line 1	Reactive
97	D003	343	"Safety Bucket Water" water contaminated with explosives (L)	Manufacture of explosives	8000	TSU-3, Bay D / TSU-8 TSU-1	Line 1	Reactive
98	D003	343	"Safety Bucket Water" (water contaminated with explosives) residue (S)	Treatment at TSU-8	800	TSU-3, Bay D / TSU-1	Line 1	Reactive
99	D008 D011	172 181	Ash and residue from treatment at TSU-1 (S)	Treatment at TSU-1	2000	TSU-3, Bay A or B / N/A	Line 1	Toxic
100	D003	172 181 213 214 343 352	Ash and residue from treatment at TSU-2 (L) & (S)	Treatment at TSU-2	500	TSU-3, Bay D / TSU-1	Line 1	Reactive, Ignitable

Legend:
(L) Liquid
(S) Solid
* Stored in magazines
** CA Restricted Waste

Note 1: Annual quantities are estimates of maximum annual quantity of a particular waste. Wastes generated in a particular year vary according to manufacturing contracts awarded to MSI, and cannot be predicted in advance. In a particular year, wastes generated would be several of the listed wastes, not all the wastes listed. Annual quantity of all wastes is significantly less than the sum of waste quantities in this Table.

Note 2: Storage location includes identification of Bays 1 through 4 at TSU-3

Note 3: N/A--Not applicable (no on-site treatment performed; shipped off-site for treatment and/or disposal).

Table III-2.
Wastes Stored in Containers - Waste Analysis Parameters

Waste	Analysis Parameter	Test Method
Acetone	Acetone	8260 GC/MS
Acetonitrile	Acetonitrile	8260 GC/MS
Aluminum Powder	Aluminum Powder	6020 (ICP/MS)
Barium Compounds, including: Barium Nitrate, Barium Oxide, and Barium Monoxide	Barium	6020 (ICP/MS)
Barium Chromate	Barium Chromium	6020 (ICP/MS)
Borane Powder	Boron	6020 (ICP/MS)
Cadmium Compounds	Cadmium	3010/7130 ICP, 6010, 7131 ICP
Chloroform	Chloroform	8260 GC/MS
Chlorinated Hydrocarbon	Chlorinated Hydrocarbon	8260 GC/MS
Dinitrotoluene	Dinitrotoluene	8270 GC/MS
Ignitable Materials, including: Dimethyl Formamide, Methanol, N-Butyl Alcohol, Cyclohexane, Methyl Isobutyl Ketone, Gasoline, Tetrahydrofuran, Cycloheptane, N-Butyl Acetate, Ethyl Alcohol, N-Heptane, Pyradine, Isopropanol, N-Propyl Alcohol, Paint Thinner, Paint/Varnish Remover, and Paints/Adhesive	Ignitability	1010 Pensky/Martens
Titanium Powder	Ignitability	None Listed
Zirconium Powder	Ignitability	None Listed
Corrosive Materials (acids): Acetic Acid, Phosphoric Acid, Ammonium Peracetic Acid, Nitric Acid, and Sulfuric Acid, Spent Acid, and Acid and Water	Corrosivity	pH Meter
Corrosive Materials (bases): Potassium Hydroxide, Sodium-Hydroxide/lye, Potassium Carbonate, Sodium Carbonate, Spent Caustic, Alkaline/Caustic Liquid	Corrosivity	pH Meter
Lead Compounds	Lead	6020/6010 (ICP)
Magnesium Powder	Magnesium Powder	6020/6010 (ICP)
Manganese Powder	Manganese Powder	6020/6010 (ICP)
Methyl Ethyl Ketone, MEK Peroxide	Methyl Ethyl Ketone	8260 GC/MS
Molybdenum Trioxide	Molybdenum Reactivity	7480, 7481 AA None Listed
Potassium Nitrate	Potassium Reactivity	7610 AA None Listed
Reactive Materials, including: 1,3,5 Trinitrobenzene, and Trinitrotoluene	Reactivity	8270 GC/MS
Reactive Materials including: Ammonium Perchlorate, Guanidine Nitrate, Hydrogen Peroxide Potassium Perchlorate, and Potassuim Chlorate	Reactivity	None Listed
Sodium Nitrate	Sodium Reactivity	7770 AA None Listed
Silver Compounds	Silver	6010, 7760 ICP
Toluene	Toluene	8260 GC/MS
1,1,1 Trichlorethelene	1,1,1 Trichlorethelene	8260 GC/MS
Xylene	Xylene	8260 GC/MS

Note: Test methods were compiled using information received from Toxscan Analytical Laboratory and the manual "Test Methods of Evaluating Solid Waste, SW-846.

Chapter IV - HW Facility Design

The PSEMC HW facility currently includes four (4), active and permitted HW treatment or storage units, which include:

1. **TSU-1:** TSU-1 is an open air burning and detonation unit (storage and treatment code X01) used to dispose of ordnance parts, scrap and explosive raw materials. The maximum hazardous waste (HW) treatment capacity of TSU-1 is 500 pounds gross weight per day for open burning, and 100 pounds Net Explosive Weight (NEW) per day for detonation.
    - Note: A part of TSU-1 (“TSU-1a”), a pit for detonation of solid reactive waste, was closed in June 2000. Remaining treatment activities at TSU-1 are limited to open burning.

    The RCRA Part B permit limits the amount of explosive (reactive) material that can be burned at TSU-1 on a single day to 125 pounds, and the total explosive material that can be burned at TSU-1 over an entire year to 4,700 pounds. Between 2010 and 2014, PSEMC treated between 0.15 and 110 pounds of explosive materials per burn event; the median amount of net explosives treated was approximately 8 pounds. On an annual basis, the total amount of net explosives treated ranges from approximately 730 to 1,080 pounds during this time period (Appendix A). These data illustrate the relatively small amounts of explosives currently treated at TSU-1 as compared to the proposed permit limits.
2. **TSU-2**: TSU-2 is an open-air burning unit (X01) that disposes of solvents used in making explosives that have become contaminated with explosive materials. The maximum treatment capacity of TSU-2 is 300 gallons per day. Between 2010 and 2014, PSEMC treated between approximately 4 and 150 gallons of solvent waste per burn event; the median amount of solvent waste treated was approximately 70 gallons. The total number of burns at TSU-2 ranged from one to five per year, resulting in a total of 14 burns over the five years, which illustrates the relatively small amounts of solvent waste treated at TSU-2 as compared to the proposed permit limits.
3. **TSU-3:** TSU-3 is a roofed, 4 bay storage unit that holds the containers of hazardous waste created at the facility (S01).
    - Note: TSU-3’s Bay D (active) also houses the treatment of two-part epoxy compounds (mixing within containers);
4. **TSU-8:** TSU-8 is a volume reduction unit (T01) that evaporates the water used to collect hazardous waste in order to concentrate it.

These units are further described herein. Storage and treatment codes (X01, S01, T04, etc.) are provided for each unit. Processes include container storage; treatment units for open burning of reactive (explosive) material; and volume reduction of explosive contaminated water. No HW management units involve the processes of separation, distillation, fractionation, thin film evaporation, solvent extraction, or air or steam stripping as listed in CCR Title 22, Section 66264.1030(b). Rules for process vents emission contained in that regulation are therefore not applicable to this plan.

Six (6), previously permitted hazardous waste treatment and storage units have been closed at the PSEMC facility since 1992. Those units and the dates closed are identified below:

1. TSU-4 (DTSC-certified closed, July 2003): three aboveground hazardous waste storage tanks;

2. TSU-5 (DTSC-certified closed, April 1992); three aboveground hazardous waste storage tanks
3. TSU-6 (DTSC-certified closed, October 2000), a silver recovery reactor;
4. TSU-7 (DTSC-certified closed, October 2001), a water evaporation unit;
5. TSU-9 (DTSC-certified closed, July 2003): treatment reactor; and
6. TSU-10 (*unregulated,* as of January 1999): a waste photographic silver recovery unit;

These six former storage/treatment units are not included within the discussions of permitted facilities herein.

A. Containers for HW Storage (S01)

1. Storage Container and HW Compatibility:

TSU-3 is the HW Container Storage Unit for the PSEMC facility. To the maximum extent possible, HW is managed in DOT approved containers in which the raw material constituting the hazardous component of the HW was received. For example, HW acetone contaminated with explosives would be stored in a container in which acetone was received as a raw material. This procedure insures compatibility of the container with the HW and with the former contents of the container, and reduces HW generation from container cleaning and contaminated empty containers to a very infrequent occurrence. When compatible raw material containers are not available, new, cleaned, or reconditioned DOT specification containers are used. For HW with hazard concentrations below hazard classification threshold, containers appropriate to the mixture's raw martial(s) are used. Container selections were developed by assessing the known hazard characteristic(s) of the expected HW streams and compatibilities against DOT container specifications. Where a specific HW is not listed in 49 CFR, container specifications for similar materials, or those of the same chemical family or hazard characteristic(s), were also considered. For explosive HW, Department of Defense Contractor's Safety Manual for Ammunition and Explosives (4145.26M), and Department of Treasury, Bureau of Alcohol, Tobacco, and Firearms Manual ATF: Explosive Law and Regulations (ATF P 5400.7), as well as PSEMC explosives safety procedures and policy for manufacturing operations, are also considered in selecting containers.

2. Description of Containers Used to Store HW:

Table IV-1 (Container Selection), at the end of this Chapter describes containers to be stored by their DOT designation and generic description, and designates which containers are authorized for each HW listed in Table III-1 (HW Stored in Containers). As listed on the table, HW storage containers used on-site are either 55- or 30-gallons in size, and characterized as 1A1, 1A2, 1H1, 6HA2 and 6HG2. The container size and type varies depending on the contents. Section B of this Chapter describes the labels used on HW containers, the tests for free liquids in HW, and storage of HW having no free liquid.

3. Polychlorinated Biphenyls Container Storage:

No container storage of polychlorinated biphenyls is planned at this facility.

4. Management Practices for HW in Containers:

Production materials, which have reached the end of their shelf life, or are obsolete, are forwarded to Support Services for redistribution to other Company users, marketing, or accumulation as HW for treatment/disposal. Each production material is evaluated to determine the item's hazardous characteristic(s), quantity, and recovery potential. Containerized HW will be kept closed and not handled in a manner that could cause them to rupture or leak. Hazardous raw materials, intermediates, and products may also be stored with compatible HW.

5. Air Emission Standards.

Air pollutant emissions from containers are controlled by keeping the containers closed, except when material is added or removed from the container. The PSEMC facility maintains an air permit from the Monterey Bay Unified Air Pollution Control District for open-air waste solvent burning of its volatile organic waste chemicals at a separate treatment unit (TSU-8).

B. TSU-3; Storage of HW in Containers (S01)

1. Secondary Containment:

The HW Container Storage Unit, TSU-3, provides secondary containment for HW containers stored at the PSEMC facility and is located in the central portion of the Facility, southeast of Lake Teledyne (see plan view map and aerial, Figures II-3 and II-4). Both hazardous materials and HW may be stored in this unit at any given time. The facility is graphically described in Figures IV-1 through IV-4. The facility has physical space for a maximum of 768 palletized, 55-gallon drums; four on each pallet stacked two pallets high. This still allows for the required aisle width of 30 inches, which creates unobstructed access for firefighting and container removal equipment. It should be noted that drums are not always a) 55 gallon drums, b) stored on pallets, or c) stacked two high. Note: Figure IV-4 shows a steel tank on support legs in Bay D of TSU-3. This aboveground tank was for temporary storage of diesel fuel (not hazardous waste) and is no longer located in TSU-3.

Liquid storage limits are set to allow collection of the portion of a 25-year storm, which may fall within the unit, plus ten percent of the liquid stored in the unit. The authority used for the 25-year storm rainfall of 5 inches was generated from the Rainfall Frequency Atlas of the U. S., by David M. Hershfield. An assumption that rain falls at a 45-degree angle is used. Limits are based on the volume of the sump for each bay, less the 25-year storm rainfall (Appendix 5 contains the details for the calculated volume). Table IV-2 below shows the TSU-3 storage volumes by bay.

Table IV-2. <u>TSU-3 Storage Volumes</u> (in gallons)

Bay#	Sump Total	Rainfall Total	10% of Allowable Liquid	Allowable Liquid Total
A	1,077	663	414	4,140
B	1,025	660	365	3,650
C	1,025	692	333	3,330
D	1,077	767	310	3,100
Totals:	4,204	2,782	1,422	14,220

2. Run-on and Infiltration:

Facility construction prevents run-on or infiltration. The facility is fully covered by a roofed building with open sides. It is surrounded on three sides by a concrete block berm, and hazardous waste containers are stored on pallets. The eaves of the building are guttered, and collected water is directed away from the storage area. Earth surfaces outside the unit are sloped away and the floor of the unit is from 12 to 20 inches above natural grade on three sides. All storage bays are graded to the front of the facility. The front of the facility is protected by individual grated sumps which prevent run-on and collect the limited amount of rain which may blow into the storage area. There are no un-repaired cracks or gaps in the floor or surrounding interior berms. Containers in the unit are separated from native soils by both the concrete floor and pallets under the containers. TSU-3 specification drawings and a photo are included at the end of this chapter as Figures IV-1 through IV-4.

3. Loading and Unloading:

The loading/unloading area, located at the east end of the facility, is a concrete drive, graded to the northeast corner where a drain collects runoff. The drain depression will hold in excess of 55 gallons, and is plugged to isolate it from the storm drain during loading and unloading of HW. The largest container loaded/unloaded is a 55-gallon drum.

4. Ancillary Equipment:

The unit is equipped with two installed eye wash/safety showers. There is a fire hydrant at the unit which furnishes an unlimited supply of water for spill cleanup (see Section VI.B for a description of the fire protection water system, and fire extinguishers and other portable ancillary equipment.)

5. Engineering Certification:

Appendix 5 contains an engineering certification that the design and construction of the container storage area, appurtenant structures, and containers are suitable for their intended use.

6. Operational Procedures for Containers and Container Storage of HW:

a. Facility Procedures for HW generation management and HW container storage combine to insure satisfactory HW characterization, container/liner condition, compatibility and container closure. Tables III-1 and IV-1, and Section A of this chapter, are used for pre-generation coordination between Support Services and generators to identify an approved container, and to insure that a correct HW label is applied to the container before HW accumulation starts (an example of the HW label is included as Attachment IV-1). DOT-approved transportation containers are used for accumulation of HW when possible or practical, usually as the container in which the main constituent to the HW was received as raw material. In other cases, the container is furnished by Support Services. Control of HW containers, their condition, compatibility, and closure is exercised by Support Services at the generation point.

When generators have accumulated HW for management, a HW Notice (Attachment IV-2) is forwarded to Support Services. An environmental technician goes to the generation site and determines the characteristics of the HW from generator records, manufacturer's information, and/or MSDS. If the material cannot be adequately identified using these sources, it is sampled for off-site analysis, as described in Chapter III (Waste Analysis Plan). The container must be in good condition, be securely closed, and be compatible with the HW. A container for liquid HW must also have at least two inches of headspace to prevent leakage or rupture due to heat expansion. Finally, it must be properly labeled. If the container is not satisfactory in any respect, or the HW is not adequately characterized for safe storage, the generator is informed of the specific deficiency, and the HW is not accepted for storage until all deficiencies are corrected by the generating activity (or Support Services, if off-site analysis is required). The HW (and its former container, if transfer was required) is then accepted, assigned a compatibility group, and transported to the container storage area.

Each bay of the unit is closed by a locked chain barrier. PSEMC policy forbids unauthorized persons from entering any locked/posted area, and imposes severe penalties, including expulsion from the site or termination of employment, for such violations. Only the trained Environmental Technicians or supervision are authorized to place HW in containers in the storage bay. This procedure prevents the introduction of HW in poor containers into the storage activity, and insures HW/container/storage bay compatibility.

b. Because waste streams are generated on a job lot basis, free liquid characteristics are known from production documentation. TSU-3 is constructed for storage of liquid HW, and the container selection procedure in Section A, above, will insure selection of an appropriate container for each waste. Testing for free liquid is not likely to be required. If required, Method 9095, Test Methods for Evaluating Solid Waste, Volume 1C: Laboratory Manual, Physical/Methods, USEPA, Nov 1986, as updated/modified, shall be used. This document is available to the Environmental Technicians.

c. TSU-3 is divided into four bays, each separated by a berm. Each bay is separated from each other by reinforced concrete dikes, which are bolted and epoxy bonded to the coated concrete floor of the bay.

The storage capacity of each bay is posted at the entry of the bay, and limits the combined storage of liquid HW and stock chemicals to the posted amount. An electronic record of the TSU-3 inventory is updated any time that a container is added or removed from any storage bay of the facility. This record insures accurate tractability of all TSU-3 drum storage transactions. The storage bays are designated for container storage of both HW and stock chemicals by compatibility groups as follows:

i. Bay “A” is used to store caustics, cyanides, sulfides, and aqueous solutions with pH of 5 to 9. The inside dimension of Bay A is 17 feet, 3 inches wide by 59 feet, 3 inches long and the volume of the sump is 1,077 gallons. The maximum quantity of liquid wastes and wastes containing free liquids for Bay A is 4,140 gallons (or 75, 55-gallon drums).

ii. Bay “B” is used to store halogenated hydrocarbons, non-flammable liquids (flash point > 200^{o}F), oxidizers, and aqueous solutions, pH of 5 to 9. The inside dimension of Bay B is 16 feet, 6 inches wide by 59 feet, 3 inches long, the volume of the sump is 1,025 gallons. The maximum quantity of liquid wastes and wastes containing free liquids for Bay A is 3,650 gallons (or 66, 55-gallon drums).

iii. Bay “C” is used to store acids. The inside dimension of Bay C is 16 feet, 6 inches wide by 59 feet, 3 inches long and the volume of the sump is 1,025 gallons. The maximum quantity of liquid wastes and wastes containing free liquids for Bay A is 3,330 gallons (or 60, 55-gallon drums).

iv. Bay “D” is used to store flammable liquids (flash point < 100^{o}F), reducing agents, metal catalysts, carbon, fuels, and combustible liquids (flash point 100°F to 200°F). The inside dimension of Bay D is 17 feet, 3 inches wide by 59 feet, 3 inches long and the volume of the sump is 1,077 gallons. The maximum quantity of liquid wastes and wastes containing free liquids for Bay A is 3,100 gallons (or 56, 55-gallon drums).

