Clearly, the use of 1×10^{-6} for regulation of individual risk is a highly conservative use of acceptable cancer risk levels. The cancer risk level predicted for the TMS facility is well below levels that historically have been of regulatory concern.

Conclusions from this risk assessment concerning emissions from the Teledyne McCormick Selph OB/OD operations near Hollister, California are as follows:

- Risk estimates have been developed based upon available data in a health conservative manner that tend to overestimate risk;

- Cancer risks from the emissions fall within a level that historically has not been a concern for regulatory agencies.

- Noncancer risks from the facility yield a hazard index less than one and should therefore be of little regulatory concern.

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Human Health and Ecological Risk Assessment Work Plan

ToxStrategies Inc. November 25, 2015 (draft)

Human Health and Ecological Risk Assessment Work Plan

NOVEMBER 25, 2015

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List of Acronyms

AAC	average annual concentration
AAD	average annual dose
ADAF	age-dependent adjustment factor
AWQC	ambient water quality criteria
BAF	bioaccumulation factor
BCF	bioconcentration factor
BTAG	Biological Technical Assistance Group
COPC	chemical of potential concern
COPEC	chemical of potential ecological concern
CSM	conceptual site model
dL	deciliter
DOD	Department of Defense
DTSC	Department of Toxic Substances Control
dw	dry weight
EAFB	Edwards Air Force Base
Eco-SSL	ecological soil screening level
EPA	Environmental Protection Agency
ERA	Ecological Risk Assessment
FIR	food ingestion rate
FSL	Forecast Systems Laboratory
GIabs	gastrointestinal absorption factor
GRAF	gastrointestinal relative absorption factor
HERO	Human and Ecological Risk Office
HHERA	human health and ecological risk assessment
HHRA	human health risk assessment
HI	hazard index
HQ	hazard quotient
in	inches
in^2	square inches
IRIS	Integrated Risk Information Service
ISCST	Industrial Source Complex Short Term
ISH	integrated surface hourly
IUR	inhalation unit risk
kg	kilogram
km	kilometer
L	liter
lbs	pounds
LAAC	lifetime average annual concentration
LADD	lifetime average daily dose
LLNL	Lawrence Livermore National Laboratory
LOAEL	lowest observed adverse effect level
m	Meter

m^2	square meter
m^3	cubic meter
µg	microgram
mg	milligram
MBUAPCD	Monterey Bay Unified Air Pollution Control District
MPRM	Meteorological Processor for Regulatory Models
MSI	McCormick Selph, Inc.
NOAA	National Oceanic and Atmospheric Administration
NOAEL	no observed adverse effect level
NSR	New Source Review
NWS	National Weather Service
OB/OD	open burn/open detonation
OBODM	Open Burn Open Detonation Model
OEHHA	Office of Health Hazard Assessment
ORNL	Oak Ridge National Laboratory
PEP	Propellant Evaluation Program
PM	particulate matter
PSEMC	Pacific Scientific Energetic Materials Corporation
RCRA	Resource Conservation and Recovery Act
RfC	reference concentration
RfD	reference dose
SCRAM	Support Center for Regulatory Air Models
sec	second
SF	slope factor
SIR	sediment/soil ingestion rate
2,3,7,8-TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TEF	toxicity equivalent factor
TEQ	toxicity equivalent
TRV	toxicity reference values
TSU	treatment/storage unit
USACHPPM	US Army Center for Health Promotion and Preventive Medicine

1.0 Introduction

On behalf of Pacific Scientific Energetic Materials Company (PSEMC), we have prepared this human health and ecological risk assessment (HHERA) Work Plan to describe the methods that will be used to evaluate potential human and ecological impacts that may result from hazardous waste treatment operations at the PSEMC facility located at 3601 Union Road, near Hollister, California (the Site). The PSEMC facility treats hazardous wastes containing explosive materials using two open burning/open detonation (OB/OD) treatment facilities. In a letter dated December 19, 2014, the Department of Toxic Substances Control (DTSC) requested that a HHERA be prepared in support of PSEMC's permit renewal process for their hazardous waste treatment operations (DTSC, 2014c).

The Human and Ecological Risk Office (HERO) of DTSC provided a memorandum dated March 21, 2014 (DTSC, 2014a) that made recommendations for performing the HHERA. In addition, DTSC provided examples of similar HHERAs performed for other OB/OD facilities (i.e., Edwards Air Force Base [EAFB], China Lake Naval Air Station [China Lake], and Lawrence Livermore National Laboratory [LLNL]). Representatives of PSEMC met with DTSC to discuss the proposed approach to the HHERA on July 10 and September 15, 2015. This HHERA Work Plan is based on standard risk assessment practices and information provided by DTSC in writing, during the July and September 2015 meetings, and during subsequent discussions.

2.0 Site Background

The 290-acre PSEMC facility is located 13 miles southwest of Hollister, San Benito County, California (Figure 1). The property is zoned for industrial use (M1), and the immediately adjacent properties are zoned for agricultural use. The vicinity of the site is sparsely developed. The nearest residences are located approximately 1,300 feet east and 400 feet north of the property boundary. San Justo Reservoir is located approximately 1000 feet southeast of the property boundary.

The PSEMC facility has been operating since 1971. The facility was operated as McCormick Selph Associates, which had been purchased by Teledyne, Incorporated in 1964. In 1983, the facility was aligned with Ryan Aeronautics and became Teledyne Ryan Aeronautical/McCormick Selph Ordnance (Teledyne Ryan). In July 1999, McCormick Selph, Inc. (MSI) became part of J.F. Lehman and Company, and in July 2003, MSI was acquired by PSEMC (DTSC, 2003).

2.1 Site Description

The 290-acre facility consists of 33 buildings comprising almost 200,000 square feet. Teledyne Lake, which is approximately 21 acres in size, is centrally located on the property and is used to store fire suppression water. Fish are present in the lake. The remainder of the property is undeveloped open space, and portions of the property outside the main operations area are used for cattle grazing (personal communication, Charlie Martin, July 7, 2015).

2.2 Operations

The PSEMC facility is used to manufacture explosives and explosive devices for aerospace, military, and commercial applications and produces specialty chemicals on a contract basis (DTSC, 2003).

2.3 Hazardous Waste Treatment Permit History

A Part A permit application was filed by Teledyne in November 1980, and interim status for hazardous waste treatment and storage was granted for the Site on April 6, 1981. A final permit to store hazardous wastes in containers and tanks was granted in November 7, 1983, but treatment activities and storage in surface impoundments remained under interim status until July 28, 1993 (DTSC, 2003). Those hazardous waste management units included:

- Part of Treatment/Storage Unit (TSU)-1: A pit for detonation of solid reactive waste (closed June 13, 2000)
- TSU-1: open burning of solid reactive waste
- TSU-2: open burning of solvents contaminated with reactive wastes
- TSU-3: hazardous waste container storage area (3 bays)
- TSU-4: three aboveground hazardous waste storage tanks (closed July 31, 2003)
- TSU-6: silver recovery reactor (closed October 4, 2000)
- TSU-7: water evaporator unit (closed October 26, 2001)
- TSU-8: water evaporator unit
- TSU-9: treatment reactor (closed July 31, 2003)
- TSU-10: waste photographic silver recovery unit (no longer regulated effective January 1, 1999).
- Treatment of two-part epoxy compounds by mixing in containers

Although the initial permit was set to expire in July 2003, operations continued under interim status at the relevant TSUs until the permit was renewed in 2006. The current permit is set to expire in May 2016. As identified above, only four of the original 10 TSUs currently are active (TSU-1, TSU-2, TSU-3, and TSU-8).

2.4 On-going Hazardous Waste Operations

Hazardous wastes generated during manufacturing activities include solvents, hazardous chemicals, metal powders, reactive components, explosives, flammable liquids, and corrosive solids and liquids. Hazardous wastes generated at the facility are either treated on site or transported off-site for treatment or disposal. Treatment focuses on hazardous wastes that contain explosive materials that may present a greater hazard during transport if shipped off site. PSEMC does not accept hazardous waste generated outside their facility (DTSC, 2003).

Of the four active TSUs (TSU-1, TSU-2, TSU-3 and TSU-8), only operations at TSU-1 and TSU-2 are considered to generate emissions that may impact human or ecological receptors. Each of these TSUs is described in more detail below.

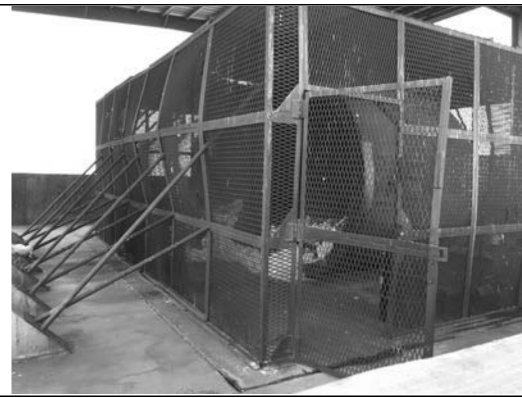
TSU-1 consists of two parallel concrete pipes (burn tubes) that contain the open burn process. Each pipe sits near ground level, and is 8.5 feet long and has a diameter of 10.5 feet. The two pipes are enclosed by a wire mesh cage and surrounded by a concrete wall that is 5 to 8 feet high. In addition, a sloped roof that is 20 to 24 feet above ground level sits above the two pipes. A 14-foot earthen berm surrounds TSU-1 on three sides (DTSC, 2003). The TSU-1 concrete pipes are open on both ends, and emissions can exit either end of the pipes before escaping to open air beyond the wall, the berm, and the roof.

At TSU-1, reactive wastes are placed inside the concrete pipes and covered with wood shavings (referred to as excelsior). From a remote location, the excelsior is lit and the material burns over an approximately 10-minute period.[1] At least 48-hours later, the area is inspected for unburned waste material, which when found is reconfigured in the concrete pipes with excelsior and burned a second time. In some cases, additional materials are added to the second burn (personal communication, Charlie Martin, August 12, 2015). In 2014, second burns occurred approximately 33 percent of the time (personal communication, Charlie Martin, August 12, 2015). A more detailed description of the specific hazardous wastes treated at TSU-1 is provided in Section 3.0.

The current and proposed RCRA Part B permit limits the amount of waste treated at TSU-1 to 500 pounds gross weight (i.e., explosive materials and non-explosive materials such as metal casings and water) per day for open burning and 100 pounds net explosive material per day for detonation (DTSC, 2006). However, as noted above, the pit formerly used for open detonation at TSU-1 was closed in 2000, and remaining treatment activities at TSU-1 are limited to open burning such that this latter permit limit does not currently apply to treatment activities at TSU-1. In addition, the proposed 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. This latter proposed permit limitation is lower than that specified in the current air quality permit to operate TSU-1, which limits the amount of waste treated at TSU-1 to 7,000 pounds explosive (reactive) material per year (MBUAPCD, 2007). 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

[1] During the course of burning the explosive materials, small detonations may occur intermittently.

period (Appendix A). These data illustrate the relatively small amounts of explosives currently treated at TSU-1 as compared to the proposed permit limits.



Photographs of TSU-1

TSU-2 is a simpler operation where solvents containing reactive material are placed in an open container located inside a designated bermed area and burned. TSU-2 consists of solvent incineration basins. Each basin is a 55-gallon drum that is cut length-wise to create a 30-gallon volume. Each set of two racks contains four split drums for total of 8 basins. The basins are arranged in a double-boiler configuration where the more volatile solvents are placed in the lower container and less volatile (e.g., containing more water) are placed in the upper container. The fire is initiated remotely in the lower container, which ignites the upper container (DTSC, 2003). TSU-2 is also surrounded by an earthen berm on three sides that is approximately 10 feet high (see photograph below). Vertical dispersion from TSU-2 is unrestricted.

The proposed RCRA Part B permit limits the amount of waste treated at TSU-2 to 240 gallons per day, which is lower than the 300 gallon per day limit in the current air quality permit to operate TSU-2. 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. These data illustrate the relatively small amounts of solvent waste treated at TSU-2 as compared to the proposed permit limits. Additionally, during this same time period, 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.


Equipment at TSU-2 in storage

2.5 Environmental Conditions and Environmental Fate and Transport 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 environment. This site conceptual fate and transport model describes how the chemicals are released and distributed in the environment.

In addition to their release to air, non-volatile chemicals emitted from treatment operations at TSU-1 and TSU-2 may deposit to soil or surface water. Chemicals in soil in the vicinity of TSU-1 and TSU-2 may be taken up into terrestrial plants growing in the area and by 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. Cows graze at the perimeter, but concentrations in soil and taken up into pasture grasses would be present in lower concentrations there than in the areas where small mammals graze near TSU-1 or TSU-2. As such, additional ecological receptors at distance from TSU-1 or TSU-2 are not considered for off-site soil.

Airborne particulate emissions from the site may also migrate and deposit to surface water, specifically Lake Teledyne and San Justo Reservoir. Fish in either water body may take up chemicals present in the water.

Considering environmental conditions and fate and transport, chemicals emitted from operations at TSU-1 and TSU-2 may be present in the following on- and/or off-site environmental media relevant to specific receptors:

- Air (on-site and off-site)
- Soil (on-site near TSU-1 and TSU-2 and off-site near residents and at San Justo Reservoir)
- Plants (on-site near TSU-1 and TSU-2 and off-site near residents)
- Small mammals (on-site near TSU-1 and TSU-2)
- Grazing cows (at the site perimeter)
- Surface water (Lake Teledyne and San Justo Reservoir)
- Fish (Lake Teledyne and San Justo Reservoir)

Figure 3 provides a diagram showing the environmental fate and transport of chemicals originating at the PSEMC facility.

3.0 Hazard Identification

As a RCRA permitted facility, PSEMC is required to keep precise hazardous waste generation records for materials treated at TSU-1 and TSU-2, as well as materials stored at TSU-3 and water evaporation at TSU-8. Each hazardous waste container has a unique number assigned to it so that it can be tracked throughout its lifecycle at the facility. The Security and Environmental Affairs Department at PSEMC maintains an electronic database record of all the hazardous waste generated on site. This electronic data base tracks the generating process, generating department, EPA waste management code, storage location, accumulation date, waste name and/or constituents, container size, net weight, ultimate disposition, disposition date, and a hazardous waste manifest number if applicable (personal communication, Charlie Martin, August 12, 2015).

The electronic record was reviewed to identify wastes treated at TSU-1 and TSU-2 over the past 10 years (i.e., 2005-2014). A ten-year time period was used because it coincides with the period since the last RCRA Part B permit renewal and would capture the variability in operations over that time period. To understand variability, the data from 2005 to 2014 were divided into two groups, 2005 to 2009 and 2010 to 2014. It would be expected that data for 2010 to 2014 represent current operations but 2005 to 2009 may identify wastes that have been generated in the past and may be generated again in the future.

As shown in the treatment inventory provided by PSEMC, a wide variety of materials are treated at TSU-1 (Appendix A). This results from PSEMC's production of specific materials for a wide variety of customers for different purposes. PSEMC's production varies as the needs of their customers vary. Because solvents are the vast majority of the wastes treated at TSU-2, the variety of materials handled is smaller at TSU-2 than at TSU-1 (Appendix B).

3.1 Emissions from TSU-1

To estimate emissions from TSU-1, the wastes and components of the wastes treated at TSU-1 were identified. Emission rates were then developed for those wastes and explosives that represented the majority of the wastes treated.

3.1.1 Explosives Treated at TSU-1

Table 1 lists the explosive materials treated at TSU-1 and the percent of each explosive material compared to the total amount of explosive materials treated during three time periods: 2005 to 2009, 2010 to 2014, and over the combined 10-year period (2005 to 2014). For purposes of identifying explosive materials to be included in the HHERA, a cut-off of 1% was initially used to delineate those materials that were treated most often over the past 10 years. As shown in the table, only a small number of the explosive materials were treated in quantities that represented greater than 1 percent of total explosive materials treated. For the period from 2005 to 2009, 16 individual explosive materials each represented 1% or more of the total amount of explosive materials treated, and in total, represented 86% of the explosive materials treated during this time period. For the period 2010 to 2014, 15 individual explosive materials represented 1% or more of the total amount of explosive materials treated, although the specific explosive materials were not all the same as those from 2005 to 2009. In total, these 15 explosive materials represented 92% of the explosive materials treated during this period. Ammonium perchlorate represented the highest percentage of explosive materials treated in both time intervals (28% for 2005 to 2009 and 37% for 2010 to 2014). Of the explosive materials that were above 1% of the total in 2005 to 2009, but below in 2010 to 2014, only zirconium metal powder may continue to be treated at levels near 1% of the total mass (personal communication, Charlie Martin, August 20, 2015). The remaining explosive materials were being or had been phased out or the amounts were not anticipated to increase to greater than 1%.

For purposes of this assessment, emissions from TSU-1 will be based on the data for the period 2010-2014, primarily because activities during this period are most representative of current operations, and thus mostly likely to be representative of future operations at the facility. As noted, 15 explosive materials represented 92% of the total explosive materials treated at TSU-1 during this period, with all of the remaining explosive materials representing the remaining 2%. During the September 15, 2015 meeting to discuss this work plan, DTSC expressed interest in the materials in the remaining 8% of the material treated that would otherwise be excluded from the HHERA. The list of explosives was reviewed, and the 11 explosives that represented 0.3% to 1% of the explosives treated were added to the list for TSU-1. In total, these 26 materials represent over 97% of the total explosive materials treated between 2010 and 2014. In addition, zirconium metal powder, which represented approximately 1% of explosive materials treated for the period 2005-2009, and may be treated at similar levels in the future, will also be included in the HHERA. Emissions of these 27 explosives will be scaled up from 98% (97% plus 1%) to a total of 100% explosive materials treated for the purpose of estimating emissions. Other components of the wastes treated at TSU-1 (e.g., metals, water) are presumed to be inert (e.g., metals remain within the pipe and are part of the residual ash that is collected) and are not included in the emission estimates for TSU-1.

3.1.2 Emissions from Open Burning at TSU-1

Combustion byproducts emitted from burning the 27 explosive materials included in the HHERA were predicted using the MICROPEP Thermal Equilibrium Program (v1.0; Martin Marietta, 1987), which is a PC version of the Propellant Evaluation Program (PEP) originally developed at China Lake (referred to herein as the "PEP code"). Several pieces of information need to be entered into the PEP code for each ingredient of the individual explosive material being modeled, including chemical name, chemical formula, heat of formation, and density. The output from the PEP code is a list of chemical species produced by combustion of the explosive material and the amount of that material emitted per amount of material burned (to a limit of detection of 1×10^{-7} moles/100 grams). For ease of calculations, the latter value is converted to units of pounds emitted per pounds burned. The PEP code was run individually for each explosive material. The PEP code output is provided in Appendix B. As shown in the appendix, essentially 100% of the mass is conserved (i.e., for every 100 pounds burned, a total of ~100 pounds is emitted). A total of 117 unique chemical species were predicted to be emitted during the burning of these 27 explosive materials (Table 2).

With the exception of potassium perchlorate, the PEP code predicted the "parent" explosives (i.e., the starting explosive material) would be completely converted to other chemical species during treatment and not emitted. During the September 15, 2015 meeting, DTSC commented that this was different from other OB/OD facilities for which HHERAs had been completed in the past 10 years (i.e., EAFB, China Lake, and LLNL), which included emission factors for "parent" explosive materials based on alternative methods to the PEP code for estimating emissions from OB/OD activities (EAFB, 2012; URS, 2007; LLNL, 2007). To address this issue, "parent" explosives treated at TSU-1 that also were evaluated in one or more of these previous risk assessments were identified (the parent explosive in each of the 27 explosive materials included in the HHERA are provided in Table 3). The emission factor of these "parent" compounds at TSU-1 was assumed to be equal to the maximum emission factor among the EAFB, China Lake, or LLNL risk assessments. The specific parent explosives assumed to be emitted include ammonium perchlorate, HMX, and RDX.

DTSC was also interested in emissions of polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-p-furans (dioxins and furans), which were not predicted to be emitted by the PEP code, but were included in the EAFB, China Lake, and LLNL risk assessments. While the reason for this discrepancy may be related to the fact that these other facilities treat wastes that are different from those treated at TSU-1 and/or the PEP code's detection limit, dioxins and furans will be assumed to be emitted during treatment at TSU-1, but only for those explosive materials containing chlorine. Of the prior assessments, China Lake was the only one to evaluate all 17 dioxin and furan congeners; therefore, the emissions factors from the China Lake assessment were used (URS, 2007). To simplify the analysis, the emission factors for the 17 individual dioxin and furan congeners were combined into a 2,3,7,8-tetrachlorodibenzo-dioxin (2,3,7,8-TCDD) toxicity equivalent (TEQ) emission factor based on toxicity equivalent factors (TEFs) recommended by the World Health Organization (Van den Berg et al., 2006) and the Office of Environmental Health Hazard Assessment (OEHHA 2015a).

Finally, as noted above, explosive materials treated at TSU-1 are covered by wood shavings (excelsior) to facilitate combustion. Some treatment operations at China Lake also include wood as a fuel, and the byproducts of combustion were evaluated based on data collected for wood burning from residential fireplaces (URS, 2007). For purposes of this assessment, the same chemicals will be assumed to be emitted during burning of excelsior during treatment of all explosive materials at TSU-1 using the same emission factors. The specific chemicals assumed to be emitted during combustion of the excelsior include benzo(a)pryene, carbon monoxide, formaldehyde, nitrogen dioxide, and sulfur dioxide (URS, 2007).

3.1.3 Components and Mass of Simulated Burn

As noted in Section 2.4, the proposed permit limits on the amount of waste treated at TSU-1 are 125 pound net explosive weight or 500 pounds gross weight per day for open burning, 100 pounds net explosive weight per day for detonation, and 4,700 pounds net explosive weight per year. Because there are 365 days per year, the 4,700 pounds net explosives weight per year is more restrictive than 100 or 125 pounds net explosives per day. For purposes of this HHERA, emissions from TSU-1 will be based on a simulated burn comprised of the 27 explosive materials identified above, scaled to the permit limit. Because there are two types of permit limits, one based on gross weight and the other based on net explosive weight, two simulated burns will be evaluated. The relative amount of each explosive material treated in each of the simulated burns will be based on the data for actual treated waste from 2010 to 2014 described above. Specifically, when wastes containing one or more of the 27 explosive materials was burned, 16% of the gross weight treated during this time period was explosive materials, with the remaining waste comprised of essentially inert materials (e.g., metals, water) (see Appendix A). Assuming the permit limit of total gross weight of 500 pounds, the net explosive weight would be approximately 80 pounds (16%). The relative weights of the 27 explosive materials within these 80 pounds was estimated based on the relative weights in wastes actually treated between 2010 and 2014, except for zirconium metal powder, which was based on data from 2005 to 2009. For example, HMX represented 2.2% of the total explosives contained in treated wastes containing the 27 materials between 2010 and 2014, which is 1.76 of the 80 pounds of explosive materials treated in this simulated burn or 0.022 pounds HMX/pounds net explosives. Based on the permit limit of 4,700 pounds net explosive weight per year, it will be assumed that 59 of these 80 pound simulated burns occur each year.

The second simulation was based on the proposed permit limit of 125 pounds net explosives per day and used to assess the worst-case 1-hour average concentration on any one day during the year. The relative percent of each of the 27 explosive materials within the 125 pounds was again estimated based on the relative weights of these materials treated between 2010 and 2014, but limited to the subset of waste materials comprised of 100% explosive materials (i.e., net explosive weight = gross weight). Based on this subset of materials, HMX represented 1.8% of the total explosives contained in the treated wastes comprised of the 27 explosives during this time period, which would represent 2.25 of the total 125 pounds of explosive materials.

3.1.4 Final Emission Factors

The final step in estimating emissions from TSU-1 during each of the two simulated burns was to calculate emission factors for each chemical species based on the emission rate from the information source (i.e., PEP code or factors from the EAFB, China Lake, or LLNL risk assessments) and the relative amount of each explosive material in each simulated burn. These final emission factors for each chemical are summed across all 27 explosive materials to estimate a total emission for each chemical species (pound emitted per pound burned). These total emission factors will be combined with the output from the air dispersion model to estimate chemical-specific concentrations at each receptor location (see Section 4.0). The emission factors for the individual chemicals emitted as a result of combustion of individual explosive materials are provided in Appendix C; the total emission factors for each chemical across all explosive materials are provided in Table 2.

3.2 Emissions from TSU-2

The wastes and components of the wastes treated at TSU-2 were identified between 2005 and 2014. Emission rates were then developed for those wastes and explosives that represented the majority of the wastes treated.

3.2.1 Materials Treated at TSU-2

Table 4 lists the wastes treated at TSU-2 and the percent of each material in the total amount of wastes treated during the three time periods: 2005 to 2009, 2010 to 2014, and over the 10-year period (2005 to 2014). Unlike TSU-1, the vast majority of wastes material treated at TSU-2 are non-explosive solvents, with explosive materials comprising approximately 1 percent of the waste treated during this time period. Eight solvents represented greater than 1% of the total waste treated at TSU-2 for the period of 2005-2009, and in total 98% of the waste treated during this time period. For 2010-2014, only six solvents were included among the materials treated, which in total represented greater than 99% of the total waste treated. The two additional solvents identified for the 2005-2009 time period, acetonitrile and tetrahydrofuran, are being phased out; therefore, these solvents are not expected to be present in future treatment (personal communication, Charlie Martin, August 20, 2015). Also, while included in the list of solvents on the current air permit, pyridine was not used at the facility between 2005 and 2014, nor is it expected to be used in the future (personal communication, Charlie Martin, November 25, 2015). No individual explosive material represented more than 1% of the total waste treated over this 10-year time period; however, five explosives represented greater than 0.1% for the period 2005-2009. Four explosives represented greater than 0.1% for the period 2010-2014, although they were not the same list of individual explosives as for 2005-2009. Of the explosives representing greater than 0.1% of the total waste treated during 2005-2009, but not during 2010-2014, none are expected to increase to levels above 0.1% in the future (personal communication, Charlie Martin, August 12, 2015).

Similar to TSU-1, emissions from TSU-2 will be based on data for the period 2010-2014. In total, the six solvents representing greater than 1% and four explosive materials representing greater than 0.1% of the total waste treated at TSU-2 during this time period comprised 99.8% of the treated waste. Emissions from these 10 materials will be scaled up from 99.8% to a total of 100% of treated waste for the purpose of estimating emissions. Because the majority of the wastes treated at TSU-2 are solvents, emissions may also result from evaporation prior to burning and then during burning. The methods used to estimate emissions from evaporation or open burning are discussed separately below.

3.2.2 Emissions from Evaporation at TSU-2

The majority of the solvents treated at TSU-2 between 2010 and 2014 was comprised of acetone (see Table 4). Therefore, to estimate the amount of solvent that might evaporate from TSU-2 prior to burning, PSEMC conducted a bench-scale test using acetone (Appendix D). Specifically, 8,000 ml of acetone was added to a stainless steel pan 40 inches long, 14 inches wide and 2 inches deep (surface area of 560 square inches [in^2]). After 1 hour at 65°F, 3,800 ml of acetone remained in the pan, or a net evaporation of 4,200 mL or 7.3 ml/in^2 (or ~0.013 pounds/in^2). The actual containers used at TSU-2 are 55-gallong drums cut in half lengthwise. The surface area of solvent in these containers when holding approximately 30 gallons of liquid is approximately 776.25 in^2 (34.5 inches long and 22.5 inches wide). Assuming a total of 8 containers (240 gallons, which is the proposed permit limit for TSU-2), the total surface area available for evaporation is 6210 in^2. Assuming a loss of ~0.013 pounds/in^2 over an hour-long period (the estimated time to load 240 gallons of waste into the 8 containers), approximately 81 pounds of acetone would evaporate, or approximately 5.1% of the starting material (1584 pounds acetone). Therefore, for purposes of the HHERA, 5% of the 240 gallons treated at TSU-2 will be assumed to evaporate and the remaining 95% will be assumed to be burned. A weighted average density of the six solvents treated was used to convert the treated volume to pounds.

3.2.3 Emissions from Open Burning at TSU-2

3.2.3.1 Combustion Byproducts

Combustion byproducts emitted from burning the six solvents and four explosive materials included in the HHERA were also predicted using the PEP Code, with the output provided in Appendix E. As with the PEP Code results for TSU-1, essentially 100% of the mass is conserved. A total of 16 chemical species were predicted during the burning of these 10 materials (Table 5), all of which were also predicted to be emitted during burning at TSU-1.

3.2.3.2 Components and Mass of Simulated Burn

As noted in Section 2.4, the permit limit for the amount of waste treated at TSU-2 is 300 gallons per day. Consistent with the approach described above for TSU-1, emissions from TSU-2 will be based on a simulated burn of the six solvents and four explosive materials identified above scaled to the permit limit. The relative amount of each material burned will be based on the data for actual treated waste from 2010 to 2014 described above. The vast majority of the wastes treated at TSU-2 is comprised of solvents. Between 2010 and 2014, the percent of explosive materials in the total material burned ranged from <0.01% to 4.1% when wastes containing one or more of the 10 identified materials was burned, with the average over the entire time period of approximately 0.5% (see Appendix B). Because the permit does not limit the relative percent of explosive material burned, the upper end of this range, or 4%, was assumed for purposes of the HHERA, with the remaining 96% assumed to be comprised of solvents. The relative percent of the solvents or explosives in the two components of the treated material was estimated based on the relative weights in the wastes actually treated between 2010 and 2014. For example, acetone represented approximately 69% of the total solvents contained in the treated wastes containing the 10 materials during this time period. Similarly, HMX represented approximately 25% of the total explosives treated.

3.3 Other Potential Emission Sources

Based on the examples provided by DTSC, other potential emission sources associated with OB/OD operations include: (1) resuspension of soil during open burning or detonation, (2) resuspension during waste handling when residual materials are collected, and (3) resuspension from vehicle traffic or windblown dust from exposed soil in the vicinity of the treatment areas. However, these additional emission sources are negligible at the PSEMC facility for the following reasons, and will not be included in HHERA.

- Resuspension of soil during open burning is not significant at the PSEMC facility because operations occur inside concrete pipes (TSU-1) or in containers (TSU-2) rather than on open soil.
- According to the 2005 Part B permit, ash generation is limited to the cellulose fuel used, small amounts of organic material and loose granules, pellets or billets. The residual ash from TSU-2 is treated at TSU-1. The small amounts of residual material and ash that are collected after each burn are handled manually (not by large equipment) and any dust generated has a very limited area where impacts may occur.
- Vehicle traffic in the areas around TSU-1 and TSU-2 is negligible (1 to 2 vehicles on unpaved roads per week for the OB/OD activities); therefore, negligible dust would be generated. Windblown fugitive dust is generated from disturbed surfaces such as active construction areas and storage piles. Undisturbed surfaces are generally resistant to wind erosion on account of the lack of erodible material (EPA, 2015a). In addition, the presence of vegetation also limits the generation of windblown dust. The general areas around TSU-1 and TSU-2 are undisturbed surfaces and are predominantly covered with grasses. Therefore potential fugitive emissions of windblown dust would be insignificant.

Accordingly, the only source that will be evaluated in the HHERA is the OB/OD activities.

3.4 Chemicals of Potential Concern for HHERA

As discussed above, a total of 117 unique chemical species were predicted to be emitted during open burning of the 27 explosive materials identified for TSU-1, with 16 of these chemical species also predicted to be emitted during open burning of the six solvents and four explosive materials identified for TSU-2. In addition to these chemicals, it will be assumed that dioxins and furans (as 2,3,7,8-TCDD TEQ) will be emitted during burning of chlorine-containing explosives at TSU-1, parent explosives ammonium perchlorate, HMX and RDX will be emitted during burning of explosive materials containing these compounds at TSU-1, and benzo(a)pyrene, carbon monoxide, formaldehyde, nitrogen dioxide, and sulfur dioxide are emitted during burning of the excelsior fuel at TSU-1 (of these, carbon monoxide, formaldehyde, and nitrogen dioxide were also predicted to be emitted as a result of burning explosive materials). Finally, the six solvents identified for TSU-2 may be emitted as a result of evaporation prior to burning. In combination, 129 unique chemicals are assumed to be emitted from OB/OD operations at TSU-1 and TSU-2. All of these chemicals will be considered chemicals of potential concern (COPCs) in the HHERA except those that were considered to be: 1) an inert gas and/or a primary component of air (argon, carbon dioxide, water, nitrogen, oxygen); 2) highly reactive and unstable, likely forming a more stable compound that is otherwise considered a COPC (carbon, ethynide radical, carbenium (+) [or methanide (-)], formyl radical [or methanone], chloride radical, fluorine anion, hydrogen radical, hydrogen, hydroxide radical, nitrogen radical, oxygen radical); 3) not a systemic toxin and/or toxic only at very high concentrations (methane, carbon monoxide); or 4) an appropriate surrogate for toxicity could not be identified (chlorine dioxide). The remaining 110 COPCs are listed in Table 6. All of these chemicals are 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 will be assumed to deposit to soil or water (and subsequently to plants, animals, and fish) (see Table 6).

4.0 Air Dispersion Modeling

Air dispersion modeling will be performed for the two open burn sources at the PSEMC facility:

- TSU-1 – Ordinance Treatment Unit, and
- TSU-2 – Open-Air Waste Solvent Burning Equipment.

These sources have different configurations that are required to handle the specific forms of reactive materials at each unit. In addition, solvent evaporation occurs at TSU-2 as the burn is set up but before it is ignited (estimated to occur over 1 hour).

Dispersion modeling for open burn of reactive materials includes:

- Selection of the appropriate model to simulate the activity being characterized;
- Determination of appropriate source configurations to reflect the activity modeled;
- Identification of meteorological data to be used in the dispersion modeling analysis;
- Determination of the modeling domain and appropriate locations (receptors) to be evaluated for air pollutant concentrations;

- Evaluation of local terrain and land use; and
- Calculation of ambient air concentrations at appropriate receptor locations for relevant averaging periods.

4.1 Model Selection

The proposed air dispersion model to evaluate air pollutant emissions from open burning at TSU-1 and TSU-2 is the Open Burn/Open Detonation Dispersion Model (OBODM). The most recent version of this model is Version 1.3.0024, dated June 6, 2007. This model is available from the U.S. Environmental Protection Agency's (EPA’s) Support Center for Regulatory Air Models (SCRAM) website.

OBODM is listed as the preferred model in the *Draft Final Open Burning/Open Detonation Permitting Guidelines* (Tetra Tech, 2002). Although not a recommended model for state and federal New Source Review (NSR), EPA considers OBODM as an alternative model that may be used “*if the preferred model is less appropriate for the specific application*” (EPA, 2005a). Given the nature of the open burn sources at the PSEMC facility, OBODM is more appropriate than the traditionally “preferred” models because this model has the capability to calculate the plume rise based on the thermodynamic properties of the material that is burned. The use of a preferred model would require additional calculations prior to modeling to duplicate this capability.

Evaporated solvent emissions from TSU-2 that are not related to any combustion activity will be modeled using EPA’s SCREEN3 model (EPA, 1995).

4.2 Model Description

OBODM was developed at the Dugway Thermal Treatment Facility, Dugway Proving Ground, Utah, for the open burning and open detonation of obsolete munitions and propellants (Bjorklund et al., 1998). 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. OBODM can consider two types of quasi-continuous or instantaneous sources: volume and line (which is treated as a series of volume sources).

OBODM can also model simple terrain (terrain with zero elevation) for particulate matter (PM) and gaseous pollutants, or complex terrain (terrain with elevations higher than the emission sources) for gaseous pollutants. The simple terrain modeling would include emission sources with zero base elevations and receptors with zero elevations or “flag pole” elevations. The complex terrain modeling uses receptors whose elevations are based on the local topography.

SCREEN3 is a single source Gaussian plume model, which estimates maximum ground level concentrations for point, area, flare, and volume sources (EPA, 2015d). In this case, the evaporative emissions will be modeled as point source.

4.3 Meteorological Inputs

OBODM modeling will be conducted with five years (2010 – 2014) of hourly meteorological data in the Industrial Source Complex Short Term (ISCST) dispersion model format. The use of five years of offsite meteorological data is the EPA requirement for air permitting modeling analyses (EPA, 2005a). The ISCST format allows OBODM to perform dispersion calculations for each hour of the year, thus, allowing this model to evaluate the different meteorological conditions that may occur during the year and over the course of five years.

The ISCST meteorological data format is developed from raw hourly surface meteorological data, and raw twice-daily upper air sounding data. Raw hourly surface meteorological data are typically measured 10 meters (m) above the ground level and provide wind speeds, wind directions, temperature, relative humidity, and some upper air data—such as cloud cover or ceiling height—that are processed to be used with the dispersion model. Raw upper air data are provided as twice-daily soundings that collect wind, temperature, pressure, and relative humidity data at different levels of the atmosphere. To generate mixing height data (the upper boundary of pollutant dispersion) that are required to process the ISCST data, the sounding data are processed along with hourly surface meteorological data to generate twice-daily mixing height data.

The meteorological data processor Meteorological Processor for Regulatory Models (MPRM) is recommended by the USEPA for generating the final ISCST formatted file that will be used in the dispersion modeling analysis (EPA, 1996 and EPA, 2005b). This processor combines the twice-daily mixing height data with the hourly surface data to determine hourly mixing height and atmospheric stability parameters (for calculating horizontal and vertical dispersion) that will be used with the dispersion model. MPRM also generates the wind speed, wind direction, and temperature data that are included in the ISCST meteorological data file. The combined meteorological data file (the ISCST formatted file) is then used as the meteorological input for the dispersion modeling analysis.

The raw surface meteorological data that will be used in the dispersion modeling is the Integrated Surface Hourly (ISH) formatted data (National Oceanic and Atmospheric Administration [NOAA], 2015a) from the Hollister Municipal Airport (CALL: KCVH). The ISH format is the current format for National Weather Service (NWS) surface meteorological data. The Hollister Airport data are the most applicable NWS hourly data for this modeling analysis based on the completeness of the data and the proximity of Hollister Airport to the PSEMC facility.

The Hollister Airport data will also be used to calculate twice-daily mixing heights along with the upper air sounding data. The raw upper air sounding (radiosonde) data that will be used is the Forecast Systems Laboratory (FSL) formatted data (NOAA, 2015b) collected at the Oakland International Airport. There are only seven active radiosonde stations in California, and Oakland is the best choice based on proximity and elevation.

SCREEN3 uses conservative default assumptions regarding meteorological conditions, and does not require hourly meteorological data.

4.4 Source Data

The specific layout and descriptions of TSU-1 and TSU-2 are presented in Section 2.4.

The majority of open burn operations at the PSEMC facility take place at TSU-1. An open burn at TSU-1 or TSU-2 will begin between 1:00 PM and 3:00 PM (Pacific time). In addition, following U.S. Department of Defense (DOD) requirements, open burns will only occur at wind speeds less than or equal to 15 mph (DOD, 2008).

Open burns at TSU-1 are less than 20 minutes in duration, and typically last 5 to 10 minutes. Open burns at TSU-2 are less than 180 minutes in duration, and typically last 90 to 120 minutes (personal communication, Charlie Martin, August 12, 2015; November 19, 2015). Only one open burn would occur at either TSU on any day; therefore, open burns at both TSUs would not occur concurrently.

Typically, an unrestricted open burn would be configured using the actual dimensions of the source. Although TSU-1 is not completely enclosed, its roof would restrict initial vertical dispersion relative to an unrestricted open burn source. Therefore, the emissions from TSU-1 cannot be configured as an unrestricted open burn source.

To address the nature of expected dispersion from TSU-1, this source will be configured as a volume source with the horizontal dimensions of 10 m by 10 m and using the source's actual orientation. The release height will be set to 1.0 m, and the vertical dimension of the initial source material will be 0.1 m. The low vertical dimension of the initial source material will be used to limit the height of the initial dispersion that would be caused by the roof.

The material burn rates for TSU-1 will be set to the same burn rate that was used for open burns for OBODM modeling for the China Lake assessment (URS, 2007). This burn rate simulated the observed burn rates at TSU-1 better than the burn rate calculated by OBODM.

Although small detonations may occur during an open burn at TSU-1, the enclosed structure of this source limits any additional plume rise that would result from detonations, and most of the detonated material is contained within the combustion zone. In addition, OBODM models a detonation as an instantaneous release of pollutants rather than a quasi-continuous release; therefore, it is more accurate to model this source as an open burn rather than an open detonation source.

Emissions from TSU-2 are vertically unrestricted, and this source will be configured as a volume source with its actual dimensions. The duration of the burn at TSU-2 will require an adjustment to its OBODM source configuration because this model limits burn times to 1 hour (so as not to exceed the meteorological data time step). Therefore, the mass of material burned at TSU-2 will be based on the maximum amount of material that would complete its burn within 1-hour. In addition, because TSU-2 burns can last up to three hours, additional 1-hour burns that begin at 2:00 and 3:00 PM, and 3:00 and 4:00 PM (depending on a start time between 1:00 and 3:00 PM) will also be modeled for TSU-2.

The amount of material burned during each hour at TSU-2 will be assumed to be one third of the maximum daily allowable amount. The OBODM burn rate will be set so that the hourly open-burn will last for the full 1-hour period.

As discussed in Section 3.2.2, approximately five percent of the solvents treated at TSU-2 will evaporate prior to initiating the burn. Evaporative emissions are anticipated to occur over a 1-hour period while the burn is set up.

4.5 Terrain and Land Use

The terrain in the general area would be considered complex because there is a predominant amount of terrain surrounding the TSU-1 and TSU-2 that is elevated above the emission sources. To address the terrain conditions, dispersion modeling will be conducted for complex terrain. Because OBODM excludes modeling PM (with appreciable gravitational settling velocities) from complex terrain modeling, the proposed approach means that any pollutants emitted as particulates included in this analysis would be assumed to disperse as if they were gases, and would not be subject to gravitational settling. Under this scenario, deposition of PM to surrounding soil will be accounted for using calculations based on a default deposition rate (Section 5.2).

Based on the density of residential and industrial development, the land use within 3 km of the PSEMC sources is greater than 50 percent rural; therefore, rural dispersion coefficients will be used for the modeling analysis (EPA 2005a).

4.6 Receptor Locations

Proposed receptors that will be used to assess ecological risks (Figure 4) will focus on locations within the PSEMC facility property boundary. Receptors that will be used to assess human health risks will include areas outside the property boundary. For each of the receptors, the location in the relevant area with the highest predicted concentration will be used to represent the exposure as a conservative, preliminary step. If this conservative assumption results in predicted effects that exceed acceptable levels, an area-wide average for the exposure area relevant to the receptor may be calculated based on a receptor grid.

To identify maximum concentrations in the vicinity of the source, a 1,500 square meter receptor grid, with 100-m spacing, was placed around the center of the facility.

4.7 Material Parameters and Emission Rates

The basis for the emission rate in the OBODM model is the mass of reactive material that is burned. To calculate emissions and buoyant plume rise, the following parameters are required:

- Mass of reactive material,
- Heat content of reactive material,
- Ratio of pollutant mass to mass of reactive material, and
- Whether the pollutant is gaseous or particulate.

The modeling for TSU-1 and TSU-2 will each be based on a single generic material whose heat content is representative of the materials burned at each source. The mass of material burned per event and per year will be based on current and proposed permit limits for these sources.

For the purpose of modeling and consistent with the PEP code, we will assume the total mass of reactive material is completely converted to pollutant emissions (a ratio of 1). In addition, as noted above, all emissions will be assumed to be gaseous to enable complex terrain modeling.

As described in Section 3.2.2, evaporative emission rates are estimated based on the presence of solvents in drums for one hour before the burn is initiated.

4.8 Modeling Calculations

Calculated pollutant mass to reactive material mass ratios (i.e., final emission factors, as described in Section 3.4) will be applied to the modeled concentrations at the selected receptors. These values will then be used to calculate inhalation risks. For deposition calculations, a default settling velocity will be applied to the modeled concentrations (Section 5.2). These results will then be used to evaluate risks from various pathways.

The OBODM will generate results for 1-hour and 5-year averaging periods. The 1-hour results will be used for assessing potential acute impacts, and the 5-year average will be used to assess potential chronic impacts.

Although TSU-1 and TSU-2 are not continuous sources, these sources will be modeled for every hour in the year when these events are expected to begin (1:00 pm to 3:00 pm for TSU-1 and 1:00 pm to 5:00 pm for TSU-2). For the 1-hour averaging period, the results for TSU-1 and TSU-2 will be evaluated in separate analyses because open burns at these sites are not concurrent. In addition, any results that are based on wind speeds greater than 15 miles per hour will not be included in the final 1-hour and the 5-year average results.

The annual results from OBODM will be factored based on the proposed permit limits for each source. For example, up to 500 pounds gross weight can be burned per day at TSU-1; however, only up to 4,700 pounds net explosive weight can be burned per year. As shown in Section 3.1.3, 16% of the gross weight treated at TSU-1 between 2010 and 2014 was explosive materials, which corresponds to 80 net explosive weight per 500 pounds gross weight treated. Because only one event can occur on any day, modeling 80 pounds net explosive weight per day would effectively limit the number of events per year to 59 (4,700/80). The total number of hourly events modeled would be 1,095 events (3 events per day for 365 days.) Therefore, a factor of 0.0054 (59/1,095) will be applied to the modeled annual results for TSU-1.

A slightly different approach is necessary for TSU-2. In this case, the proposed permit limit is 240 gallons per day, with the proportion of net explosives and solvents estimated as described in Section 3.2.3. Because a burn at TSU-2 is assumed to last 3 hours sometime over a 5-hour time period (1 pm to 6 pm), the total number of hourly events modeled per day is 1.67 (5 hours/3 hours), and the total number of hourly events modeled per year is 608 (1.67×365 days per year). However, burns at TSU-2 do not occur on the same day as TSU-1, nor do they occur on weekends. Therefore, burns at TSU-2 could only occur on a total of 202 days (365-59-104), resulting in a factor of 0.332 (202/608) needing to be applied to the modeled annual results for TSU-2.

5.0 Predicted Environmental Media Concentrations

Potential exposures to many environmental media are common to both the human health and ecological risk assessments. As such, the process for predicting those concentrations is discussed in this section and is applicable to both risk evaluations as appropriate, as further discussed in Section 6.0 (Human Health) and Section 7.0 (Ecological). The environmental media potentially affected by emissions from TSU-1 and TSU-2 and the relationships between those media are presented in Figure 3. The environmental media that will be included in this evaluation are:

- Air
- Soil (on-site and off-site)
- Plants grown in areas of potentially affected soil (on-site and off-site)
- Cattle grazing in areas of potentially affected pasture grasses and soil (off-site)
- Terrestrial invertebrates in areas of potentially affected soil (on-site)
- Small mammals in areas of potentially affected soil (on-site)
- Water (San Justo Reservoir and Lake Teledyne)
- Fish (San Justo Reservoir and Lake Teledyne)

Air concentrations will be predicted using air dispersion modeling at five locations relevant to human and/or ecological receptors.

- Terrestrial locations near TSU-1 and TSU-2
- Perimeter
- Residence
- San Justo Reservoir
- Lake Teledyne

The predicted air concentrations will be used as follows to predict concentrations in environmental media for each of the human health and ecological receptors.

- Off-Site Resident – Air, soil, and homegrown produce concentrations based on predicted air concentration at a residence near PSEMC. Water concentration based on predicted concentration in water at San Justo Reservoir to be used as domestic water supply.
- Rancher – Air and soil concentrations at the perimeter are applicable to exposure by the rancher. Cattle are raised in the area surrounding PSEMC (i.e., perimeter). Beef concentrations are estimated based on air, soil and pasture grass concentrations at the perimeter.
- Recreational receptor – Air, soil, and fish concentrations based on predicted concentration at San Justo Reservoir.
- Terrestrial plants, invertebrates, mammals – Soil concentration based on predicted concentration at the terrestrial location.
- Fish – Water and fish tissue concentrations based on predicted concentrations at Lake Teledyne and San Justo Reservoir

The locations of the predicted air concentrations that will be used to estimate concentrations in other media for each receptor are as follows:

Model Location for Receptors and Exposure Media

Exposure Media	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	--	--	--	T	--
Terrestrial Invertebrates	--	--	--	T	--
Terrestrial Small mammals	--	--	--	T	--
Fish	--	SJ	--	LT	LT
Beef	--	--	P	--	--

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

As part of the California's Air Toxic Hot Spots Program, OEHHA has developed guidelines for assessing multi-pathway exposures resulting from airborne emissions (OEHHA, 2015a), which include equations for estimating environmental media concentrations based on concentrations of chemicals in air. OEHHA's guidance will be used to develop media-specific concentrations related to emissions from TSU-1 and TSU-2. The general assumptions associated with the following equations are provided in Table 7; chemical-specific parameters will be provided in the HHERA report.

5.1 Air

The predicted air concentration (Cair) at relevant locations will result from the emission estimates and the air dispersion model. The model will predict the ambient air concentration at each receptor location from the total material burned at each source (total ambient air concentration). There are two spatially separated sources (TSU-1 and TSU-2) that for some of the receptor locations have different maximum locations in the modeling results (e.g., the physical location of the terrestrial receptor for TSU-1 is different from the physical location of the terrestrial receptor for TSU-2). Regardless, to be conservative, the air concentrations for these two locations have been added together for the purpose of estimating potential exposure for each of the receptors. As described above, an emission factor (i.e. pounds of chemicals per total pounds burned) will be applied to the total ambient air concentration for each source to predict an ambient air concentration for each chemical. As stated in Section 4, TSU-1 and TSU-2 do not operate concurrently; therefore, the impacts from each of these sources will be treated as separate impacts for the purpose of assessing acute exposure.

The following equation will be used to calculate air concentrations for each source at each receptor location.

$$Cair = (Qi \;/\; Qt) * Ct$$

Where:

- Cair = Concentration in air for chemical "i" ($\mu g/m^3$)
- Qi / Qt = Emission factor for chemical "i" (pounds of chemical / total pounds burned) (Section 3.0)
- Ct = Total ambient air concentration resulting from total amount of material burned ($\mu g/m^3$) (Section 4.0)

5.2 Soil

The average concentration in soil (Cs) is based on deposition of non-volatile chemicals to soil, the half-life of chemicals in soil, mixing depth, and soil bulk density. For the purpose of this assessment, we will assume a 26-year deposition period based on lifetime exposure for a resident (DTSC, 2014b). The following equation will be used to calculate soil concentrations at each receptor location.

$$Cs = Dep * X/(Ks * SD * BD * Tt)$$

Where:

- Cs = Concentration in soil over evaluation period (mg/kg)
- Dep = Deposition on the affected soil area per day (mg/m^2-day)
  - Dep = Cair * Dep-rate * 86,400 * 0.001
  - Cair = Concentration in air ($\mu g/m^3$)
  - Dep-rate = Vertical rate of deposition (m/sec)
  - 86,400 = Seconds per day conversion factor (sec/day)
  - 0.001 = Milligrams per microgram conversion factor (mg/µg)

X = Integral function for soil accumulation (d)

X = $([e^{(-Ks*Tf)} - e^{(-Ks*T0)}]/Ks) + Tt$

e = 2.718

Ks = Soil elimination constant ($days^{-1}$)

Tf = Total evaluation period (days)

T0 = Initial time (days)

Ks = Soil elimination constant ($days^{-1}$)

Ks = $0.693/t_{1/2}$

$t_{1/2}$ = Chemical-specific half-life in soil

SD = Soil mixing depth (m)

BD = Soil bulk density (kg/m^3)

Tt = Soil accumulation period (days)

5.3 Plants

Concentrations of chemicals in plants are the sum of the amount deposited on the plant surface and uptake of the chemical in soil via the plant roots.

For the HHRA, the concentration in five types of plants, i.e., root vegetables, leafy vegetables, exposed fruits or vegetables, protected fruits or vegetables (collectively referred to as homegrown produce), and pasture grasses (for beef ingestion pathway) will be estimated as follows:

$$Cv = Cdepv + Ctrans$$

Where:

Cv = Average concentration in and on vegetation (mg/kg)

Cdepv = Concentration from direct deposition (mg/kg)

Cdepv = $[Dep * IF/(k * Y)] * (1-e^{-kt})$

Dep = Deposition on affected vegetation per day (mg/m^2-day)

IF = Interception fraction

k = Weathering constant ($days^{-1}$)

Y = Yield (kg/m^2)

e = Base of natural logarithm (2.718)

T = Growth period (days)

Ctrans = Concentration in vegetation due to root translocation or uptake (mg/kg)

Ctrans = $Cs * UF_2$

Cs = Average soil concentration (mg/kg)

UF_2 = Chemical-specific uptake factor

Uptake factors specific to each type of plant will be used where available; otherwise, surrogate values based on other types of plants will be used.

For the ERA, concentrations in terrestrial plants tissue will be estimated using the following equation, consistent with the methods used by EPA to derive ecological soil screening levels (Eco-SSLs) (EPA 2007).[2]

$$Cplant = Cs * BAFplant$$

Where:

Cplant	= Average concentration in terrestrial plant tissue (mg/kg)
Cs	= Concentration in soil (mg/kg)
BAFplant	= Chemical-specific terrestrial plant bioaccumulation factor (unitless)

5.4 Grazing Cattle

The average concentration of chemicals in grazing cattle depends on the applicable exposure routes. At PSEMC, cattle may graze on pasture grasses along the site perimeter, which would also result in potential soil exposure. Cattle are not potentially exposed to water in Teledyne Lake or San Justo Reservoir and supplemental feed is assumed to exclude chemicals related to TSU-1 and TSU-2.

Concentrations in grazing cattle will be estimated using the following equations.

$$Cca = (Inhalation + Grazing\ Ingestion + Soil\ Ingestion) * Tco$$

Where:

Cca	= Average concentration in cattle (mg/kg)	
Inhalation	= BRa * Cair	
	BRa	= Breathing rate (m^3/day)
	Cair	= Concentration in air ($\mu g/m^3$)
Grazing Ingestion	= FG * Cv * FI	
	FG	= Fraction of diet from grazing (site-specific)
	Cv	= Concentration in pasture/grazing material (mg/kg)
	FI	= Feed ingestion rate (kg/day)
Soil Ingestion	= SIa * Cs	
	SIa	= Soil ingestion rate for animal (kg/day)
	Cs	= Average soil concentration (mg/kg)
Tco	= Chemical-specific transfer coefficient of chemical from diet to animal product (day/kg)	

5.5 Terrestrial invertebrates

The average concentration of chemicals in terrestrial invertebrate tissue depends on the concentration in the soil and uptake from prey (e.g., terrestrial plants). Concentrations in

[2] In some cases, a chemical regression model will be used to estimate terrestrial plant tissue concentrations from soil rather than a BAF.

terrestrial invertebrate tissue will be estimated using the following equation, consistent with the methods used by EPA to derive Eco-SSLs (EPA 2007).[3]

$$Cinvert = Cs * BAFinvert$$

Where:

Cinvert	= Average concentration in terrestrial invertebrate tissue (mg/kg)
Cs	= Concentration in soil (mg/kg)
BAFinvert	= Chemical-specific terrestrial invertebrate bioaccumulation factor (unitless)

5.6 Small mammals

The average concentration of chemicals in small mammals tissue depends on the concentration in the soil and uptake from small mammal prey (e.g., invertebrates, terrestrial plants). Concentrations in small mammal tissue will be estimated using the following equation, consistent with the methods used by EPA to derive Eco-SSLs (EPA 2007).[4]

$$Cmam = Cs * BAFmam$$

Where:

Cmam	= Average concentration in small mammal tissue (mg/kg)
Cs	= Concentration in soil (mg/kg)
BAFmam	= Chemical-specific small mammal bioaccumulation factor (unitless), which takes into account exposure from dietary uptake

5.7 Surface Water

The average concentration in standing water (e.g., pond or lake) potentially impacted by facility emissions can be estimated based on deposition to the surface water body. This calculation does not account for surface water runoff to the surface water body, which would not apply significantly to San Justo Reservoir, which is at a much higher elevation than TSU-1 and TSU-2. Potential runoff from TSU-2 to Teledyne Lake may occur, but is likely much lower than direct impact from deposition because TSU-2 is operated in containers and residual material is disposed. Surface water concentrations will be estimated as follows:

$$Cw = DEP * SA * 365/(WV * VC)$$

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[3] In some cases, a chemical regression model will be used to estimate invertebrate tissue concentrations from soil rather than a BAF.

[4] In some cases, a chemical regression model will be used to estimate small mammal tissue concentrations from soil rather than a BAF.