Table III-1 also includes identification of the appropriate Bay A, B, C, or D location for each of the waste streams (and federal and California waste codes) generated on site. Containers of hazardous waste may not be stored at the Facility for longer than one year.

d. Only Environmental Technicians and supervision are authorized to access the container storage area and make any disposition, or take any action regarding containerized HW. In the very infrequent event of container leakage in the storage area, these trained employees transfer the HW to a compatible container, clean up the spilled HW, and containerize the cleanup HW with the source material or in a compatible additional container. The above procedures also insure that only closed containers are introduced to this storage unit, and that they are closed, except while HW is added/removed.

e. Containers of HW are handled only by employees trained in HW movement using the correct material handling equipment and devices. All forklift operators complete a classroom and an on the job training (OJT) program before certification for lift operation. Use of hand truck and manual lift devices are included in OJT training. Both powered and manual lifts are equipped with accessories for safely lifting standard DOT drums, which is by far the most commonly encountered HW container. This handling procedure prevents leaking containers due to damage.

f. TSU-3 is observed daily by the Resource Protection staff and HW containers in the storage area and at authorized satellite accumulation points are inspected weekly by an Environmental Technician for evidence of deterioration. Inspection includes careful scrutiny of all exterior surfaces for serious rust or damage, and inspection of the area around the bottom of the container for signs of leakage. If unacceptable deterioration or suspected leakage is noted, the HW is immediately transferred to a satisfactory container and any spill is cleaned up. The defective container and spill cleanup residue are correctly containerized and processed as HW. (See Chapter VI, Section C, Facility Inspection, for details.)

g. TSU-3 is over 500 feet from the property line at the nearest point (See Figure II-2). This exceeds the safety zone required for ignitable/reactive HW storage.

h. Point of generation control of HW containers, and use of only trained Environmental Technicians for other operations inside the facility, insure that incompatible HWs are not placed in the same container. These procedures further prevent HW from being placed in unwashed containers that previously held incompatible HW.

i. The unit's four bays are separated by substantial, reinforced concrete dikes, which are both bolted and epoxy bonded to the coated concrete floor of the unit. Through point of generation control, as described above, HW in containers is identified by compatibility group by an Environmental Technician prior to transportation to the storage unit, and is placed in the correct storage bay. This combination of facility construction and operational procedures separates incompatible HW by a barrier.

j. Point of generation control of containerized HW greatly reduces the necessity of transfer of HW between containers, and almost eliminates generation of empty HW containers. Because container HW labels are applied at the generation point, the compatibility group of empty containers is known. These procedures identify HW contaminated containers, insure that they are handled as HW, and prevent use of contaminated containers for incompatible HW.

k. In addition to the unit's construction features discussed in the paragraph above, containers are thus protected from deterioration by weather. Accumulated liquid is removed as soon as possible, after it is noted. If the source of the liquid is not known (such as rainfall), removed liquid is analyzed using the method appropriate for the material in the containers of that bay.

l. PSEMC's manufacturing activity does not generate PCB HW. On-site electrical equipment, such as transformers and capacitors, were inspected in 1986, and all units containing more than 50 ppm of PCBs were removed and treated off-site by the utility supplier. PSEMC has no requirement for PCB HW storage.

m. The management practices described above in point of generation control of containerized HW and in facility handling and inspection procedures, ensure that containers will not rupture or leak.

n. On-site management includes operational procedures for container location that maintain adequate aisle space (a minimum of 30 inches) between drums/containers and/or pallets to allow unobstructed movement of firefighting equipment or container handling equipment, and their respective operators. Figure IV-1 shows a “typical” arrangement of pallets of 55- gallon drums in each bay of TSU-3. However, this is not the only acceptable arrangement. But in every case, at least 30 inches between drums, other containers, and/or pallets is maintained.

o. The daily observations of the containers in storage in TSU-3 by the Resource Protection staff identified in item “h” above also help to assure that compliance with the air emission control procedures specified in CCR 22.66264.1086 is continuous. The primary method of compliance is to assure that the containers are always kept closed unless removing or adding hazardous waste material.

C. Hazardous Waste Treatment Process/Units

1. TSU-1: Treatment of Ordnance Parts, Scrap, and Explosive Raw Material by Open Burning or Detonation (X01):

TSU-1 is an open burn/open detonation unit and is located in the southern portion of the PSEMC Facility (see plan view map and aerial, Figures II-3 and II-4). The facility layout and construction see Figures IV-5, IV-6, and IV-7. The Standard Operating Procedure is described in Support Services SOP 235074 (Paragraph 3.0, Ordinance Burning), Attachment IV-3. This unit consists of an open burning or detonation device, as follows:

Treatment by Open Burning or Detonation (Capacity 500 Pounds Gross Weight HW Per Day). Prior to treatment, Explosive Hazardous Waste (EHW) and EHW contaminated wastes are stored in secure locations in accordance with State, BATF, and DOD requirements. EHW is burned inside two, 10-foot diameter, reinforced concrete pipes (burn tubes), which are enclosed in a reinforced, expanded metal mesh cage. The mesh cage is surrounded by concrete walls (installed in 2002) and on three sides by an earth bank and earth barricades over 15 feet high. The pipes rest on a six-inch concrete slab reinforced with steel bars. The cage is fastened to the concrete slab by numerous bolts, and is structurally supported by cantilever supports attached to external foundation blocks. It has three entry/exit points, which are secured with high security combination locks, except when the ET employees are at the site. There is a 66-foot by 62-foot, corrugated metal roof structure over the mesh cage and concrete slab. Potable water is available at the unit for fire suppression and for site cleanup after each burn operation. The site is supported by a portable and/or installed emergency eye wash/shower unit.

EHW material, ejected from the tubes during a burn, is collected for continued treatment or final disposition as soon as safe entry can be made after a burn (usually 48 hours). Ash generation is limited to the cellulose fuel used, to small amounts from EHW contaminated organic material, and to loose EHW in the form of granules, pellets, or billets. Ash from TSU-1 with lead content is collected and managed as hazardous waste through TSU-3. Other ash from TSU-1 is managed as non-hazardous waste, as scrap metal.

All open burning operations shall be conducted in a manner that minimizes the amount of time the waste material is in-process to the greatest extent possible. Subsequent secondary and tertiary treatment shall be conducted in the shortest time frame practicable. Circumstances beyond the control of PSEMC, however, may result in extended in-process operations. In most instances, these extensions will be in the order of days, but could theoretically result in extensions of several weeks. Circumstances that may result in extended operations and associated documentation are noted in Department 37's Standard Operating Procedure No. 235074, Treatment of Hazardous Waste, located in Attachment IV-3. No untreated EHW is stored in the unit at any time for any period. NOTE: An exception to the “no storage” rule is the unplanned suspension (per Department of Defense requirements) of operations due to electrical storms at the site. The Engineering Certification of TSU-1 is included in Appendix 4.

2. TSU-2: Open Burning of Explosive HW in Solvent (EHWS) in Containment Device with Secondary Containment (X01):

TSU-2 is an open burning unit for solvent wastes containing explosives. TSU-2 is located in the central portion of the Facility, south of Lake Teledyne and west of TSU-8 (see plan view map and aerial, Figures II-3 and II-4). Treatment capacity of this unit is 300 gallons per day. For location, see Figure II-2; for details, see Figures IV-8, IV-9, and IV-10. For Standard Operating Procedures, see Paragraph 5.0, Attachment IV-3.

a. This unit consists of four sets of open horizontal, split steel drums supported by steel racks in a double boiler arrangement. Each set of two racks contains four split drums. The permit allows for up to 300 gallons per day of Explosive Hazardous Waste in Solvent (EHWS) to be treated by open burning in this unit. All HW is consumed in treatment or retained in the burn troughs. In the event that precipitation is forecast or the threat of precipitation occurs, a precipitation cover is placed over the burn troughs. Covers are constructed of corrugated steel, and are held in place by weights or lashings at each end.

The manufacturing, conditioning, and blending of reactive materials (known as powders) utilizes various ignitable, organic solvents as a working medium. When the powder and solvent are separated, the solvent contains small amounts of powder in solution and/or in suspension. Solvents are recovered and reused when possible, but product quality and facility safety preclude more complete recovery. Current reclamation technology is not adequate for further solvent recovery because concentration of the reactive material, in the hot environment of a recycling unit, results in polymerization of the solvent/explosive mixture and could result in an explosion. Therefore, the contaminated solvents are burned in a double boiler arrangement wherein the most volatile solvents are placed in the lower container, and solvents containing relatively more water and/or lower volatility are placed in the upper container. The fire is initiated remotely in the lower container, and the fire predominantly consumes both the solvents and the powders.

b. The troughs used for burning EHWS are made from 55-gallon carbon or stainless steel drums cut on the height axis to have a volume for 30 gallons of fluid and a five-inch freeboard. Two racks with eight troughs rest in a 0.1875 inch thick welded, stainless steel secondary containment pan, is four feet by ten feet and 0.489 foot deep (146 gallons), and the second secondary containment pan has the same length and depth and a width of 4.98 feet (183 gallons). The pans are used interchangeably. For EHWS treatment, each trough is serviced with a maximum of 30 gallons or 20.5% of the volume of the smaller pan.

EHWS are not placed in the unit until minutes before burning starts. Treatment is not done during periods of expected rain because rain would degrade the effectiveness of treatment. Between treatments, the upper troughs contain less than five gallons of material with free liquid, and the lower troughs contain dry ash. If not empty, the treatment units are covered; if empty, the troughs and pans are removed or inverted during expected periods of rain. All open burning operations shall be conducted in a manner that minimizes the amount of time the waste material is in process to the greatest extent possible.

Subsequent secondary and tertiary treatment shall be conducted in the shortest time frame practicable. In some instances, treatment residues from TSU-2 may be more effectively treated at TSU-1. Circumstances beyond the control of PSEMC, however, may result in extended in- process operations. In most instances, these extensions will be in the order of days, but could theoretically result in extensions of several weeks. Circumstances that may result in extended operations and associated documentation are noted in Department 37's Standard Operating Procedure No. 235074, Treatment of Hazardous Waste, located in Attachment IV-3. There is no exposure to the combined risk of EHWS release and heavy rain.

Table IV-3, below, presents for hazardous waste treated in this unit; that table illustrates the solvents that are permitted to be burned at TSU-2 and examples of the explosive compounds that may be entrained in those solvents.).

Table IV-3. **Explosive Hazardous Waste in Solvent Mixtures Treated in TSU-2**

Note: Explosive percentages may vary.

Solvents	**Example Explosive(s)**	**Typical %**
Methanol	HNBB/HNS	10%
Acetonitrile	HNBB/HNS	10%
Acetone	HNBB/HNS, Hivelite, HMX, PETN, RDX, CH6, DIPAM	10%
Ethanol	Lead Azide	<0.1%
Isopropanol	DIPAM/Hivelite	5%
N-Butyl Acetate	Hivelite	5%
Tetrahydrofuran	HNBB/HNS, DIPAM	10%
Pyradine	HNBB/HNS	10%
Dimethyl formamide	RDX, HNS, PETN, CH6	10%

The unit is supported by a portable and/or installed eye wash/shower unit. The Engineering Certification of TSU-2 is included in Appendix 9 hereto

3. Protection of Human Health and the Environment (TSU-1 and/or TSU-2):

The following remarks apply to units TSU-1 and/or TSU-2, as specified below:

a. Fire Protection (Both TSU-1 and TSU-2). The area around the site is cleared of combustible natural material, under the guidance of the California Department of Forestry (CDF). CDF annually inspects the site for fire protection at the beginning of the dry season. In addition, the Hollister CDF station is notified prior to each explosive treatment operation.

b. Ground Water Monitoring (Both TSU-1 and TSU-2). Because all EHW and solvent is consumed in detonations or by burning, and spills are always cleaned up immediately, no ground water monitoring is associated with these two treatment units.

c. Potential Explosive Particle Ejection (Both TSU-1 and TSU-2). Potential explosive particle ejection from treatment by burning is controlled by the secondary containments of the burn cage. Not over six (6) pounds net explosive weight (NEW) of material, which is expected to mass detonate, is placed in each tube of the burn containment device. PSEMC has never experienced a detonation or rapid deflagration in burning many thousands of gallons of EHWS.

d. Inspection (Both TSU-1 and TSU-2). Inspection of the RCRA permitted units is performed weekly. If deterioration is noted, operations are suspended until repairs are completed.

e. Precipitation, Spills, and Leaching (Both TSU-1 and TSU-2). Because all EHW is consumed by treatment and no EHW is ever stored at the sites, the potential for a hazardous waste accident occurring is remote. In the case of a meteorological event, the burn troughs at TSU-2 will be covered to insure against the possibility of EHW leaching into the surrounding area. TSU-1 is completely covered to minimize concerns at that location. All explosive material brought to the units is contained in manufactured explosive devices or is in compatible containers. Spills occurring during fill of the burn troughs (TSU-2), or charging of the burn tubes (TSU-1), are immediately cleaned up, and the clean up material is added to the burn/detonation operation. This procedure prevents dispersal of EHW due to spills, precipitation, or leaching.

f. Ash Management (Both TSU-1 and TSU-2). Over 95% of the EHW treated in this TSU-1 is contained in explosive devices made of metal. Ash generation is limited to the cellulose fuel used, to small amounts from EHW contaminated organic material, and to loose EHWs in the form of granules, pellets, or billets. The EHWS treated in TSU-2 result in about 5% by volume of solid residue. Solid residue from TSU-2 is treated in TSU-1 to insure final neutralization of its reactivity. Ash from TSU-1 with lead content is collected and managed as HW through TSU-3. Other ash from TSU-1 is managed as non-hazardous waste, as is scrap metal.

g. Risk Assessment (Both TSU-1 and TSU-2). A Survey Risk Assessment (SRA) of HW operations, covered by this plan, was filed with the DTSC in January 1991 (copy included in Appendix 11). Health risks were determined to be far below levels of regulatory concern. Specifically the Screening Risk Assessment determined the total upper bound incremental cancer risk at the point of the maximally exposed individual is 8.66×10^{-14}. Regulatory action is not usually taken to control cancer risks below 1×10^{-6}. Since 1991, no HW operations have been added to the PSEMC facility while several TSUs (TSU-4, -5, -7, -9, and -10) have been closed or deregulated, thereby reducing overall risks at the PSEMC facility.

In March 2014, the Human and Ecological Risk Office (HERO) of DTSC provided a memorandum recommendations for performing a human health and ecological risk assessment (HHERA)[7]. A HHERA Work Plan has been submitted to DTSC and is currently undergoing revisions[8] (a copy is included in Appendix 11). The HHERA Work Plan described the methods that would be used to evaluate potential human and ecological impacts that may result from hazardous waste treatment operations at TSU-1 (open burning of solid reactive waste) and TSU-2 (open burning of solvents contaminated with reactive wastes), both of which generate emissions that have the potential to impact human or ecological receptors. Although there are a number of DTSC comments[9] that are currently being responded to, the preliminary HHERA assessment findings include:

- *Site Conceptual Model*: Operations at both TSU-1 and TSU-2 result in periodic airborne emissions (in the form of gases/vapors and particulates) that distribute chemicals to the

---

[7]: DTSC-HERO memorandum: *Risk Assessment Recommendations for Pacific Scientific Energetic Materials Co. Permit Renewal, Hollister, California*, March 21, 2014.

[8]: ToxStrategies, Inc. report: *Human Health and Ecological Risk Assessment Workplan*, November 25, 2015.

[9]: DTSC-HERO letter: *Comments for Human Health & Ecological Risk Assessment Work Plan, Pacific Scientific Energetic Materials Co., 3601 Union Road, Hollister, California*, February 1, 2016.

environment. In addition, nonvolatile chemicals emitted from treatment operations at TSU-1 and TSU-2 may deposit to onsite soil or surface water (Lake Teledyne). Chemicals in soil in the vicinity of TSU-1 and TSU-2 have some potential be taken up into plants growing in the area and by other ecological organisms (e.g., invertebrates and small mammals) in the area. Airborne particulate emissions from the site may migrate and deposit to off-site soil at the property perimeter and in the residential areas near the facility, as well as to off-site soil and surface water at San Justo Reservoir. Cattle grazing in the vicinity of the PSEMC facility may take up chemicals present in soil or plants. Fish in either Lake Teledyne or San Justo Reservoir may take up chemicals present in the water.

- *Emission Estimates*: The PSEMC's Security and Environmental Affairs Department maintains a database of all hazardous wastes generated on site. This database was used to identify wastes treated at TSU-1 and TSU-2 over the past 10 years (i.e., 2005-2014). Following a detailed analysis of this database, emissions from TSU-1 and TSU-2 evaluated in the HHERA were based on data for the period 2010-2014, because activities during this period are most representative of current operations, and thus most likely representative of future operations at the facility.
  - The highest volume wastes treated at TSU-1 (>0.3% of total wastes) included twenty-seven explosive materials, which represent over 97% of the wastes treated at TSU-1 during this time period.
  - The highest volume wastes treated at TSU-2 (>0.1%) included six solvents and four explosive materials, which represent over 99% of the wastes treated at TSU-2 during the same period.

  For each TSU, the MCIROPEP Thermal Equilibrium Program, referred to herein as the PEP code, was used to identify combustion byproducts emitted during burning of the identified waste materials. The PEP code is based on a program originally developed at the China Lake Naval Air Station (China Lake). A total of 117 unique chemical species were predicted during burning of the 27 explosive materials at TSU-1; the 16 chemical species predicted to be emitted during burning of the six solvents and four explosive materials at TSU-2 were also emitted from TSU-1. The Work Plan states that importantly, essentially 100% of the mass is conserved (i.e., for every 100 pounds burned, a total of ~100 pounds is emitted). In addition to the chemical species predicted by the PEP code for TSU-1, three "parent" explosives (i.e., ammonium perchlorate, HMX, and RDX) and dioxins and furans were assumed to be emitted based on data from risk assessments prepared for three other facilities with open burn/open detonation (OB/OD) operations (i.e., Edwards Air Force Base [EAFB], China Lake, and Lawrence Livermore National Laboratory [LLNL]. Wood fuel is used to ignite the explosives (excelsior) at TSU-1; emissions were estimated based on data from China Lake, which also uses wood as a fuel for open burn operations. Finally, because the majority of the wastes treated at TSU-2 are solvents, emissions may also result from evaporation prior to burning. Evaporative emissions from TSU-2 were estimated based on a bench-scale test conducted by PSEMC.

  - *Chemicals of Potential Concern:* In total, 129 unique chemical species were identified as being emitted as a result of open burning at TSU-1 and TSU-2 and evaporation at TSU-2. Of these chemicals, 19 were not considered further in the HHERA because they were considered to be: 1) an inert gas and/or a primary component of air; 2) highly reactive and unstable, likely forming a more stable compound that is otherwise considered a COPC; 3) not a systemic toxin and/or toxic only at very high concentrations; or 4) an appropriate surrogate for toxicity could not be identified. The remaining 110 chemicals were considered chemicals of potential concern (COPCs) in the HHERA. All of these chemicals were considered COPCs for air, but only those that include a metallic element (with the exception of halogenated metalloids because they are volatile) and/or have a vapor pressure less than 1 mmHg were assumed to deposit to soil or water (and subsequently to plants, animals, and fish).

- *Air Dispersion Modeling:* The Open Burn/Open Detonation Model (OBODM), available from the U.S. Environmental Protection Agency (EPA), was used to evaluate chemical emissions from open burning at TSU-1 and TSU-2. OBODM uses cloud/plume rise, dispersion, and deposition algorithms taken from existing models for instantaneous (open detonation) and quasi-continuous (open burn) sources to predict the downwind transport and dispersion of pollutants released by the combustion of propellants.

  - Five years of meteorological data (hourly surface data from Hollister Municipal Airport and upper air sounding data from Oakland International Airport) were used.
  - Evaporated solvent emissions from TSU-2 that are not related to any combustion activity were modeled using EPA's SCREEN3 model. SCREEN3 is a single source Gaussian plume model, which estimates maximum ground level concentrations for point, area, flare, and volume sources. SCREEN3 uses conservative default assumptions regarding meteorological conditions, and does not require hourly meteorological data.

  For purposes of the HHERA, chemical emissions and subsequent dispersion estimates were based on the proposed permit limits for each TSU. Specifically, the proposed permit limits the amount of waste treated at TSU-1 by open burning to 500 pounds gross weight per day (i.e., explosive materials and non-explosive materials such as metal casings and water) and 125 pounds explosive material per day, as well as limits the total explosive material treated per year to 4,700 pounds. For TSU-2, the proposed permit limits the amount of solvent waste treated to 240 gallons per day. The majority of these limits are lower than for the previous permit and in all cases far in excess of actual treatment operations between 2010 and 2014. Therefore, the assumption of using the permit limits for chemical emissions and subsequent dispersion estimates results in conservative estimates for use in the HHERA compared to actual emissions and dispersion taking place at the site.