Where:	Cw	= Average concentration in water (mg/L)
	DEP	= Deposition on water body per day (mg/m^2-day) (Same as soil equations above in Section 5.2)
	SA	= Site-specific surface area (m^2)
	WV	= Water volume (L)
	VC	= Site-specific number of volume changes per year (unitless)

5.8 Fish

The average concentration of chemicals in fish tissue depends on the concentration in the surface water body. Relevant to PSEMC, fish are present in Lake Teledyne and San Justo Reservoir. The fish in Lake Teledyne are considered ecological receptors but are not consumed by anglers. The fish in San Justo Reservoir are considered ecological receptors and may be ingested by anglers in the future if the reservoir is reopened.

Concentrations in fish tissue will be estimated using the following equations.

$$Cft = Cw * BCFfish$$

Where:

Cft	= Average concentration in fish tissue (mg/kg)
Cw	= Concentration in water (mg/L)
BCFfish	= Chemical-specific fish bioconcentration factor (unitless)

6.0 Human Health Risk Assessment

The human health risk assessment will quantitatively evaluate potential exposures and health effects related to environmental media potentially affected by airborne emissions from TSU-1 and TSU-2.

The initial step of a human health risk assessment, i.e., data evaluation, is addressed in Sections 3 and 4 describing how emissions will be quantified and dispersion coefficients will be predicted. Section 5 continues the data evaluation phase and describes how concentrations in various environmental media will be estimated. The remaining components of the human health risk assessment process are described in this section.

6.1 Exposure Assessment

Exposure assessment involves the identification of the potential human exposure pathways at the site for present and potential future-use scenarios. The identification of potential human receptors is based on the characteristics of the site, the surrounding land uses, and the hypothetical future land uses.

Exposure pathways link the sources, locations, types of environmental releases, and environmental fate and transport with receptor locations and activity patterns. Generally, an exposure pathway is considered complete if it consists of the following four elements:

- a source and mechanism of release (e.g., release to the subsurface);
- a transport mechanism (e.g., dust or groundwater);
- a receptor (e.g., resident); and
- an exposure point (i.e., point of potential contact with a contaminated medium) and an exposure route (e.g., ingestion) at the exposure point for a specific receptor.

6.1.1 Receptors and Exposure Pathways

As described, operations at TSU-1 and TSU-2 result in airborne emissions that for non-volatile compounds may deposit to soil and water, which then are available for uptake by grazing cattle, fish, and plants. The human receptors considered for this evaluation include:

- Off-site residents
- Off-site rancher
- Future recreational use of San Justo Reservoir

The relevant exposure pathways for each receptor are shown on Figure 5 and are summarized below:

<u>Off-site Resident</u>

The PSEMC facility is generally surrounded by agricultural land and open space. There is a housing development approximately 2000 feet north of TSU-1, and there are three individual houses located at least 1600 feet east of TSU-1. For the purpose of assessing residential exposure, we plan to make an initial conservative assumption that the off-site resident is exposed via all the exposure routes listed below. We have included potential exposure from domestic use of water in the San Justo Reservoir, although the primary use of water in the reservoir is for agricultural purposes. The resident is assumed to be exposed for 6 years as a child and 20 years as an adult (DTSC, 2014b).

- Inhalation
- Incidental ingestion of soil
- Dermal contact with soil
- Ingestion of homegrown produce
- Domestic use of surface water (San Justo Reservoir)
    - Ingestion of surface water
    - Dermal contact with surface water
- Ingestion of mother's milk (related to lead, benzo(a)pyrene and 2,3,7,8-TCDD only [OEHHA, 2015a])

<u>Off-site Rancher</u>

The off-site rancher is assumed to spend one day per week tending cattle at the perimeter of the PSEMC facility for 20 years. During that time (8-hour workday), the rancher could be exposed to chemicals in air and soil. In addition, the rancher is assumed to consume beef raised at the facility perimeter. The rancher also is assumed to have been exposed via beef consumption as a child for 6 years, assuming his parent was the previous rancher who brought beef raised at the perimeter home for consumption.

<u>Future Recreational Use of San Justo Reservoir</u>
The San Justo Reservoir was closed in 2008 to boating and fishing because of an infestation of zebra mussels; swimming and wading are not allowed San Justo Reservoir (http://www.cosb.us/county-departments/parks-recreation/regional-parks/san-justo/#.Vk5INcqzMWs). A plan was developed to mitigate the zebra mussels, but has not been implemented as it waits for agency approvals. Therefore, while the San Justo Reservoir is not currently accessible to the public, it is reasonably forseeable that it may reopen to the public in the future for boating and fishing. In that event, a recreational user could be exposed via all of the pathways listed below. Similar to the other receptors, a recreational user is assumed to exposed for 6 years as a child and 20 years as an adult.

- Inhalation
- Incidental ingestion of soil
- Dermal contact with soil
- Ingestion of fish

6.1.2 Exposure Quantification
This section describes how exposure will be quantified for the exposure scenarios identified for this site. Two exposure durations will be evaluated: acute exposures to chemicals in air and chronic exposure to chemicals in air as well as those that deposit to and are taken up by other environmental media.

Potential exposure rates will be quantified using reasonable maximum exposure assumptions for the various receptors. As noted above, each receptor is assumed to have exposure as a child (0 to 6 years) and as an adult (6 to 26 years). Exposure assumptions recommended in regulatory guidance (DTSC, 2014b, EPA, 2015c, and OEHHA, 2015a) that will be used in the evaluation are summarized in Table 8. Exposure equations used to estimate potential exposures are presented below.

6.1.2.1 Inhalation Exposure
Acute inhalation exposures are evaluated for potential inhalation effects using a short-term upper-bound air concentration predicted from modeling. Chronic exposures for inhalation routes of exposure are evaluated for potential non-cancer health effects by calculating an annual average concentration (AAC) and for potential carcinogenic health effects by calculating a lifetime annual average concentration (LAAC). The equations for calculating these values are the same with the exception of the averaging time. The average concentrations are adjusted for exposure time, frequency, duration, and averaging time as follows:

$$AAC = Cair * ET * EF * ED/ATnc$$
$$LAAC = Cair * ET * EF * ED/ATca$$

Where: AAC = Annual average air concentration ($\mu g/m^3$)
LAAC = Lifetime average air concentration ($\mu g/m^3$)

Cair = Concentration in air ($\mu g/m^3$)
ET = Exposure time (hours per day)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
ATnc = Averaging time for non-carcinogens (hours)
ATca = Averaging time for carcinogens (hours)

The AAC is calculated for an averaging time equal to the exposure duration (e.g., 175,200 hours for a 20-year adult exposure duration). The LAAC is calculated for a lifetime averaging period equivalent to 70 years (613,200 hours).

6.1.2.2 Non-inhalation Exposures

Concentrations in various environmental media will be estimated as described in Section 5.0. These estimates are based on worst-case assumptions regarding emissions and air concentrations, which are likely to overestimate potential human health risks. Concentrations in environmental media and exposure rates (a function of contact rate, exposure frequency, and exposure duration) are used to quantify potential exposure. Chronic exposures for non-inhalation routes of exposure are evaluated for potential non-cancer health effects by calculating an annual average daily dose (AADD) and for potential carcinogenic health effects by calculating a lifetime average daily dose (LADD).

Incidental ingestion of Soil

Potential average daily doses for ingestion of soil are calculated as follows:

ADDing = Cs * IRs * GRAF * EF * ED * CF1/(ATnc * BW)
LADDing = Cs * IRs * GRAF * EF * ED * CF1/(ATca * BW)

Where:

ADD = Annual average daily dose (mg/kg-day)
LADD = Lifetime average daily dose (mg/kg-day)
Cs = Concentration in soil (mg/kg)
IRs = Ingestion rate of soil (mg/day)
GRAF = Gastrointestinal relative absorption fraction (unitless, chemical specific)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
CF1 = $1x10^{-6}$ (kg soil/mg soil)
ATnc = Averaging time for non-carcinogens (days)
ATca = Averaging time for carcinogens (days)
BW = Body weight (kg)

Ingestion of Homegrown Produce, Beef, and Fish

Potential average daily doses for ingestion of food are calculated as follows:

ADDf = Cf * IRf *GRAF * Lf * EF *ED *CF2/(ATnc *BW)
LADDf = Cf * IRf *GRAF * Lf * EF *ED *CF2/(ATca *BW)

Where:

ADD = Annual average daily dose (mg/kg-day)

LADD = Lifetime average daily dose (mg/kg-day)
Cf = Concentration in food (mg/kg)
IRf = Ingestion rate of food (g/day)
GRAF = Gastrointestinal relative absorption fraction (unitless, chemical-specific)
Lf = Fraction from affected food source (unitless)[5]
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
CF2 = $1x10^{-3}$ (kg food/g food)
ATnc = Averaging time for non-carcinogens (days)
ATca = Averaging time for carcinogens (days)
BW = Body weight (kg)

Dermal Contact with Soil

Potential average daily doses for dermal contact with soil are calculated as follows:

ADDds = Cs * SAs * AF * ABSd * EF *ED *CF3/(ATnc *BW)
LADDds = Cs * SAs * AF * ABSd * EF *ED *CF3/(ATca *BW)

Where:

ADD = Annual average daily dose (mg/kg-day)
LADD = Lifetime average daily dose (mg/kg-day)
Cs = Concentration in soil (mg/kg)
SAs = Surface area for soil contact (cm^2)
AF = Adherence factor (mg/cm^2)
ABSd = Fraction absorbed across the skin (unitless; chemical-specific)
EF = Exposure frequency (days/year)
ED = Exposure duration (years)
CF3 = $1x10^{-6}$ (kg soil/mg soil)
ATnc = Averaging time for non-carcinogens (days)
ATca = Averaging time for carcinogens (days)
BW = Body weight (kg)

Dermal Contact with Water

Potential average daily doses for dermal contact with water while using water from San Justo Reservoir as a municipal water source are calculated as follows:

ADDdw = DAevent * SAw * EFw *ED /(ATnc *BW)
LADDdw = DAevent * SAw * EFw *ED /(ATca *BW)

Where:

ADD = Annual average daily dose (mg/kg-day)
LADD = Lifetime average daily dose (mg/kg-day)
DAevent = Dermal absorption during bathing (mg/cm^2/event)
Inorganics
= Kp * Cw * tevent * CF4

[5] Abbreviated "L" in OEHHA guidance; "Lf" used herein to distinguish this factor from the abbreviation for "liters."

or

Organics[6]

$$= 2 * FA * Kp * Cw * CF4 * (6*\tau event*tevent/\pi)^{0.5}$$

Where:
Kp = Permeability constant (cm/hr; chemical-specific)
Cw = Concentration in water (mg/L)
tevent = Duration of bathing (hours/day)
CF4 = $1x10^{-3}$ (L per cm^3)
FA = Fraction absorbed water
τevent = Lag time per event (hr/event)
π = pi (3.41459)

SAw = Surface area for water contact (cm^2)
EFw = Exposure frequency for water contact (days/year)
ED = Exposure duration (years)
ATnc = Averaging time for non-carcinogens (days)
ATca = Averaging time for carcinogens (days)
BW = Body weight (kg)

Ingestion of Water

Potential average daily doses for ingestion of water while using water from San Justo Reservoir as a municipal water source are calculated as follows:

$$ADDiw = Cw * IRw * RBAw * EFw *ED /(ATnc *BW)$$
$$LADDiw = Cw * IRw * RBAw * EFw *ED *ED /(ATca *BW)$$

Where:

ADD = Annual average daily dose (mg/kg-day)
LADD = Lifetime average daily dose (mg/kg-day)
Cw = Concentration in water (mg/L)
IRw = Ingestion rate of water (L/day)
RBAw = Relative bioavailability of chemical in water (unitless; chemical-specific)
EFw = Exposure frequency for water contact (days/year)
ED = Exposure duration (years)
ATnc = Averaging time for non-carcinogens (days)
ATca = Averaging time for carcinogens (days)
BW = Body weight (kg)

Ingestion of Mother's Milk

Potential exposure related to ingestion of mother's milk is related to the mother's dose while nursing, the transfer of the chemical to mother's milk, and ingestion by the infant. The mother's dose is related to the various exposure pathways relevant to the resident.

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[6] This equation assumes the time to reach steady state (t*) is greater than the time of the bathing event (t_{event}) (EPA, 2004), which is the case for all organic chemicals to which this pathway applies.

Transfer to milk is separated into to two components: dose from inhalation and dermal contact (dose presumed not to pass through the liver) and dose from ingestion of soil, homegrown produce and other food sources. The equations governing this process are:

Concentration in Mother's Milk

$$Cm = ([Din\_der * Tcom\_inder] + [Ding * Tcom\_ing]) * BW$$

Where:

Cm	= Concentration in mother's milk (mg/kg-milk)
Din_der	= AAC (*Inh/BW) + ADDds + ADDdw (dose from inhalation [converted from air concentration], dermal contact with soil and dermal contact with water; mg/kg-day) Inh = Inhalation rate (m^3/day) BW = Body weight (kg)
Tcom_inder	= Chemical-specific biotransfer coefficient from inhalation and dermal absorption to mother's milk (d/kg-milk)
Ding	= ADDing + ADDf + ADDiw (dose from soil ingestion, foods, and water)
Tcom_ing	= Chemical-specific biotransfer coefficient from ingestion to mother's milk (d/kg-milk)
BW	= Body weight (kg)

Dose to the infant is related to the concentration in mother's milk and the milk ingestion rate. Implicit in the calculation is the assumption that infants consume mother's milk for one year.

Dose to Infant through mother's milk intake

$$AADDm = Cm * BMIbw * CF * EFm * ED/ATnc$$

$$LADDm = Cm * BMIbw * CF * EFm * ED/ATca$$

Where:

ADD	= Annual average daily dose (mg/kg-day)
LADD	= Lifetime average daily dose (mg/kg-day)
Cm	= Concentration in mother's milk (mg/kg milk)
BMIbw	= Daily breast-milk ingestion rate (g/kg/day)
CF	= Conversion factor (10^{-3} kg/g)
EFm	= Exposure frequency for mother's milk (days/year)
ED	= Exposure duration (years)
ATnc	= Averaging time for non-carcinogens (days)
ATca	= Averaging time for carcinogens (days)

6.2 Toxicity Assessment

The purpose of the toxicity assessment is two-fold (EPA, 1989):

- To evaluate available information regarding the potential for a chemical to cause adverse health effects in exposed individuals (hazard identification); and

- To estimate the relationship between the extent of exposure and the increased likelihood (e.g., probability or chance) and/or severity of adverse effects (dose-response assessment.

This human health risk assessment will quantitatively address chemicals for which a dose-response assessment has been completed or for which a relevant surrogate chemical can be identified. Toxicological values and information regarding the potential for carcinogens and noncarcinogens to cause adverse health effects in humans will be 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 information may be referenced as appropriate.

In some cases, toxicity criteria have only been developed for one of the routes of exposure (e.g., inhalation or oral exposure). If one route of exposure does not have a toxicity criterion, consistent with DTSC's general practice, the toxicity criterion for the route of exposure that has been developed will be applied to the route of exposure for which toxicity information is not available (i.e., route-to-route extrapolation). There are also cases where DTSC and EPA expressly do not recommend this sort of extrapolation (e.g., nickel's inhalation slope factor); in these cases, route extrapolation will not be used.

Additionally, dermal exposure estimates are in terms of an absorbed chemical dose, while toxicity testing results are evaluated based on the applied dose. EPA has evaluated toxicity testing for several chemicals to assess whether the absorbed dermal dose may be significantly different from the absorbed dose related to the oral toxicity testing. In cases where the difference is significant, EPA has developed gastrointestinal absorption factors (GIabs) to adjust from applied dose to absorbed dose. Only in cases where the results are significant does EPA recommended the use of GIabs factors (EPA, 2004).

6.2.1 Carcinogens

For ingestion exposures, a slope factor (SF) is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen. SFs are presented in units of the inverse of milligrams per kilogram per day [$(mg/kg\text{-}day)^{-1}$]. Specifically, a SF is a plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime.

For inhalation exposures, an inhalation unit risk (IUR) is used to describe the upper-bound probability of an individual developing cancer after exposure to a lifetime average air concentration. IURs are quantified in units of the inverse of micrograms per cubic meter [$(\mu g/m^3)^{-1}$].

Some carcinogens are classified as mutagens based on their mode of action. Mutagens are considered by EPA to result in potentially higher probability of cancer when exposure occurs as a child. EPA has developed age-dependent adjustment factors (ADAFs) for mutagens to account for the increased probability of cancer from exposure at a young age (EPA, 2005c):

- 0-2 years – 10
- 2-6 years – 3
- 6-16 years – 3
- 16-30 years – 1

ADAFs will be used for chemicals identified as mutagens by EPA in this evaluation (i.e., benzo(a)pyrene). As shown above, exposure will be estimated for three age groups: infant (0-1 year; mother's milk only), child (0-6 years), and adult (6-26 years). The ADAF of 10 for 0-2 years will be used for the infant; however, weighted average ADAFs will be used for the child and adult as follows:

<u>Child</u>

$$ADAF_{child} = [(2 \text{ yrs} * 10) + (4 \text{ yrs} * 3)]/6 \text{ yrs}$$
$$5.33$$

<u>Adult</u>

$$ADAF_{adult} = [(10 \text{ yrs} * 3) + (10 \text{ yrs} * 1)]/20 \text{ yrs}$$
$$= 2$$

6.2.2 Noncarcinogens

For the evaluation of noncarcinogens in the risk assessment, chronic reference doses (RfDs) for the ingestion and dermal exposure routes and acute and chronic reference concentrations (RfCs) for the inhalation route are used. A chronic RfD is an estimate of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without appreciable adverse health effects during a lifetime. The RfC is an estimate of the maximum air concentration over a specified time period that will not result in adverse health effects. Chronic RfDs and RfCs are generally used to evaluate the potential noncarcinogenic effects associated with exposure periods between six years and a lifetime. Acute RfCs are an estimate of the maximum air concentration over a short-time period (as short as 1 hour to 14 days) that will not result in adverse health effects.

6.2.3 Lead

The potential for human health effects caused by lead is typically determined based on estimated blood-lead concentrations (e.g., a blood-lead level of "x" is associated with a particular adverse health effect).

In 2007, OEHHA established 1 microgram per deciliter (µg/dL) as a benchmark for source-specific incremental change in blood-lead levels for the protection of school children and fetuses (OEHHA, 2007). For this project, the results of the air dispersion modeling and environmental fate and transport calculations will be used in DTSC's LeadSpread model (version 8) to assess potential exposure to lead.

6.3 Risk Characterization

In the risk characterization, toxicity and exposure assessments are integrated to provide a quantitative estimate of the potential for adverse health effects. Exposures to multiple media and multiple chemicals by the same receptor are summed to estimate the potential for adverse health effects related to cumulative exposure.

6.3.1 Carcinogens

Carcinogenic risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen, which are a function of exposure and toxicity. Specifically, lifetime excess cancer risk will be estimated as follows:

<u>For oral and dermal exposure:</u>

$$\text{Lifetime Excess Cancer Risk}_i = \text{LADD}_i \times \text{SF}_i \times \text{ADAF}$$

Where:

LADDi	= Lifetime average daily dose for chemical "i" (mg/kg-day)
SFi	= Slope factor (oral or dermal) for chemical "i" $(\text{mg/kg-day})^{-1}$
ADAF	= Age-dependent adjustment factor, if applicable

<u>For inhalation exposure:</u>

$$\text{Lifetime Excess Cancer Risk}_i = \text{LAAC}_i \times \text{IUR}_i \times \text{ADAF}$$

Where:

LAACi	= Lifetime annual average concentration for chemical "i" $(\mu g/m^3)$
IURi	= Inhalation unit risk for chemical "i" $(\mu g/m^3)^{-1}$
ADAF	= Age-dependent adjustment factor, if applicable

These carcinogenic risk estimates are generally an upper-bound value because the slope factor is often a 95% upper confidence limit (UCL) of probability of response based on experimental animal data. The estimated excess cancer risks for each chemical and exposure route are summed for adult and child receptors and then summed across all chemicals and exposure routes regardless of toxic endpoint to estimate the total excess cancer risk for the exposed individual.

To evaluate estimated cancer risks, the EPA and Cal/EPA have defined what is considered to be an acceptable level of risk in similar, though slightly different, ways. The EPA considers one in one-million (1×10^{-6}) to one in ten thousand (1×10^{-4}) to be the target range for acceptable risk (EPA, 1990a and b). Estimates of lifetime excess cancer risk associated with exposure to chemicals of less than 1×10^{-6} are considered de minimis, a risk level that is so low as to not warrant any further investigation or analysis (EPA, 1990a). Within the state of California, Cal/EPA also generally targets the same range for acceptable risks with a focus on the lower end of the risk range for residential exposures.

It should be noted that cancer risks in the 1×10^{-6} to 1×10^{-4} range or higher do not necessarily mean that adverse health effects will be observed. Current methodology for estimating the carcinogenic potential of chemicals is believed to not underestimate the true risk, but it could overestimate the true risk by a considerable degree. In fact, the range of possible risks includes zero.

6.3.2 Noncarcinogens

Potential noncarcinogenic effects are evaluated by comparing exposure over a specified time period with a reference dose derived for a similar exposure period. This ratio of exposure to toxicity is referred to as a hazard quotient (HQ), which is calculated as follows:

For oral and dermal exposure:

$$HQ = AADDi/RfDi$$

Where

AADDi	= Annual average daily dose for chemical "i" (mg/kg-day)
RfDi	= Reference dose (oral or dermal) for chemical "i" (mg/kg-day)

For chronic inhalation exposure:

$$HQ = AACi/RfCi$$

Where:

AACi	= Annual average concentration for chemical "i" ($\mu g/m^3$)
RfCi	= Reference concentration for chemical "i" ($\mu g/m^3$)

For acute inhalation exposure:

$$HQ = ACi/ARfCi$$

Where:

ACi	= Acute concentration for chemical "i" ($\mu g/m^3$)
ARfCi	= Acute reference concentration for chemical "i" ($\mu g/m^3$)

HQs will be calculated separately for adult and child receptors; however, only the highest value (for the child) will be included in the risk assessment summary. For a screening assessment of potentially cumulative noncancer health effects, HQs for all chemicals will be summed as a hazard index (HI). If the screening HI is greater than one, then only HQs for the individual COPCs that potentially act on the same organs or result in the same health endpoint (e.g., respiratory irritants) will be summed to assess potential additive effects.

A HI or HQ (for effects which are not additive) of less than or equal to 1 indicates acceptable levels of exposure for COPCs. It should be noted that HQs or HIs greater than 1 do not necessarily mean that adverse health effects will be observed. A substantial margin of safety has been incorporated into some of the RfDs and RfCs developed for the COPCs. Therefore, for these chemicals, adverse health effects may not be observed even if the HQ or HI is much larger than 1.

7.0 Ecological Risk Assessment

The following describes the approach for conducting an ecological risk assessment (ERA) for the PSEMC facility. The ERA will follow an iterative, phased approach based on both DTSC's *Guidance for Ecological Risk Assessment at Hazardous Waste Site and Permitted Facilities* (DTSC, 1996a and b) and EPA guidance (EPA, 1997). Each step of the phased approach will move from generic, conservative assumptions towards more site-specific, realistic assumptions. At each step of this phased approach, the results of the assessment will be evaluated to determine whether: (1) no additional evaluation is necessary because ecological risks are determined to be negligible, or (2) additional evaluation (i.e., the next tier of evaluation) is warranted to refine all or part of the ERA to determine the potential for ecological risk. The ERA phases are as follows:

- **Scoping Assessment** – equivalent to DTSC's Scoping Assessment (DTSC, 1996a and b) and EPA's Screening-Level Problem Formulation (EPA 1997); this assessment provides a qualitative narrative of the Site from an ecological perspective and evaluates the potential for complete exposure pathways.
- **Screening Assessment** – equivalent to DTSC's Phase I: Predictive Assessment (DTSC, 1996a) and EPA's Screening-Level Assessment (EPA, 1997); in a screening assessment, conservative assumptions (e.g., maximum exposure concentrations, no-effect adverse effect levels [NOAELs]) are used to predict quantitative risk estimates.
- **Baseline Assessment** – equivalent to EPA's Baseline Assessment (EPA, 1997); this assessment is also a refinement of DTSC's Phase I: Predictive Assessment (DTSC, 1996a) based on baseline assumptions and/or site-specific media (e.g., soil) data. In a baseline assessment, more realistic assumptions (e.g., upper bound exposure concentrations, lowest-effect adverse effect levels [LOAELs]) are used to predict quantitative risk estimates. We recommended that this type of assessment be considered by DTSC prior to making a decision about whether a Validation Study should be conducted.
- **Validation Study** – equivalent to DTSC's Phase II: Validation Assessment (DTSC 1996a); this study is a validation-level assessment. Site-specific measurements of toxicity are made to determine whether ecological risks occur at a site.

The remainder of this section describes the approach that will be used to conduct the ERA for the Site.

7.1 Scoping Assessment

The Scoping Assessment will follow DTSC guidance (DTSC, 1996a and b). The Scoping Assessment will provide a brief qualitative narrative of the Site from an ecological perspective and will include: (1) a characterization of physical, chemical and biological conditions at the site; (2) a preliminary list of contaminants of potential ecological concern (COPECs); and (3) a conceptual site model (CSM) identifying any complete exposure pathways. If no complete exposure pathways are identified, then it will be concluded that the potential for ecological risks is negligible and no further assessment is needed.

Data from the most recent biological site visit (conducted in July 2015), previous biological surveys (H. T. Harvey, 2003), and site assessments (Ecology and Environment, 1989; Ebasco, 1991) will be used to summarize site and biological conditions at the PSEMC facility and in the surrounding area. As part of the biological characterization (Section 7.1.2), state biological databases[7] will also be consulted.

7.1.1 Site Characterization

The physical and chemical conditions at the Site will be characterized to provide context for the ecological setting at the Site and potential for exposure pathways. A preliminary characterization of the Site for the Scoping Assessment is summarized in the remainder of this section.

The PSEMC facility is located in a rural area within the San Juan Valley. The facility is zoned for industrial use and the primary surrounding land use is agricultural with some residential areas. The topographic gradient ranges from approximately 250 feet in the northwest corner to approximately 430 feet in the southeast portion of the property. In the center of the property is Lake Teledyne, a man-made lake which was created in the 1970s to provide water supply for firefighting needs at the facility. The average depth of Lake Teledyne is 2 feet; depths range from 2 to 7 feet (H. T. Harvey 2003). The San Justo Reservoir is approximately 1300 feet northeast of the facility boundary, which is a source of local irrigation water. San Justo Reservoir has been used in the past for recreational purposes, but is currently closed to the public in an effort to eradicate zebra mussels, which were found present in the reservoir in 2008.

A perimeter fence surrounds the property. Within the property, there is an interior barbed wire fence that separates the operating portion of the facility (including property buildings and TSU-2, TSU-3, and TSU-8) from TSU-1. The focus of the Screening Assessment (Section 7.2) will be areas within the Site (i.e., terrestrial areas immediately downwind of TSU-1 and TSU-2 and Lake Teledyne) and the San Justo Reservoir.

7.1.2 Biological characterization

The biological conditions of the Site (i.e., habitat and species present) will be characterized to determine the ecological receptors that are potentially present at the site and potentially exposed to site contaminants. As was observed during the July 2015 site visit, non-native, annual grassland habitat occurs in the undeveloped areas of the facility. Lake Teledyne provides aquatic habitat with emergent vegetation (including cattails and rushes).

The biological characterization will include tables of common plant and wildlife species observed or potentially present at the site, as well as special-status species based on

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[7] California Department of Fish and Wildlife [CDFW] California Natural Diversity Database [CNDDB] [available at http://www.dfg.ca.gov/biogeodata/cnddb/] and the California Native Plant Society's *Inventory of Rare and Endangered Plants of California* [available at: http://www.rareplants.cnps.org/].

California species of special concern, state or federally listed species, or species recommended for state or federal listing. A preliminary list of animal and plant species that may or do occur at and nearby the Site are presented in Tables 9 and 10, respectively.

7.1.3 Pathways assessment

The results of the site and biological characterizations will be used to determine which exposure pathways are significant and potentially complete. Per DTSC guidance (1996b), exposure routes to be evaluated will include direct (i.e., dermal contact, ingestion, and inhalation) and indirect (i.e., food web transfer) pathways. Site-specific exposure pathways are illustrated in a preliminary CSM based on general receptor groups (Figure 6).

7.1.4 Results and decision criteria for additional assessment

The results of the Scoping Assessment will provide the basis for a recommendation to either: (1) conduct no further assessment because no complete exposure pathways are identified and the potential for ecological risks is assumed to be negligible, or (2) conduct a Screening Assessment following DTSC (1996a) guidance for a Predictive Assessment for any complete and significant exposure pathways identified for ecological receptors. Given what is currently known about the Site, a Screening Assessment will be required for this Site.

7.2 Screening Assessment

For any complete exposure pathways identified in the Scoping Assessment, a Screening Assessment will be conducted. In this assessment, predicted concentrations and doses will be compared to conservative ecological thresholds to derive HQs for the COPECs identified in the Scoping Assessment as having potentially significant and complete exposure pathways. HQs will be used to evaluate whether there is a potential for ecological risk. If conservative ecological thresholds are not exceeded, then it will be concluded that the potential for ecological risks is negligible and no further assessment is needed. If conservative ecological thresholds are exceeded, further evaluation will be conducted to refine the risk estimates.

7.2.1 Problem formulation

The information presented in the Scoping Assessment, such as potentially complete exposure pathways and species present (or potentially present) at the Site, will be presented to describe the overall problem formulation for the Screening Assessment.

7.2.1.1 Selection of ecological receptors

Ecological receptors evaluated in the Screening Assessment are species that are representative of the aquatic and terrestrial species (both plant and wildlife) identified in the biological characterization of the Scoping Assessment. Based on what is known about the Site at this time, the preliminary selected receptors for the Screening Assessment were selected from the occurring and potentially occurring species listed in Tables 9 and 10 using criteria consistent with DTSC (1996a) and EPA (1997) guidance. Receptors were selected based on their likelihood of occurrence and exposure to COPECs at the Site to represent the range of trophic levels and feeding guilds (e.g., herbivore, carnivore) within the food chain, and to be protective of any special status species known or potentially present at the Site.

The following ecological receptors been preliminarily identified to be evaluated in the Screening Assessment based on the above criteria and what have been observed at the Site:

- **Terrestrial plant community –** Terrestrial vegetation is present throughout the Site. The terrestrial plant community will be evaluated as a whole rather than focusing on a single species.
- **Aquatic-limited receptors (i.e., aquatic plant community and largemouth bass)[8]** – Aquatic-limited receptors represent localized exposure within either Lake Teledyne or the San Justo Reservoir. The aquatic plant community will be evaluated as a whole rather than focusing on a single species. Fish are present in both Lake Teledyne (bass have been observed) and the San Justo Reservoir.
- **Great egret**– Heron/egrets have been observed in Lake Teledyne and are expected to also utilize the San Justo Reservoir. The diet of the great egret is primarily fish.
- **Savannah sparrow** – Omnivorous birds, such as sparrows have localized exposure to COPECs at the Site. Their diet is comprised of terrestrial invertebrates and plants.
- **Deer mouse** – Small mammals, such as mice and voles have small home ranges and therefore, will have localized exposure to COPECs at the Site more so than wide-ranging mammals such as large mammals. Their diet is comprised of terrestrial invertebrates and plants.
- **Red-tailed hawk** – Red tailed hawk are larger carnivorous birds representing a high trophic level species. Their diet is primarily small mammals.

Amphibians and reptiles are likely present at the Site; however, due to the lack of toxicity data available for these receptors, they were not selected as a specific receptor for evaluation in the Screening Assessment. The Screening Assessment will discuss these receptor groups qualitatively, noting their presence at the Site and their relative sensitivity to COPECs compared with other ecological receptors.

7.2.1.2 Conceptual site model

The ecological CSM that is developed in the Scoping Assessment will present the complete exposure pathways, representative ecological receptors, and media that will be evaluated in the Screening Assessment. A preliminary ecological CSM is presented in Figure 6. As noted in the figure, exposure media to be evaluated included on-site soil, on-site terrestrial plants, terrestrial invertebrates and small mammals, surface water, and fish. The one exposure medium that will not be evaluated is air because the potential ecological risks from exposure to air via inhalation are assumed to be insignificant

[8] Aquatic-limited receptors will be evaluated using ambient water quality criteria (AWQC) to evaluate their exposure to water in Lake Teledyne (see Section 7.2.1.3 and Section 7.2.3).

relative to potential risks from exposure to chemicals via direct contact with abiotic media (soil, water) and dietary exposure.

7.2.1.3 COPECs to be evaluated

COPECs for the Site will be those chemicals identified as emissions in Section 3.0.

7.2.2 Exposure assessment

The exposure assessment will be conducted for aquatic and terrestrial ecological receptors following the methods recommended by DTSC (1996a) and EPA (1997). The exposure assessment will include a summary of the chemical concentrations in site media (i.e., soil and water) selected to represent exposure of ecological receptors to the COPECs identified in the Scoping Assessment.

7.2.2.1 Derivation of soil and water exposure concentrations

COPEC concentrations in soil and water will be determined using the modeling methods described in Section 4.0 and the environmental fate and transport described in Section 5.0.

7.2.2.2 Derivation of tissue exposure concentrations

Maximum COPEC soil and water concentrations (as defined above) will be used to predict tissue concentrations, as necessary, for the evaluation of complete dietary exposure pathways. Tissue types with predicted concentrations will potentially include: terrestrial plant tissue, terrestrial invertebrate tissue, whole-body terrestrial small mammal tissue, and whole-body fish tissue.

The derivation of these tissue concentrations will follow the methods provided in Section 5.0. The OHHEA model provides uptake factors[9] and assumptions to derive tissue types specific to a human health risk assessment (HHRA) (i.e., vegetation, cattle, and edible [muscle] fish tissue). For the ERA, additional uptake factors and assumptions may be needed to estimate ERA-specific tissue types (i.e., invertebrate tissue, small mammal tissue, or whole-body fish tissue). ERA-specific uptake factors for specific tissue types needed for the Screening Assessment will be based on the general literature from the following sources:

- Uptake models used for EPA's Eco-SSLs (EPA, 2007) (models available for soil-to-plants, soil-to-invertebrates, and soil-to-small mammals)
- Uptake models reported by Oak Ridge National Laboratory (ORNL) (Bechtel Jacobs, 1998; Sample et al., 1998; Sample et al., 1999) (models available for soil-to-plants, soil-to-invertebrates, and soil-to-small mammals)
- Uptake models reported by Tsao and Sample (2005) (models are available for energetic compounds for soil-to-plants, and soil-to-invertebrates)
- Uptake models reported by EPA (1999) (models available for soil-to-plants, soil-to-invertebrates, and water-to-fish)

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[9] Uptake factors include soil-to-tissue biota accumulation factors (BAFs) and water-to-tissue bioconcentration factors (BCFs).

Other assumptions needed to estimate ERA-specific tissue concentrations using the OHHEA approach, such as food and incidental soil ingestion rates for estimating small mammal tissue, will be the same at those used to model dietary doses (Section 7.2.2.3).

7.2.2.3 Derivation of dietary doses

Dietary exposure for wildlife will be determined using the following equation:

$$Dose = \frac{\left[\left(FIR \times C_{prey}\right) + \left(SIR \times C_{sed}\right)\right]}{BW} \times SUF$$

Where:

Dose	=	daily ingested dose (mg/kg body weight [bw]/day)
FIR	=	food ingestion rate (kg dry weight [dw] /day)
C_{food}	=	chemical concentration in food (mg/kg dw)
SIR	=	incidental sediment/soil ingestion rate (kg dw/day)
$C_{sed/soil}$	=	chemical concentration in sediment or soil (mg/kg dw)
SUF	=	site use factor (unitless)
BW	=	body weight (kg)

Exposure parameters, including body weights and ingestion rates, will be determined using the following sources: Nagy (2001), EPA's Wildlife Exposure Factors Handbook (1993), DTSC EcoNOTEs (https://www.dtsc.ca.gov/AssessingRisk/eco.cfm), and additional sources, as needed (e.g., Beyer et al., 1994; Sample and Suter, 1994).

7.2.3 Toxicity assessment

For the Screening Assessment, toxicity reference values (TRVs) will be identified for each COPEC/receptor/pathway. Consistent with DTSC guidance (DTSC, 1996a), NOAEL TRVs will be used. NOAELs are concentrations at which no adverse effect is observed and represent conservative screening-level thresholds. Rather than conduct an extensive literature search and review of the primary toxicological literature, NOAELs will be selected from existing compilations based on extensive reviews. TRVs will be selected as follows:

- For wildlife, dietary TRVs will be based on EPA's soil screening levels (SSLs) (EPA, 2007), US Navy/Biological Technical Assistance Group (BTAG) TRVs (EPA, 2009; 2002), as recommended by DTSC EcoNOTEs (https://www.dtsc.ca.gov/AssessingRisk/eco.cfm), or on NOAEL TRVs reported by ORNL (Sample et al., 1996). TRVs available from the US Army Center for Health Promotion and Preventive Medicine (USACHPPM), will also be considered for those COPECs not evaluated in the above sources.
- For plants, soil TRVs will be based on ORNL plant-specific screening levels (http://www.esd.ornl.gov/programs/ecorisk/benchmark_reports.html) or plant-specific Eco-SSLs (http://www.epa.gov/ecotox/ecossl/).
- For aquatic-limited receptors, water TRVs will be based on ecological chronic freshwater ambient water quality criteria (AWQC) from EPA

(http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm#altable).

Other sources may be consulted, as necessary, to identify appropriate TRVs for pairs of COPEC-receptor groups not evaluated in the above sources.

The following criteria will be evaluated in the selection of wildlife TRVs, consistent with DTSC guidance (DTSC 1996b):

- Taxonomic-specific TRVs will be derived,[10] as appropriate.
- TRVs will be adjusted to correct for differences in body weight among test species and selected receptors.
- TRVs will be based on NOAELs derived from chronic toxicity tests or tests conducted during critical life stages (reproduction), provided that such toxicity data are available.
- Uncertainty factors (UCFs) to derive chronic NOAELs (when chronic NOAEL data are not available) are as follows:
    - A NOAEL derived from a LOAEL will be estimated using an UCF of 10.
    - A chronic NOAEL derived from a sub-chronic NOAEL will be estimated using an UCF of 10.

COPECs for which no toxicity thresholds can be identified will be identified in the Screening Assessment and discussed in the uncertainty evaluation.

7.2.4 Risk characterization and uncertainty analysis

Screening-level risk estimates will be quantified as HQs using the following equation:

$$HQ = \frac{EC \text{ or } Dose}{TRV}$$

Where:

HQ	=	hazard quotient (unitless)
EC	=	exposure concentration
Dose	=	dose
TRV	=	toxicity reference value

HQs for all exposure pathways will be added to arrive at a species-specific HIs for COPECs that have a common mechanism of action or common target organ (DTSC, 1996a).

An uncertainty analysis will be presented along with the risk results. Uncertainties associated with, but not necessarily limited to, the following will be discussed:

[10] Because of limited plant toxicity, laboratory plant species will be considered acceptable surrogates for plant receptors at the Site.

- Representativeness of exposure pathways and selected receptors
- Representativeness of modeled exposure concentrations, including the use of air modeling to derive soil and water concentrations, the use of localized areas to represent exposure areas, the use of uptake models to derive tissue concentrations, and the use of exposure assumptions to model doses
- Limitations and representativeness of toxicity data
- Use of conservative assumptions (e.g., NOAELs) to derive risk estimates

A discussion of the risk results, including the magnitude of HQs/HIs greater than one and associated uncertainties, will be presented to determine the conclusions of the Screening Assessment.

If existing background data are available from the area, background COPEC concentrations of inorganic COPECs and their associated risk estimates may also be discussed as part of the risk characterization. If inorganic COPECs contribute significantly to predicted risks, site samples and/or background samples may be collected to verify or evaluate the modeled concentrations.

7.2.5 Results and decision criteria for additional evaluation

The results of the Screening Assessment will provide the basis for a recommendation to either: (1) conduct no further assessment because HQs/HIs are less than one and ecological risks is assumed to be negligible, or (2) conduct further assessment, such as a Baseline Assessment and/or Validation Study, to further characterize the potential for ecological risk.

7.3 Baseline Assessment and Validation Study

For any receptors/COPECs with HQs/HIs greater than one from the Screening Assessment, a Baseline Assessment may be warranted for further evaluation of potential risk, prior to determining the need for a Validation Study. A Baseline Assessment is recommended prior to deciding whether a Validation Study is necessary to ensure that potential ecological risks are appropriately evaluated beyond screening-level assumptions before conducting costly (and potentially unnecessary) site-specific toxicity studies.

A Baseline Assessment is equivalent to EPA’s Baseline Assessment (EPA, 1997). A Baseline Assessment is not an explicit step of DTSC’s ERA process; instead, it is a refinement of DTSC’s Phase I: Predictive Assessment (DTSC, 1996a) (i.e., the Screening Assessment described in Section 7.2) using more realistic assumptions and/or site-specific media (i.e., soil) to predict quantitative risk estimates.

The Baseline Assessment would be a refinement of the Screening Assessment based on one or more of the following components:

- Refinement of exposure assumptions (such as the consideration of home ranges to estimate exposures the include areas outside of the point locations downwind and immediately adjacent to TSU-1 and TSU-2)

- Refinement of toxicity values (use of LOAELs rather than NOAELs)
- Use of site-specific media data (e.g., site-specific background data, site-specific soil data)

The Baseline Assessment would be presented as an addendum to the Screening Assessment, rather than as a standalone report, and would focus only on describing and providing rationale for the baseline assumptions that were changed from the screening assumptions, and the results of the baseline assessment.

If HQs/HIs are less than one based on baseline assumptions and/or site-specific data, risks at the Site will be considered to be within an acceptable range and no further evaluation will be proposed. However, if HQs/HIs are still greater than one based on baseline assumptions and/or site-specific data, a determination of whether a Validation Study is needed will be discussed with DTSC.

In a Validation Study, site-specific toxicity data will be collected for those receptor pathways that the Screening and/or Baseline Assessment(s) determine to possess the potential for risk. The details and level of effort needed for a Validation Study will be vetted with DTSC prior to the collection of site-specific toxicity data. The results of the site-specific toxicity data would be compared to those of the Screening and/or Baseline Assessment(s) to determine whether the predicted risks actually appear to be occurring at the Site.

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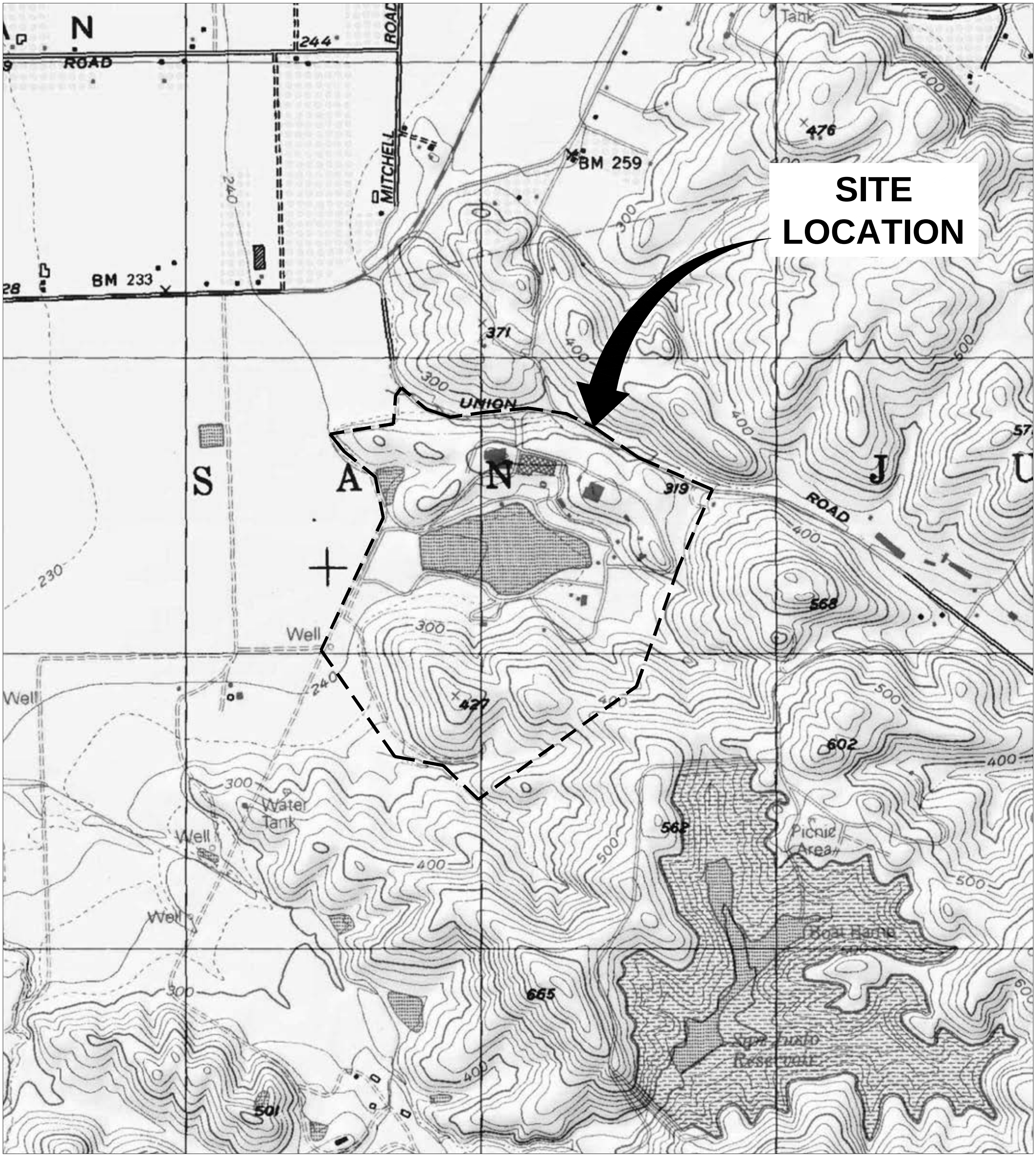
Tables

Figures



REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., HOLLISTER, CA

0 1600' 3200'

Approximate Scale: 1 in. = 1000 ft.

North

TDY INDUSTRIES, LLC
FORMER TELEDYNE McCORMICK SELPH INC. FACILITY
HOLLISTER, CALIFORNIA

SITE LOCATION

ARCADIS

FIGURE
1

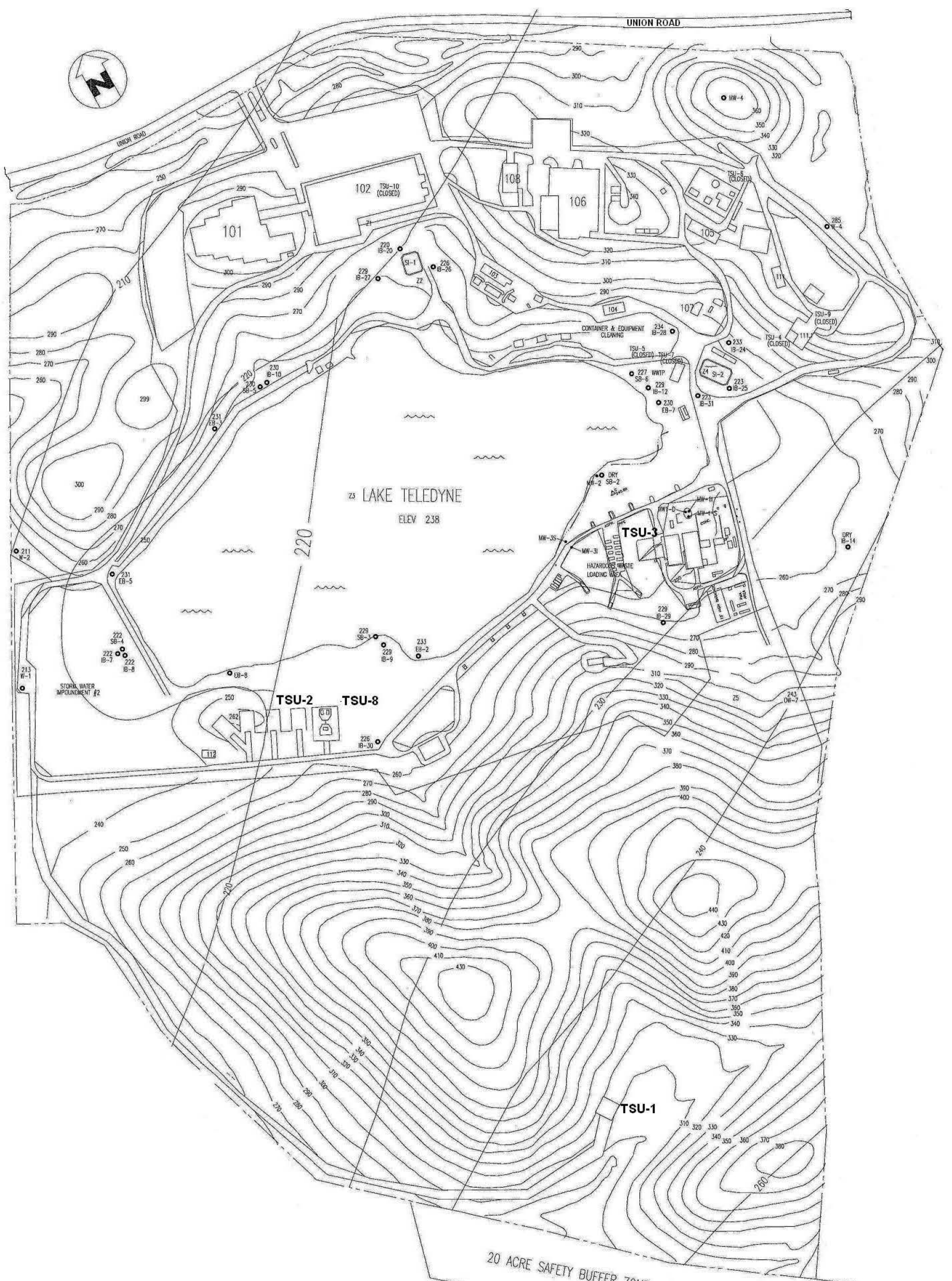
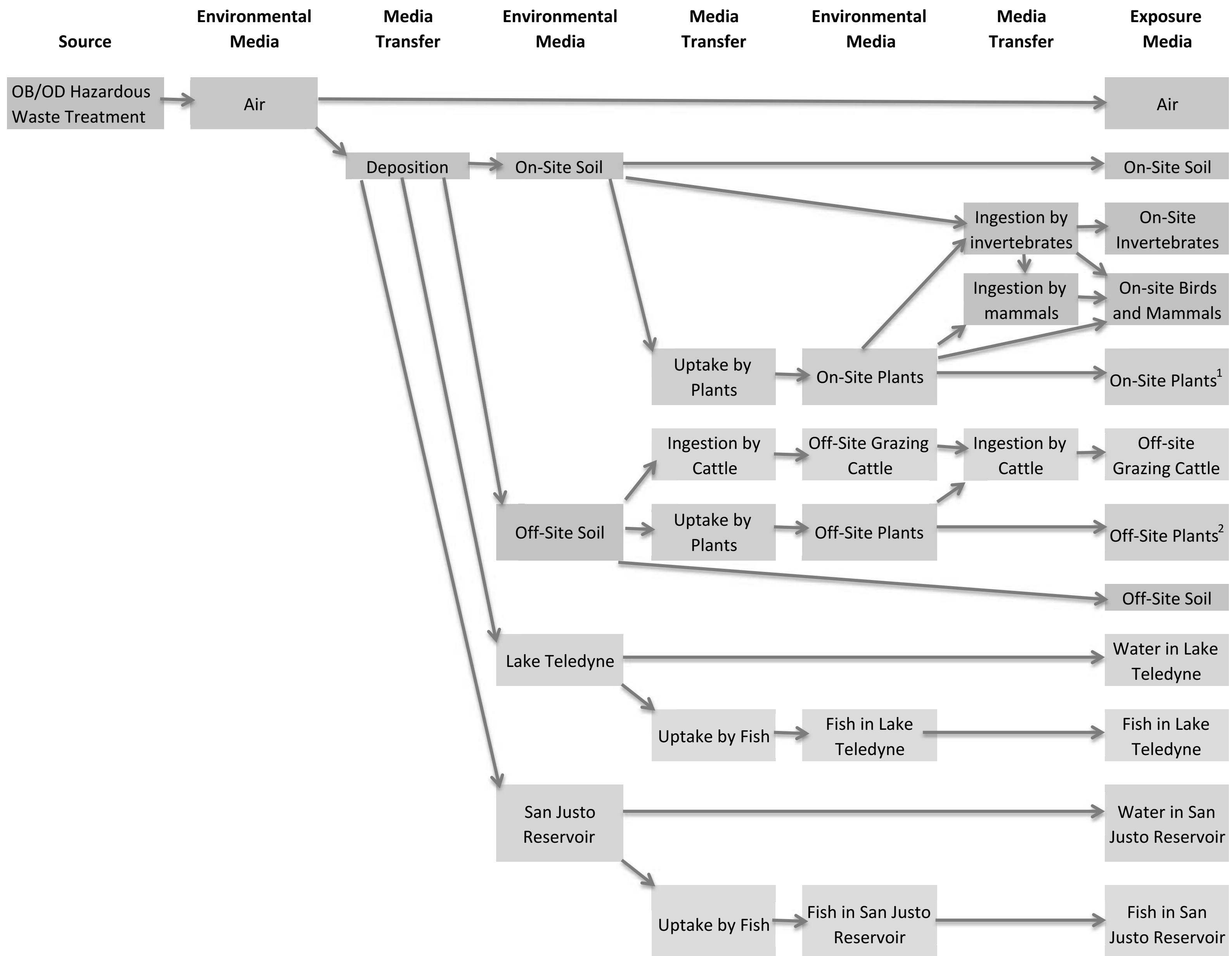


Figure 2. Locations of Hazardous Waste Treatment Units
(Figure from Hazardous Waste Facility Permit, DTSC, May 12, 2006)

Figure 3. Environmental Fate and Transport Conceptual Model



Notes
1. Includes terrestrial plants
2. Includes homegrown produce and pasture grasses.