  Based on data for actual operations during this time period, the OBODM was used to estimate annual average air concentrations as a result of emissions from TSU-1 assuming a simulated burn of 80 pounds explosive material and 420 pounds of non-explosive material (total of 500 pounds) on 59 days each year (4,700 pounds/year divided 80 pounds/burn) and maximum hourly air concentrations assuming a simulated burn of 125 pounds explosive material. Both simulations also assumed burning 125 pounds of excelsior (wood fuel). For TSU-2, maximum hourly and annual average air concentrations were estimated based a simulated burn of 240 gallons of solvent. A total of 5% of the solvent was assumed to evaporate during the process of loading the waste into the treatment basins, and the remaining 95% was assumed to be burned. Because treatment operations at TSU-1 and TSU-2 do not occur on the same day, annual average air concentrations for TSU-2 were estimated assuming operations on 202 days/year (365 days minus 104 weekend days minus 59 days of operation at TSU-1).

- *Predicted Environmental Media Concentrations* Air concentrations were predicted at five locations relevant to human and/or ecological receptors: terrestrial locations near TSU-1 and TSU-2, Lake Teledyne, perimeter of the PSEMC property, nearby residences, and San Justo Reservoir. Because TSU-1 and TSU-2 are separated spatially, the maximum predicted air concentration for each category was not necessarily at the same location for each TSU. Regardless, to be conservative, the maximum predicted air concentrations for each category were added together for the purpose of estimating potential chronic (annual average) exposure for each of the relevant receptors. Because TSU-1 and TSU-2 are not operated on the same day, potential acute (maximum hourly) exposure was evaluated separately for each TSU.

  Guidance from the Office of Environmental Health Hazard Assessment (OEHHA) was used to estimate chemical concentrations in other environmental media (soil, water,) based on the predicted annual average air concentrations (OEHHA, 2015a). Note: human and ecological risk references are included in Appendix 11.Chemical concentration estimates in tissues for input into the human health calculations (i.e., for plants, beef, and edible fish) were estimated also using the OEHHA guidance. Chemical concentration estimates in tissue for input into the ecological risk calculations (i.e., terrestrial plants, terrestrial invertebrates, terrestrial small mammals, and whole body fish) were estimated using uptake models consistent with US Environmental Protection Agency's (EPA's) ecological soil screening levels (EcoSSLs) (EPA, 2007). The model locations used to estimate concentrations in other media for each receptor are summarized in Table IV-4:

Table IV-4. **<u>Summary of exposure media and areas evaluated for HHERA receptors</u>**

	Receptors				
	Resident	Recreator	Rancher	Terrestrial Eco	Aquatic Eco
Air	R	SJ	P	--	--
Soil	R	SJ	P	T	--
Water	SJ	--	--	--	LT
Homegrown Produce	R	--	--	--	--
Terrestrial Plants	R	--	--	T	--
Terrestrial Invertebrates				T	
Terrestrial Small mammals				T	
Fish	--	SJ	--	--	LT
Beef	--	--	P	--	--

Lake Teledyne, P – Perimeter, R – Residences, SJ – San Justo Reservoir, T – Terrestrial

- <u>*Human Health Risk Assessment*</u> *(HHRA);* The HHRA evaluated the following three receptors and associated exposure pathways:

1. Resident (child and adult) – Inhalation, incidental soil ingestion, dermal contact with soil, homegrown produce ingestion, tap water ingestion, showering in tap water, and mother's milk ingestion (infant only).
2. Recreator (child and adult) – Inhalation, incidental soil ingestion, dermal contact with soil, and fish ingestion.
3. Rancher (child and adult) – Inhalation (adult only), incidental soil ingestion (adult only), dermal contact with soil (adult only), and beef ingestion.

Exposures were quantified using reasonable maximum exposure (RME) assumptions as recommended by DTSC (2014), EPA (2015a), and OEHHA (2015a). Inhalation and oral toxicity criteria were obtained from a hierarchy of California and EPA sources, beginning with the OEHHA online Toxicity Criteria Database (OEHHA, 2015b) and EPA's Integrated Risk Information System (IRIS) online database (EPA, 2015b). Additional sources of toxicity criteria (e.g., EPA Provisional Peer-reviewed Toxicity Values [PPRTVs]) were used as appropriate. When a toxicity criterion was available for only one route of exposure (oral or inhalation), the toxicity criterion for that exposure route was applied to the other exposure route (i.e., route-to-route extrapolation), except in cases where DTSC and EPA expressly recommend against this sort of extrapolation (e.g., nickel's inhalation slope factor). A gastrointestinal absorption factor (GIabs) was used to adjust the oral toxicity criteria for purposes of evaluating dermal exposure for a subset of chemicals identified by EPA as warranting such an adjustment. Lastly, age-dependent adjustment factors (ADAFs) were used to estimate cancer risks for COPCs identified as mutagens by EPA (only benzo(a)pyrene). Non-cancer hazard indexes and excess cancer risks were estimated for each receptor based on the estimated exposures and associated toxicity criteria. Non-cancer hazard indexes were estimated for both chronic (annual average) and acute (maximum hourly) exposures. The results of the HHRA are summarized as follows:

Resident

- The acute hazard index for TSU-1 is 0.2, which is less than the generally acceptable level of 1. The primary contributor is inhalation of chlorine as result of treatment of ammonium perchlorate. The acute hazard index for TSU-2 is 0.1, which is also below the generally acceptable level. The primary contributor is inhalation of isopropyl alcohol as a result of evaporation prior to treatment.
- The chronic non-cancer hazard index is 0.5, which is less than the generally acceptable level of 1. The primary contributor is ingestion of potassium perchlorate in homegrown produce.
- The excess cancer risk is $5x10^{-7}$, which is less than the generally acceptable level of $1x10^{-6}$. The primary contributors are inhalation of cobalt as a result of treatment of hexamine cobalt nitrate (HACN), ingestion of benzo(a)pyrene in homegrown produce or mother's milk as a result of burning wood fuel, and ingestion of RDX in homegrown produce and tap water as a result of treatment of RDX. In the case of RDX, the PEP code did not predict that parent compound would be emitted during combustion of RDX; rather, this estimate is based on an emission factor from another facility (EAFB and China Lake).

Recreator

- The acute hazard index for TSU-1 is 0.5, which is less than the generally acceptable level of 1. The primary contributor is inhalation of chlorine. The acute hazard index for TSU-2 is 0.1, which is also below the generally acceptable level. The primary contributor is inhalation of isopropyl alcohol.
- The chronic non-cancer index is 0.01, which is much less than the generally acceptable level of 1. The primary contributors are incidental ingestion of zirconium in soil as a result of treatment of zirconium metal powder and inhalation of dimethylformamide as a result of evaporation prior to treatment.
- The excess cancer risk is $7x10^{-8}$, which is much less than the generally acceptable level of 1?10-6. The primary contributor is ingestion of benzo(a)pyrene in fish.

Rancher

- The acute hazard index for TSU-1 is 1, which is equal to the generally acceptable level. The primary contributor is inhalation of chlorine gas. The acute hazard index for TSU-2 is 0.7, which is also below the generally acceptable level. The primary contributor is inhalation of isopropyl alcohol.
- The chronic non-cancer index is 0.03, which is much less than the generally acceptable level of 1. The primary contributors are inhalation of dimethylformamide, inhalation or cobalt, inhalation of chlorine gas, and incidental ingestion of zirconium.
- The excess cancer risk is $1x10^{-6}$, which is equal to the generally acceptable level. The primary contributor is ingestion of benzo(a)pyrene in beef.

The estimated non-cancer indexes and excess cancer risks are equal to or less than generally accepted levels for all three receptors. These results indicate that operation of TSU-1 and TSU-2 up to the permitted limits will not pose an unacceptable health risk to the surrounding community under the conditions evaluated. The risks estimated in this HHRA are intended to be conservative, upperbound estimates based on the permit limits; actual operations at PSEM are typically lower.

o *Ecological Risk Assessment* *(ERA):* The ERA screening assessment followed DTSC's Phase I: predictive assessment guidance (DTSC, 1996) and EPA's screening-level assessment guidance (EPA, 1997), wherein conservative assumptions (e.g., maximum exposure concentrations, no-effect adverse effect levels [NOAELs]) are used to conservatively approximate quantitative risk estimates. Note: human and ecological risk references are included in Appendix 11.

Aquatic ecological risk calculations were based on estimated water and fish tissue concentrations that were modeled based on air concentrations predicted at Lake Teledyne. Terrestrial ecological risk calculations were based on estimated soil and terrestrial tissue concentrations that were modeled based on air concentrations at the terrestrial locations near TSU-1 and TSU-2. In cases where multiple compounds were modeled for a given chemical evaluated in the risk calculations, the concentration in the abiotic media (soil or water) was based on the sum of those compounds (e.g., the total lead concentration in soil was modeled as the sum of modeled soil concentrations in lead, lead [II] chloride, lead oxide, and lead dioxide). The derivation of a total soil concentration for a single chemical based on the summation of all related compounds concentrations is conservative. In addition, the use of a single-point terrestrial exposure area (i.e., the two areas immediately downwind of TSU-1 and TSU-2) results in a conservative estimate of exposure for ecological receptors, as many ecological organisms (e.g., wildlife) are mobile, and ecological communities (e.g., the plant community) represent a larger spatial area than the area represented by a single point.

The following ecological receptor pathways were evaluated based on a determination of significant and complete pathways and potential receptors present at the PSEMC facility:

- **Terrestrial plants**: direct contact with soil
- **Aquatic limited receptors** (i.e., aquatic plant community and fish): direct contact with surface water
- **Wildlife** (i.e., great egret, savanna sparrow, deer mouse, and red-tailed hawk): dietary ingestion of prey and incidental ingestion of soil

The four wildlife receptors, which were selected based on their likelihood of occurrence and exposure to COPCs at the Site, represent a range of trophic levels and feeding guilds within the food chain, and are intended to be protective of special status species known or potentially present at the Site[10]. Exposure parameters specific to these receptors were used to derive dietary doses to estimate wildlife exposure, based on the following sources: Nagy (2001), EPA (1993, 2007), DTSC (1999), and Cornell Lab of Ornithology (2015).

Screening toxicity reference values (TRVs) were based on NOAELs, or on conservative low-effect adverse effect levels (LOAELs) where no NOAELs were available. Screening TRVs were identified for plants in soil, aquatic-dependent organisms in water, bird diet, and mammal diet and were based primarily on the following sources: EPA Eco-SSLs (EPA, 2015c), wildlife NOAELs presented in Sample et al. (1996), Oakridge National Laboratory plant soil thresholds (Efroymson et al., 1997), EPA ambient water quality criteria (AWQC) (EPA, 2015d), and TRVs available from the US Army Center for Health Promotion and Preventive Medicine(USACHPPM).

Screening-level risk estimates were quantified as hazard quotients (HQs) based on a comparison of exposure concentrations or doses to screening TRVs. The results of the screening assessment ERA are as follows:

- For terrestrial plants: All modeled soil concentrations representing the areas near TSU-1/TSU-2 were less than screening level TRVs (all HQs were less than 1), except for concentrations of chromium and boron. For chromium and boron, the maximum modeled soil concentrations exceeded screening soil TRVs for plants based on Efroymson et al. (1997); however, modeled soil concentrations for these chemicals are similar to or less than average background concentrations reported for the state of California:
    - o The modeled terrestrial soil concentration at TSU-1/TSU-2 for chromium is

[10]: Savannah sparrows are listed as endangered species in the state of California.

4.6 mg/kg dw, which is well below the chromium background concentrations (ranging from approximately 20 to 120 mg/kg dw) reported in California (University of California, 1996; USGS, 2001).

- The modeled terrestrial soil concentration at TSU-1/TSU-2 for boron is 41 mg/kg dw, which is higher than the average background concentration of 19 mg/kg dw reported in California (University of California, 1996); however, this modeled boron concentration is the sum of the concentrations in all boron related compounds, which is an overestimate of total boron. When the total boron concentration is calculated as the sum of the concentrations of elemental boron, the total boron soil concentration is 20 mg/kg, which is similar to the background boron concentration.

- For all aquatic-dependent organisms: No modeled surface water COPEC concentration in Lake Teledyne or the San Justo Reservoir exceeded EPA chronic AQWC values (all HQs were less than 1); therefore, no unacceptable risks to aquatic-dependent organisms are expected based on contamination in surface water from air emissions.
- For bird and mammal receptors (i.e., great egret, savanna sparrow, deer mouse, and red-tailed hawk): No dietary dose for any COPEC exceeded dietary NOAELs (all HQs were less than 1); therefore, no unacceptable risks to terrestrial or aquatic wildlife utilizing the PSEMC facility are expected based on contamination from air emissions.

These results indicate that the operation of TSU-1 and TSU-2 up to the permitted limits will either 1) not pose an unacceptable risk to ecological receptors under the conditions evaluated, or 2) not exceed expected background levels. The risks estimated in this screening assessment ERA are intended to be conservative, upper-bound estimates based on the permit limits; actual risks associated with operations at PSEMC are typically lower.

h. Hydrological and Chemical Assessment (Both TSU-1 and TSU-2). A site-wide hydrogeological and chemical assessment of the PSEMC property was completed and accepted by DTSC in 1986. The assessment demonstrated that similar operations at other locations on PSEMC property had resulted in no detectable level of surface or subsurface soil or water contamination. Subsequent on-site environmental investigations have identified lead (in surface and subsurface soils) and perchlorate (in shallow groundwater) contamination at the site. See Section XI for additional information on current status of ongoing investigations.

i. Meteorological Assessment (Both TSU-1 and TSU-2). The meteorology of the site was considered in the SRA filed with DTSC in January 1991. Meteorological conditions have been updated as part of the current HHRA evaluation (see chapter 4.3 in the Appendix 11). National Weather Service hourly data generated from the Hollister Airport were applied to the site modeling analysis based on the completeness of the data and the proximity of Hollister Airport to the PSEMC facility.

j. Air Quality Permits (Both TSU-1 and TSU-2). Air quality permits for these units are listed in Chapter XIII. The Monterey Bay Unified Air Pollution Control District inspects each permitted unit annually. Inspection typically includes observation of a treatment operation or chemical process. No deficiencies have been cited.

k. Land Use (Both TSU-1 and TSU-2). All adjoining property is zoned AP or AR by the San Benito County Planning Department (Figure II-6).

l. Pathways of Human Exposure (Both TSU-1 and TSU-2). Pathways of human exposure are reported and evaluated in the previously filed SRA (1991) and the current HHRA Work Plan evaluation (described in Section g, above).

m. Effectiveness of Treatment (Both TSU-1 and TSU-2). Treatment of EHW contaminated solvent in TSU-2 results in slight residue, which is further treated in TSU-1. Treatment by detonation, by definition, destroys the reactive material totally. Treatment by open burning is recognized by DOD Manual, 4145.26M, Explosive Manufacturers Safety Manual, as an effective method for treatment of ordnance devices and material.

i. There are documented reports of explosives ejecting from or remaining in place after detonation (EPA Seminar on Alternative Treatment of Reactive Waste, 1990). In the instances reported, a review of the documentation revealed that loose explosives in large piles were detonated for the experiments. Under these conditions, three distinct dynamics developed in the pile: a supersonic sound wave in the detonating material; an atmospheric pressure wave; and the explosive material in rapid motion. Interaction of these three forces with gaps and voids in the pile can easily result in ejection of material and/or localized attenuation of the detonation front, which in turn results in unexploded material remaining within the perimeter of the pile. A similar phenomenon has been noted in detonation of large piles of munitions.

ii. Ejection and attenuation during detonation can be avoided by two conditions, which are difficult to obtain in large piles of explosives:

1) If the explosive is encased without voids in a single restraining device (such as, a bomb casing or metal tube), the detonation will progress rapidly and uniformly to the entire mass of explosive. This effect is enhanced in proportion to the strength of the containment. And,

2) To ensure detonation of each device in a pile, a system can be used which delivers the initiating force to each device simultaneously.

Both of the above conditions are used to ensure deactivation by detonation in TSU-1. No uncontained explosive is treated by detonation.

n. Minimum Protective Distance (Both TSI-1 and TSU-2). TSU-1 is 675 feet from the nearest property line, and is barricaded. 27 CFR55.218, “Table of Distances for Storage of Explosives” gives 375 feet as the barricaded distance for up to 800 pounds of mass detonating ex-plosives. If 500 pounds of mass detonating explosive were stored at this site, only 350 feet would be required. In the PSEMC Site Plan, filed with the Department of Defense Contract Administration Service under the provisions of DOD Manual, 4356.26M, it was concluded that the containment devices used, and the characteristics of the HW treated in TSU-1, did not require a greater safety zone to protect persons on adjacent property. In addition, the San Benito County Planning Commission has instituted an informal procedure that will require the location and operations of PSEMC be included in the title documents of all residences approved for construction within one mile of PSEMC. (See Figure IV-6, Master Site Plan.) Total net explosive weight in TSU-2 is typically less than 10 pounds, and this method of treatment has never resulted in a detonation while treating tens of thousands of gallons of EHWs solvent.

o. Certification of Mass Detonation Characteristics of HW (Both TSU-1 and TSU-2). Theodore Gold, a registered safety engineer, certified the mass detonation characteristics of HW treated in TSU-1 and

TSU-2 in 1991. A copy is available for review in PSEMC's files.

4. TSU-8; HW Treatment in Tanks, Safety Bucket Water (SBW) Recycling Volume Reduction by Natural Evaporation (T01):

The manufacture of explosive and pyrotechnic devices generates EHW scrap and EHW contaminated material at almost every workstation. EHW scrap and EHW contaminated materials are inerted in conductive, non-sparking safety buckets containing water near the workstation. Because most EHW is insoluble in water, little or no material dissolves, but small particles are transported by the water. While the explosive and pyrotechnic material in Safety Bucket Water (SBW), even when concentrated by evaporation, is below an acute toxic (Attachment IV-4, Bioassay Evaluation) or reactive concentration, it could accumulate to a hazardous concentration if it were sewered or otherwise released into the environment.

TSU-8 treats water containing particles of explosives (Safety Bucket Water) by natural evaporation. TSU-8 is located in the central portion of the Facility, south of Lake Teledyne and east of TSU-2. (See Figure II-3 and II-4). SBW is collected, strained to remove most of the explosive material, and the water is returned to the safety buckets where it continues in the use cycle until it becomes turbid. It is then removed from the cycle and is placed, without intermediate accumulation, into HW treatment unit TSU-8. When enough water has evaporated to cause thick turbidity, the concentrated HW is transferred to TSU-1 or TSU-2, added to other EHWs, and burned. Because no VOCs are contained in the SBW, TSU-8 has no possibility of VOC emissions.

On a daily basis, the explosive solids filtered from the SBW are removed from the recycling station and placed in a heavy-gage, conductive plastic bag. The plastic bag is placed, temporarily, in a screw top, 85-gallon, poly recovery drum at the filtering station. It is collected and accumulated in similar drums at TSU-8. This EHW is treated in TSU-1 in less than 90 days from the accumulation date.

Treatment capacity of TSU-8 unit is approximately 1,100 gallons per year, based on an observed average evaporation rate of three gallons per day using a six-inch freeboard. Actual daily evaporation varies from near zero during cold rainy weather when precipitation covers are in place, to over ten gallons during hot, dry, windy weather. The location of TSU-8 is shown on Figures II-3 and II-4 and construction specification drawings and photos are shown on Figures IV-10 through IV-15. The large surface area of the troughs, exposed to ambient atmospheric conditions, results in rapid evaporation of the water, except during rainy periods. Portable rain covers are placed on the evaporation troughs during periods of rain. The covers are mounted in such a way that evaporation can continue at a reduced rate with the covers in place.

TSU-8 consists of two evaporation troughs within a concrete secondary containment pad filled by gravity feed pipes from an unloading area. Safety Bucket Water is siphoned or hand-pumped from a container in an environmental support vehicle into the feed pipes in the unloading area, which empty into the evaporation troughs. The feed pipes are pipe-in-pipe construction with a 2-inch diameter stainless steel inner pipe and a 4-inch diameter polyvinyl chloride (PVC) outer pipe. The troughs are constructed of three-sixteenths of an inch thick carbon steel with welded heads. The troughs are coated with a 100% solids coal tar polyurethane elastomer coating to a minimum thickness of 100 mils (equals one tenth of an inch). The troughs are half cylinders with slightly domed ends. Each trough is approximately 4.32 feet in diameter and 11.3 feet long. The maximum capacity of each treatment trough, with an operational freeboard of six inches, is approximately 505 gallons.

When enough water has evaporated to make the remaining water thickly turbid, it is drained into a container and transferred to TSU-1 or TSU-2 for treatment.

For the purpose of computing required secondary containment volume, the troughs are treated as half cylinders, although they have slightly domed ends. Secondary containment must be at least the volume of the 25-year rain plus 10% of the volume of all containers (or the total volume of the largest container, whichever is larger, dimensions are shown in Figure IV-12.) The containment has an area of 198.2 square feet and a depth of one foot. It includes a sump with a volume of 4.3 cubic feet for a total volume of 202.5 cubic feet. A 25-year rain (0.417 foot or 5 inches) will generate 82.6 cubic feet of water. The remaining capacity is 119.9 cubic feet or 896.8 gallons. Each evaporation trough is 4.3 feet in diameter and 11.3 feet long, with slightly domed ends. Using an operational freeboard of six inches, the liquid capacity of each trough is 504.8 gallons which means the secondary containment has an excess capacity of 391 gallons. The Engineering Certification for TSU-8 is included in Appendix 6.

5. Miscellaneous HW Treatment, Solidification of Two-Part Epoxy Materials (T04):

Two-part epoxy paints, potting compounds, adhesives, and insulating materials are used intermittently and in very small quantities at most work stations. Partial containers thus generated at the work stations often cannot be used on subsequent production efforts because of shelf life or contractual lot integrity standards. To prevent the widespread generation of this material as HW, opened containers of the material (up to one liter) are mixed and solidified according to the manufacturer's specifications at work stations.

Open quantities at work stations greater than one liter and larger quantities of two-part epoxy materials in unopened containers become excess to production needs through expiration of shelf life, and when quality inspection reveals the material to be off specification. These materials are accumulated and transported to TSU-3, Bay D for storage and treatment by mixing.

Environmental technicians mix the two-part materials according to the manufacturer's specification in either the original containers or in one-gallon, open steel cans in TSU-3, Bay D. Once the epoxy material is solidified, it is no longer hazardous and is disposed of as non-hazardous solid waste.

6. Closure of Historical Hazardous Waste Treatment/Process Units:

A complete summary of treatment system closures at the facility since 1992 is included in the introduction section of this chapter.

D. Uniform Building Code Compliance for TSUs

PSEMC commissioned an independent third-party evaluation of the compliance of the four active TSUs (i.e., TSU-1, TSU-2, TSU-3, and TSU-8) for compliance with the applicable Uniform Building Code (UBC) requirements. Piland Structural Engineering Inc. (PSI) performed the review in May and June, 2005 utilizing available records including facility drawing and San Benito County building permits/approvals and inspection reports (see Attachment IV-5] and site observations. PSI concluded that all four TSUs were in compliance with relevant UBC to which the TSUs were subjected at the time of construction.

PSI’s certification report dated June 30, 2005 (“Treatment/Storage Unit (TSU) Uniform Building Code (UBC) Compliance & Certification”) is included as Attachment IV-6. Three (3) recommendations for facility improvement were made in that referenced report. The recommendations included:

(1) Retrofit/replacement to original specifications of a single base plate/concrete anchorage of the steel mesh cage at TSU-1

(2) Provide weep holes in the sides of the corrugated pipe used for caisson forms for the metal roof

canopy at TSU-1. Placing such weep holes below the base plates will ensure water drainage and minimize the potential for corrosion.

(3) Replace and compact additional soil adjacent to the “backside” of the exterior foundation of TSU-3 to redirect surface drainage away from the structure.

Those recommendations (which will ensure continued stability of the structures and ongoing UBC compliance) have been implemented.

Chapter IV Attachments

- *TSU Figure and Photos*
- *Hazardous Waste Containers Table*
- *Example Hazardous Waste Label*
- *Notice of Hazardous Waste Form*
- *PSEMC Standard Operating Procedure*
- *Results of Bioassay Evaluation*
- *San Benito County Permits and Approval Letters*
- *Building Code Compliance*

Chapter IV TSU Figures & Photos

WHA

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

TSU-3 Building Layout

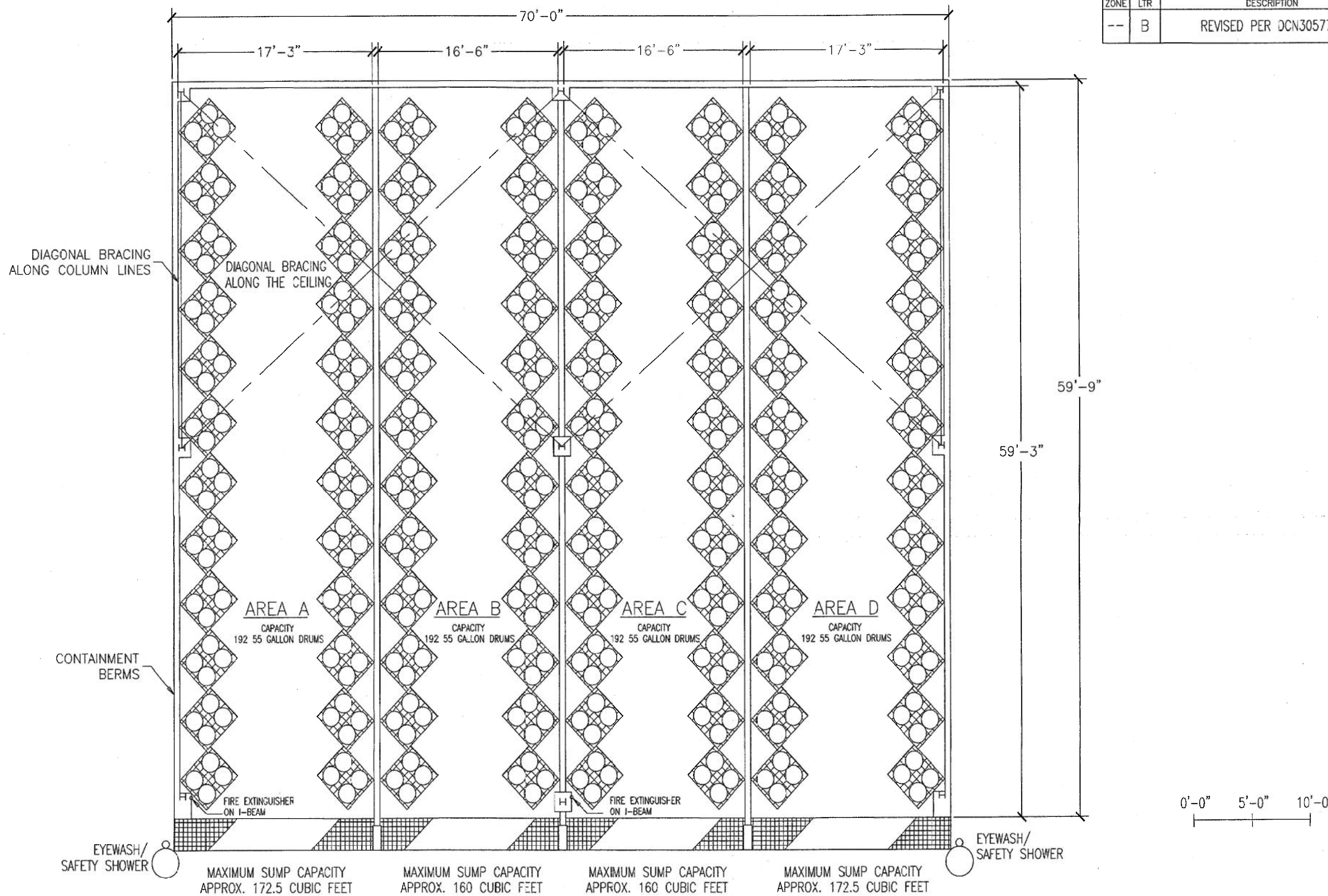
Site: Pacific Science Energetic Materials Company
Address: 3601 Union Road. Hollister, CA

Date: March 2016

Revisions/Notes:

Figure IV-1
Project 2X502

REVISION				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
--	B	REVISED PER DCN305779	071109 SY	[signature]



NEXT ASSY	USED ON
APPLICATION	
DO NOT SCALE THIS DWG	
CUSTOMER CONTROLLED: YES ☐ NO ☒	
CUST NAME:	

PACIFIC SCIENTIFIC PROPRIETARY
THIS DOCUMENT AND THE DATA DISCLOSED HEREIN OR HEREWITH IS NOT TO BE REPRODUCED, USED OR DISCLOSED IN WHOLE OR IN PART TO ANYONE WITHOUT WRITTEN PERMISSION OF PAC SCI

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DRAWING IAW MIL-T-31000
DIM & TOL IAW ANSI Y14.5M
SURF TEXTURE IAW ANSI B46.1
DECIMALS .XX ± .03 .XXX ± .010
ANGLES ± 5° 125

CONTRACT NO.		
DRAWN BY	A. GARIBAY	02-05-14
CHECKED		
ENGINEER		
QE		
CONFIG MGR		
APPROVAL	C QUINN	02-06-18
RELEASED		

PACIFIC SCIENTIFIC
HOLLISTER, CALIFORNIA

TSU - 3

SIZE	CAGE CODE	DRAWING NO.
D	06331	401056

SCALE: 1/4" = 1'-0" CALC WT SHEET 1 OF

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

TSU-3 Surrounding Area Layout

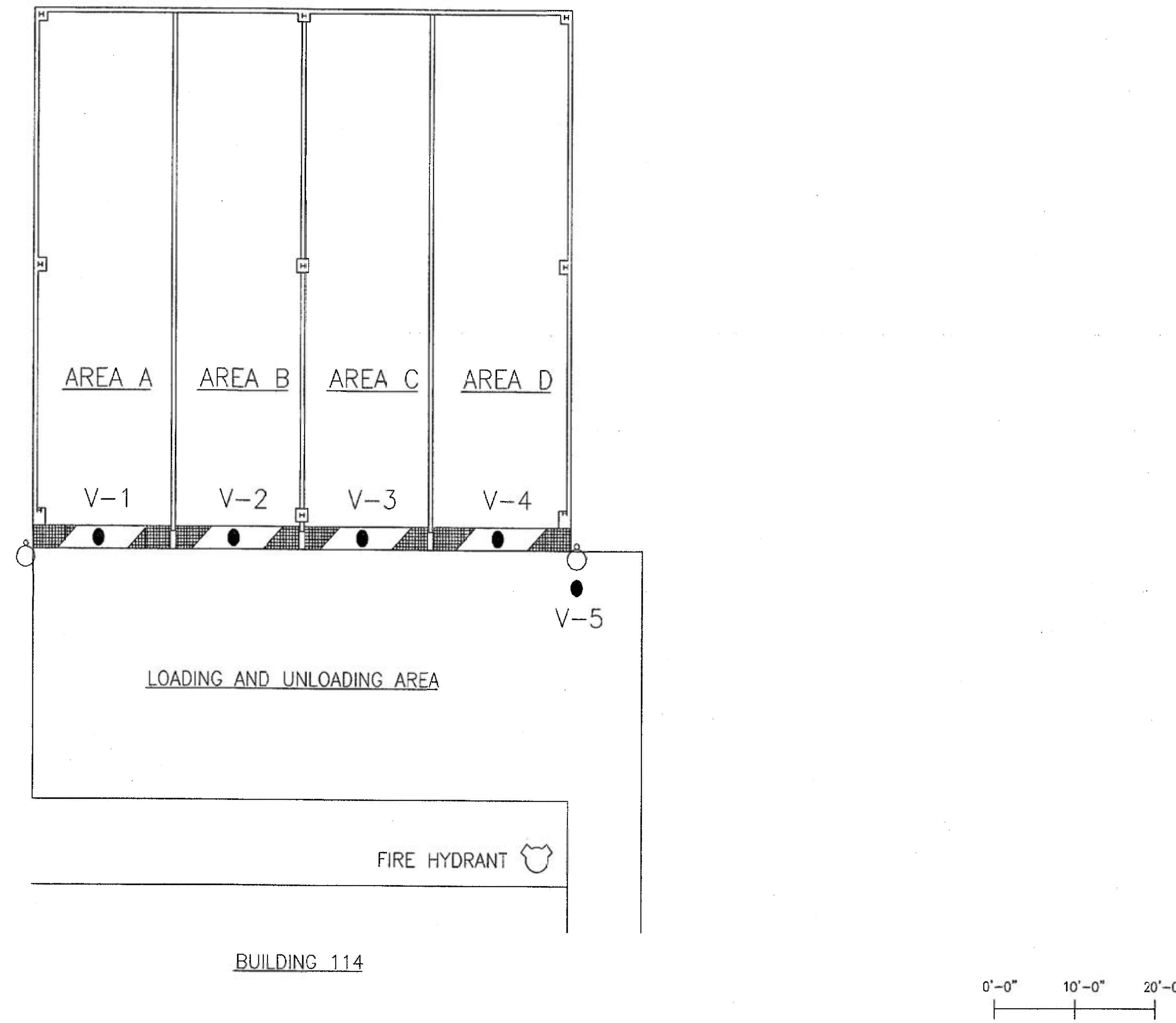
Site: Pacific Science Energetic Materials Company
Address: 3601 Union Road. Hollister, CA

Date: March 2016

Revisions/Notes:

Figure IV-2
Project 2X502

ZONE	LTR	REVISION DESCRIPTION	DATE	APPROVED
--	B	REVISED PER DCN305779	071109 SY	CM



LEGEND:

V-1: VERIFICATION WIPE SAMPLE

NEXT ASSY	USED ON
APPLICATION	
DO NOT SCALE THIS DWG	
CUSTOMER CONTROLLED: YES ☐ NO ☒	
CUST NAME:	

PACIFIC SCIENTIFIC PROPRIETARY
THIS DOCUMENT AND THE DATA DISCLOSED HEREIN OR HEREWITH IS NOT TO BE REPRODUCED, USED OR DISCLOSED IN WHOLE OR IN PART TO ANYONE WITHOUT WRITTEN PERMISSION OF PAC SCI

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DRAWING IAW MIL-T-31000
DIM & TOL IAW ANSI Y14.5M
SURF TEXTURE IAW ANSI B46.1

DECIMALS .XX ± .03 .XXX ± .010
ANGLES ± 5° 125

CONTRACT NO.		
DRAWN BY	A. GARIBAY	02-05-14
CHECKED		
ENGINEER		
QE		
CONFIG MGR		
APPROVAL	C. QUINN	02-06-18
RELEASED		

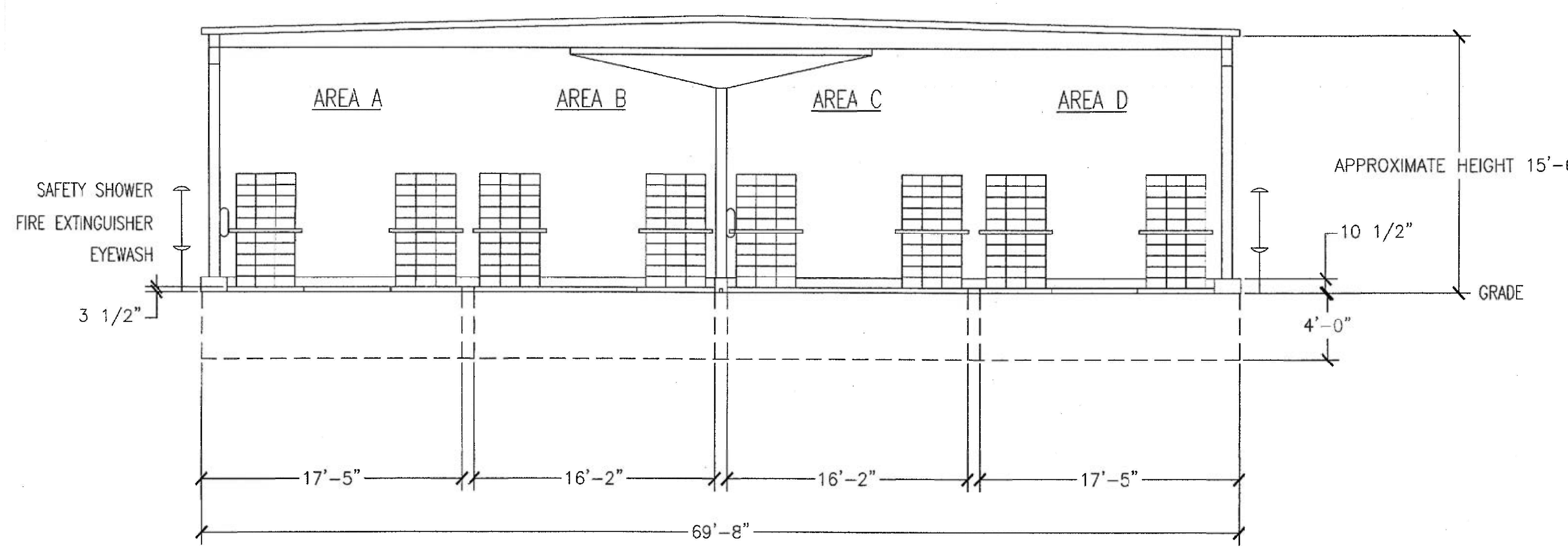
PACIFIC SCIENTIFIC
HOLLISTER, CALIFORNIA

TSU - 3

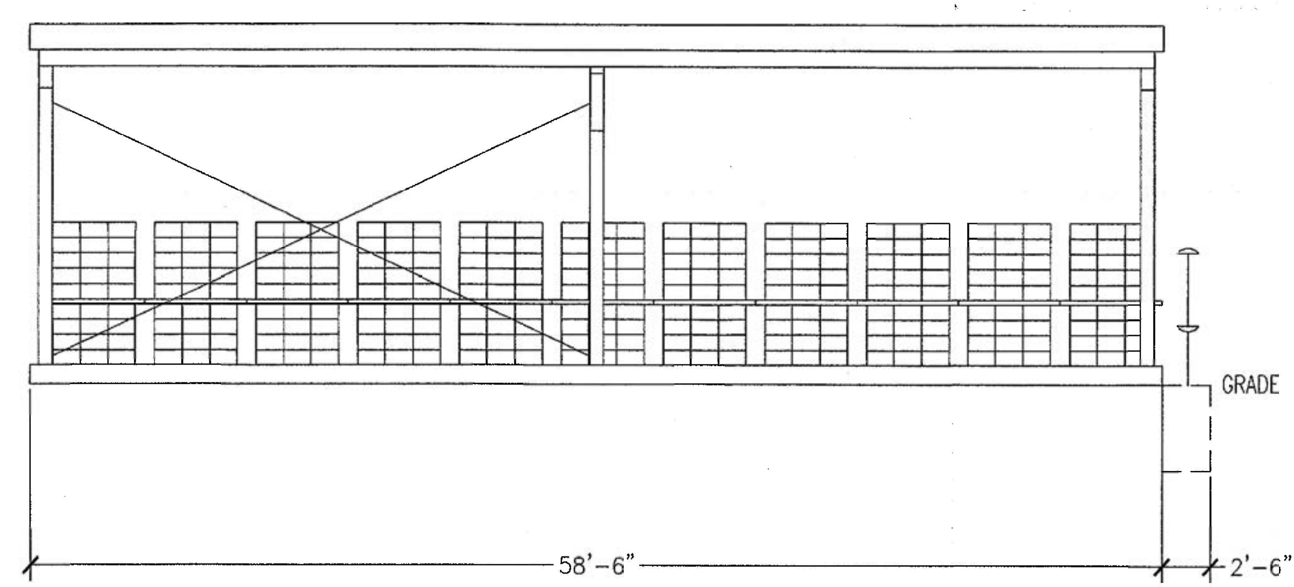
SIZE	CAGE CODE	DRAWING NO.
D	06331	401058