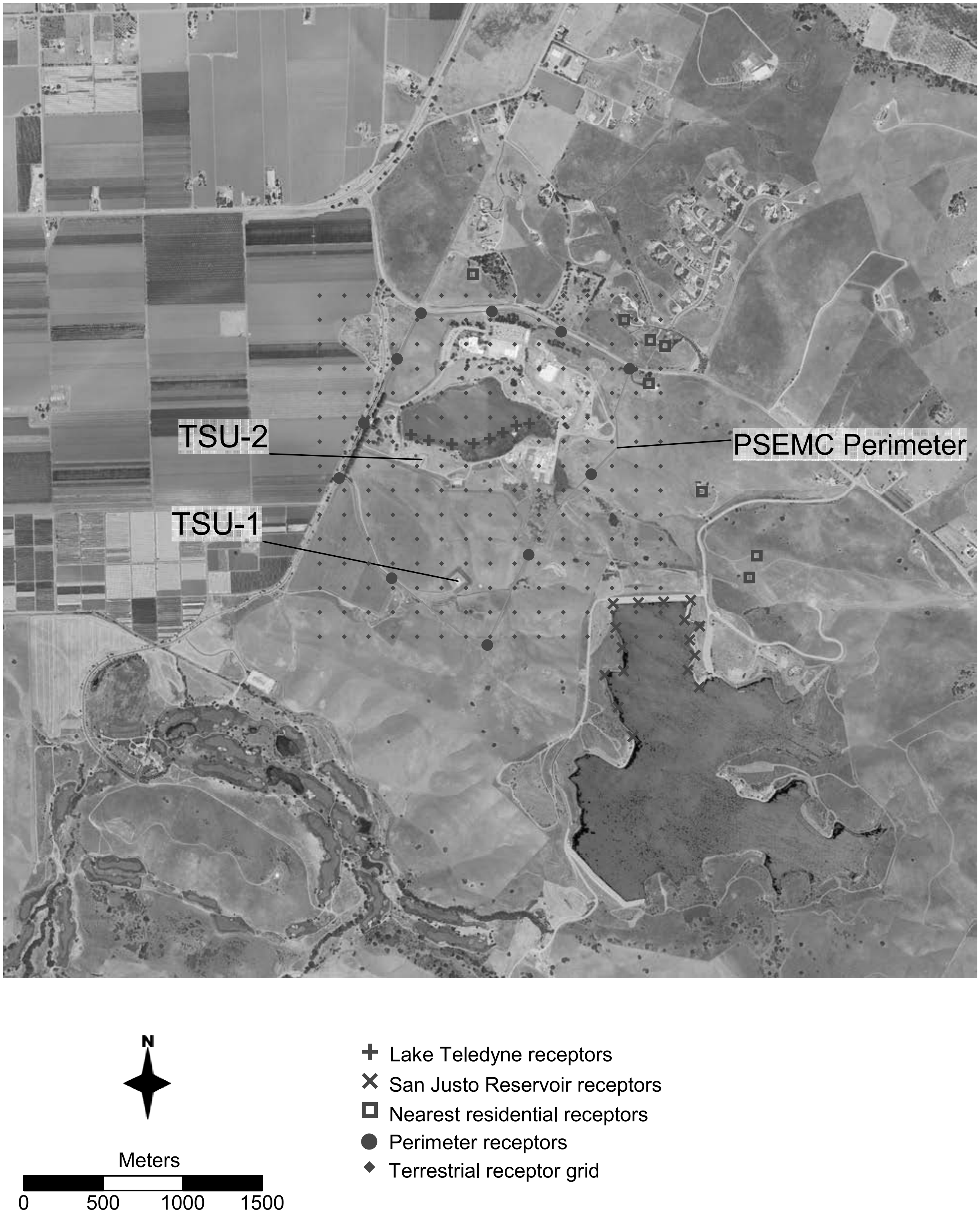


Figure 4. Receptor Locations for Air Dispersion Modeling

Figure 5. Human Health Conceptual Exposure Model

		Receptors		
Exposure Media	**Exposure Route**	**Off-site Resident**	**Off-Site Rancher**	**Future Recreational Use of San Justo Reservoir**
Air	Inhalation			
On-Site Soil	Ingestion/ Dermal Contact	NA	NA	NA
On-Site Plants	NA	NA	NA	NA
Off-Site Grazing Cattle	Ingestion	NA		NA
Off-Site Soil	Ingestion/ Dermal Contact			
Off-Site Plants	Ingestion		NA	NA
Water in San Justo Reservoir	Ingestion/ Dermal Contact		NA	NA
Fish in San Justo Reservoir	Ingestion	NA	NA	
Mother's Milk	Ingestion		NA	NA

Notes

Complete and major pathway

NA - not applicable

Figure 6. Ecological Conceptual Exposure Model

Exposure Media	Exposure Route	Receptors: Terrestrial plants	Aquatic Plants	Fish	Heron/Egret	Omnivorous Terrestrial Bird	Small Terrestrial Mammal	Carnivorous Terrestrial Bird
Air	→ Inhalation	X	X	NA	X	X	X	X
On Site Soil	→ Direct contact/ root uptake		NA	NA	X	X	X	X
On Site Soil	→ Ingestion	NA	NA	NA	X			
On Site Soil	→ Dermal Contact	NA	NA	NA	X	X	X	X
On-Site Plants	→ Ingestion	NA	NA		X			X
Terrestrial Invertebrates	→ Ingestion	NA	NA	NA	X			X
Terrstrial small mammals	→ Ingestion	NA	NA	NA	X	NA	NA	
Surface Water	→ Direct contact/ root uptake	NA			X	X	X	X
Surface Water	→ Ingestion	NA	NA		X	X	X	X
Fish	→ Ingestion	NA	NA			X	X	X

Complete and major pathway
X (Insignficiant pathway)
NA - not applicable

Appendix A

TSU-1 Treatment Inventory (2005-2014)

(Appendixes provided as electronic files)

Appendix B

TSU-2 Treatment Inventory (2005-2014)

(Appendixes provided as electronic files)

Appendix C

TSU-1 Emission Factors

(Appendixes provided as electronic files)

Appendix D

TSU-2 Acetone Evaporation Test

Appendix D: TSU-2 Acetone Evaporation Test

Evaporation Test-Acetone (October 6, 2015)

Stainless Steel Pan Dimensions; Length: 40” Width: 14” Depth: 2” (560 $inches^2$)

Temperature: 65 F

11:19 am – Added 8,000 mL to pan

12:19 pm – 3,800mL remained

Net evaporation: 4,200 mL or 7.3 lbs [(4,200 ml × 0.791 g/ml)/453.59 g/lb] or 0.013 lbs/in^2 (7.3 lbs/560 in^2)

TSU-2 Solvent Burn Containers

Container dimensions with a capacity of ~30 gallons: Length: 34.5” Width: 22.5“ (776.25 in^2/drum)

Total Surface area: 776.25 in^2/drum × 8 drums (240 gallons) = 6210 in^2

Total Solvent Weight: (240 gal × 3785.4 ml/gal × 0.791 g/ml)/453.59 g/lb = 1584 lbs

Estimated Evaporation: 6210 in^2 × 0.013 lbs/in^2 = 81 lbs or 5.1% of of the total solvent weight (81 lbs/1584 lbs)

Appendix E

TSU-2 Emission Factors

(Appendixes provided as electronic files)

Appendix 11

2005 RCRA Facility Assessment (4 Pages)

2002 RCRA Facility Assessment (4 Pages)

1991 RCRA Facility Assessment (132 Pages)

Appendix 11

2005 RCRA Facility Assessment

(4 Pages)

RCRA Facility Assessment Current Condition Report for McCormick Selph Inc. 3601 Union Road Hollister, California

July 2005

The purpose of this document is to update the RCRA Facility Assessment (RFA) produced by the Department of Toxic Substances Control, Region 2, in June 1991 for the McCormick Selph Inc. (MSI) facility. Specifically, this update focuses on the known status of Solid Waste Management Units (SWMUs) identified in the original June 1991 Report and recently identified potential Areas of Concern (AOC).

SWMUs

The SWMU numbers utilized in the June 1991 RCRA Facility Assessment are included for reference.

SWMU #1 – Lake Teledyne
McCormick Selph, Inc. (MSI) predecessor companies implemented a groundwater monitoring program (Order No. 86-94) in accordance with Regional Water Quality Control Board, Central Coast Region (RWQCB) directives in 1986. The purpose of the monitoring program was to determine if the underlying groundwater was contaminated as a result of historical solid waste management units, including Lake Teledyne.

In 1999 a comprehensive groundwater analysis (1999 analysis), beyond the scope of Order No. 86-94, was conducted. This sampling campaign resulted in the identification of several chlorinated hydrocarbons and perchlorate in MSI's shallow water aquifer. While the chlorinated hydrocarbons were at inconsequential levels, perchlorate concentrations exceeded 5,000 µg/L in some samples. Samples taken from and around Lake Teledyne however, indicate that Lake Teledyne continues to be free of contaminants. The source of the perchlorate contamination has yet to be identified.

Order No. 86-94 is no longer in effect. The previous owner of MSI, TDY Industries (TDY), is contractually liable for the groundwater contamination. As such, the RWQCB ordered TDY to conduct a groundwater investigation and subsequent to that investigation submit a Corrective Action Plan. PES Environmental, on the behalf of TDY, submitted a "Corrective Action Plan, Soil and Groundwater Investigation, McCormick Selph Inc." report dated December 19, 2002.

Briefly, the final method selected for remediating the contamination was a combination of monitored natural attenuation and enhanced in-situ bioremediation involving the use of "Hydrogen Release Compound."

PES just completed and submitted its fifth monitoring event in its continued development of a pilot-scale program in an effort to implement a full-scale program. PES will conduct one more monitoring event prior to submitting a full-scale workplan to the RWQCB by September 30, 2005.

The condition and use of Lake Teledyne is unchanged from the 1991 RFA.

SWMU #2 – Surface Impoundment #1 (SI-1)
While this unit was associated with Order No. 86-94 and the subsequent 1999 analysis, no contamination associated with this unit was identified.

The condition and use of this unit is unchanged.

SWMU #3 – Surface Impoundment #2 (SI-2)
The 1999 analysis identified perchlorate contamination in the shallow ground water aquifer in the vicinity of SI-2. The source of the perchlorate contamination has yet to be identified.

The condition and use of SI-2 is otherwise unchanged.

SWMU #4 – Plating Shop Waste Storage Tank
There is no change in the condition or use (closed) of this unit.

SWMU #5 – Industrial Waste Water Screening Tank
There is no change in the condition or use (closed) of this unit.

SWMU #6 – Silver Recovery Vessel (TSU-6)
Clean closure of this unit was approved by DTSC on October 4, 2002.

There has otherwise been no change in condition or use of this facility.

SWMU #7 – Upper Drum Storage Area.
There is no change in the condition or use of this unit.

SWMU #8 – Hazardous Waste Storage Area #1 (TSU-5)
This unit consisted of three (3) tanks at the time of the 1991 Report: T-720, T-794 and T-796. Closure of T-720 was approved by DTSC (September 29, 1989) prior to the 1991 Report and the tank was subsequently moved to building #107 to be used in a production capacity.

Closure of T-794 was subsequently approved by DTSC on April 30, 1992. Tank T-796, which was used for production purposes, was decontaminated prior to the 1991 Report and has not been used since.

In 2004 Tanks T-794 and T- 796 cut up into small pieces and disposed of in the county landfill.

SWMU #9 – Hazardous Waste Storage Area - Hazardous Waste Storage Area #2

There is no change in the condition or use of this unit.

SWMU #10 – Unsymmetrical Dimethylhydrazine (UDMH) Storage

The true dimensions of the secondary containment dike for this SWMU is 26 feet by 40 feet by 4 feet.

Both of the tanks in this SWMU (T-1107 and T-1108) were modified for storage of 90% or greater nitric acid (product) in May 1984 and were put into service in July of the same year.

In 1988 it was discovered that both tanks had minor leaks at a welded seam. Both tanks were emptied and cleaned at that time.

In 2004 both tanks were cut up and removed for scrap by a metal recycler.

SWMU #11 – Spray Field

Groundwater investigations conducted by ATI beginning in 1999 indicate that the groundwater in the Spray Field is contaminated with perchlorate and trichlorethylene (TCE) at 40 μg/L and 10 μg/L respectively. ATI is conducting a "Soil and Water Investigation" under the direction of the RWQCB. While the concentration of the TCE is of little concern, the RWQCB has tasked ATI with assessing the vertical extent, direction of groundwater flow, lateral and vertical hydraulic gradients, and the distribution of perchlorate in groundwater at the facility. The source of the contaminants has not been identified.

SWMU #12 – Hazardous Waste Area #3 TSU-4)

MSI submitted a Closure Report for TSU-4 in a letter dated July 31, 2003.

SWMU #13 – Hazardous Waste Storage Area # 4 (TSU-3)

Groundwater investigations conducted by ATI beginning in 1999 indicate that groundwater just east of TSU-3 is contaminated with trichloroethane (TCA), dichloroethane (DCE) and perchlorate. While the concentration of the TCE and DCE are of little concern, the RWQCB has tasked ATI with assessing the vertical extent, direction of groundwater flow, lateral and vertical hydraulic gradients, and the distribution of perchlorate in groundwater at the facility. The source of the contaminants has not been identified.

There has otherwise been no change in condition or use of this facility.

SMWMU #14 – Thermal Oxidizer

Groundwater investigations conducted by ATI beginning in 1999 indicate that the groundwater at this site is contaminated with trichloroethylene (TCE) and perchlorate and the shallow water aquifer is contaminated with perchlorate. While the concentration of the TCE and is of little concern, the RWQCB has tasked ATI with assessing the vertical extent, direction of groundwater flow, lateral and vertical hydraulic gradients, and the distribution of perchlorate in groundwater at the facility. The source of the contaminants has not been identified.

There has otherwise been no change in condition or use of this facility.

SWMU #15 – Surface Impoundment for Treatment of Explosives in Water (TSU-8)

This area is the location of TSU-8. TSU-8 currently consists of two epoxy lined carbon steel drums located in an epoxy lined concrete dike. The tanks are used for natural evaporation of explosive contaminated water, and accumulation of explosive contaminated waste that is contained in plastic bags placed in Poly over-pack containers.

MSI's Permit current Permit application describes the proposed modifications of this unit. The modifications are essentially a replacement of the existing tanks and an improved liquid charging system.

SWMU #16 – Old Burn Area

There is no change in the condition or use of this unit.

SWMU #17 – Waste Solvent Incinerator (New Burn Area) (TSU-2) This unit is now permitted to treat 300 gallons of explosive contaminated solvent per day.

There has otherwise been no change in condition or use of this facility.

SWMU #18 – Burn Pit

A RCRA Facility Investigation conducted at this unit in 1996 resulted in the discovery of lead contamination of the surrounding soils. Subsequent remediation and Corrective Action resulted in a partial Closure of the unit, removal of lead contaminated soils and structural modification of the unit to prevent a reoccurrence.

The Corrective Measure Completion Report for Lead Affected Soils was submitted to DTSC in 2000. The Corrective Measures Completion Report for structural modifications to the unit was submitted February 9, 2001.

Annual confirmatory samples confirm that lead concentrations remain below the established clean up level. Although one of the 2005 sampling campaign samples exceeded the clean-up goal of 5,295 mg/kg, it is believed to be an anomaly, based on the fact that all the other samples in the direct vicinity are an order of magnitude below the clean-up goal.

Appendix 11

2002 RCRA Facility Assessment

(4 Pages)

RCRA Facility Assessment Current Condition Report
December 2002

The purpose of this document is to update the RCRA Facility Assessment (RFA) produced by the Department of Toxic Substances Control, Region 2, in June 1991. Specifically, this update focuses on the known status of Solid Waste Management Units (SWMUs) identified in the original June 1991 Report and recently identified potential Areas of Concern (AOC).

SWMUs

The SWMU numbers utilized in the June 1991 RCRA Facility Assessment are included for easy reference.

SWMU #1 – Lake Teledyne
McCormick Selph, Inc. (MSI) predecessor companies implemented a groundwater monitoring program (Order No. 86-94) in accordance with Regional Water Quality Control Board, Central Coast Region (RWQCB) directives in 1986. The purpose of the monitoring program was to determine if the underlying groundwater was contaminated as a result of historical solid waste management units, including Lake Teledyne.

In 1999 a comprehensive groundwater analysis (1999 analysis), beyond the scope of Order No. 86-94, was conducted. This sampling campaign resulted in the identification of several chlorinated hydrocarbons and perchlorate in MSI's shallow water aquifer. While the chlorinated hydrocarbons were at inconsequential levels, perchlorate concentrations exceeded 5,000 µg/L in some samples. Samples taken from and around Lake Teledyne however, indicate that Lake Teledyne continues to be free of contaminants. The source of the perchlorate contamination has yet to be identified.

While Order No. 86-94 is no longer in effect, the RWQCB will soon enforce a new water monitoring order to track the perchlorate plume. While MSI will be overseeing the implementation of the forthcoming order, Allegheny Teledyne Inc. (ATI) will be responsible for implementing the order.

The condition and use of Lake Teledyne is unchanged from the 1991 RFA.

SWMU #2 – Surface Impoundment #1 (SI-1)
While this unit was associated with Order No. 86-94 and the subsequent 1999 analysis, no contamination associated with this unit was identified.

The condition and use of this unit is unchanged.

SWMU #3 – Surface Impoundment #2 (SI-2)
The 1999 analysis identified perchlorate contamination in the shallow ground water aquifer in the vicinity of SI-2. The source of the perchlorate contamination has yet to be identified.

The condition and use of SI-2 is otherwise unchanged.

SWMU #4 – Plating Shop Waste Storage Tank
There is no change in the condition or use (closed) of this unit.

SWMU #5 – Industrial Waste Water Screening Tank
There is no change in the condition or use (closed) of this unit.

SWMU #6 – Silver Recovery Vessel (TSU-6)
Clean closure of this unit was approved by DTSC on October 4, 2002.

There has otherwise been no change in condition or use of this facility.

SWMU #7 – Upper Drum Storage Area
There is no change in the condition or use of this unit.

SWMU #8 – Hazardous Waste Storage Area #1 (TSU-5)
This unit consisted of three (3) tanks at the time of the 1991 Report: T-720, T-794 and T-796. Closure of T-720 was approved by DTSC (September 29, 1989) prior to the 1991 Report and the tank was subsequently moved to building #107 to be used in a production capacity.

Closure of T-794 was subsequently approved by DTSC on April 30, 1992. Tank T-796, which was used for production purposes, was decontaminated prior to the 1991 Report and has not been used since.

Tanks T-794 and T- 796 remain in their original location.

The current condition of SWMU #8 is otherwise unchanged. Both tanks associated with this unit are, and have been clean and empty since 1991.

SWMU #9 – Hazardous Waste Storage Area - Hazardous Waste Storage Area #2
There is no change in the condition or use of this unit.

SWMU #10 – Unsymmetrical Dimethylhydrazine (UDMH) Storage

The true dimensions of the secondary containment dike for this SWMU is 26 feet by 40 feet by 4 feet.

Both of the tanks in this SWMU (T-1107 and T-1108) were modified for storage of 90% or greater nitric acid (product) in May 1984 and were put into service in July of the same year.

In 1988 it was discovered that both tanks had minor leaks at a welded seam. Both tanks were emptied and cleaned at that time and have remained empty.

SWMU #11 – Spray Field
Groundwater investigations conducted by ATI beginning in 1999 indicate that the groundwater in the Spray Field is contaminated with perchlorate and trichlorethylene (TCE) at 40 µg/L and 10 µg/L respectively. ATI is conducting a "Soil and Water Investigation" under the direction of the RWQCB. While the concentration of the TCE is of little concern, the RWQCB has tasked ATI with assessing the vertical extent, direction of groundwater flow, lateral and vertical hydraulic gradients, and the distribution of perchlorate in groundwater at the facility. The source of the contaminants has not been identified.

SWMU #12 – Hazardous Waste Area #3 TSU-4)
These tanks have been clean and empty for several years. MSI is currently working with DTSC on a modified closure plan for this facility. MSI anticipates closing these units prior to re-issuance of MSI permit in July 2003.

There has otherwise been no change in condition or use of this facility.

SWMU #13 – Hazardous Waste Storage Area # 4 (TSU-3)
Groundwater investigations conducted by ATI beginning in 1999 indicate that groundwater just east of TSU-3 is contaminated with trichloroethane (TCA), dichloroethane (DCE) and perchlorate. While the concentration of the TCE and DCE are of little concern, the RWQCB has tasked ATI with assessing the vertical extent, direction of groundwater flow, lateral and vertical hydraulic gradients, and the distribution of perchlorate in groundwater at the facility. The source of the contaminants has not been identified.

There has otherwise been no change in condition or use of this facility.

SMWMU #14 – Thermal Oxidizer
Groundwater investigations conducted by ATI beginning in 1999 indicate that the groundwater at this site is contaminated with trichloroethylene (TCE) and perchlorate and the shallow water aquifer is contaminated with perchlorate. While the concentration of the TCE and is of little concern, the RWQCB has tasked ATI with assessing the vertical extent, direction of groundwater flow,

lateral and vertical hydraulic gradients, and the distribution of perchlorate in groundwater at the facility. The source of the contaminants has not been identified.

There has otherwise been no change in condition or use of this facility.

SWMU #15 – Surface Impoundment for Treatment of Explosives in Water (TSU-8)
This area is the location of TSU-8. TSU-8 currently consists of two epoxy lined carbon steel drums located in an epoxy lined concrete dike. The tanks are used for natural evaporation of explosive contaminated water, and accumulation of explosive contaminated waste that is contained in plastic bags placed in Poly over-pack containers.

There has otherwise been no change in condition or use of this facility.

SWMU #16 – Old Burn Area
There is no change in the condition or use of this unit.

SWMU #17 – Waste Solvent Incinerator (New Burn Area) (TSU-2) This unit is now permitted to treat 300 gallons of explosive contaminated solvent per day.

There has otherwise been no change in condition or use of this facility.

SWMU #18 – Burn Pit

A RCRA Facility Investigation conducted at this unit in 1996 resulted in the discovery of lead contamination of the surrounding soils. Subsequent remediation and Corrective Action resulted in a partial Closure of the unit, removal of lead contaminated soils and structural modification of the unit to prevent a reoccurrence.

The Corrective Measure Completion Report for Lead Affected Soils was submitted to DTSC in 2000. The Corrective Measures Completion Report for structural modifications to the unit was submitted February 9, 2001.

Annual confirmatory sampling conducted in May 2002 confirms that lead concentrations remain below the established clean up level. This verifies the effectiveness of lead substitution and engineering controls in reducing lead dispersion from TSU-1.

Appendix 11

1991 RCRA Facility Assessment

(132 Pages)

TELEDYNE MCCORMICK SELPH
3601 UNION ROAD
HOLLISTER, CA

RCRA FACILITY ASSESSMENT

Prepared for:

U.S. EPA, Region IX
75 Hawthorne Street
San Francisco, CA 94105

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
TOXIC SUBSTANCES CONTROL PROGRAM
Region 2

June 1991

Facility Address:	Teledyne McCormick Selph 3601 Union Road Hollister, CA 95023
Mailing Address:	P. O. Box 6 Hollister, CA 95023-0006
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APPENDICES

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EXECUTIVE SUMMARY

A RCRA Facility Assessment (RFA) was performed to identify and evaluate solid waste management units (SWMU's) at the Teledyne McCormick Selph facility in Hollister, California. The RFA utilized a records review, data evaluation, interviews and a visual site inspection (VSI) to evaluate past and potential releases of hazardous constituents from SWMU's identified during the assessment. The records review included the RCRA and CERCLA files at EPA, Region IX, files from the California Department of Health Services (DHS), the Regional Water Quality Control Board (RWQCB) Central Coast Region, the County of San Benito, and the Monterey Bay Unified Air Pollution Control District.

A Visual Site Inspection (VSI) was conducted on October 5, 1990. During the visit the DHS representative was guided by Edmond Lynam throughout the facility. The VSI included inspection of identified SWMU's and of the manufacturing facilities.

Teledyne has operated at its current location since 1971. Current operations involve the production of explosive ordnance materials and systems for aerospace, military, and commercial use, and the manufacture of custom organic chemicals.

A total of 18 SWMU's were identified at the Teledyne facility. These units include past and present process or hazardous waste areas. A Preliminary Assessment was performed by Ecology and Environment, Inc. in 1989 for EPA Region IX. This assessment identified 23 SWMUs, but some were tanks included in another SWMU or incorrectly identified.

The facility has a history of continuing hazardous waste violations, including leaking tanks and drums, unauthorized facility modification and unapproved closure. However, as of the last DHS inspection the facility was in compliance.

1.0 INTRODUCTION

The Department of Health Services (DHS) has an agreement with the U.S. EPA, Region IX to conduct a RCRA Facility Assessment (RFA) at the Teledyne McCormick Selph facility at 3601 Union Road in Hollister, California. This report presents the results of the RFA. It documents the process leading to its various conclusions and recommendations. It also consolidates pertinent information on the facility and its Solid Waste Management Units (SWMU's).

1.1 The RCRA Facility Assessment (RFA)

The purpose of the RFA is to identify releases of hazardous waste and hazardous constituents to the environment from solid waste management units and areas of concern that may require corrective action.

The RFA is the first step in the implementation of the corrective action provisions of the 1984 RCRA Hazardous and Solid Waste Amendments (HSWA). As such, the RFA should provide a preliminary scope to corrective action activities that include a RCRA Facility Investigation (RFI) or interim measures that may be required when identified releases constitute a substantial and imminent danger to human health and the environment.

2.0 FACILITY DESCRIPTION

Teledyne McCormick Selph is a division of Teledyne Industries, Inc., a California corporation, which is a wholly owned subsidiary of Teledyne, Inc., a Delaware corporation. The facility is located on 250 acres of rolling hill country in an unincorporated rural area of San Benito County, approximately two and one half miles south-west of Hollister. Teledyne has produced explosive ordnance materials at its current location since 1971 and small volume specialty chemicals for agricultural, pharmaceutical and industrial applications since 1974.

Current operations involve the production of explosive ordnance materials and systems for aerospace, military, and commercial use, and the manufacture of custom organic chemicals. Current waste streams are listed in the February 1991 Facility Hazardous Waste Operations Plan (1991 FHWOP) and in the 1990 Part A Application and include reactive scrap materials, explosive-contaminated solvents, obsolete chemical products and materials, metal powders, spent corrosive materials, etc.

Teledyne filed their original Part A Application on November 19, 1980, and the facility was issued an Interim Status Document (ISD) for hazardous waste treatment and storage on April 6, 1981. A permit to store hazardous waste in tanks and containers was issued on November 7, 1983. The ISD was kept in place for treatment in tanks, storage and treatment in surface impoundments, and thermal treatment of explosives. Teledyne is an on-site facility only and does not accept any hazardous waste from off-site.

Teledyne submitted closure certifications for two underground treatment tanks in March of 1985. Lake Teledyne and Surface Impoundments 1 and 2 were closed with DHS approval on October 7, 1986.

2.1 Site Location and Features

The Teledyne McCormick Selph facility is located in the city of Hollister, San Benito County, California, at approximately 36o50' north latitude and 121o27'30" west longitude. Teledyne occupies 250 acres of rolling hill country.

The site consists of office buildings, manufacturing facilities, hazardous waste areas, and a network of internal roads. The facility has 12 major buildings and numerous other areas as listed in Table 2.1. The locations of these buildings are shown in Figure 2-1.

Table 2.1

TELEDYNE BUILDINGS

Building	Past Use	Current Use
101		Administration
102		Ordnance
103		Powder Blending
104		Propellent Machining and Blending
105		Research and Development
106		LFE
107		Chemical Manufacturing (not currently operating)
108		Storage
109		Maintenance
110		Guard Station
111		Chemical Manufacturing
112		Remote Test Site - Control
Other Areas		
4	Plating Waste Water Treatment	Closed
5	Surface Impoundment SI-1	Closed
7	Treatment & Storage Unit 1	Same

Building	Past Use	Current Use
10	Domestic Sewage Treatment Facility	Same
11	Polishing Pond for Sanitary Sewage	Same
12	Spray Field for Effluent from #11	Same
13	Treatment and Storage Unit 5	Same
14	Hazardous Waste Drum/Container Storage	Same
15	Silver Recovery Unit	Same
17	Ordnance Test Area	Same
18	Treatment and Storage Unit 4	Same
20	Explosive Waste Storage Area	Same
21	Explosive Waste Storage Area	Same
22	Explosive Waste Storage Area	Same
23	Explosive Waste Storage Area	Same
24	Storage Shed for adhesives and Paints	Same

From March 1991 DRAFT

2.2 FACILITY OPERATIONS AND HAZARDOUS WASTE MANAGEMENT

2.2.1 PROCESS DESCRIPTION

Teledyne is engaged in the production of explosive ordnance items and materials, and small volume specialty chemical manufacture.

Ordnance Operations include research, engineering, and manufacturing facilities designed to support research, development and volume production of explosively actuated systems and components for use on aircraft, missiles, and space vehicles. Aircraft systems include aircrew escape module severance, aircraft stores release severance, and removal of aircraft and helicopter canopies, helicopter blades, aircraft emergency egress, and aircrew equipment and restraints divestment by means of single point releases. Missiles and spacecraft systems include the application of ordnance technology for uses; such as, igniting rocket motors, separating stages, terminating thrust, and deploying scientific equipment. Research and development activities include gun and rocket propellant, ignition applications, and additives and coatings on high velocity and hypervelocity ammunition. The Chemical Manufacturing activity includes job lot production of

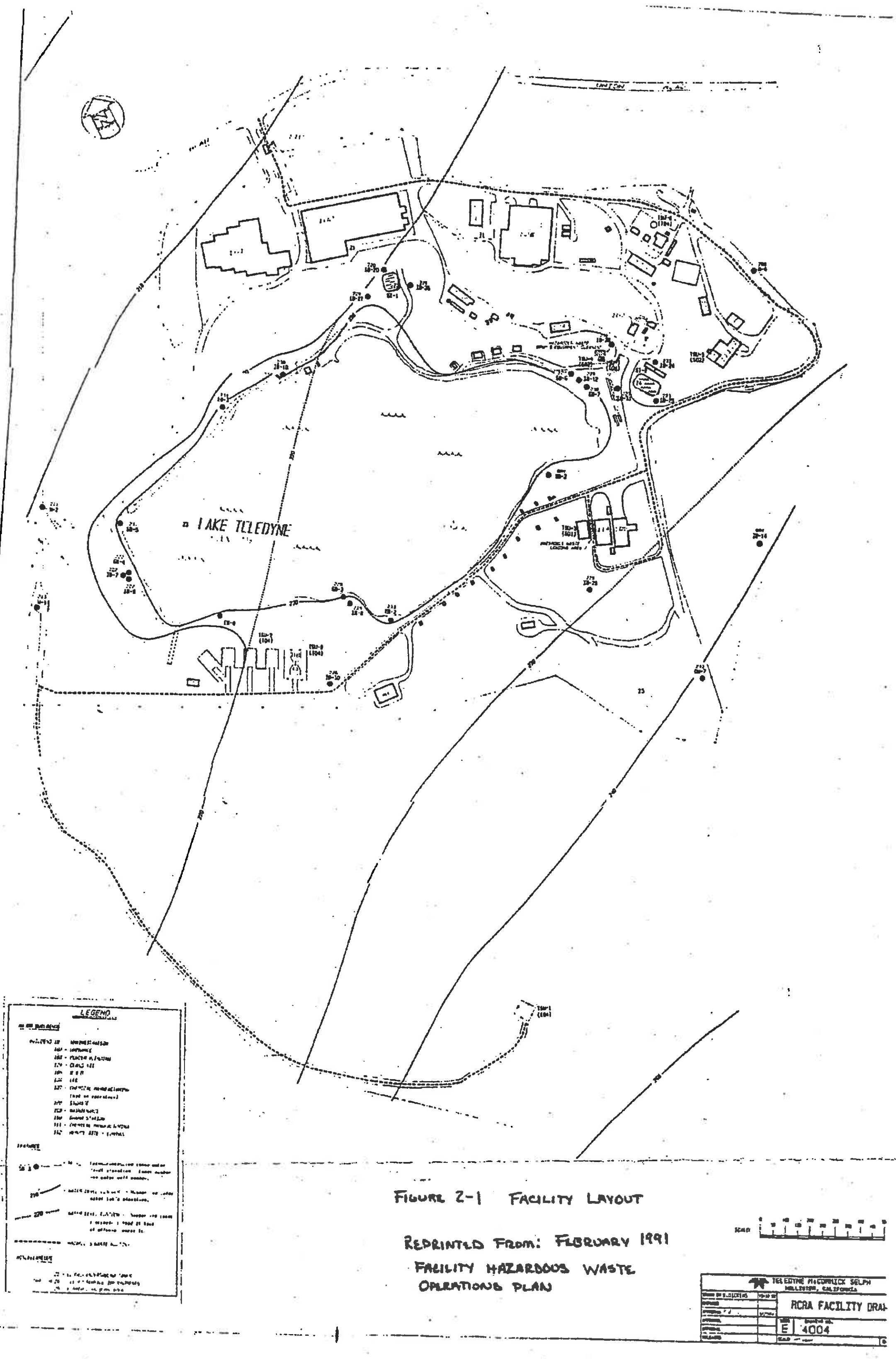

FIGURE 2-1 FACILITY LAYOUT

REPRINTED FROM: FEBRUARY 1991
FACILITY HAZARDOUS WASTE
OPERATIONS PLAN

explosive and pyrotechnic compounds and nitrogen based chemicals for agricultural, pharmaceutical, and industrial applications. Proprietary and generic explosives and pyrotechnics are manufactured, blended, and/or modified at research and development, pilot plant, and production scales. Individual manufacturing efforts are intermittent, with production runs ranging from days to months.

2.2.2 HAZARDOUS WASTE ACTIVITY

Hazardous waste activities at the site consist of: (1) generation and accumulation of different types of waste for less than 90 days from manufacturing and R & D activities prior to storage in the permitted storage areas; (2) storage of hazardous wastes in tanks and containers for periods up to one year; (3) evaporation of water from explosive contaminated waste; (4) open burning of solvent contaminated with reactive wastes; (5) open burning of solid reactive waste; and (6) open detonation of solid reactive wastes.

The hazardous waste units at the facility which are regulated under the 1981 ISD, the 1983 Permit, and the November 1989 Agreed Settlement aand Order (Appendix E) include the following:

Solvent Burning Facility:

Solvents contaminated with explosive waste are burned in a double boiler system. The boiler units are composed of pairs of half drums which hold the liquid waste. The thermal treatment process involves remote initiation which ignites the solvents, evaporates water, and burns the explosive residues.

Hazardous Waste Treatment and Storage in Tanks

There are five tanks and one reactor vessel in which hazardous waste are stored or treated. The treatment involves the recovery of silver.

Container Storage Area

Containers of hazardous are permitted to be stored for periods of less than one year. The Main Drum Pad has four bermed storage areas for:

a) Bases, cyanides, sulfides, and neutral aqueous solutions.

b) Halogenated hydrocarbons, nonflammable liquids, oxidizers, neutral aqueous solutions, and combustible liquids.

c) Acids.

d) Flammable liquids, reducing agents, metal catalysts, carbon, fuels, and combustible liquids.

Explosives Burn Facility

Two 10-foot diameter sewer pipes enclosed in a metal mesh cage are use to destroy hazardous sold wastes containing explosives via repeated detonations.

2.2.3 Regulatory Status

Teledyne operates seven hazardous waste management units which are subject to RCRA and DHS regulation. The facility is currently operating under its 1989 Facility Hazardous Waste Operations Plan. This is due to the Settlement Agreement which was signed on November 7, 1989. Teledyne is currently in the process of renewing their 1983 Permits from DHS and EPA. There have been some changes to the original application for renewal. The open burn and open detonation units, as well as another proposed unit will be included in this permit renewal review. Tank 796 which was originally listed as a hazardous waste storage tank has never stored hazardous waste. Teledyne currently plans to request that this tank be deleted from their interim status. Tank 794 which is a tank which was included in Teledyne's 1983 permit will go through closure.

2.3 Site Contamination

In 1989 a CERCLA Preliminary Site Assessment/Preliminary Review[1] was conducted on this site as part of the U.S. Environmental Protection Agency's (EPA) Environmental Priorities Initiative (EPI) program. The study, which included the application of the Hazard Ranking System (HRS) model to the site, recommended that a Visual Site Inspection be conducted at the site. The study however, contains numerous inaccuracies regarding the location of hazardous waste handling areas at the facility. The study also concludes that based on the HRS factors, the Teledyne McCormick Selph facility may meet the criteria for inclusion on the National Priorities List for the following reasons:

- Potentially high groundwater target population.
- Potential for observed release to groundwater due to containment flaws.
- Potential for explosion based on past incidents.

However, based on the chemical site characterization report produced by IT Corporation in 1985, there is "no indication of contamination of the site due to the treatment and storage of hazardous wastes."[2]

3.0 ENVIRONMENTAL SETTING

3.1 Surrounding Area

The 250-acre facility is located 4 miles west of Hollister, California (Figure 3-1). The facility is within San Benito County and lies in the southeast part of the San Juan Valley.

The facility is situated in a rural area. The primary surrounding land use is agriculture, with a small number of residents. A number of row crops are planted in the area, as well as stone fruits. The nearest resident lives within 1 kilometer of the facility. Meat cattle graze at an average distance of approximately 1.3 kilometers from the site. There are no schools, day care centers, hospitals or convalescent homes within 2 kilometers of the site.

3.2 Meteorology

The prevailing wind if from the West with an average speed between five and ten miles per hour. The temperature ranges between 36 and 76 degrees Fahrenheit. The average humidity is 40%. Rainfall averages 13.20 inches per year.

3.3 Geology and Hydrogeology

Teledyne is located within the Bird Creek Hills in the south east part of the San Juan Valley, west of Hollister, California. The site is north of the San Andreas rift zone, which runs southeast to northwest, as do the other major faults of the area. The Calaveras fault, which runs through Hollister, separates the San Juan and Hollister groundwater subbasins. The geology of the facility is characterized by uniformly dipping sandstone and claystone beds, and a gently folding anticlinal structure which is cut by a fault in the northeast quadrant of the site. The sandstone and claystone units form the middle member of the Purisima Formation of Tertiary Age and are locally covered by Quaternary alluvial deposits.[3] (Figure 3-2)

The sandstone beds of the middle member of the Purisima Formation are composed of well-bedded, massive, poorly cemented sands with claystone inclusions. The claystone occur in laterally discontinuous beds that range in thickness from 2 to 30 feet.[4]

Groundwater near the facility occurs in two principle geologic units: 1) Alluvial materials, including valley fill and terrace deposits; and 2) permeable members of a non-marine,

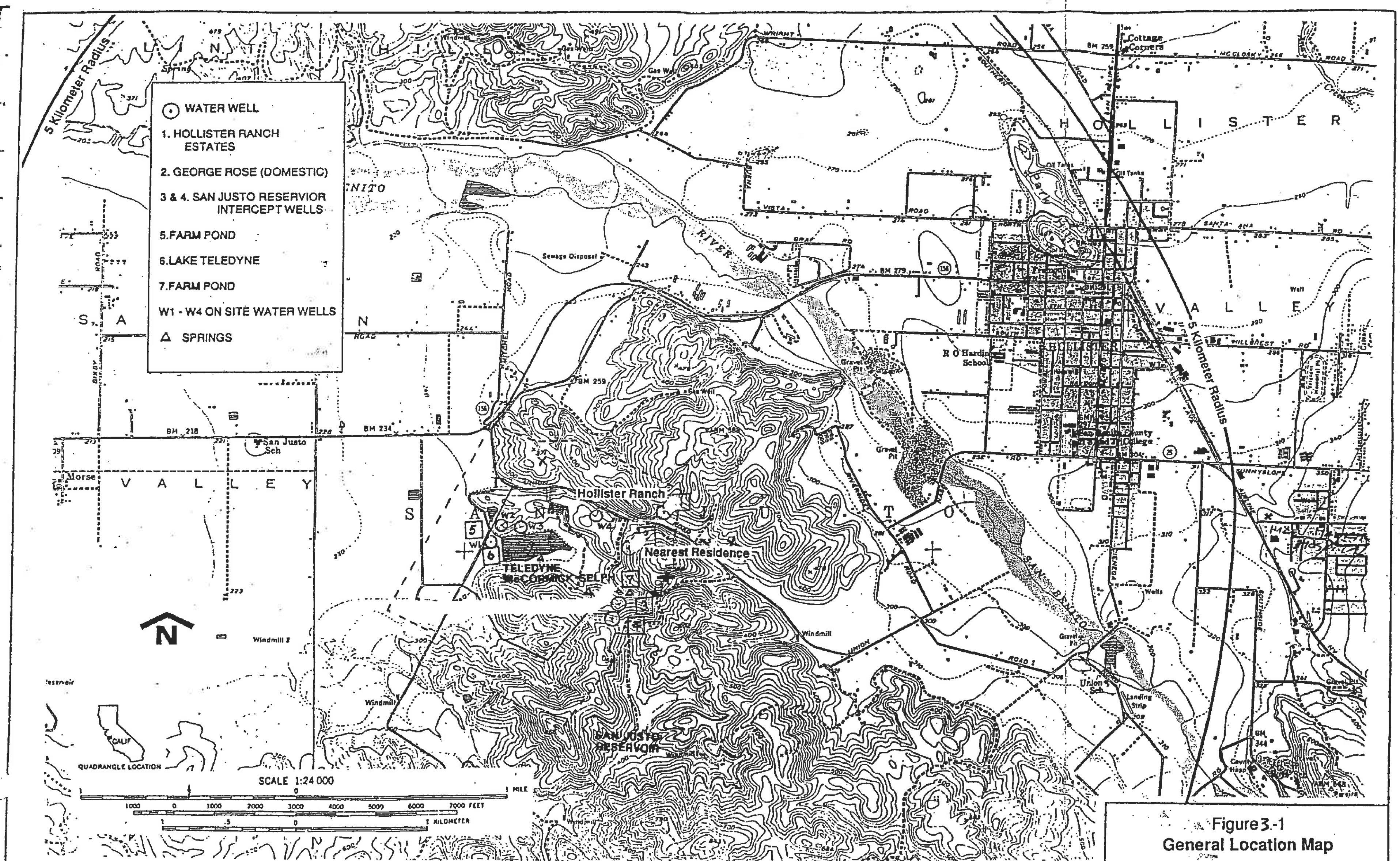

Figure 3.-1
General Location Map

REPRINTED FROM: JANUARY 1991 SCREENING RISK ASSESSMENT

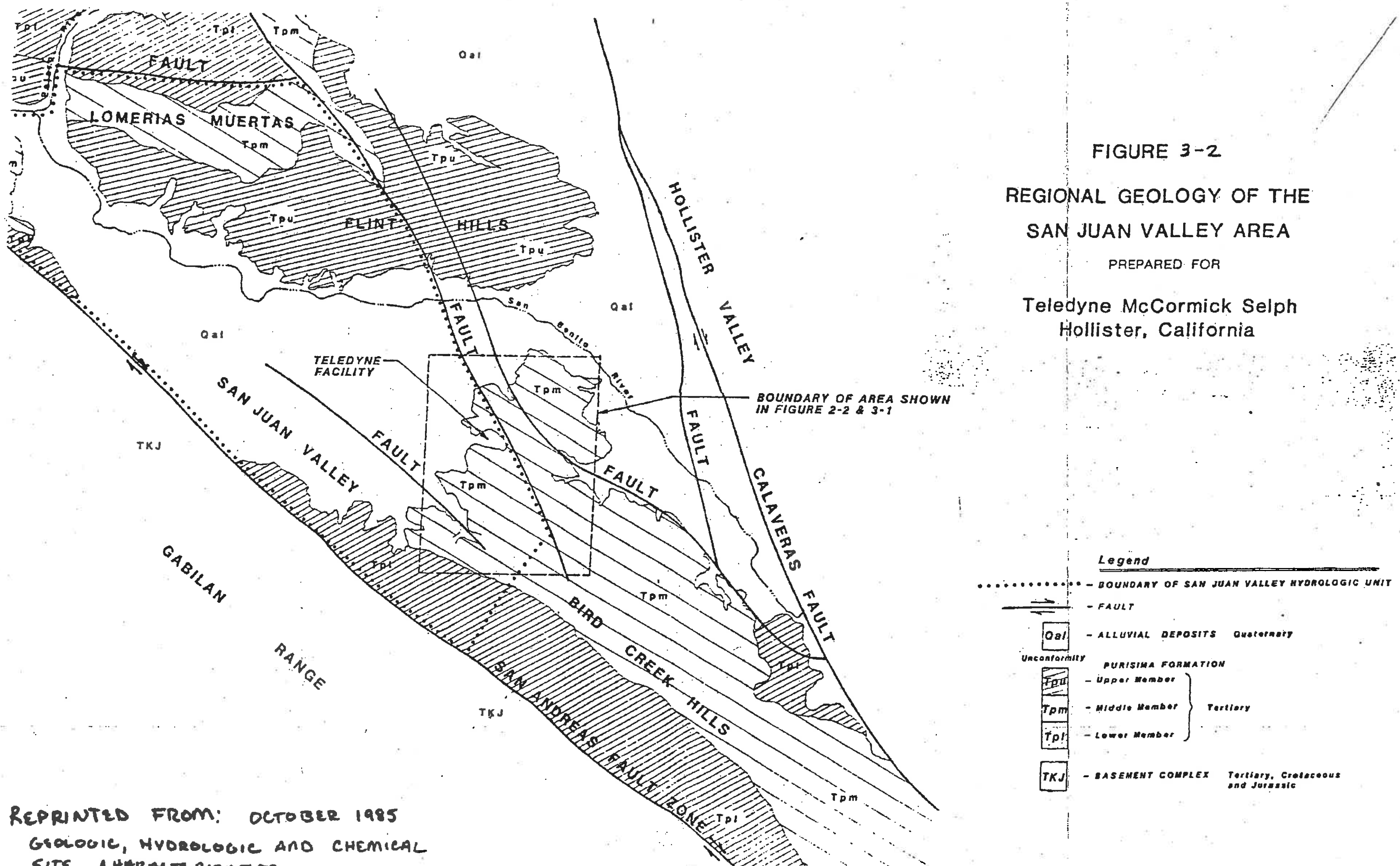

FIGURE 3-2

REGIONAL GEOLOGY OF THE SAN JUAN VALLEY AREA

PREPARED FOR

Teledyne McCormick Selph
Hollister, California

REPRINTED FROM: OCTOBER 1985
GEOLOGIC, HYDROLOGIC AND CHEMICAL SITE CHARACTERIZATION (2)

undifferentiated sandstone and claystone bedrock. Flow in the latter is relatively more restricted due to the presence of faults and fractures and generally less permeable materials. Groundwater generally flows to the northwest, although overdraft in the Hollister area may have changed the gradient. The Calaveras fault divides the area into the Hollister and San Juan Valley subbasins (Figure 3-3). Transmission between these units is impeded because of dislocation caused by faulting. Groundwater in the San Juan Valley is not considered to be nearly as abundant as that in the Hollister Valley, where it is found at shallower depths. The water table in the Hollister Valley, however, has been greatly reduced because of overdraft. Imported Bureau of Reclamation water is currently diminishing the burden on groundwater and, as a result, water tables are rising.[5]

There are four groundwater wells on the Teledyne facility (Figure 3-1). One is used as the drinking water supply for the approximately 150 Teledyne employees. Within three miles of the facility there are 5 municipal wells, 42 domestic wells, 65 irrigation wells, 7 mixed domestic-irrigation wells, and 3 industrial wells.

3.4 SURFACE WATERS

Surface water within 1,000 feet of the facility includes the San Justo Reservoir, a farm pond, two stock ponds, and a dry creek. Lake Teledyne, though artificial, sits in a natural basin. The drainage flow from the facility, as well as the surrounding watershed, flows into Lake Teledyne. The San Benito River, an intermittent stream, flows between Teledyne and Hollister in a northwesterly direction during heavy storms. Water that does not drain into the San Benito River recharges the aquifer.

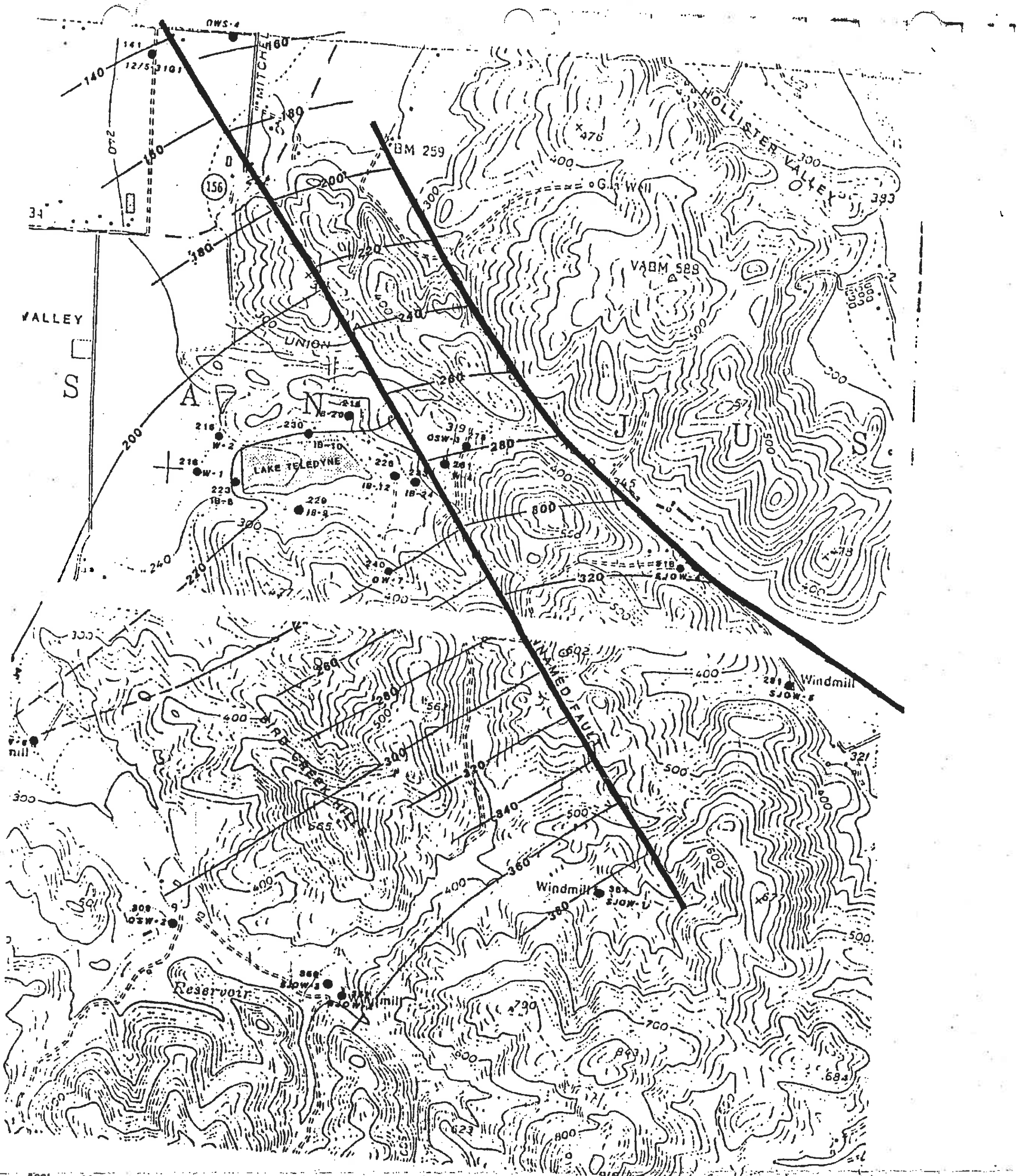

FIGURE 3-3

REGIONAL GROUND-WATER LEVELS
SPRING 1985

PREPARED FOR

Teledyne McCormick Selph
Hollister, California

REPRINTED FROM: OCTOBER 1985
GEOLOGIC, HYDROLOGIC AND CHEMICAL SITE CHARATERIZATION (2)

LEGEND

— Fault

236
W-3 ● — Well - Upper number indicates

4.0 DESCRIPTION OF SOLID WASTE MANAGEMENTS UNITS

Distinct Solid Waste Management Units (SWMUs) have been identified to evaluate potential on-site sources of releases to air, surface water, groundwater, soil, and subsurface gas (see Figure 4-1). A SWMU is defined as any discernible waste management unit at a RCRA facility from which hazardous constituents might migrate, irrespective of whether the unit was intended for the management of solid and/or hazardous waste.

Twenty-three SWMUs were identified in the PA/PR which was performed by Ecology and Environment for US EPA. All of these units are either described or have been removed from the list for the reasons stated in this assessment. These SWMUs are summarized in Table 4-1. Unit descriptions consist of date of start-up and closure, wastes managed, release controls, history of releases, and information regarding the potential for soil/groundwater, surface water, and air releases. All SWMU locations are shown in Figure 4-1.

Table 4.1

SWMU NUMBER FROM PA/PR	SWMU NUMBER (NEW)	DESCRIPTION	START DATE	CLOSURE DATE
1	1	LAKE TELEDYNE	1976	CURRENLTY OPERATING
2	2	SURFACE IMPOUNDMENT #1	approx. 1972	1985
3	3	SURFACE IMPOUNDMENT #2	approx. 1969	1985
4	4	PLATING SHOP WASTE STORAGE TANK	approx. 1972	1985
5	5	INDUSTRIAL WASTEWATER SCREENING TANK	1986	CURRENTLY OPERATING
6	6	SILVER RECOVERY VESSEL	1979	CURRENTLY OPERATING
7	13	CONTAINER STORAGE AREA	*	
8	9 & 12	TANK 5042	1977	CURRENTLY OPERATING
9	8	TANK 57683	1983 *	1989
10	8	TANK 57684	1983 *	CURRRENTLY OPERATING
11	7	UPPER DRUM STORAGE AREA	1987	CURRENTLY OPERATING
12	8	HAZARDOUS WASTE STORAGE AREA #1	1982	CURRENTLY OPERATING (Closure Plan filed)

13	9	HAZARDOUS WASTE STORAGE AREA #2	1987	1979
14	10	UNSYMETRICAL DIMETHYL-HYDRAZINE STORAGE	1977	CURRENTLY OPERATING
15	11	SPRAY FIELD	approx. 1969	CURRENTLY OPERATING
16	12	HAZARDOUS WASTE STORAGE AREA #3	1983	CURRENTLY OPERATING
17	13	HAZARDOUS WASTE STORAGE AREA #4	1983	CURRENTLY OPERATING
18	14	THERMAL OXIDIZER	UNKNOWN	1979
19	15	SURFACE IMPOUNDMENT	1985	1988
20	16	OLD BURN AREA	1971	1983
21	17	WASTE SOLVENT OPEN BURN AREA	1987	CURRENTLY OPERATING
22	17	HAZARDOUS WASTE STORAGE AREA #5	*	
23	18	OPEN BURN OF EXPLOSIVE SOLIDS	1986	CURRENTLY OPERATING

* denotes a SWMU which was in the PA/PR but could not otherwise be located at the facility.

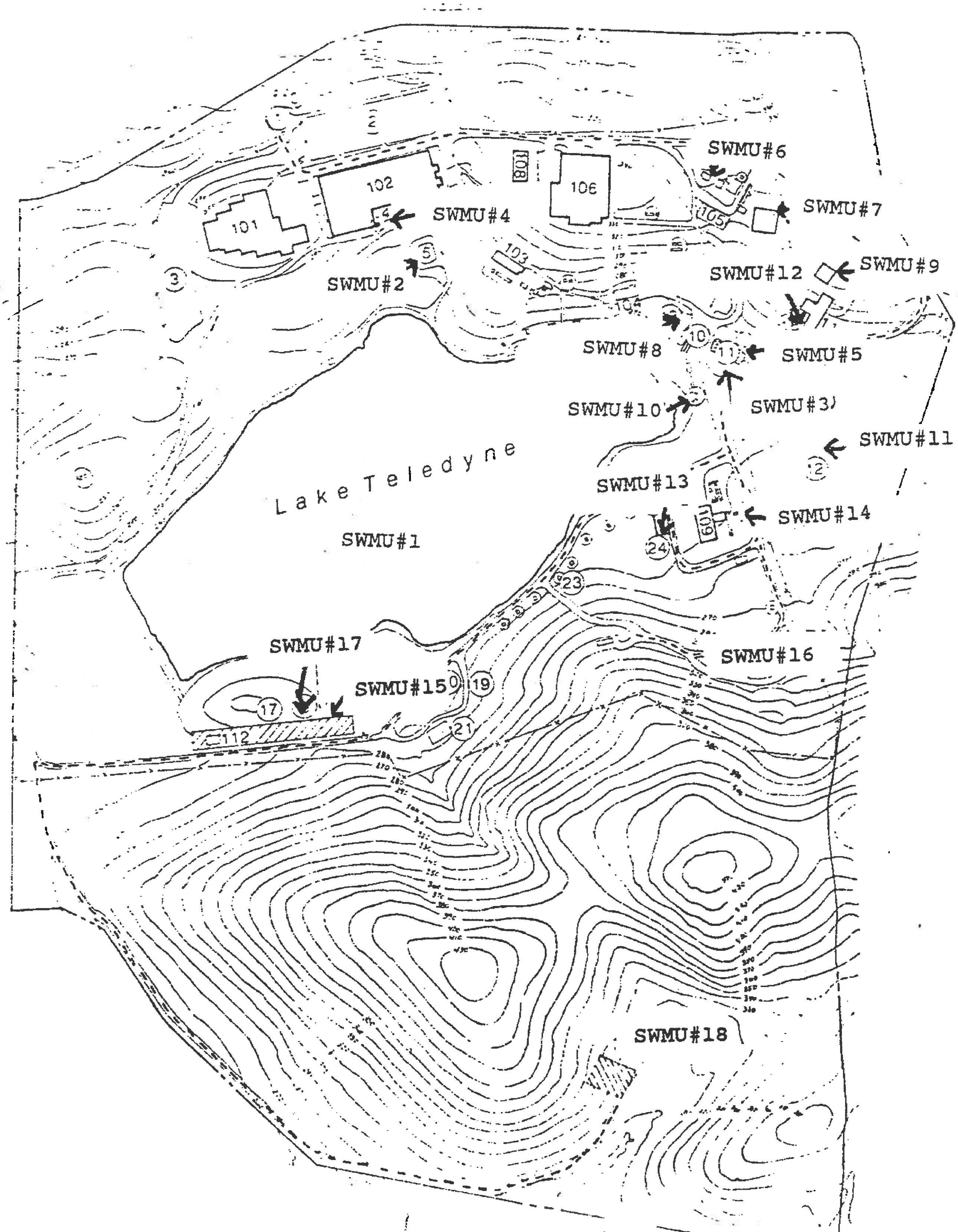

Figure 4.1 SOLID WASTE MANAGEMENT UNITS

4.1 SWMU #1 - LAKE TELEDYNE

Lake Teledyne (previously named Lake Allen) is an artificial reservoir, located in a natural basin at the Teledyne site. The lake's volume is an estimated 157.5 acre-feet with a surface area of 35 acres and average depth of 4.5 feet (20). It receives surface runoff from a grass-covered watershed of approximately 240 acres to the southeast, and from about 100 acres of Teledyne property.