SCALE: 1/8" = 1'-0" CALC WT SHEET 1 OF 1

REVISION				
ZONE	LTR	DESCRIPTION	DATE	APPROVED
--	B	REVISED PER DCN305779	071109 SY	



FRONT ELEVATION



SIDE ELEVATION

0'-0" 5'-0" 10'-0"

NEXT ASSY	USED ON
APPLICATION	
DO NOT SCALE THIS DWG	
CUSTOMER CONTROLLED: YES [ ] NO [X]	
CUST NAME:	

PACIFIC SCIENTIFIC PROPRIETARY
THIS DOCUMENT AND THE DATA DISCLOSED HEREIN OR HEREWITH IS NOT TO BE REPRODUCED, USED OR DISCLOSED IN WHOLE OR IN PART TO ANYONE WITHOUT WRITTEN PERMISSION OF PAC SCI

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DRAWING IAW MIL-T-31000
DIM & TOL IAW ANSI Y14.5M
SURF TEXTURE IAW ANSI B46.1

DECIMALS .XX ± .03 .XXX ± .010

ANGLES ± 5° 125

CONTRACT NO.		
DRAWN BY	A. GARIBAY	02-05-15
CHECKED		
ENGINEER		
QE		
CONFIG MGR		
APPROVAL	C. QUINN	02-06-18
RELEASED		

PACIFIC SCIENTIFIC
HOLLISTER, CALIFORNIA

ELEVATIONS
TSU - 3

SIZE	CAGE CODE	DRAWING NO.
D	06331	401057

SCALE: NONE CALC WT SHEET 1 OF 1

WEBER, HAYES & ASSOCIATES
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

TSU-3 Front View / Elevations

Site: Pacific Science Energetic Materials Company
Address: 3601 Union Road. Hollister, CA

Date: March 2016

Revisions/Notes:

Figure IV-3
Project 2X502

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

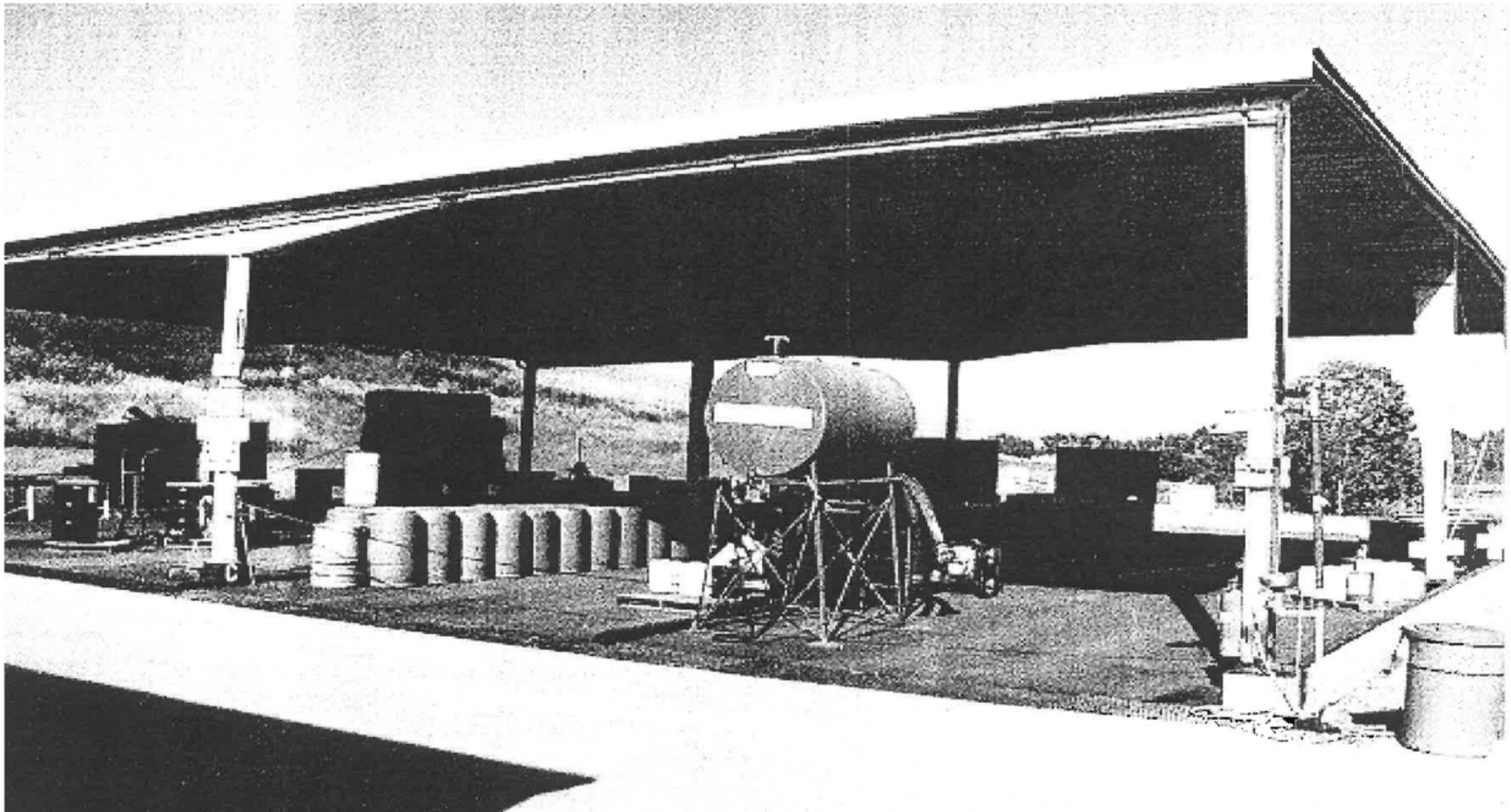
Photograph of TSU-3

Site: **Pacific Scientific Energetic Materials Company**
Address: 3601 Union Road, Hollister, California

Date: March 2016

Revisions/Notes:

Figure IV -4
Project 2X502



TSU-3 is for the storage of containers of hazardous wastes generated at the Facility. Hazardous wastes are segregated into the Bays at TSU-3 based on chemical compatibility.

- Bay A stores caustics, cyanides, sulfides, and aqueous solutions with pH of 5 to 9.
- Bay B stores halogenated hydrocarbons, non-flammable liquids, and aqueous solutions with pH of 5 to 9.
- Bay C stores acids.
- Bay D is used to store flammable liquids, reducing agents, metal catalysts, carbon, fuels, and combustible liquids.

TSU-3 is a roofed structure with open sides having a 6-inch thick reinforced concrete slab surrounded on three sides by a concrete block berm. The unbermed front side of TSU-3 has individual grated sumps for each of the four Bays which prevent run-on and collect spills and any rain which may blow into the Bays. The Bays are separated from each other by reinforced concrete dikes, which are bolted and epoxy bonded to the coated concrete floor of the Bay. Each Bay has an identical max capacity of 192 ea., 55-gallon drums (four drums per pallet, stacked two pallets high).

TSU-1 Building Details

Site: Pacific Science Energetic Materials Company
Address: 3601 Union Road. Hollister, CA
Date: March 2016
Revisions/Notes:

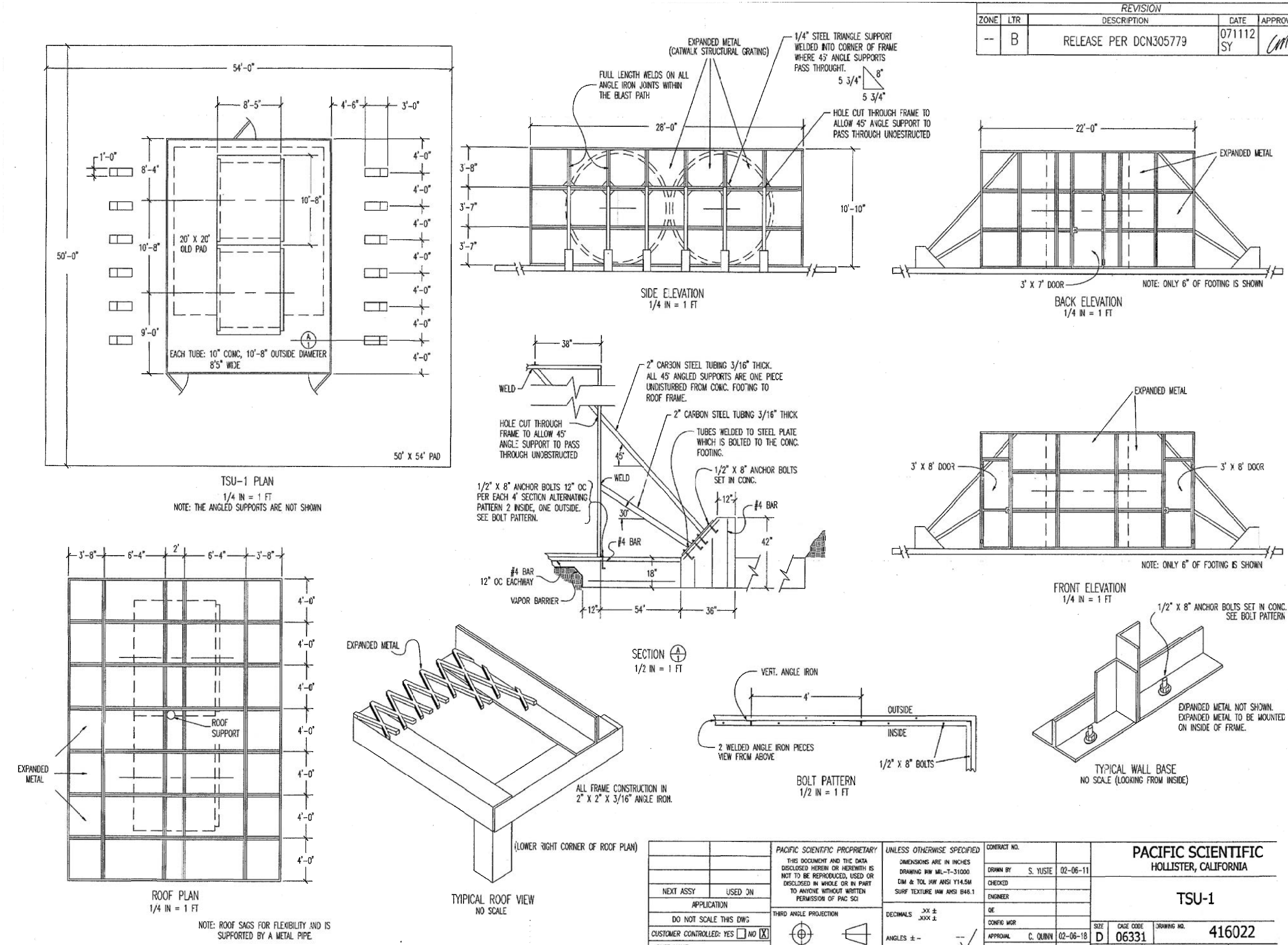


Figure IV-5

Project 2X502

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

Photograph of TSU-1

Site: **Pacific Scientific Energetic Materials Company**
Address: 3601 Union Road, Hollister, California

Date: March 2016

Revisions/Notes:

Figure IV -6
Project 2X502

TSU-1 contains two 10-foot diameter, reinforced concrete pipes (burn tubes) which are enclosed in a reinforced, expanded metal mesh cage (22’ W x 28’ D x 10’10” H). The mesh cage is surrounded by concrete walls, installed in 2002, and on three sides by an earth bank and earth barricades over 15 feet high.

The pipes rest on a six-inch thick concrete slab reinforced with steel bars. The cage is bolted to the concrete slab and structurally supported by cantilever supports attached to external foundation blocks. The dimensions of the concrete slab are 54-foot W x 50-foot D. There is a 66-foot by 62-foot, corrugated metal roof structure over the mesh cage and concrete slab.

The maximum capacity is 500 pounds gross weight of hazardous waste per day for open burning and 100 pounds Net Explosive Weight (NEW) per day for detonation. Not over six (6) pounds NEW of material, which is expected to mass detonate, is allowed in each burn tube.

WEBER, HAYES & ASSOCIATES
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

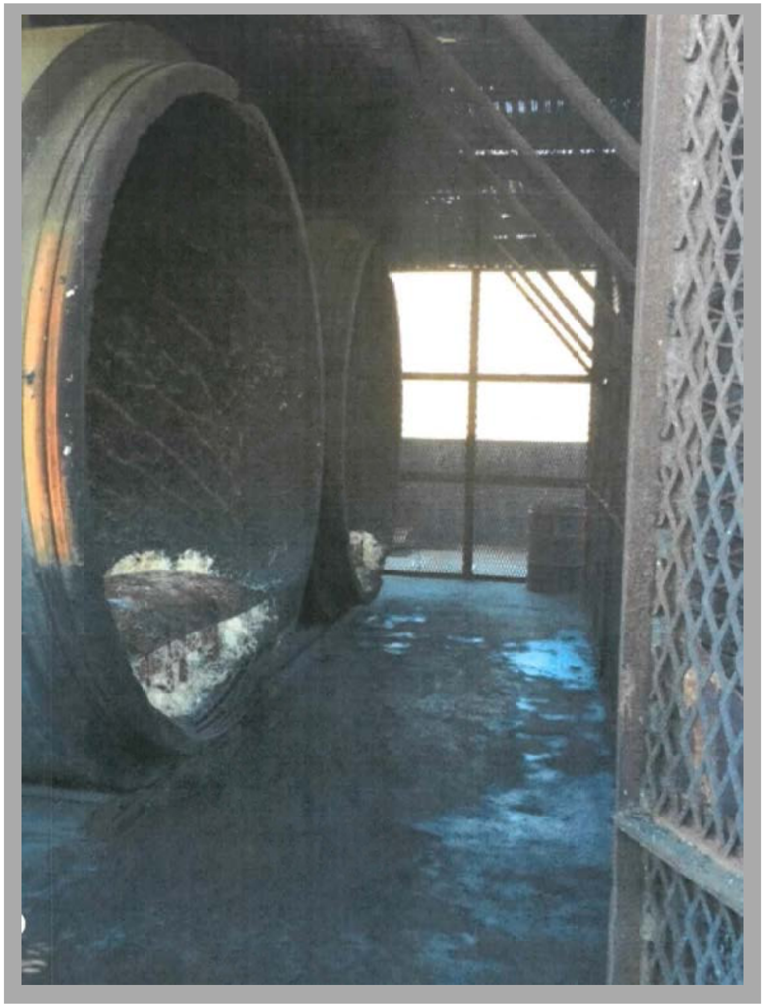
PHOTOGRAPH OF TSU-1

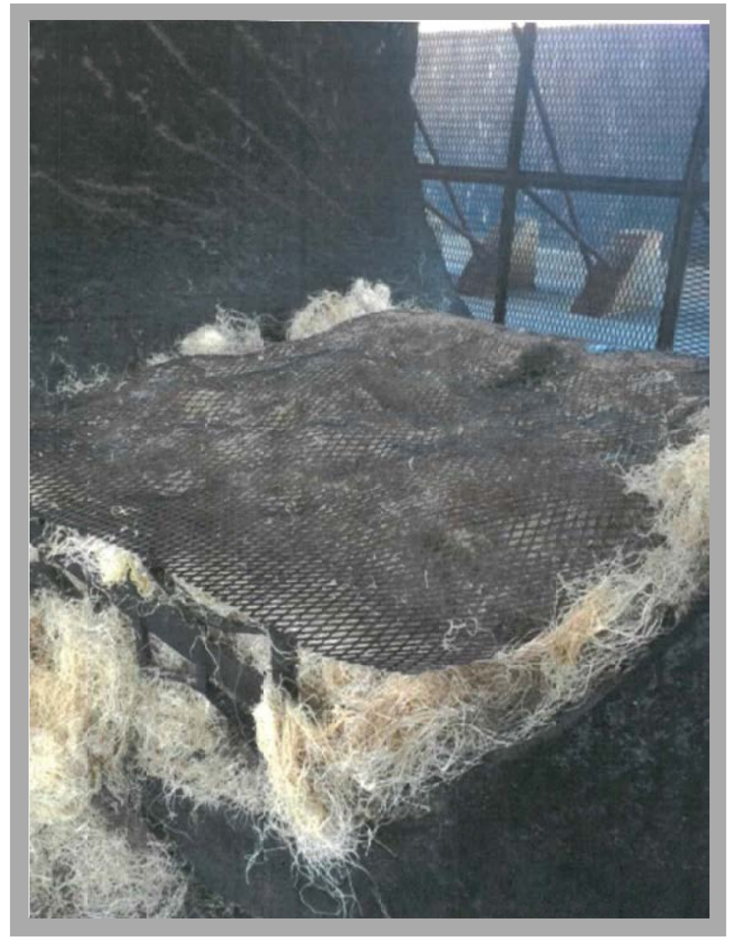
SITE: **Pacific Scientific Energetic Materials Company**
ADDRESS: 3601 Union Road, Hollister, California

DATE: MARCH 2016

REVISIONS/NOTES:

FIGURE IV -7
Project 2X502





Explosive hazardous waste (EHW) and EHW contaminated waste is burned/detonated at TSU-1. Subsequent secondary and tertiary burning is conducted as needed to ensure complete treatment of the reactive materials.

- Over 95% of the EHW treated at TSU-1 is contained in explosive devices made of metal.
- The Explosive Hazardous Waste in Solvents (EHWS) residue from TSU-2 makes up about 5% of the waste treated.
- Ash generation is limited to the cellulose fuel used (shown in photo above, right), to small amounts from EHW contaminated organic material, and to loose EHW in the form of granules, pellets, or billets. Ash from TSU-1 with lead content is collected and managed as hazardous waste through TSU-3. Other ash from TSU-1 is managed as non-hazardous waste, as is scrap metal.