After purchasing the site in 1970, Teledyne diked this natural depression to create an industrial evaporation pond and reservoir to provide a fire fighting water supply for the automatic sprinkler system in several production buildings, and for numerous fire hydrants on-site (2). The lake was used by Teledyne employees for recreational activities, such as fishing and boating, until April 1977 (3).

The start-up date of Lake Teledyne was in 1976. Lake Teledyne is still operating.

<u>Wastes Managed</u>

The lake received up to 33,000 gallons per day of treated and settled effluent from the facility's plating shop waste stream (the shop closed in 1985) and still receives up to 12,000 gallons per day from industrial waste streams such as the boiler and cooling tower blowdown, reverse osmosis filters, and filter effluent from a silver recovery system in the X-ray laboratory.[6] No hazardous wastes have been discharged into Lake Teledyne and the Lake was clean closed by the Department of Health Services in 1986. The 1985 Site Characterization which was performed by IT Corporation for Teledyne McCormick Selph found that there was no contamination of the site due to the treatment and storage of hazardous waste.[7]

Release Controls

Lake Teledyne is "lined" with existing natural clay deposits. No artificial cement or plastic liners were ever added. Lake Teledyne influences subsurface flow at shallow depths and recharges groundwater. In 1985, RWQCB found the groundwater monitoring program to be inadequate for Lake Teledyne.[8] A new groundwater monitoring program which meets all requirements of RWQCB was implemented in 1986.

History of Releases

On April 21, 1975, the reclamation plant (unspecified in document) discharged an unknown quantity of ammonia into the domestic plant, where it was disposed of by sprinkler. A subsequent rain carried the contaminants into Lake Teledyne where a fish kill occurred. Dead fish were noted first on April 23, 1975; on April 28, 1975, 409 dead fish were counted. The fish kill totaled 2,000 fish, which comprised about 10% of the estimated number stocked.[9]

4.2 SWMU #2 - SURFACE IMPOUNDMENT #1 (SI-1)

SI-1 is located on the hillside about 150 feet south of Building 102. The impoundment is constructed of 3 inches of concrete with 0.25-inch reinforcement wire on 6-inch centers. The sides slope at about 45 degrees to a flat bottom. The dimensions of the unit are 48 feet by 35 feet by 7 feet. The capacity of the impoundment is 88,000 gallons. SI-1 received effluent wastewater from the plating shop waste treatment system. This unit operated as a clarifier to separate metal-bearing sludge from clarified water. The separation was performed by allowing sufficient retention time for the metals to settle out by gravity. A pipe delivered the clarified water from the top of this unit into Lake Teledyne.

The effluent from this surface impoundment was analyzed as required by RWQCB discharge standards every six months. The unit was dredged (manually by vacuum truck) of an estimated 33,000 gallons, about every two or three years, as needed. The sludge was hauled to a Class I disposal site operated by the City of Hollister. Records of this disposal are found in Appendix A. The operation of the effluent stream and treatment unit was permitted by the Central Coast RWQCB.

The start-up date of this unit was sometime around 1972. The unit was clean-closed by DOHS, RWQCB, and EPA in August 1985.[10]

Wastes Managed

Surface impoundment #1 received effluent from the plating shop. Paragraph 11.8.5 of the Water Order recognizes the following hazardous materials in the Plating Shops effluent stream (2): Cadmium, Chromium, Cyanide, Lead, Mercury, and Phenol. The sludge from SI-1 was found to contain (2,6):

- Chromium (2540 mg/kg),
- Copper (845 mg/kg
- Silver (23.7 mg/kg),
- Lead (118 mg/kg), and
- Nickel (701 mg/kg).

Release Controls

The surface impoundment had a single concrete liner and had no leachate collection system.

History of Releases

No evidence of releases from this unit was found in the documents reviewed.

4.3 SWMU #3 - SURFACE IMPOUNDMENT #2 (SI-2)

SI-2 is located east of Lake Teledyne. The unit is irregular in shape, with dimensions of 117 feet by 73 feet by 117.5 feet by 63 feet. The sill on the south and east sides is on top of a dike that ranges from 7 to 2 feet above the terrain. On the north and west sides, the sill follows the ground contour. The waterline is about 2.5 feet below the lowest elevation of the sill. The bottom of the impoundment slopes to form a waterline depth of 3.3 feet at the inlet in the west corner to 4.5 feet in the east corner at the outlet.

SI-2 received effluent from the domestic sewage treatment and chemical processing areas. The effluent from this unit was discharged by a level control to a spray field just east of the surface impoundment. The effluent from this unit was analyzed as required by RWQCB standards every six months. The RWQCB standards for methods and frequencies of analysis for this effluent are identical to those for SI-1. The sludge from this unit was analyzed by the same parameters as the sludge in SI-1, except aluminum and iron were excluded from, and phenol added to, the list. The last disposal of sludge from this surface impoundment occured during the 1985 closure activities. This waste was found to be nonhazardous and was disposed of at the City of Hollister sewage treatment site. Records of these disposals are in Appendix A.

The soils from the spray field were also sampled and analyzed annually. The unit received a variable flow of 7,000 to 12,000 gallons per day of treated sewage from the aerator, which is located about 60 feet to the northwest of this unit. Storage volume is about 83,000 gallons, excluding the freeboard volume. There was less than 8,000 gallons of settled sludge. SI-2 has been dredged on a demand basis, usually every two to three years. The unit still operates as a domestic sewage treatment unit but no longer receives chemical wastes.

Some chemical process area floor drains, storm drains, and scrubber drains from the chemical production plant and the research and development buildings formerly discharged into this unit.

The start-up date of this unit was around 1969. This unit was clean-closed by DOHS, RWQCB, and EPA in August 1985.[11]

Wastes Managed

The wastes discharged into this surface impoundment include domestic sewage waste from plant operations and effluent from the chemical production plant and research and development area's floor and runoff drains. These effluent may have drained into the unit as a result of area runoff and washdown. The following chemicals have been manufactured in the chemical production plant and research and development buildings since 1982:

- N-nitrosohexamethyleneimine (N-HMI),
- Triaminoguanidine Nitrate (TAG Nitrate),
- 3-Nitro-4-methylacetophenone (1-CA),
- Oxamide, and
- 5-Nitroanthranilic Acid (5-NAA).

Release Controls

This unit is double-lined with a concrete surface liner and a plastic second liner and had no leachate collection system. RWQCB found groundwater monitoring inadequate (4).

History of Releases

No evidence of any releases from this unit was found in documents reviewed.

4.4 SWMU #4 - PLATING SHOP WASTE STORAGE TANK

This unit was an underground tank located on the south side of Building 102. It provided secondary treatment of cyanide-bearing waste from the plating shop. The unit had a capacity of 2,500 gallons, dimensions of 16 feet by 5 feet by 5.8 feet, and was epoxy-lined concrete. The tank was separated into four sections.

The tank was used starting in approximately 1972. The tank was clean-closed by DOHS in 1984.

Wastes Managed

The wastes stored in this tank include cyanide-bearing wastewater and sludge from the plating shop. Treated wastewater from this unit was fed through a pipe for discharge into surface impoundment #1. The characteristics of the wastes are found in Appendix A. These wastes included the following chemicals: nickel chloride, hydrochloric acid, water, iron, nitric acid, chromium, and sulfuric acid.

Release Controls

The unit was an epoxy-lined, concrete underground tank. There were no other release controls.

History of Releases

No evidence of any releases from this tank was found in documents reviewed.

4.5 SWMU #5 - INDUSTRIAL WASTEWATER SCREENING TANK

This unit was an underground tank located on the south side of Building 102. The purpose of the unit was secondary treatment of waste from the chemical lab, X-ray laboratory, cooling tower blowdown, and chromate rinse tank. The unit had a total capacity of 15,000 gallons and was epoxy-lined concrete. The tank was separated into two sections. The sections of the tank had capacities of 6,000 gallons and 9000 gallons. The first section overflowed into the second section somewhat like a clarifier.

The this unit began operation in January or February 1986. This tank was clean-closed by DOHS in 1984.

Wastes Managed

The potential wastes stored in this tank include sludge and wastewater from the chemical lab, X-ray laboratory, cooling tower, and chrome plating shop. The tank has never stored hazardous waste.

Release Controls

The tank was epoxy-lined concrete. No other controls are known.

History of Releases

No evidence of any releases from this tank was found in documents reviewed.

4.6 SWMU #6 - SILVER RECOVERY VESSEL

This silver recovery vessel is located above the research and design building. It is used approximately ten days a year for the recovery of silver from explosive waste. The unit has a capacity of 300 gallons. Its dimensions are 53 inches by 70 inches, and it is lined with 5/8 inch glass (1).

The start-up date of this unit is December 11, 1979. The silver recovery vessel is currently in operation.

Wastes Managed

Between 1979 and 1984 this unit was used to recover silver nitrate solution from explosive wastes. In 1984 this process was changed to recover silver metal from the explosive waste.

Release Controls

The unit is located on a concrete pad. The vessel has numerous controls since is also used as a production vessel. The unit has a vent that releases to two consecutive scrubbers. The current RCRA Part B Application contains complete schematics of all piping including shutoffs. The unit is manually loaded and has no bypass system.

History of Releases

No evidence of releases was found in documents reviewed.

4.7 SWMU #7 - UPPER DRUM STORAGE AREA

The location and description in the preliminary assement do not correspond with any known hazardous waste handling area at the Teledyne facility. The location indicated is a boiler room. Based on the documents reviewed and discussion with Ed Lynam of Teledyne, this unit is the bulk chemical storage area. The dimensions of this unit are 77 feet (northside), 60 feet (westside), 75 feet (southside), and 75 feet (eastside).

The date of start-up was approximately April 1987. The unit was cited for greater than 90 day storage in 1988 in an inspection by DOHS. The unit will not be used for hazardous waste storage greater than 90 days in the future.

Wastes Managed

The materials for which this storage area was cited for included methanol, acetone and tetrahydrofuran (flammable liquids with explosive solids). A maximum of 30 drums were stored at any time.

Release Controls

Cement dikes with vertical and horizantal rebar were constructed in 1987. These dikes were sealed to the pad with epoxy. The containment area slopes to the southwest corner with a drive way built over a sloped dike on the eastside.

History of Releases

No evidence of releases from this area was found in files reviewed.

4.8 SWMU #8 - HAZARDOUS WASTE STORAGE AREA #1

This unit was located east of Lake Teledyne and contained Tank 57683 and Tank 57684. This unit was also know as N2O4 dike.

The start-up date of this unit was in 1982. This unit is currently operating and contains Tank 796 and 794.

Tank 57683 had a capacity of 6,450 gallons. It is a high-density, polyethylene flat bottom tank. Its dimensions are 119 inches by 138 inches. Wastes stored in this unit was generated by specialty chemical manufacturing operations. The unit began operation in February 1982. In February 1985 the tank developed a pinhole leak. This leak was repaired and the tank remained idle until December 1985 when it was removed from service as a hazardous waste storage tank. Tank 57683 was clean closed under the Agreed Settlement and Order on September 29, 1989.

Tank 57684 was used for bulk chemical storage. The tank was constructed of high-density, cross-linked polyethylene. Its capacity is 6,450 gallons. Its dimensions are 119 inches x 138 inches. The start-up date of this unit was February 1982. This tank was renumbered as Tank 794.

Tank 796 was installed at this location in December 1986. The tank is constructed of stainless steel, has dimensions of 96" x 192", and has a maximum vertical capacity of 6,000 gallons. On April 21, 1989, pinhole leaks were detected along the bottom weld seam of the tank. The seam was patched. On April 24, 1989 the tank was drained of it contents. It was then decontaminated.

Wastes Managed

Waste with the following typical composition was stored in Tank 57683 between 1982 and 1983:

15-20% Sulfuric Acid

5-10% Hydrochloric Acid

2% Fluorinated Aromatic Organic Compounds

68-78% Water

Between 1983 and 1985 this tank stored waste with a typical composition of the following, was stored in the tank:

56-73% Water

10-20% Tetrahydrofuran

5-10% Acetone

5-10% Methanol

2-5% explosive waste byproducts

No hazardous wastes have been stored in Tank 796.

Release Controls

This unit which contains the tanks described above is a concrete-bermed area whose dimensions are 25 feet by 30 feet by 32 inches, and volume is 14,000 gallons. This containment area was coated with a chemical resistant epoxy coating in 1988.

Teledyne's chemical manufacturing operations are batch-type operations of known volume. Waste materials, such as off specification batches, are transferred to the tank with operators present observing tank levels. Chemicals are transferred to and from these tanks manually from trucks, portable tanks, or drums. Both tanks have manual shut-off valves.

History of Releases

No record of releases were found in the documents reviewed. The pinhole leaks which were discovered in 1985 and 1989 did not result in a release of hazardous waste to the environment. None of the documents reviewed showed evidence of releases.

4.9 SWMU #9 - HAZARDOUS WASTE STORAGE AREA #2

This storage area is just east of Building 111. It originally contained Tank 5042, a 10,000-gallon stainless steel tank between 1978 and 1980. In 1988 this unit was cited for storage of hazardous waste in drums for greater than 90 days.

The start-up date of this area was July 1978. In 1980, Tank 5042 was moved to hazardous waste storage area #3. This area is not currently being used for hazardous waaste storage of greater than 90 days.

Wastes Managed

This storage area held Tank 5042, which stored deionized water. The issue of whether the materials which were being stored were waste or intermediate products was raised at the time of the above violations.

Release Controls

The area is contained by two cement dikes which are 29 feet by 49 feet with a one foot high wall. The forklift access ramp is approximately one half foot in height.

Release Controls

The area is contained by two cement dikes which are 29 feet by 49 feet with a one foot high wall. The forklift access ramp is approximately one half foot in height.

History of Releases

No evidence of any releases from this unit was found in the documents reviewed.

4.10 SWMU #10 - UNSYMMETRICAL DIMETHYLHYDRAZINE (UDMH) STORAGE

This unit was located east of Lake Teledyne. UDMH is primarily used as a rocket fuel for numerous Air Force Missile systems. This unit consisted of two 13,000 gallon horizantal tanks. These tanks were designated as Tank 1107 and Tank 1108. The unit was first used in 1977 for storage of UDMH product. The unit was certified closed by the United Staes Air Force sometime between 1978 and 1979. All records of this closure have been lost.

Wastes Managed

Only two product streams were historically stored in these tanks. The first was UDMH and the second was Nitric Acid. Tank 1107 is currently used for storage of Nitric Acid product. No hazardous waste was stored in this unit.

Release Controls

The containment area consists of cement dike which is 4 feet high and has dimensions of 40 feet by 22 feet.

History of Releases

There is no documentation of any releases from this unit.

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4.11 SWMU #11 - SPRAY FIELD

The spray field is east of the thermal oxidizer, outside of the fenced area to Teledyne. It receives effluent from the ~~industrial wastewater screening tank~~ Sanitary sewage treatment systems (SWMU #5) and its runoff flows into Lake Teledyne. It does not receive effluent from any other area. The start-up date of this unit was around 1969. This unit is still in use. Runoff occurs only during the rainy season.

Wastes Managed

This unit receives effluent which has passed the screening levels for discharge from SI-2 and may contain low levels of cadmium, chromium copper, cyanide, lead, mercury, and phenol. The waste quantity managed by this unit ~~is estimated as the one-through liquid volume of SI-2 75,000 gallons.~~ are included in this average 2000 gal effluent from SI-2. Waste received from SI-2 is considered nonhazardous.

History of Releases

There is no documentation of any releases from this unit.

4.11 SWMU #11 - SPRAY FIELD

The spray field is east of the thermal oxidizer, outside of the fenced area to Teledyne. It receives effluent from the sanitary sewer treatment system (SWMU #5) and its runoff flows into Lake Teledyne. It does not receive effluent from any other area. The start-up date of this unit was around 1969. This unit is still in use. Runoff occurs only during the rainy season.

Wastes Managed

This unit receives effluent which has passed the screening levels for discharge from SI-2 and may contain low levels of cadmium, chromium copper, cyanide, lead, mercury, and phenol. The waste quantity managed by this unit is inlcuded in the 12,000 gallons per day effluent stream from Surface Impoundment #2. Waste received from SI-2 is considered nonhazardous.

Release Controls

All effluent from this unit is screened before it is released from SI-2.

History of Releases

No information regarding releases was found in the documents reviewed. The chemical site characterization which was performed by IT corporation in 1985 determined that there was no contamination at this unit.[12]

4.12 SWMU # 12 - HAZARDOUS WASTE STORAGE AREA #3

This hazardous waste storage area is located west of Building 111. This unit currently is composed of a containment area which surrounds Tank 5038, Tank 5040, and Tank 5042. Start-up date of this area was in 1983 and the unit is currently operating.

Tank 5038 and Tank 5040 are unlined, closed top, vertical tanks constructed out of cross-linked polyethylene. They have dimensions of 10' by 11'6" and were purchased and put in to service at this location in 1980.

Tank 5042 is a stainless steel cone bottom tank. It has a 10,400-gallon capacity. The dimensions are 126 inches by 160 inches. The start-up date of this unit was July 1978. This tank was originally located in hazardous waste storage area #2. The tank was moved to its present location in hazardous waste storage area #3 in 1980. The tank is currently in operation at this location.

Wastes Managed

Estimated annual quantities and types of waste for Tanks 5038 and 5040 are located in Appendix F. Between 1978 and 1982 tank 5042 tank stored deionized water. In 1982 Tank 5042 began storing TAG mother liquor, which is a chemical product. Tank 5042 has never stored hazardous waste but may do so in the future.

Release Controls

The tanks ares located on a concrete pad which reduces the potential for materials to enter subsurface soils or groundwater. The containment system includes a 27 feet by 28 feet by 33 inches concrete-bermed area with a capacity of 25,000 gallons. The containment area was coated with an epoxy coating in 1988. All three tanks are vented through a scrubber. Waste materials are transferred to the tank with operators present observing tank levels. Tank 5042 has a float-type level indicator. Manual shutoff valves are present in the supply piping.

History of Releases

No records of releases were found in the documents reviewed.

4.13 SWMU #13 - HAZARDOUS WASTE STORAGE AREA #4

The container storage area is located near Building 103. This unit stores containerized hazardous wastes. There are four storage sections for wastes. One section is used for acids only. Wastes are analyzed before storage (7). All of the wastes are in a liquid form.

The four sections of this unit are divided into the following categories (1):

A) All containers have alkaline compounds or neutral aqueous solutions (pH 5-9). The alkaline-compatible wastes stored in this area include hydroxides, cyanides, and sulfides.

B) The containers may store halogenated hydrocarbons, nonflammable liquids, oxidizers, or neutral aqueous solutions.

C) The containers in this section are used for acids only.

D) The containers in this section have six different types of compounds: flammable liquids, reducing agents, metal catalysts, carbon, pyrotechnic fuels, and combustible liquids.

The this unit began operation in 1983 and is currently in operation.

Wastes Managed

Wastes stored in containers are listed in Appendix G. Many of these wastes may not be generated in any given year, but are listed in the event that they are generated as the result of a specific contract award or the discontinuance of production under a specific contract.

Release Controls

The unit is designed for storage of containers in groupings according to compatibility. Containers are kept on pallets to prevent rupture or leakage during handling. The secondary containment system is an epoxy coated concrete pad with a roof. There is a one-foot-high curb around the perimeter to prevent run-on. There are sumps for each section of the unit to collect liquids and prevent contact of containers with accumulated liquids. Each of the four ~~pads~~ Sections has a capacity of: ~~Bay~~ Sections A+D, 4190 gallons; Sections B+C, 3710 gallons) ~~8,900 gallons~~. Thus, the total capacity for the unit is 15800 ~~35,000~~ gallons. The four sumps have a combined capacity of 4162 ~~3,560~~ gallons, or 10% of the ~~unit's~~ section volume, Plus the 100 year rain. This capacity is greater than the unit's largest ~~container (55 gallons). The dimensions of each section's sump are~~ APPROX. ~~2 feet by 17 feet by 3 feet 6 inches.~~

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container (55 gallons). The dimensions of each section's sump are approximately 2 feet by 17 feet by 3 feet 6 inches.

History of Releases

No records of releases were found in the documents reviewed.

4.14 SWMU #14 - THERMAL OXIDIZER

The thermal oxidizer was located in the southeast portion of the facility. The unit was specifically designed as a stationary plant pollution control device to destruct all substances it received from the unsymmetrical dimethylhydrazine (UDMH) production facility and to emit as little residual pollutants (NOx and particulates) as possible. UDMH was used primarily as a rocket and torpedo propellant for numerous U.S. Air Force missile systems.

The reduction of nitrogen oxides was accomplished in a horizontal, cylindrical furnace. Reoxidation of gases was achieved in a reoxidation furnace. The NOx waste stream was enriched with make-up air and introduced into an HI burner. The HI burner heats the process stream and establishes a reducing atmosphere. An environment of approximately 2400 degrees Fahrenheit, and 8% combustibles, is maintained in the reduction furnace.

Exit gases from the reduction furnace are cooled and reoxidized in a recycle, reoxidation duct. They are quenched with 420° F recycle combustion gases maintaining a 1,400° F temperature prior to oxidation, thus minimizing NOx reformation. Combustion air introduced into the reoxidation duct is controlled, maintaining a maximum of 1% oxygen in the combustion gas stream. Heat in the combustion gas stream is utilized to produce steam in a waste heat boiler. The boiler exit gas stream is divided, sufficient gas is recycled to maintain proper reoxidation temperature and the remainder is vented at acceptable air levels to the atmosphere.

The start-up date of the thermal oxidizer was 1977. The unit was closed and decontaminated in 1979 when the U.S. Air Force canceled their contract with Teledyne. However, the records of this closure are missing.

<u>Wastes Managed</u>

The wastes received by this unit are by-products from the production of UDMH. During the manufacturing cycle, one of the starting materials, dimethylamine (DMA) and an intermediated product, dimethylnitrosamine (DMN), are produced. These two compounds are suspected carcinogenic substances.

Release Controls

Operating procedures monitored streams from heating systems to detect any process equipment failures.

All tankage and supply service equipment was located within retained diked areas. In the event analysis showed contaminated effluent, an alternate plumbing system would be used that connected these diked areas to the domestic sewage treatment plant.

The unit was to be designed with an alternative backup fuel source to ensure continuous operation in case peak demands exceed supply or in the event of natural gas curtailments.

History of Releases

No history of releases other than permitted stack emissions was found in the documents reviewed.

4.15 SWMU #15 - SURFACE IMPOUNDMENT (FOR TREATMENT OF EXPLOSIVES IN WATER)

This surface impoundment was located next to the new waste solvent open burn area (SWMU #17). It began operation in 1985 and was used until 1988 for evaporation of water which was contaminated with small partcles of explosives prior to being burned in the waste solvent open burn unit. In 1988 during an inspection by DOHS this unit was identified as a non-permitted unit and as part of the agreed settlement and order, use of this unit was discontinued.

Wastes Managed

The wastes stored in this surface impoundment were aqueous wastes containing explosives.

Release Controls

This unit was a double-lined unit.

History of Releases

No information regarding releases was found in the documents reviewed.

4.16 SWMU #16 - OLD BURN AREA

The old burn area was located south of Lake Teledyne. This unit began operation in approximately 1971. It was used to burn solvent and solid waste materials contaminated with explosives. Solid wastes to be burned were placed inside two six-foot diameter concrete sewer pipes which were surrounded by a wire mesh cage. Solvents containing explosives were placed in an open container within the wire mesh area and ignited. In April 1983 a landslide destroyed the unit.

Wastes Managed

The waste types and average quantities of wastes burned are in Appendices F and G.

Release Controls

This unit was located on a concrete slab, and the wire cage was used to keep solid explosives from leaving the area. There is no documentation of any other release controls.

History of Releases

There is no evidence of releases other than normal emissions from the burning operations in the documents reviewed. The 1985 chemical site characterization sampled this area and found no contamination.[13]

4.17 SWMU #17 - WASTE SOLVENT INCINERATOR (NEW BURN AREA)

This unit, southwest of Lake Teledyne, was a waste solvent open burn unit. It consisted of six 55-gallon drums, cut in half and filled with waste solvents contaminated with explosives. The solvents were then ignited. This unit began operation in 1987 and is currently operating.

Wastes Managed

The burn capacity of this unit is 150 gallons/day. Teledyne has requested to increase the burn rate to 300 gallons/day in their current permit application. Wastes include methanol, isopropanol, acetone, tetrahydrafuran, acetonitrile and pyradine. Specific quantities incinerated in the past are listed in Appendix H.

Release Controls

Controls include 5-inch freeboard from the top of each half-drum to the solvent surface to reduce fugitive loss and minimize chance for spills. A stainless steel contaiment pan is located underneath the drums.

History of Releases

No information regarding releases other than those from normal burning operations was found in the documents reviewed.

4.18 SWMU #18 - BURN PIT

The burn pit is located southeast of Lake Teledyne, outside of the fenced area. This unit consists of two 10-foot diameter reinforced concrete pipes which are enclosed in a mesh cage. The mesh cage is surrounded on three sides by an earth bank and is bolted to a 6-inch thick concrete slab.

Waste Managed

Only solid explosive wastes have been burned in this unit. The types and quantities are listed in Appendix H.

Release Controls

Only solid hazardous waste is treated by burning in this unit. The cage keeps pieces of explosives from exiting to the environment.

History of Releases

No information regarding releases other than from normal burning operations was found in the documents reviewed.

5.0 RECOMMENDATIONS

Based on the information reviewed and the lack of any evidence of release of hazardous wastes to the environment, no further action is recommended at this time. No RCRA Facilities Investigation is recommended at this time. Any permit issued by the US Environmental Protection Agency should include details regarding any RCRA Facilities Investigation and Corrective Measures Study to be implemented if future evidence of a release is identified.

REFERENCES

1. Ecology and Environment for US Environmental Protection Agency, "Preliminary Assessment/Preliminary Review," May 15, 1989.

2. IT Corporation for Teledyne McCormick Selph, "Geologic, Hydrologic, and Chemical Site Characterization," October 29, 1985.

3. IT Corporation for Teledyne McCormick Selph, "Geologic, Hydrologic, and Chemical Site Characterization," October 29, 1985.

4. IT Corporation for Teledyne McCormick Selph, "Geologic, Hydrologic, and Chemical Site Characterization," October 29, 1985.

5. Ecology and Environment, Inc. for US EPA, "Preliminary Assessment/Preliminary Review," May 15, 1989.

6. Teledyne McCormick Selph, "Consolidated Closure Plan for Hazardous Waste Units," 1986.

7. IT Corporation for Teledyne McCormick Selph, "Geologic, Hydrologic, and Chemical Site Characterization," October 29, 1985.

8. Ecology and Environment for US EPA, "Preliminary Assessment/Preliminary Review," May 15, 1989.

9. Ecology and Environment, Inc. for US EPA, "Preliminary Assessment/Preliminary Review," May 15, 1989.

10. Teledyne McCormick Selph, "Consolidated Closure Plan for Hazardous Waste Units," 1986.

11. Teledyne McCormick Selph, "Consolidated Closure Plan for Hazardous Waste Units," 1986.

12. IT Corporation for Teledyne McCormick Selph, "Geologic, Hyrdologic, and Chemical Site Characterization," October 29, 1985.

13. IT Corporation for Teledyne McCormick Selph, "Geologic, Hydrologic, and Chemical Site Characterization," October 29, 1985.

APPENDIX A

TRANSPORTATION RECORDS FOR SLUDGE REMOVAL

Rev[illegible] [illegible]cember 1975

CALIFORNIA LIQUID WASTE HAULER RECORD

STATE WATER R[illegible] [illegible]ES CONTROL BOARD
STATE DEPARTMENT OF HEALTH

HAULER NUMBER 802

PRODUCER OF WASTE (Must be filled by producer)

Name (print or type): Teledyne McCormick Selph — Code No.

Pick up Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: (408) 637-3731 P.O. or Contract No.: 15306MG

Order Placed By: Maxine Gomez Date: 2/28/80

Type of Process which Produced Wastes: Plating Shop Waste — Code No.
(Examples: metal plating, equipment cleaning, oil drilling, wastewater treatment, pickling bath, petroleum refining)

DESCRIPTION OF WASTE (Must be filled by producer)

Check type of wastes:

1. [X] Acid solution
2. [ ] Alkaline solution
3. [ ] Pesticides
4. [ ] Paint sludge
5. [ ] Solvent
6. [ ] Tetraethyl lead sludge
7. [ ] Chemical toilet wastes
8. [ ] Tank bottom sediment
9. [ ] Oil
10. [ ] Drilling mud
11. [ ] Contaminated soil and sand
12. [ ] Cannery waste
13. [ ] Latex waste
14. [ ] Mud and water
15. [ ] Brine

[ ] Other (Specify): ______ Code No.

Components (Examples: hydrochloric acid, lime, caustic soda, phenolics, solvents (list), metals (list), organics (list), cyanide)

Component	Upper	Lower	%	ppm
1. Nickel Chloride	27	22	X	
2. Hydrochloric Acid	5	3	X	
3. Remainder - water				
4.				
5.				
6.				

Hazardous Properties of Waste: pH 0 [ ] none [ ] toxic [ ] flammable [X] corrosive [ ] explosive

Bulk Volume: 21 [X] gal [ ] tons [ ] barrels (42 gal) [ ] other (specify)

Containers: 5 (Number) [ ] drums [ ] cartons [ ] bags [X] other cans (specify)

Physical State: [ ] solid [X] liquid [ ] sludge [ ] other (specify)

Special Handling Instructions (if any): Avoid contact with material. Acid gear and eye protection recommended.

The waste is described to the best of my ability and it was delivered to a licensed liquid waste hauler (if applicable). I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature]

HAULER OF WASTE (Must be filled by hauler)

Name (print or type): Teledyne McCormick Selph — Code No.

Business Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: (408) 637-3731 Pick Up: 3/20/80 (Date) Time: 900 AM

State Liquid Waste Hauler's Registration No. (if applicable):

Job No.: -- No. of Loads or Trips: 1 Unit No.: 4

Vehicle: [ ] vacuum truck ___ barrels, [ ] [illegible], [X] other dump (specify)

The described waste was hauled by me to the disposal facility named below and was accepted.

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature] Signature of authorized agent and title

DISPOSER OF WASTE (Must be filled by disposer)

Name (print or type): ______ Code No.

Site Address: ______

The hauler above delivered the described waste to this disposal facility and it was an acceptable material under the terms of RWQCB requirements, State Department of Health regulations, and local restrictions.

Quantity measured at site (if applicable): 15 gallons State fee (if any): X

Handling Method(s):

[ ] recovery
[ ] treatment (specify): (Examples: incineration, neutralization, precipitation) Code No.
[ ] disposal (specify): [X] pond [ ] spreading [ ] landfill [ ] injection well [ ] other (specify): Code No.

If waste is held for disposal elsewhere specify final location: ______

Disposal Date: 3-20-80

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature] Signature of authorized agent and title

The site operator shall submit a legible copy of each completed Record to the State Department of Health with monthly fee reports.

X hauled in same load as TMCS NO 6 See other for fees

FOR INFORMATION RELATED TO SPILLS OR OTHER EMERGENCIES INVOLVING HAZARDOUS WASTE OR OTHER MATERIALS CALL (800) 421-9300.

STOCK NO. C-213

Revised September 1975

CALIFORNIA LIQUID WASTE HAULER RECORD

STATE WATER RESOURCES CONTROL BOARD
STATE DEPARTMENT OF HEALTH

HAULER NUMBER 802

PRODUCER OF WASTE (Must be filled by producer)

Name (print or type): Teledyne McCormick Selph — Code No.

Pick up Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: (408) 637-3731 P.O. or Contract No.: Hollister

Order Placed By: Maxine Gomez Date: 2/28/80

Type of Process which Produced Wastes: Plating Shop WAstes — Code No.
(Examples: metal plating, equipment cleaning, oil drilling—wastewater treatment, pickling bath, petroleum refining)

DESCRIPTION OF WASTE (Must be filled by producer)

Check type of wastes:

- 1. [X] Acid solution
- 2. [ ] Alkaline solution
- 3. [ ] Pesticides
- 4. [ ] Paint sludge
- 5. [ ] Solvent
- 6. [ ] Tetraethyl lead sludge
- 7. [ ] Chemical toilet wastes
- 8. [ ] Tank bottom sediment
- 9. [ ] Oil
- 10. [ ] Drilling mud
- 11. [ ] Contaminated soil and sand
- 12. [ ] Cannery waste
- 13. [ ] Latex waste
- 14. [ ] Mud and water
- 15. [ ] Brine

[ ] Other (Specify): — Code No.

Components:
(Examples: Hydrochloric acid, lime, caustic soda, phenolics, solvents (list), metals (list), organics (list), cyanide)

Component	Upper	Lower	%	ppm
1. Hydrochloric Acid	0.5	--	[X]	[ ]
2. Iron (III)	0.5	--	[X]	[ ]
3. Remainder - water			[ ]	[ ]
4.			[ ]	[ ]
5.			[ ]	[ ]
6.			[ ]	[ ]

Hazardous Properties of Waste: pH 0 [ ] none [ ] toxic [ ] flammable [X] corrosive [ ] explosive

Bulk Volume: 220 [X] gal [ ] tons [ ] barrels (42 gal) [ ] other (specify)

Containers: 4 (Number) [X] drums [ ] cartons [ ] bags [ ] other (specify)

Physical State: [ ] solid [X] liquid [ ] sludge [ ] other (specify)

Special Handling Instructions (if any): ~~MMK~~ Avoid contact with material. Acid gear and eye protection recommended.

The waste is described to the best of my ability and it was delivered to a licensed liquid waste hauler (if applicable).
I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature]

HAULER OF WASTE (Must be filled by hauler)

Name (print or type): Teledyne McCormick Selph — Code No.

Business Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: (408) 637-3731 Pick Up: 3/20/80 (Date) Time: 900 AM/PM

State Liquid Waste Hauler's Registration No. (if applicable):

Job No.: -- No. of Loads or Trips: 1 Unit No.: 4

Vehicles: [ ] vacuum truck ___ barrels, [ ] ... [X] other dump (specify)

The described waste was hauled by me to the disposal facility named below and was accepted.

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature]
Signature of authorized agent and title

DISPOSER OF WASTE (Must be filled by disposer)

Name (print or type): — Code No.

Site Address:

The hauler above delivered the described waste to this disposal facility and it was an acceptable material under the terms of RWQCB requirements, State Department of Health regulations, and local restrictions.

Quantity measured at site (if applicable): 1600 Pounds State fee (if any) 1.00 Per ton

Handling Method(s):

[ ] recovery

[ ] treatment (specify): (Examples: incineration, neutralization, precipitation) Code No.

[ ] disposal (specify): [ ] pond [ ] spreading [ ] landfill [ ] injection well [ ] other (specify): — Code No.

If waste is held for disposal elsewhere specify final location:

Disposal Date: 3-20-80

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature]
Signature of authorized agent and title

The site operator shall submit a legible copy of each completed Record to the State Department of Health with monthly fee reports.

Dump. F $25.00 Total $36.00
State. F $1.00
Waste. H.F $10.00 Charge

FOR INFORMATION RELATED TO SPILLS OR OTHER EMERGENCIES INVOLVING HAZARDOUS WASTE OR OTHER MATERIALS CALL (800) 424-8300.

Revised December 1975

CALIFORNIA LIQUID WASTE HAULER RECORD

STATE WATER RESOURCES CONTROL BOARD
STATE DEPARTMENT OF HEALTH

HAULER NUMBER 802

PRODUCER OF WASTE (Must be filled by producer)

Name (print or type): Teledyne McCormick Selph — Code No.: [ ][ ][ ][ ][ ]

Pick up Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: 408, 637-3731 P.O. or Contract No.: 15306MG

Order Placed by: Maxine Gomez Date: 2/28/80

Type of Process which Produced Wastes: Plating Shop Waste XXXXXXXXXXXXXXXXXXXXX — Code No.: [ ][ ][ ][ ]

(Examples: metal plating, equipment cleaning, oil drilling--wastewater treatment, pickling bath, petroleum refining)

DESCRIPTION OF WASTE (Must be filled by producer)

Check type of wastes:

1. [x] Acid solution
2. [ ] Alkaline solution
3. [ ] Pesticides
4. [ ] Paint sludge
5. [ ] Solvent
6. [ ] Tetraethyl lead sludge
7. [ ] Chemical toilet wastes
8. [ ] Tank bottom sediment
9. [ ] Oil
10. [ ] Drilling mud
11. [ ] Contaminated soil and sand
12. [ ] Cannery waste
13. [ ] Latex waste
14. [ ] Mud and water
15. [ ] Brine

[ ] Other (Specify) ______ Code No. [ ][ ][ ]

Components:
(Examples: Hydrochloric acid, lime, caustic soda, phenolics, solvents (list), metals (list), organics (list), cyanide)

Component	Concentration: Upper	Lower	%	ppm
1. Nitric Acid	0.1	--	X	
2. Chromium (VI)	0.1	--	X	
3. Remainder - water				
4.				
5.				
6.				

Hazardous Properties of Waste:
pH 1.6 [ ] none [x] toxic [ ] flammable [x] corrosive [ ] explosive

Bulk Volume: 220 [x] gal [ ] tons [ ] barrels (42 gal) [ ] other (specify)

Containers: 6 (Number) [x] drums [ ] cartons [ ] bags [ ] other (specify)

Physical State: [ ] solid [x] liquid [ ] sludge [ ] other (specify)

Special Handling Instructions (if any): Avoid contact with materials. Acid gear and eye protection recommended.

The waste is described to the best of my ability and it was delivered to a licensed liquid waste hauler (if applicable). I certify (or declare) under penalty of perjury that the foregoing is true and correct.

[signature]

HAULER OF WASTE (Must be filled by hauler)

Name (print or type): Teledyne McCormick Selph — Code No. [ ][ ][ ]

Business Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: 408)637-3731 Pick Up: 3/20/80 (Date) Time: 900 Am

State Liquid Waste Hauler's Registration No. (if applicable): ______

Job No.: -- No. of Loads or Trips: 1 Unit No.: 4

Vehicle: [ ] vacuum truck ___ barrels, [ ] ... [x] other dump (specify)

The described waste was hauled by me to the disposal facility named below and was accepted.

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

[signature]
Signature of authorized agent and title

DISPOSER OF WASTE (Must be filled by disposer)

Name (print or type): ______ Code No. [ ][ ][ ]

Site Address: ______

The hauler above delivered the described waste to this disposal facility and it was an acceptable material under the terms of RWQCB requirements, State Department of Health regulations, and local restrictions.

Quantity measured at site (if applicable): 16.00 State fee (if any): 1.00

Handling Method(s): Pamelo Paxton

[ ] recovery

[ ] treatment (specify): ______ Code No. [ ][ ]
(Examples: incineration, neutralization, precipitation)

[ ] disposal (specify): [ ] pond [ ] spreading [ ] landfill [ ] injection well [ ] other (specify): ______ Code No. [ ][ ]

If waste is held for disposal elsewhere specify final location: ______

Disposal Date: 3-20-80

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

[signature: R Villa...]
Signature of authorized agent and title

The site operator shall submit a legible copy of each completed Record to the State Department of Health with monthly fee reports.

Dump F# 25.00 $36.00
State F #1.00 total
waste H.F # 10.00 Charge

FOR INFORMATION RELATED TO SPILLS OR OTHER EMERGENCIES INVOLVING HAZARDOUS WASTE OR OTHER MATERIALS CALL ...

Revised December 1974

CALIFORNIA LIQUID W[illegible]TE HAULER RECORD

STATE WATER RESOU[illegible] CONTROL BOARD
STATE DEPARTMENT OF HEALTH

PRODUCER OF WASTE (Must be filled by producer)

Name (print or type): Teledyne McCormick Selph — Code No.

Pick up Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: (408) 637-3731 P.O. or Contract No.: 17361MG

Order Placed By: Maxine Gomez Date: 9/10/80

Type or Process which Produced Waste: Labs., Chem. Mfg., Swg. Trt., Mudslide — Code No.

(Examples: Metal plating, equipment cleaning, oil drilling, wastewater treatment, pickling bath, petroleum refining)

DESCRIPTION OF WASTE (Must be filled by producer)

Check type of wastes:

1. ☐ Acid solution
2. ☐ Alkaline solution
3. ☐ Pesticides
4. ☐ Paint sludge
5. ☐ Solvent
6. ☐ Tetraethyl lead sludge
7. ☐ Chemical toilet wastes
8. ☐ Tank bottom sediment
9. ☐ Oil
10. ☐ Drilling mud
11. ☐ Contaminated soil and sand
12. ☐ Cannery waste
13. ☐ Latex waste
14. ☐ Mud and water
15. ☐ Brine

☒ Other (Specify) Alkaline sludge — Code No.

Components:
(Examples: Hydrochloric acid, lime, caustic soda, phenolics, solvents (list), metals (list), organics (list), cyanids)

	Upper	Lower	Concentration: %	ppm
1.				
2. See Attached Sheet				
3.				
4.				
5.				
6.				

Hazardous Properties of Waste: ph 8 ☐ none ☒ toxic ☐ flammable ☐ corrosive ☐ explosive

Bulk Volume: 20K (est) ☒ gal ☐ tons ☐ barrels (42 gal) ☐ other (specify)

Containers: (Number) ☐ drums ☐ cartons ☐ bags ☐ other (specify)

Physical State: ☐ solid ☐ liquid ☒ sludge ☐ other (specify)

Special Handling Instructions (if any): Avoid contact with skin or eyes. Wear protective clothing. Wash thoroughly after handling.,

The waste is described to the best of my ability and it was delivered to a licensed liquid waste hauler (if applicable).

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature]

HAULER OF WASTE (Must be filled by hauler)

Name (print or type): TOM'S SEPTIC TANK SERVICE — Code No.

Business Address: 1128-A MADISON LANE, (Number) (Street) SALINAS, CA 93907 (City)

Telephone Number: (408) 663-3801 Pick Up: 9-22-80 Time: [illegible] am/pm

State Liquid Waste Hauler's Registration No. (if applicable): 384

Job No.: 8653 No. of Loads or Trips: [illegible] 5 Unit No.: [illegible] 8

Vehicle: ☐ vacuum truck 65 barrels, ☐ flatbed, ☐ other (specify)

The described waste was hauled by me to the disposal facility named below and was accepted.

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature]
Signature of authorized agent and title

DISPOSER OF WASTE (Must be filled by disposer)

Name (print or type): — Code No.

Site Address:

The hauler above delivered the described waste to this disposal facility and it was an acceptable material under the terms of RWCQB requirements, State Department of Health regulations, and local restrictions.

Quantity measured at site (if applicable): 15 Tons Per Load State fee (if any): [illegible] Per Ton

Handling Method(s):

☐ recovery

☐ treatment (specify): — Code No.
(Example: incineration, neutralization, precipitation)

☐ disposal (specify): ☐ pond ☐ spreading ☐ landfill ☐ injection well other (specify): — Code No.

If waste is held for disposal elsewhere specify final location:

Disposal Date: 9-23-80

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature]
Signature of authorized agent and title

The site operator shall submit a legible copy of each completed Record to the State Department of Health with monthly fee reports.

Dump. F $25.00 Total $50.00
West H.F $10.00 Per Load #250.00
State F $15.00 Charge

1084

FOR INFORMATION RELATED TO SPILLS OR OTHER EMERGENCIES INVOLVING HAZARDOUS WASTE OR OTHER MATERIALS CALL (800) 424-9300.

CALIFORNIA LIQUID WASTE HAULER RECORD

STATE WATER RESOURCES CONTROL BOARD
STATE DEPARTMENT OF HEALTH

PRODUCER OF WASTE (Must be filled by producer)

Name (print or type): Teledyne McCormick Selph — Code No.

Pick up Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: (408) 637-3731 P.O. or Contract No.: 17361MG

Order Placed By: Maxine Gomez Date: 9/10/80

Type or Process which Produced Wastes: Labs., Chem. Mfg., Swg. Trt., Hydalide — Code No.
(Examples: Metal plating, equipment cleaning, oil drilling, wastewater treatment, pickling bath, petroleum refining)

DESCRIPTION OF WASTE (Must be filled by producer)

Check type of wastes:
1. ☐ Acid solution
2. ☐ Alkaline solution
3. ☐ Pesticides
4. ☐ Paint sludge
5. ☐ Solvent
6. ☐ Tetraethyl lead sludge
7. ☐ Chemical toilet wastes
8. ☐ Tank bottom sediment
9. ☐ Oil
10. ☐ Drilling mud
11. ☐ Contaminated soil and sand
12. ☐ Cannery waste
13. ☐ Latex waste
14. ☐ Mud and water
15. ☐ Brine

☒ Other (Specify) Alkaline Sludge — Code No.

Components:
(Examples: Hydrochloric acid, lime, caustic soda, phenolics, solvents (list), metals (list), organics (list), cyanids)

	Upper	Lower	Concentration: %	ppm
1. See Attached Sheet				
2.				
3.				
4.				
5.				
6.				

Hazardous Properties of Waste: 8 ☐ none ☒ toxic ☐ flammable ☐ corrosive ☐ explosive

Bulk Volume: X 10K(est) ☐ gal ☐ tons ☐ barrels (42 gal) ☐ other (specify)

Containers: 1 (Number) ☐ drums ☐ cartons ☐ bags ☒ other pond (specify)

Physical State: ☐ solid ☐ liquid ☒ sludge ☐ other (specify)

Special Handling Instructions (if any): Avoid contact with skin or eyes. Wear protective clothing. Wash thoroughly after handling.

The waste is described to the best of my ability and it was delivered to a licensed liquid waste hauler (if applicable).

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature]

HAULER OF WASTE (Must be filled by hauler)

Name (print or type): TOM'S SEPTIC TANK SERVICE — Code No.

Business Address: 1128 A MADISON LANE (Number) (Street) SALINAS, CA 93907 (City)

Telephone Number: (408) 663-3601 Pick Up: 9-24-80 Time ☐ am ☐ pm

State Liquid Waste Hauler's Registration No. (if applicable): 384

Job No.: 8653 No. of Loads or Trips: 5 Unit No.: 5

Vehicle: ☒ Vacuum truck 65 barrels, ☐ flatbed, ☐ other (specify)

The described waste was hauled by me to the disposal facility named below and was accepted.

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature] Signature of authorized agent and title

DISPOSER OF WASTE (Must be filled by disposer)

Name (print or type): — Code No.

Site Address

The hauler above delivered the described waste to this disposal facility and it was an acceptable material under the terms of RWCQB requirements, State Department of Health regulations, and local restrictions.

Quantity measured at site (if applicable): 17 tons Per Load State fee (if any): $1.00 Per Ton

Handling Method(s):

☐ recovery

☐ treatment (specify): — Code No.
(Example: incineration, neutralization, precipitation)

☐ disposal (specify): ☒ pond ☐ spreading ☐ landfill ☐ injection well
other (specify): — Code No.

If waste is held for disposal elsewhere specify final location:

Disposal Date: 9-24-80

I certify (or declare) under penalty of perjury that the foregoing is true and correct. [signature] Signature of authorized agent and title

The site operator shall submit a legible copy of each completed Record to the State Department of Health with monthly fee reports.

Dump F $25.00
Wast H.F. $10.00
State F $17.00
Total $285.00
Charge 5 Loads
1051

FOR INFORMATION RELATED TO SPILLS OR OTHER EMERGENCIES INVOLVING HAZARDOUS WASTE OR OTHER MATERIALS CALL ...

Revised December 1974

CALIFORNIA LIQUID WASTE HAULER RECORD

STATE WATER RESO[...] CONTROL BOARD
STATE DEPARTMENT OF HEALTH

PRODUCER OF WASTE (Must be filled by producer)

Name (print or type): Teledyne McCormick Selph — Code No.

Pick up Address: 3601 Union Road (Number) (Street) Hollister (City)

Telephone Number: 408 637-3731 P.O. or Contract No.: 173611MG

Order Placed By: Maxine Gomez Date: 9/10/80

Type or Process which Produced Wastes: Labs., Chem Mfg., Swg. Trt. Undelible — Code No.
(Examples: Metal plating, equipment cleaning, oil drilling, wastewater treatment, pickling bath, petroleum refining)

DESCRIPTION OF WASTE (Must be filled by producer)

Check type of wastes:

1. ☐ Acid solution
2. ☐ Alkaline solution
3. ☐ Pesticides
4. ☐ Paint sludge
5. ☐ Solvent
6. ☐ Tetraethyl lead sludge
7. ☐ Chemical toilet wastes
8. ☐ Tank bottom sediment
9. ☐ Oil
10. ☐ Drilling mud
11. ☐ Contaminated soil and sand
12. ☐ Cannery waste
13. ☐ Latex waste
14. ☐ Mud and water
15. ☐ Brine

☐ Other (Specify) Alkaline Sludge — Code No.

Components:
(Examples: Hydrochloric acid, lime, caustic soda, phenolics, solvents (list), metals (list), organics (list), cyanids)

	Components	Upper	Lower	Concentration: %	ppm
1.	See Attached Sheet				
2.					
3.					
4.					
5.					
6.					

Hazardous Properties of Waste:
ph 9 ☐ none ☒ toxic ☐ flammable ☐ corrosive ☐ explosive

Bulk Volume: 10K (est) ☒ gal ☐ tons ☐ barrels (42 gal) ☐ other (specify)

Containers: 1 (Number) ☐ drums ☐ cartons ☐ bags ☒ other pond (specify)

Physical State: ☐ solid ☐ liquid ☒ sludge ☐ other (specify)

Special Handling Instructions (if any): Avoid contact with skin or eyes. Wear protective clothing. Wash thoroughly after handling.

The waste is described to the best of my ability and it was delivered to a licensed liquid waste hauler (if applicable).

[signature]

HAULER OF WASTE (Must be filled by hauler)

Name (print or type): TOM'S SEPTIC TANK SERVICE — Code No.

Business Address: 1128-A MADISON LANE, SALINAS, CA 93907 (Number) (Street) (City)

Telephone Number: (408) 663-3801 Pick Up: 9-24-80 Time 9:30 ☐ am ☐ pm

State Liquid Waste Hauler's Registration No. (if applicable): 384

Job No.: 0653 No. of Loads or Trips: 5 Unit No.: 5

Vehicle: ☒ vacuum truck 65 barrels, ☐ flatbed, ☐ other (specify)

The described waste was hauled by me to the disposal facility named below and was accepted.

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

[signature] — Signature of authorized agent and title

DISPOSER OF WASTE (Must be filled by disposer)

Name (print or type): — Code No.

Site Address

The hauler above delivered the described waste to this disposal facility and it was an acceptable material under the terms of RWCQB requirements, State Department of Health regulations, and local restrictions.

Quantity measured at site (if applicable): 10 tons State fee (if any): $1.00 per ton

Handling Method(s):

☐ recovery

☐ treatment (specify): — Code No.
(Example: incineration, neutralization, precipitation)

☐ disposal (specify): ☐ pond ☐ spreading ☐ landfill ☐ injection well
other (specify): — Code No.

If waste is held for disposal elsewhere specify final location:

Disposal Date: 9-24-80

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

[signature] — Signature of authorized agent and title

The site operator shall submit a legible copy of each completed Record to the State Department of Health with monthly fee reports.

Dump F $25.00 Total $175.00
Wast H.F $10.00
State F $10.00 Charge 1052

FOR INFORMATION RELATED TO SPILLS OR OTHER EMERGENCIES INVOLVING HAZARDOUS WASTE OR OTHER MATERIALS CALL (800) 421-9300.

[...] Alkaline Liquid [...]

STATE STATE DEPARTMENT OF HEALTH

HAULER NUMBER 802

PRODUCER OF WASTE (Must be filled by producer)

Name (print or type): Teledyne McCormck Selph

Pick up Address: 3601 Union Road (Street) Hollister (City)

Telephone Number: (408) 637-3731 P.O. or Contract No.: 17820AS

Order Placed By: Al Sturgill Date: 10/24/80

Type of Process which Produced Wastes: Plating Shop

(Examples: metal plating, equipment cleaning, oil drilling, wastewater treatment, pickling bath, petroleum refining)

DESCRIPTION OF WASTE (Must be filled by producer)

Check type of wastes:

1. [X] Acid solution
2. [ ] Alkaline solution
3. [ ] Pesticides
4. [ ] Paint sludge
5. [ ] Solvent
6. [ ] Tetraethyl lead sludge
7. [ ] Chemical toilet wastes
8. [ ] Tank bottom sediment
9. [ ] Oil
10. [ ] Drilling mud
11. [ ] Contaminated soil and sand
12. [ ] Cannery waste
13. [ ] Latex waste
14. [ ] Mud and water
15. [ ] Brine/ brine

[ ] Other (Specify):

Components: (Examples: Hydrochloric acid, lime, caustic soda, phenolics, solvents (list), metals (list), organics (list), cyanide).

	Upper	Concentration Lower	%	ppm
1. See Attached Sheet				
2.				
3.				
4.				
5.				
6.				

Hazardous Properties of Wastes: pH 4-7.0 [ ] none [X] toxic [ ] flammable [X] corrosive [ ] explosive

Bulk Volume: 100 [X] gal [ ] tons [ ] barrels (42 gal) [ ] other (specify)

Containers: 7 (Number) [X] drums [ ] cartons [ ] bags [X] other bottles (specify)

Physical State: [ ] solid [X] liquid [ ] sludge [ ] other (specify)

Special Handling Instructions (if any): Wash thoroughly after handling. Protect eyes and skin while ~~handling.~~

The waste is described to the best of my ability and it was delivered to a licensed liquid waste hauler (if applicable).

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

[signature]
Signature of authorized agent and title

HAULER OF WASTE (Must be filled by hauler)

Name (print or type): Teledyne McCormick Selph

Business Address: 3601 Union Road (Street) Hollister (City)

Telephone Number: (408)637-3731 Pick Up: 10/28/80 (Date) Time: 1:00

State Liquid Waste Hauler's Registration No. (if applicable): N/A

Job No.: 35-539 No. of Loads or Trips: 1 Unit No.: 4

Vehicle: [ ] vacuum truck ___ barrels, [ ] ___ [X] other Dump (specify)

The described waste was hauled by me to the disposal facility named below and was accepted.

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

[signature]
Signature of authorized agent and title

DISPOSER OF WASTE (Must be filled by disposer)

Name (print or type):

Site Address:

The hauler above delivered the described waste to this disposal facility and it was an acceptable material under the terms of RWQCB requirements, State Department of Health regulations, and local restrictions.

Quantity measured at site (if applicable): 500 gal State fee (if any): $1.00

Handling Method(s): Pelton

[ ] recovery

[ ] treatment (specify): (Examples: incineration, neutralization, precipitation)

[ ] disposal (specify): [X] pond [ ] spreading [ ] landfill [ ] injection well [ ] other (specify):

If waste is held for disposal elsewhere specify final location:

Disposal Date: 10-28-80

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

[signature]
Signature of authorized agent and title

The site operator shall submit a legible copy of each completed Record to the State Department of Health with monthly fee reports.

Dump. F $25.00 Total $36.00
State. F $1.00
Waste H.F. $10.00 Charge

FOR INFORMATION RELATED TO SPILLS OR OTHER EMERGENCIES INVOLVING HAZARDOUS WASTE OR OTHER MATERIALS CALL (800) 424-8300.

DOT Proper Shipping Name: FERRIC CHLORIDE SOL... ACID LIQUID, NOS

SEE REVERSE SIDES FOR INSTRUCTIONS. PLEASE TYPE OR PRINT CLEARLY. ...S HARD

CALIFORNIA HAZARDOUS WASTE MANIFEST

STATE DEPARTMENT OF HEALTH SERVICES
HAZARDOUS MATERIALS MANAGEMENT SECTION
744 P STREET, SACRAMENTO, CA 95814

MANIFEST NUMBER: 802 № 0000...

GENERATOR (GENERATOR MUST COMPLETE)

NAME: Teledyne McCormick Selph
EPA NO.: CAD009220898
ADDRESS: 3601 Union Road PO Box 6
CITY, STATE, ZIP CODE: Hollister, Calif. 95023
PHONE NO.: (408) 637-3731
ORDER PLACED BY: Cliff Cain — ORDER DATE: 7/23/82
P.O. CONTRACT NO.: 25000CC

DESIGNATED TSD FACILITY

(AUTHORIZED TO OPERATE UNDER AN APPROVED STATE OR FEDERAL PROGRAM)

NAME: John Smith Solid Waste Site
EPA NO.: CAD990665432
ADDRESS: John Smith Road
CITY, STATE, ZIP CODE: Hollister, CA 95023
PHONE NO.: ---

ALTERNATE TSD FACILITY

NAME:
EPA NO.:
ADDRESS:
CITY, STATE, ZIP CODE:
PHONE NO.:

	U.S. DOT PROPER SHIPPING NAME	U.S. DOT