WEBER, HAYES & ASSOCIATES
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

TSU-2 Building Details

SITE: PACIFIC SCIENCE ENERGETIC MATERIALS COMPANY
ADDRESS: 3601 UNION ROAD. HOLLISTER, CA

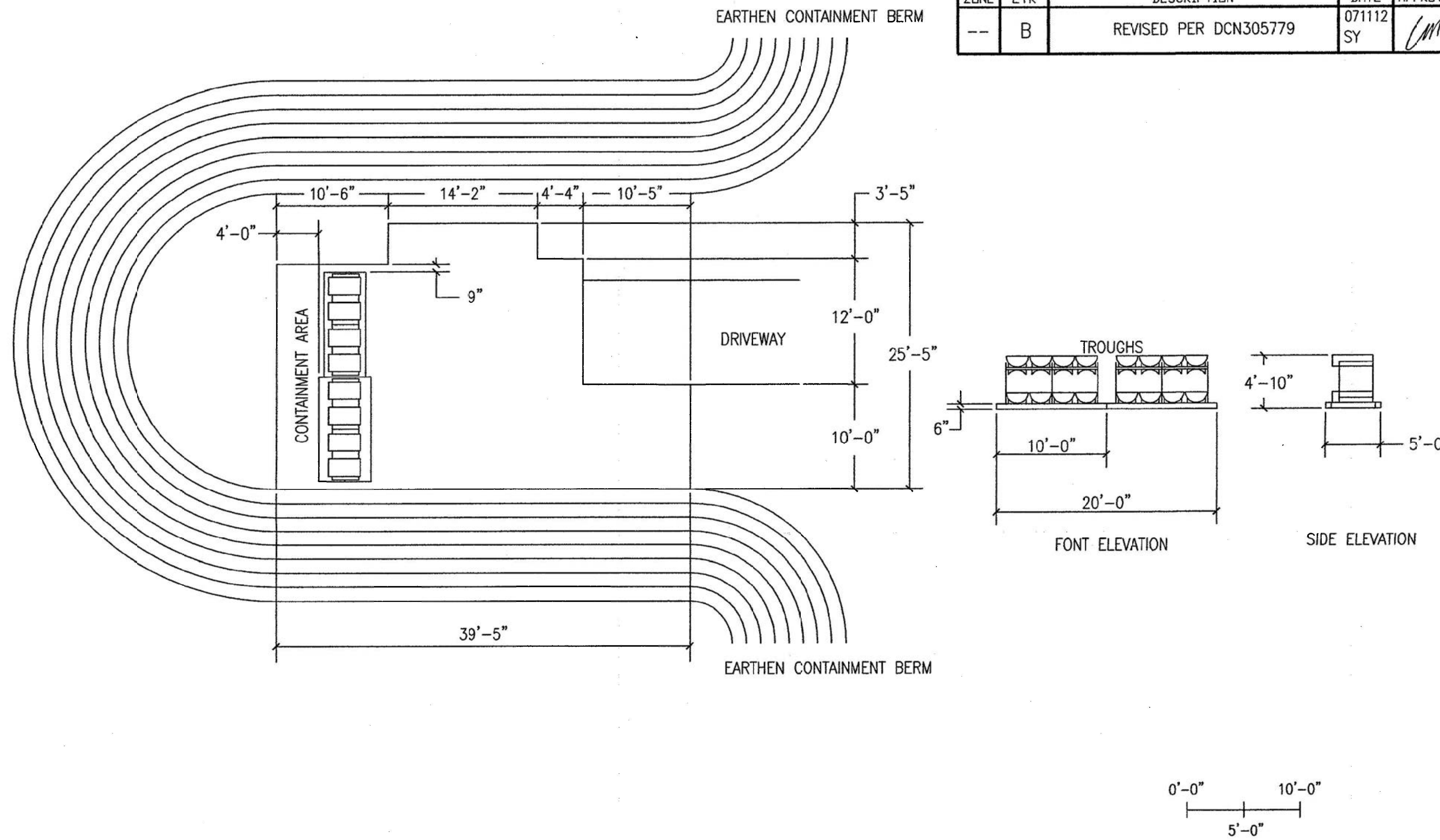
DATE: MARCH 2016

REVISIONS/NOTES:

FIGURE IV-8
Project 2X502

REVISION

ZONE	LTR	DESCRIPTION	DATE	APPROVED
--	B	REVISED PER DCN305779	071112 SY	CM



NEXT ASSY	USED ON
APPLICATION	
DO NOT SCALE THIS DWG	
CUSTOMER CONTROLLED: YES ☐ NO ☒	
CUSTOMER NAME:	

PACIFIC SCIENTIFIC PROPRIETARY
THIS DOCUMENT AND THE DATA DISCLOSED HEREIN OR HEREWITH IS NOT TO BE REPRODUCED, USED OR DISCLOSED IN WHOLE OR IN PART TO ANYONE WITHOUT WRITTEN PERMISSION OF PAC SCI

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DRAWING IAW MIL-T-31000
DIM & TOL IAW ANSI Y14.5M
SURF TEXTURE IAW ANSI B46.1
DECIMALS .XX ± .03 .XXX ± .010
ANGLES ±

CONTRACT NO.		
DRAWN BY	S. YUSTE	02-05-16
CHECKED		
ENGINEER		
QC		
CONFIG MGR		
APPROVAL	C. QIUNN	02-06-18
RELEASED		

PACIFIC SCIENTIFIC
HOLLISTER, CALIFORNIA

TSU-2

SIZE	CAGE CODE	DRAWING NO.
C	06331	401065

SCALE: 1/4"-1'-0" CALC WT SHEET 1 OF 1

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

Photograph of TSU-2

Site: **Pacific Scientific Energetic Materials Company**
Address: 3601 Union Road, Hollister, California

Date: March 2016

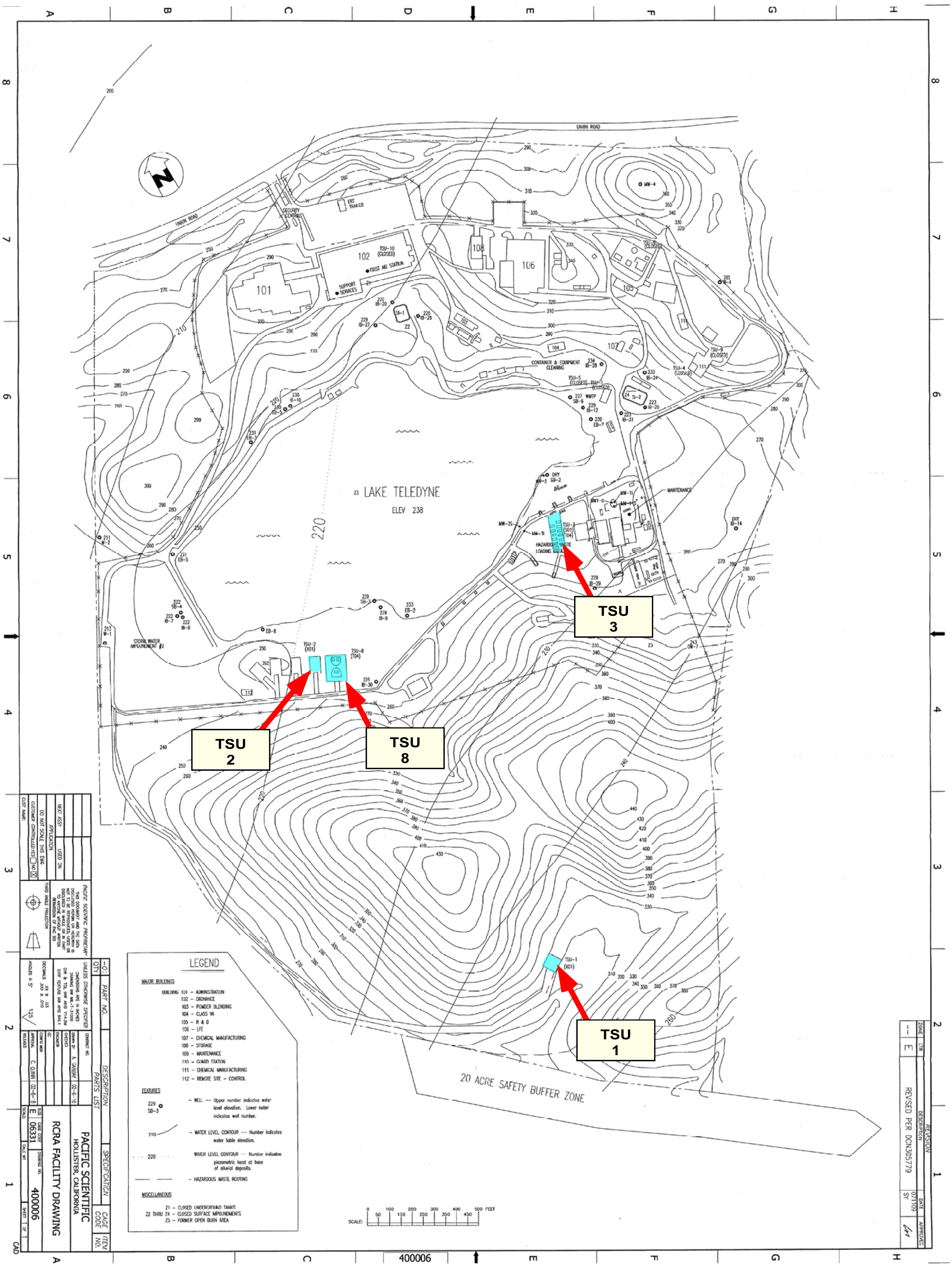
Revisions/Notes:

Figure
IV -9
Project
2X502

Explosive hazardous waste in solvent (EHWS) is burned in open horizontal, split steel troughs supported by steel racks in a double boiler arrangement. Contaminated solvents containing relatively more water or lower volatility are placed in the upper container. The fire is initiated remotely in the lower container. EHWS is not placed into the unit until just before burning is started. The treatment capacity is 300 gallons per day.

Between treatments, the upper troughs contain less than five gallons of material with free liquid and the lower troughs contain dry ash. Residue from TSU-2 is treated in TSU-1 to ensure complete treatment of its reactivity. If empty, the troughs and secondary containment pans are removed (as pictured above) or inverted during expected periods of rain.

TSU-2 consists of four sets of open, horizontal, split steel troughs supported by steel racks in a double boiler arrangement. The troughs are made from 55-gallon carbon or stainless steel drums cut on the height axis to have a volume for 30 gallons of fluid and a five-inch freeboard. Two racks with eight troughs rest in a 0.1875-inch thick welded, stainless steel secondary containment pan. There are two secondary containment pans. One is four feet by ten feet and 0.489 feet deep (146 gallons). The other secondary containment pan is 4.98 feet wide by ten feet and 0.489 feet deep (183 gallons).



WEBER, HAYES & ASSOCIATES
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

TSU-8 SURROUNDING AREA

SITE: PACIFIC SCIENCE ENERGETIC MATERIALS COMPANY
ADDRESS: 3601 UNION ROAD. HOLLISTER, CA

DATE: MARCH 2016

REVISIONS/NOTES:

FIGURE IV-10
Project 2X502

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

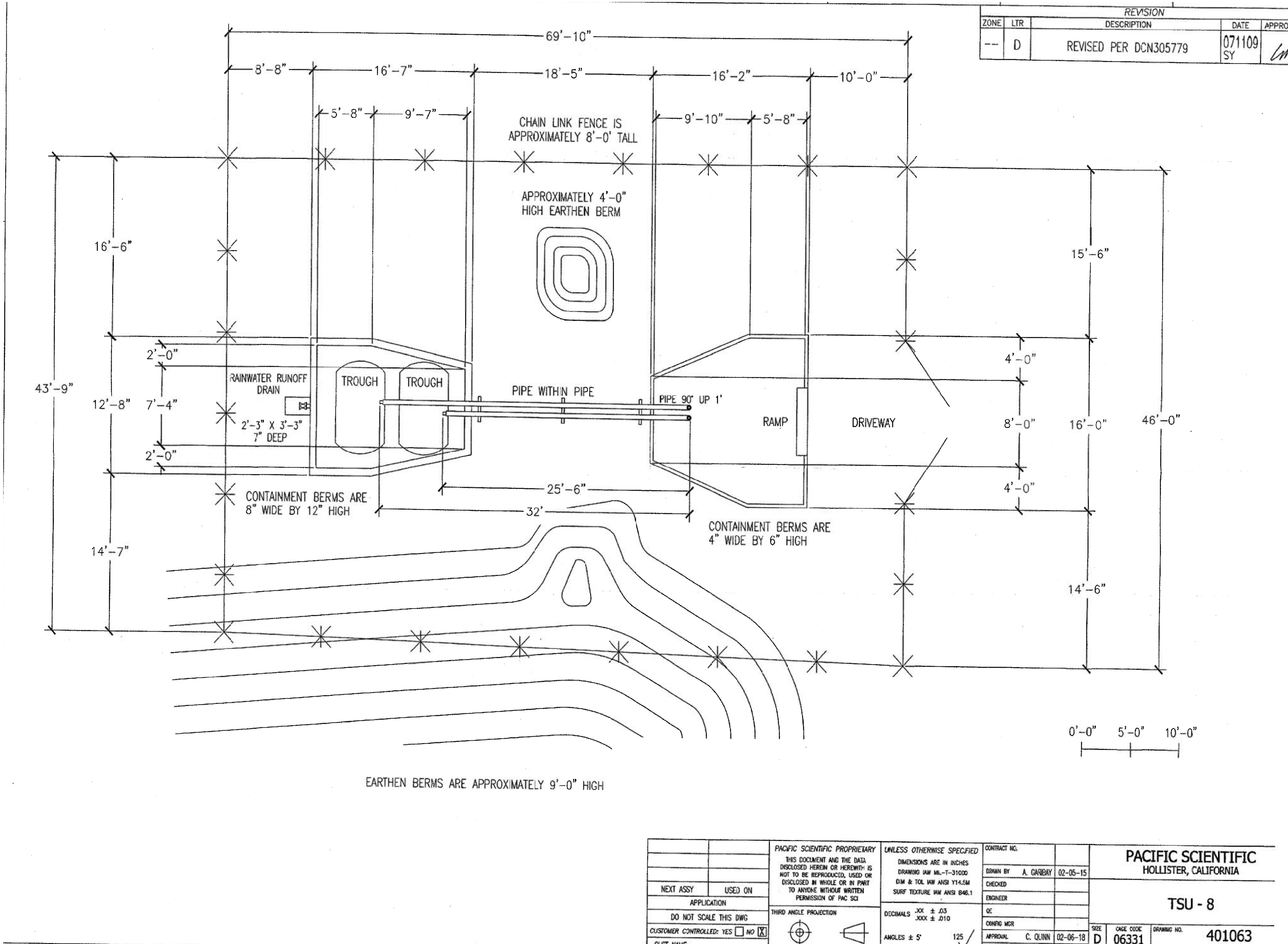
TSU-8 Building Details

Site: Pacific Science Energetic Materials Company
Address: 3601 Union Road. Hollister, CA

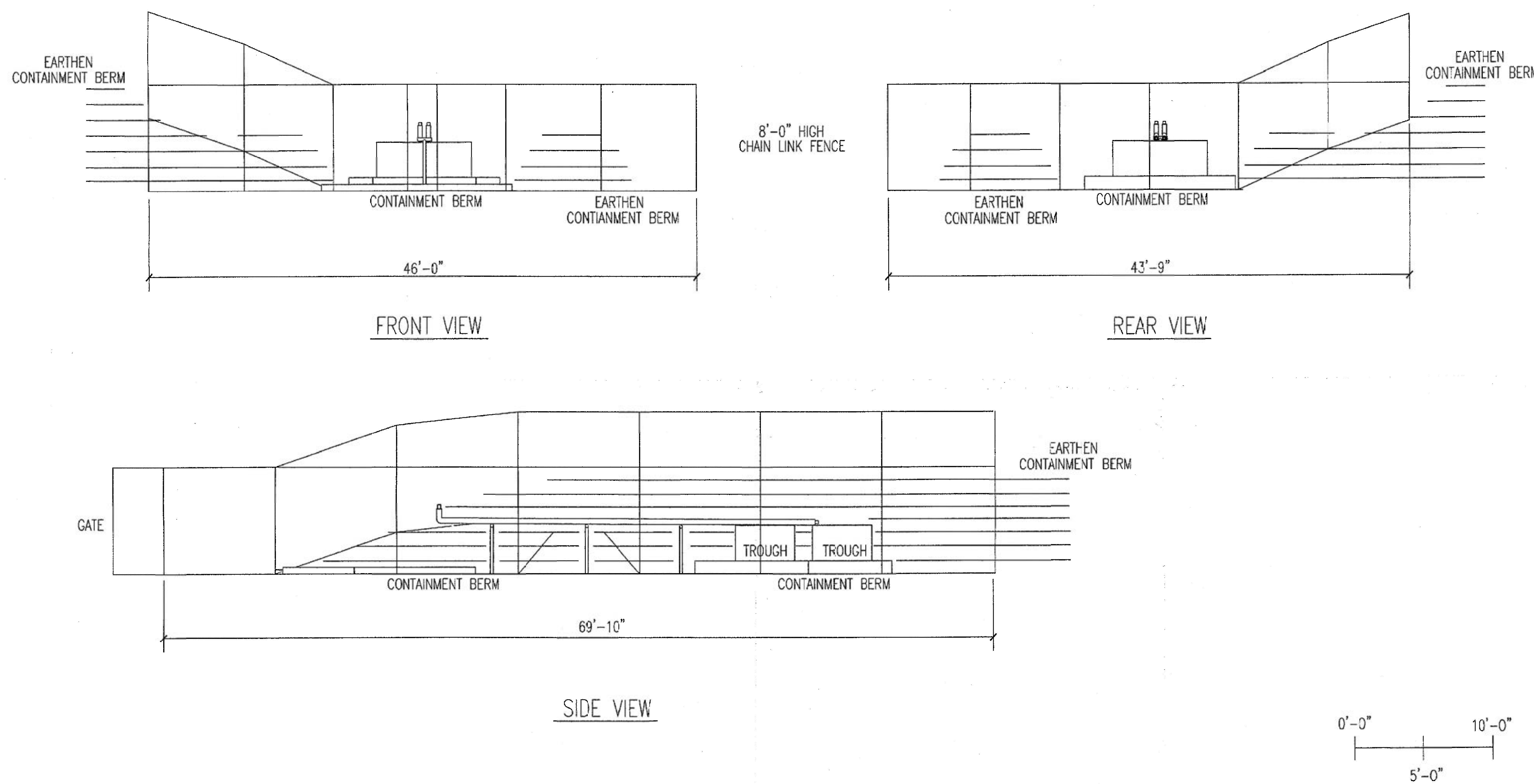
Date: March 2016

Revisions/Notes:

Figure IV-11
Project 2X502



ZONE	LTR	DESCRIPTION	DATE	APPROVED
--	D	REVISED PER DCN305779	071109 SY	



NEXT ASSY	USED ON
APPLICATION	
DO NOT SCALE THIS DWG	
CUSTOMER CONTROLLED: YES ☐ NO ☒	
CUST NAME:	

PACIFIC SCIENTIFIC PROPRIETARY
THIS DOCUMENT AND THE DATA DISCLOSED HEREIN OR HEREWITH IS NOT TO BE REPRODUCED, USED OR DISCLOSED IN WHOLE OR IN PART TO ANYONE WITHOUT WRITTEN PERMISSION OF PAC SCI

THIRD ANGLE PROJECTION

UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
DRAWING IAW MIL-T-31000
DIM & TOL IAW ANSI Y14.5M
SURF TEXTURE IAW ANSI B46.1
DECIMALS .XX ± .03 .XXX ± .010
ANGLES ±

CONTRACT NO.		
DRAWN BY	S. YUSTE	02-05-14
CHECKED		
ENGINEER		
QE		
CONFIG MGR		
APPROVAL	C. QUINN	02-06-18
RELEASED		

PACIFIC SCIENTIFIC
HOLLISTER, CALIFORNIA

TSU-8

SIZE	CAGE CODE	DRAWING NO.
D	06331	401064

SCALE: 1/4" = 1'-0" CALC WT SHEET 1 OF 1

TSU-8

TSU-8 Building Details (Side View)

Site: Pacific Science Energetic Materials Company
Address: 3601 Union Road. Hollister, CA

Date: March 2016

Revisions/Notes:

Weber, Hayes & Associates
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

Figure IV-12
Project 2X502

WEBER, HAYES & ASSOCIATES
Hydrogeology and Environmental Engineering
120 Westgate Drive, Watsonville, CA
831.722.3580 / www.weber-hayes.com

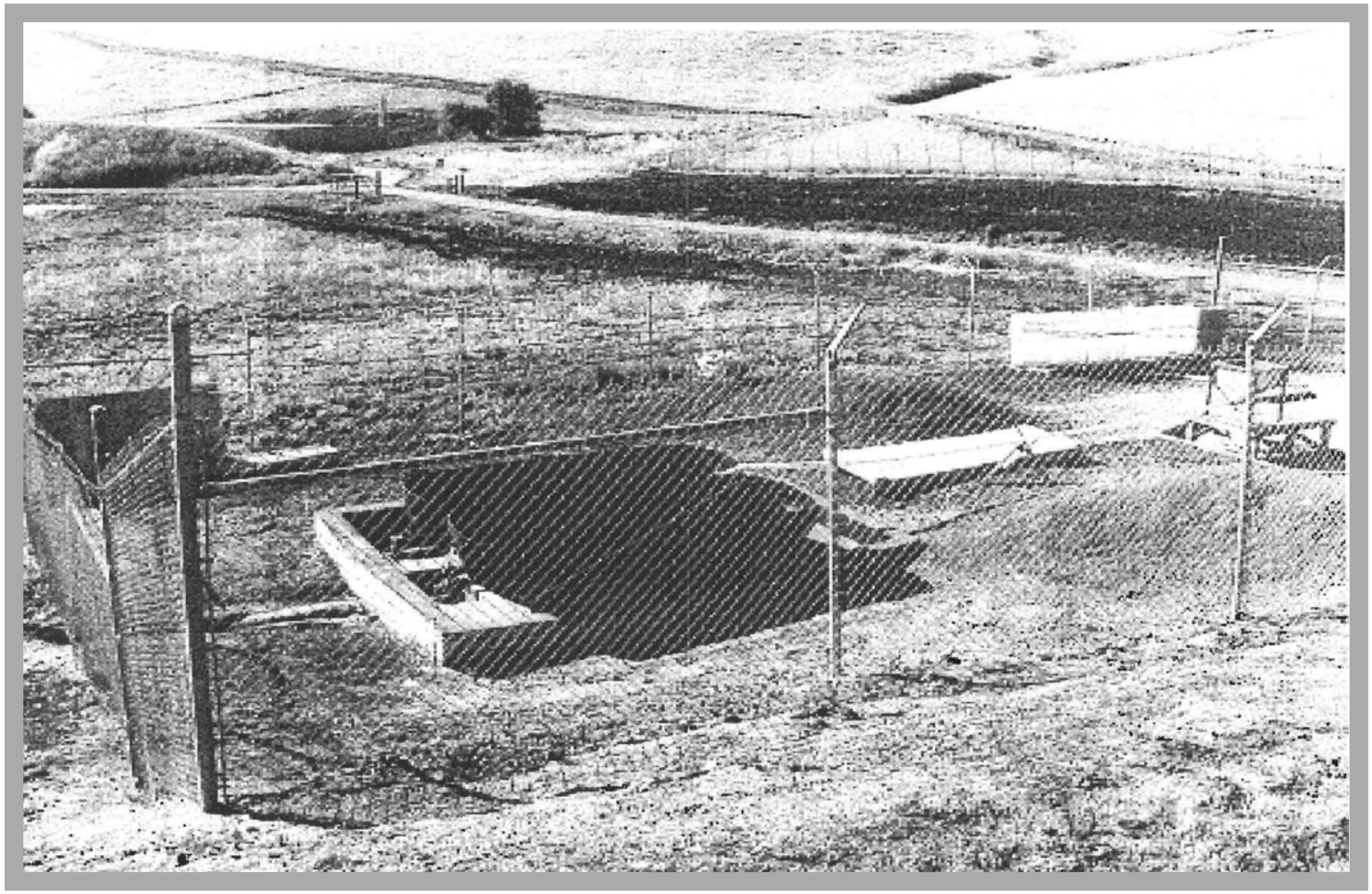
PHOTOGRAPH OF TSU-8

SITE: **Pacific Scientific Energetic Materials Company**
ADDRESS: 3601 Union Road, Hollister, California

DATE: MARCH 2016

REVISIONS/NOTES:

FIGURE IV-13
Project 2X502



TSU-8 consists of two open troughs used to naturally evaporate Safety Bucket water (water-containing explosives). When enough water has evaporated to result in a thick turbidity, the concentrated hazardous waste is transferred to TSU-1 or TSU-2, added to other EHWS and burned. No volatile organic compounds are present in the Safety Bucket Water. Daily evaporation varies from near zero during cold rainy weather when precipitation covers are in place, to over ten gallons during hot, dry, windy weather.

The two evaporation troughs are coated with a 100% solids coal tar polyurethane elastomer (Endura-Flex 1947) coating to a minimum thickness of 100 mils and are located within a concrete secondary containment pad filled by a gravity feed pipe from an unloading area. Safety Bucket Water is siphoned or hand-pumped from a container in an environmental support vehicle into the feed pipes in the unloading area which empty into the evaporation troughs. The feed pipes are pipe-in-pipe construction with a 2-inch diameter stainless steel inner pipe and a 4-inch diameter polyvinyl chloride (PVC) outer pipe. The troughs are constructed of three-sixteenths of an inch thick carbon steel with welded heads. The troughs are half cylinders with slightly domed ends. Each trough is approximately 4.32 feet in diameter and 11.3 feet long.

Chapter IV Table

Hazardous Waste Containers Table

TABLE IV-1. DOT Container Selection*
(for Table III-1. HW Stored in Containers)

Container	Wastes Stored
1A1 or 1H1 (55 gallons)	1, 2, 3, 4, 5, 7, 8, 10, 11, 12, 15, 16, 17, 18, 19, 20, 29, 30, 31, 39, 40, 42, 45, 46, 68, 69, 70, 87, 89, 90, 91, 95, 96, and 97
1A1, 1A2, or 1H1 (55 gallons)	27, 46, 80, and 83
6HA2 or 6HG2 (55 gallons)	61, 63, 66, 67, and 71
1A2 (55 gallons)	21, 54, 55, 60, 98, 22, 23, 99, 100 and 60 (if solid)
1A2 (30 gallons)	47, 48, 78, 79, 81, and 82
1A1 or 1H1 (55 gallons)	If corrosive or combustible: 32, 33, 34, 35, 36, 37, 38, and 83 (OK if flammable)
1A1 (55 gallons)	If flammable: 32, 33, 34, 35, 36, and 37
1A1 or 1A2 (55 gallons)	41, and 43 (all if particle size >45 microns, characterized as an oxidizer); 44, 51, 52, and 53
1H1 (55 gallons)	42, 49, 50, 56, 57, 58, 59, 60, 65, 66, 67, and 71

Original DOT shipping containers used for in plant production, transportation, or magazine storage. Containers shall be non-sparking conductive or non-conductive, and explosive HW may be packaged in anti-static or conductive wrappers. Explosive HW to be stored in compatible magazines.	6, 9, 13, 14, 22, 23, 24, 25, 26, 27, 28, 72, 73, 74, 75, 76, 77, 84, 85, 86, 88, and 94
6HG2 or 6HA2 (55 gallons)	62 (wetted, 30% water), 64 (maximum content weight limited to 250 pounds)
1P1	64

NOTE: These are DOT approved containers for the listed wastes, but they are not necessarily the only DOT approved containers that may be used.

Table III-1 line items (waste Streams) #92 and #93 are empty containers, and as such, do not have containers designated to place them in.

Attachment IV-1

Example Hazardous Waste Label

HAZARDOUS WASTE

STATE AND FEDERAL LAWS PROHIBIT IMPROPER DISPOSAL

IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY, THE U.S. ENVIRONMENTAL PROTECTION AGENCY OR THE CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCE CONTROL

GENERATOR INFORMATION:

NAME ______________________________

ADDRESS ____________________ PHONE ____________

CITY ____________________ STATE ______ ZIP ____________

EPA ID NO. ____________________ MANIFEST DOCUMENT NO. ____________

EPA WASTE NO. ____________ CA WASTE NO. ________ ACCUMULATION START DATE ____________

CONTENTS, COMPOSITION: ______________________________

____

PHYSICAL STATE: ☐ SOLID ☐ LIQUID

HAZARDOUS PROPERTIES: ☐ FLAMMABLE ☐ TOXIC ☐ CORROSIVE ☐ REACTIVE ☐ OTHER ________

[______________________________

____

______________________________]

D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

HANDLE WITH CARE!

BRADY® SIGNMARK® DIV.

Attachment IV-2

Notice of Waste Material, Form 1572-1, 3/02

PSEMC

Notice of Waste Material

Generator

Accumulation Date: ____________________ Name: ____________________

Pre-production/Post-production *(circle one)* Date: ____________________

Maintenance: ____________________ Department/Location: ____________________

Other: ____________________ Job No./Log No.: ____________________

Waste Identification

Description of Waste	Hazard Class	Quantity	Waste Determination
Main Components %	☐ Toxic	☐ Gallons ______	☐ Laboratory Analysis
	☐ Flammable	☐ Lbs ______	Method: ______
	☐ Corrosive	☐ Grams ______	Date: ______
	☐ Reactive	☐ Exp. Net Wt. (lbs) ______	☐ Direct Composition
	☐ Explosive	☐ Other ______	pH: ______
			Determination by: ______

Container Description and Storage Location

Number of Containers: ____________ Description *(DOT Type, Material)*: ____________

Containers – Sealed and Labeled: ☐ Yes ☐ No Storage Locations: ____________

Remarks: ____

Department 120

Waste Treatment and Disposition

Waste Stream No.: ____________________ LDR: ☐ Yes ☐ No

EPA Hazardous Waste No.: ____________________ State Waste No.: ____________________

LDR Treatment Standard: ____________________ Subcategory: ____________________

☐ Waste Waters (CFR 40, 268.7 (a) CFR 40, Section: ____________ Table: ____________

☐ Non- waste Waters (CFR 40, 268.7 (a)

Disposition: ____

Remarks: ____

Department 120 Signature: ____________________ Date: ____________

Attachment IV-3

Standard Operating Procedure: *Treatment of Hazardous Waste*,

SOP No.235074

PACIFIC SCIENTIFIC EMC-California Operations	STANDARD OPERATING PROCEDURE	SOP 235074, Rev. F Affects: Dept. 37 Date: September 27, 2005 Page 1 of 9

SUBJECT: TREATMENT OF HAZARDOUS WASTE

Date/Prepared By:	Date/Approval	Date/Approval	Date/Environmental	Date/Safety

SUMMARY OF CHANGES

- Document has been significantly revised and is to be read in its entirety.
- For forms mentioned in this document, contact Document Control.

1.0 PURPOSE AND SCOPE

This procedure provides instructions and specifications for safe treatment of ordnance waste in compliance with Federal, State and local laws and regulations

1.1. **Type of Operations**
Thermal treatment of reactive wastes by open burning.

1.2. **Location/Area**
The Ordnance Treatment Facility (TSU-1) and the Solvent Burning Facility (TSU-2).

1.3. **Items Involved**
Scrap ordnance hardware, loose powders, machined propellants and explosive contaminated waste (solids and free liquids).

2.0 SAFETY

2.1. **General**
Materials to be treated have one or more reactive, flammable or toxic characteristics. Personnel performing ordnance treatment must be trained in the hazards and comply with all the safety rules and regulatory limitations specified in this procedure. This section provides general information on material hazards and general safety conduct. More specific safety precautions and regulatory limitations are listed in the relevant sections.

2.2. **General Safety Guidelines**

a. Work Condition
Collection, delivery and preparation of materials for treatment should be made in a humid atmosphere (relative humidity 30% or higher). Maximum utilization of the early morning hours for these tasks is desirable. Preparations shall be halted if wind speed exceeds 15 miles per hour or if an electrical storm prevails during operations.

b. Personnel Limits
All ordnance treatment operations shall be conducted by a minimum of two (2) operators. The maximum personnel at the site shall be three (3) operators and three observers.
Note: The Environmental Team Leader may waive the maximum personnel limit requirements for specific operations.

c. Personal Protective Equipment (PPE)
Minimum PPE shall include safety glasses, fire retardant shop coats, safety shoes, and gloves. Additional PPE is identified for specific tasks.

d. Blasting
Operator I – refer to PSEMC Form 1931, "*Explosive Treatment Checklist*"

1. Pre-operations Testing
   Prior to commencing with explosive treatment operations, the blasting circuit shall be checked for extraneous electricity using a voltmeter or a radio pilot lamp of known, good quality (or similar device). Perform the SD 100 blaster internal test, blasting circuit continuity test, and voltage test per manufacturer's instructions. (Refer to Safety Devices SD-100 Blasting Control, Appendix 1)
2. Operations
   Verify prior to entering Ordnance Treatment Areas (OTAs) that the power ends of the circuit leads are shorted and grounded and, where applicable (ordnance burn tube) the safe and arm plug shall be put in the "safe" position. Upon exiting to the blasting location, the safety and arm plug shall be in the "arm" position.
3. Have sole control of the blaster.
4. Prepare the blasting squib or other initiating device.
5. Before completing the circuit at the blaster and signaling for initiation, Operator I shall confirm that everyone in the vicinity is in a safe place

e. Escape Routes
   Keep all escape routes and pathways to vehicles free of obstruction.

f. Transportation
   Upon arrival at the OTA, the transport vehicle shall be unloaded as soon as is practical and withdrawn to a safe location prior to commencing with treatment operations and oriented toward direction of escape.

g. Safety Equipment
   A working fire extinguisher rated for A and B fires and a tested safety shower shall be available.

h. Radio/Cell Phones
   Except in an emergency, there shall be no radio transmission or cell phone use from within 150 feet of an ordnance treatment operation.

i. Combustibles
   No exposed combustible materials (dry grass, boxes, excelsior, etc.) shall be left in the OTA.

j. Waiting Period
   48 hours must elapse prior to the next burn unless the burned-over area has been saturated with water and has passed a safety inspection.

   Note: The "saturation" method shall apply only to those non-sheathed propellants and powders amenable to open burning without detonation.

2.3. **Material Safety Data**

a. Explosive Hardware
   This includes spools, metal tubes, initiators, detonators, gas generators and shaped charges of various diameters, all filled with high explosives, propellants or rapid deflagrating materials (RDM).
   High explosives such as RDX or HNS have relatively lower sensitivity than initiating materials.

They will not ignite or detonate unless subjected to a strong stimuli such as a blast impact, high temperature, or electrical discharge. Activation may result in a destructive, deadly shock wave and high-energy fragments.
Rapid deflagrating materials are far more sensitive than high explosives, particularly to electrostatic discharge or heat. Activation will result with flash fire, normally with no massive detonation.

WARNING: Burning RDM or PETN may activate high explosives.

1. Handling
   i. All explosive hardware should be handled in a humid atmosphere (relative humidity 30% or higher). The early morning hours are preferred, although humid afternoons are also appropriate.
   ii. Attempt to minimize movement of explosive hardware as much as possible.
   iii. Avoid shock, friction or heat.
   iv. In general, handle all hardware as if highly sensitive.

b. Loose Powders

Powders may differ in their sensitivity and other hazard characteristics. High explosives will usually burn but may detonate, while propellants (RDMs) may undergo rapid combustion.

1. Read the label and study the identification of the powder.
2. Open powder container only at the treatment area.
3. Containers with sensitive powder shall not be opened.
4. Powders should be handled in a humid atmosphere (relative humidity 30% or higher).
5. Do not subject powders to heat, static or strong impact.
6. Use a cartridge respirator with dust pre-filters, goggles and impervious gloves when dispersing powder.
7. Powders shall be dispersed onto the surface of the burn pile from as low of a distance as practicable as to avoid the generation of electrostatic discharge.

c. Ordnance Devices

Devices sent for treatment may vary in their explosive load and sensitivity.
Load may consist of high explosives, initiators, RDMs, propellants or a combination of the above. Some parts may be activated by a small impact or static discharge, while others have much lower sensitivity.

1. Handling
   i. Avoid excessive shock, friction, impact, etc.
   ii. When uncertain of device status, handle device as if highly sensitive.
   iii. Do not place primers near hardware containing high explosives.

Machined Propellants

These materials have relatively lower sensitivity than initiators and would normally burn rather than detonate.

WARNING: When exposed to a detonation shock wave, these materials may detonate.

d. Explosive Contaminated Solids

Primarily includes shredded propellants, Kimwipes and gloves contaminated with residual amounts of explosives.

WARNING: Despite segregation efforts, this waste stream may also contain small ordnance hardware.

e. Explosive Contaminated Solvents
This includes flammable solvents such as acetone, IPA methanol, THF and pyridine which are contaminated with various amounts of explosives or RDMs. Primary hazards are the flammability and the toxicity of these volatile solvents. Highly loaded solvents may have explosive characteristics as well.
   1. Handling
   Use half-face organic vapor respirator (full-face if THF is present), chemical goggles and rubber gloves.

f. Explosive Contaminated Water
Such water normally presents very low explosion hazards unless water contains large amounts of lead azide. Principle hazard is the toxicity of the contaminants.

3.0 ORDNANCE BURNING (TSU-1)

3.1. Explosive Limits

The amount of explosives (hardware, powder, explosive contaminated paper, etc.) allowed at TSU-1 shall be limited to the amount that will be burned during a single operation. No other explosives, explosive contaminated materials, etc., shall be left at the facility during operations. The amount of explosives to be burned per day shall not exceed 100 pounds net explosive weight (NEW) or 500 pounds gross weight.

Note: Materials having a propensity to mass detonate should be limited to six (6) pounds NEW per operational tube.

3.2. Equipment

Equipment needed for explosive burning is listed in PSEMC Form 1931, "*Explosive Treatment Checklist*".

3.3. Procedure

a. To best utilize the morning hours for ordnance waste treatment, all preparations, which do not involve handling of explosives, shall be completed before the burn day. This includes checking road conditions and verifying the integrity and availability of operational equipment and safety gear.

b. On burn day, contact the California Department of Forestry (CDF) at 831-637-4474, for permission to burn. Call the ARB Burn Status Recording to confirm it is a positive burn day (1-800-225-2876). Notify the receptionist and/or Security Central of the upcoming operations.

c. Collect all equipment required for the operation. Complete the *Explosive Treatment Checklist*.

d. Collect explosive materials to be treated from assigned magazines.

e. Proceed from the magazine to the OTA by the most direct route available. Do not haul explosives through industrial areas.

f. Perform pre-operations testing in accordance with 2.2 (d) (1) of this document.
g. Put safe and arm in "safe" position.
h. After unloading vehicle, conduct a radio check with Security Central ("Control").

Important: While performing steps "i" through "u", wear earplugs, safety glasses and shop coats.

i. Lay shredded excelsior base under the expanded metal grate and a thin layer over the expanded metal grate.
j. Evenly distribute a layer of explosive contaminated waste, containing mostly paper.
k. Continue laying alternate layers of excelsior and explosive waste until all waste is in place. Loose powders shall be carefully spread evenly over the pile. Highly loaded hardware or machine propellants shall be spread apart as much as possible.
l. Inspect and clear the cage. Place all tools, containers, materials, etc., in a safety location.
m. Prepare a fire trail: lay excelsior and loose propellant (preferably black powder) from the burn pile toward the west exit, two (2) to four (4) feet long.
n. Attach a squib or similar device to the detonator leads. Place the device in a small mound of propellant.
o. Evacuate and lock the cage.
p. Close fence gate.
q. Put safe and arm in "fire" position.
r. Withdraw to blasting point.
s. Remove shunt and connect circuit leads to blaster.
t. Visually verify that the area is clear and confirm that everyone in the vicinity is in a safe place. Sound three (3) three-second blasts with the vehicle horn. Shout, "Fire in the hole!"
u. Fire by lifting red firing switch guard and pressing fire switch. Notify Security ("Control") that "Initiation has been completed."
v. Remove circuit leads from blaster, shunt and ground circuit leads.
w. <u>Misfire Procedure</u>
   1. If fire is not heard, wait 30 minutes than repeat steps "l" through "u", as required.
x. From a safe vantage point, observe the area for 15 minutes to ensure fire containment. If spread of fire is observed or suspected, notify Security and withdraw.
y. Return blaster equipment and unexpended materials to appropriate storage.
z. Second and third burns (as required) are performed by re-piling all dispersed materials and repeating steps "f" through "x". Additional burns are necessary only if sounds during previous burns indicate that undestroyed ordnance may still exist.
aa. The tube shall be cleaned of all solid waste not earlier than one (1) workday following the burn.

4.0 CLEAN UP OF ASH AND DEBRIS=

4.1. **General**

Prior to clean up, a mist shall be sprayed over the ash and debris in an effort to minimize the stirring of lead particulate during clean-up operations.

4.2. **PPE**

A *tyvek* suit including hood and booties shall be worn during clean up. In addition, gloves and a half-face air-purifying respirator with HEPA filters shall be worn. Contaminated *tyvek* suits and gloves shall be disposed of as hazardous waste in accordance with EH&S 001, "*Hazardous Waste Management*". Respirators shall be cleaned in accordance with Safety Instruction 299006, "*Respirators Selection and Use*" and standard cleaning procedures.

5.0 SOLVENT BURINING (TSU-2)

5.1. **Explosive Limits**

The amount of explosive contaminated solvents allowed at TSU-2 shall be limited to the amount that will be burned during a single operation. No explosive contaminated material shall be left at the facility during a solvent burning operation. The amount of explosive contaminated solvent to be burned during any single day shall not exceed 300 gallons.

5.2. **General**

a. Burning of explosive-contaminated solvents shall be done at TSU-2.
b. Preparation and burning should be performed in the morning hours in order to avoid excessive evaporation.

5.3. **Materials**

a. Half-drums and stand
b. Gravity siphon pumps
c. Excelsior
d. Blaster
e. Portable magazine with squibs.

5.4. **Procedure**

a. Collect all equipment required for the operation. Complete the *Explosive Treatment Checklist*.
b. On burn day, contact the California Department of Forestry (CDF) at 831-637-4474, for permission to burn. Call the ARB Burn Status Recording to confirm it is a positive burn day (1-800-225-2876). Notify the receptionist and/or Security Central of the upcoming operations.
c. Bring equipment and materials to be burned to TSU-2.
d. Barricade road at both sides; activate warning (rotating) lights and barricade lights.
e. Conduct a radio check with Security Central ("Control").
f. Perform pre-operations testing per 2.2 (d) (1), "Pre-operations Testing".
g. Shunt firing circuit, as required.
h. Make a fire bridge among half-drums using excelsior at the near end.
i. Ground drum with grounding wire.
j. Ground stainless steel pan.
k. Solvent shall be delivered to respective half-drum as follows:
   1. Solvent with high content of water – higher half-drum

2. Other solvents – lower half-drum

l. Siphon solvent into drums.
m. Allow four (4) inch freeboard minimum. If solvents are heavily loaded with explosives, freeboard shall be at least six (6) inches.
n. When solvent level has reached the desired freeboard, stop the pump by opening the anti-siphon valve.
o. Proceed, as described above, until all solvent has been delivered, but not more than 300 gallons of solvent.
p. Remove all equipment to a secure place.
q. Connect squib or similar device to extension wires.
r. Attach the device to one of the half-drums just above the liquid.
s. Close local barricade and withdraw to operation point at the control house of the Test Department.
t. Visually verify that area is clear, and that everyone in the vicinity is in a safe place. Sound three, three-second blasts with the vehicle horn. Shout, "Fire in the hole!"
u. Notify Security Central ("Control") that "Initiation has been completed".
v. Fire by lifting red firing switch guard and pressing fire switch.
w. Remove circuit leads from blaster and shunt circuit leads.
x. In case of uncontrolled fire, notify Security and withdraw.
y. <u>Misfire Procedure</u>
   1. If no fire is observed, wait 15 minutes and repeat steps "s through "y" of this section, as required.
z. After solvent completely burns, open road barricade, turn off warning light, and open local barricades.
aa. Return all equipment to proper storage.
bb. A PSEMC employee certified by the State of California in reading smoke opacities shall be present at all solvent burning operations and shall observe the first 30 minutes of each burn. For the remainder of the burn, a State certified person shall be made available at the facility to make readings if a determination is necessary. Record all findings per Monterey Bay Unified Air Pollution Control District (MBUAPCD) Permit No. 11727 on the "Burn Log" section of the "*Explosive Treatment Checklist*".

Appendix 1
Safety Devices SD-100 Blasting Control

Firing Voltage	Capacitance	External Input Power
510 volts - internal	2 ea 1100 MFD@ 450 volts in series (550 MFDS total)	12 volts DC @ 2.6 amps

Series Parallel = 20 series of 40 caps each
Series Parallel = 50 caps
Series Secondary = 100 caps above ground only, short leg wires.
Use caution in extremely wet ground. Allow for 50% loss due to leakage current in highly conductive ore body or water or boreholes. Keep connections (splices) out of water and insulate.

OHMS CALIBRATION:
Insert OHMS test plug into marked OHMS CHECK. Clip alligator leads together and while holding OHMS switch on OHMS position, adjust CAL knob until meter reads zero. The meter needle will be deflected to the right side of the OHMS scale on the meter.

OHMS TEST:
After making the OHMS calibration test, clip the alligator test leads directly to the lead wires again pressing the OHMS switch. Read the resistance of the circuit and continuity in one easy check.

POWER:
Select the mode of power desired. "INT" = internal or "EXT" = external by switching the INT-OFF-EXT switch to either INT or EXT (INT = internal battery and EXT = truck or jeep power). Observe + and -. Leave the unit on "INT".

VOLTAGE
Press VOLTS SWITH and read safety firing voltage, indicated by a green arc on the meter scale, 400 – 600 volts DC. If voltage is not within green arc replace battery or switch to "EXT" and use an external power source.

FIRING HOOK-UP:
Connect the lead wires to the firing posts. Strip the insulated wire back $^{3}/_{8}$ inches by grasping between the thumb and index finger. Push down while feeding.

FIRING:
Lift the read firing switch guard.
CLEAR AREA FOR FIRING:
Press the firing switch firmly and release

MAINTENANCE INSTRUCTION WARNING
Switch the INT-OFF-EXT switch to the off position and discharge the capacitors prior to performing any maintenance.
REPLACING THE BATTERIES:
1. Remove the two sided chassis retaining screws.
2. Remove the chassis from the case by lifting the chassis straight up and out.
3. The silver chloride cell is removed by first removing the two nuts and wires from the cell. IMPORTANT: the red wire must go to the positive (+) sign on the battery.
4. The high voltage battery is removed and replaced by first removing the four counter-sunk screws in the right side of the chassis. Remove the battery holder with the battery. When replacing the battery, reverse this procedure making sure the positive (+) and the negative (-) are observed. The battery is inserted in such a manner that the offset connectors make proper contact with the battery. Shim if necessary to avoid any play or battery movement within the case.

WARNING:
This device should be maintained by competent technicians since operating voltages are lethal. Ensure the unit is discharged and the battery unplugged prior to performing any maintenance.
NOTE:
Leave INT-OFF-EXT switch on "INT" position when not in use and all other times to keep capacitors formed.
1. EXT = 12 volt external power supply.
2. OFF = service, turn to OFF and discharge capacitors by firing into 10 ohm (Ω) load resistor with a power rating of 10 watts or greater.
3. INT = normal use internal battery.

Attachment IV-4

Results from Bioassay Evaluation of Wastewater,

Marine Bioassay Laboratories, 8/3/87

MARINE BIOASSAY LABORATORIES

1234 HIGHWAY ONE
WATSONVILLE, CA 95076
(408) 724-4522

03 August 1987

Teledyne, McCormick-Selph
3601 Union Rd.
Hollister, CA 95023

ATTN: Ben Cohen

From 24 June to 28 June, 1987, Marine Bioassay Laboratories (MBL) conducted a bioassay evaluation of a sample of wastewater received from Teledyne McCormick-Selph.

The procedure used by MBL was that described in the 15th Edition, "Standard Methods for the Examination of Water and Wastewater," modified to accommodate the objective of the study.

The study objective was to determine whether the sample should be classified as hazardous waste according to the criteria established by the California Department of Health Services in the CAM regulations, Section 66696. These criteria state that wastes are to be classified as hazardous if aquatic biossays conducted with fathead minnows produce LC50 values less than 500 parts per million (ppm).

MBL tested the sample at five concentrations; i.e. 5000 ppm, 2500 ppm, 1000 ppm, 500 ppm and 250 ppm with fathead minnows. Test specifications and results are summmarized on the following pages.

Test concentrations for these samples were prepared on a volume/volume basis (ppm as ml/liter). The required volume of sample was measured and mixed with dilution water immediately prior to test initiation. The sample was maintained at 5°C from time of receipt until the test began.

No mortality of test organisms was observed after 96 hours exposure, thus demonstrating that the Teledyne McCormick-Selph wastewater sample has an LC50 of greater than 5000 ppm, considerably higher than the CAM, Section 66696, criteria of 500 ppm. The sample is, therefore, non-hazardous as defined by this criterion.

Raymond P Markel
Laboratory Director KG

Summary of Experimental Conditions

Constituent	Mean	Std Dev.	Maximum	Minimum
Dissolved Oxygen (mg/l)				
Wastewater	7.2	0.86	6.4	7.6
Control	7.4	0.42	6.8	7.6
Temperature (°C)				
Wastewater	20.3	0.62	21.4	19.5
Control	20.2	0.49	21.3	19.5
pH value (units)				
Wastewater	8.4	0.12	8.5	8.2
Control	8.4	0.09	8.6	8.3
Hardness (mg/l as $CaCO_3$)				
Wastewater	177	1.3	179	176
Control	178	1.0	179	177

TEST SPECIFICATIONS: Sample: Teledyne McCormick-Selph Wastewater

Date Started:	24 June 1987
Time Started:	13:00
Date Completed:	28 June 1987
Time Completed:	13:00
Test Species:	Fathead Minnow (*Pimephales promelas*)
Mean Weight:	0.83 grams
Mean Loading:	0.83 grams/liter
# Organisms/Tank:	10
# Test Tanks:	12
volume/Tank:	10 liters
Test Material Concentrations:	5000 ppm, 2500 ppm, 1000 ppm, 500 ppm, 250 ppm, 0 ppm (control).
Replicates/Concentration:	2
Test Temperature:	20.5 ± 1.3°C.

TEST RESULTS:

Test Concentration	Replicate #	Number of Survivors 0	24	48	72	96 hours
5000 ppm	1	10	10	10	10	10
	2	10	10	10	10	10
2500 ppm	1	10	10	10	10	10
	2	10	10	10	10	10
1000 ppm	1	10	10	10	10	10
	2	10	10	10	10	10
500 ppm	1	10	10	10	10	10
	2	10	10	10	10	10
250 ppm	1	10	10	10	10	10
	2	10	10	10	10	10
Control (0 ppm)	1	10	10	10	10	10
	2	10	10	10	10	10

LC50 >5000 ppm.

Attachment IV-5

County of San Benito Building Permit, Approval Letter, and Grading Permit for TSU-1

11/10/99 through 11/1/00

Modification of Existing RCRA-TSU-1 Burn Unit; Enlarge Conc. Pad, Add Concrete Containment Walls & Steel Canopy Structure over Entire.

POST THIS PERMIT AT BUILDING SITE

BUILDING PERMIT
COUNTY OF SAN BENITO

No. 9369
Date 9-13-2000

NAME McCormick Selph S.F.D. ____ GARAGE ____ REMODEL ____ ADDITION ____

ADDRESS 3601 UNION ROAD; HOLLISTER LOT ____ APN 21-14-01

CONTRACTOR AUSONIO INC. APPROVED [signature]

PERMIT FEE $ 1,045.00 RECEIPT NO. 3772 VAL $ 130,000.00

NOTE: Pour no concrete until A is signed. Lay no sub floor until B is signed. Cover no interior walls until C is signed or apply stucco until wire is signed.

SET BACKS:

INSPECTIONS

A — FOUNDATION
- Pier Holes 9-13-00 [initials]
- ~~Footings~~
- Grade Beams
- ~~Forms & Steel~~
- ~~Concrete Block Steel~~
- ~~Hold Downs~~
- ~~Garage~~ Slab 9-21-00 [initials]
- ~~Fireplace Pad~~

B — SUB-FLOOR FRAMING
- Girders & Joist
- R. Plumbing
- Gas Pressure Test
- Sheet Metal

C — STRUCTURAL FRAMING
- Roof Sheathing
- ~~Shear Ply. Nailing~~
- Walls - Steel & Conc 9/25/00 [initials]
- Roof 10/1/00 [initials]
- ~~Fireplace~~
- ~~Elect. Wiring~~
- ~~Plumbing & Vents~~

D — INTERIOR FINISH
- Sheet Rock Nailing
- Firewall

FINAL INSPECTION — 11/1/00 [initials]
- ~~Gas Pressure Test~~
- ~~Tape & Texture~~
- ~~Electrical~~
- ~~Plumb & Heating~~
- ~~Insulation Cert~~
- Address Posted ✓

EXTERIOR FINISH
- Wire Lath
- Scratch Coat
- Brown Coat
- Finish Coat

Insulation Floor ____ Elec. Temp. ____ Perm. ____ Erosion Control Required ____

Walls ____ Ceiling ____ Gas Temp. ____ Perm. ____ Finish Grading ____

Plumbing Permit	$ ____	No. ____
Electrical Permit	$ ____	No. ____
Mechanical Permit	$ ____	No. ____
Demolition Permit	$ ____	No. ____

Permit expires 180 days from date of last inspection.

STATEMENT OF LICENSING

Pursuant to Section 7031.5 of the Business and Professions Code, the following form shall be completed:

1. I am licensed under the provisions of the State Contractor's Licensing Law, Chapter 9, Division 3, Business and Professions Code and my State Contractor's License is in full force and effect. Contractor's License No. 682308
Exp. Date 3-31-2002 State Comp. Insurance Co. MAJESTIC
Policy No. C[illegible]20370 Expiration Date 1-1-2001

2. I am exempt from the provisions of the Workmans Compensation Laws. The basis for my exemption is ____

Signed [signature] Date 9-13-2000
Contractor for Ausonio Inc.

I certify that in the performance of the work for which this permit issued, I shall not employ any person in any manner, so as to become subject to the Workmans Compensation Laws of the State of California.

Signed [signature] Date 11/1/00
Owner/Builder

TEMPORARY OCCUPANCY ____ (30 DAYS TO FINAL) OCCUPANCY APPROVED 11/1/00 [initials]

COUNTY OF SAN BENITO

3224 SOUTHSIDE ROAD
HOLLISTER, CA 95023-9174
831-637-5313 • Fax 831-637-9015

PLANNING DEPARTMENT
BUILDING DEPARTMENT

August 4, 2000

RECEIVED AUG - 7 2000

Mr. Rick Hutton
PES Environmental
1682 Novato Boulevard, Suite 100
Novato, CA 94947

RE: McCORMICK SELPH TSU-1 MODIFICATION PROJECT

Dear Mr. Hutton:

The plans and calculations for the above project were plan checked shortly after their submittal and have been approved as designed under the 1994 Uniform Building Code ("UBC"). Permits are ready to be prepared upon notification that the project is ready to proceed with no changes.

Sincerely,

Michael M Machado

Michael M. Machado
Building Official

MMM/kb

FAXED AND MAILED

POST THIS PERMIT
AT GRADING SITE

GRADING PERMIT
COUNTY OF SAN BENITO

No. 99-188
Date 11-10-9

NAME McCORMICK SELPH INC. CU. YDS. 1250 CY

ADDRESS 3601 UNION ROAD HOLLISTER, CA LOT ASSESSOR'S PARC OR SUBD. 21-14

CONTRACTOR PHILLIPS SERVICES, CORP. (Lic. 534002 C-57) APPROVED [signature]

PERMIT FEE $126.00 PLAN-CHECK FEE $30.00 TOTAL FEE $156.00 RECEIPT NO 62

INSPECTION RECORD

	DATE	INSPECTOR	REMARKS
GRADING			
	6/20/00		
	9/1/00		
		final	Grading Erosion cntrl
			complete and OK

FINAL INSPECTION 10/19/00 [signature] DATE 10/19/0

COUNTY OF SAN BENITO

3224 SOUTHSIDE ROAD
HOLLISTER, CA 95023-9174
831-637-5313 • Fax 831-637-9015

PLANNING DEPARTMENT
BUILDING DEPARTMENT

APPROVAL NOTICE
Winter Grading - October 15 to April 15

GRADING PERMIT NO:	99-188
APPLICANT:	Rick Hutton, PES Environmental, Inc.
OWNER:	McCormick Selph, Inc. (MSI)
ASSESSOR PARCEL:	21-14-01
LOCATION:	3601 Union Road
DATE:	October 7, 1999

The application for a grading permit, County File No. GR 99-188 is hereby approved for grading about 1,250 cubic yards of cut and 200 cubic yards of fill to alter the area around an existing waste ordnance processing structure (burn unit).

CEQA Findings:

The Department of Toxic Substances Control (DTSC) prepared a Negative Declaration in July of 1999 for the Class 2 Permit Modification at the Teledyne facility on Union Road in Hollister California. Grading Permit 99-188 is for the proposed modification to the structural design of the burn unit described in the Negative Declaration. Pursuant to section 15162(a) of the California Environmental Quality Act, the Negative Declaration adopted for the Class 2 Permit Modification can be used for the proposed GR 99-188 based on the following findings:

Finding 1: Substantial changes are not proposed in the project which will require major revisions of the previous negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects:

Finding 2: Substantial changes have not occurred with respect to the circumstances under which the project is undertaken which will require major revisions of the previous negative declaration due to the involvement of new significant environmental effects or a substantial increase in he severity of previously identified significant effects.

Evidence: The negative declaration for the Class 2 Permit Modification contemplated the proposed grading and the grading plans are consistent with the proposed changes to the burn unit described in the initial study. The project will not result in a substantial increase in the severity of previously identified significant effects and no new significant environmental effects were identified during the project review.

Finding 3: There is no new information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous negative declaration was adopted shows any of the following: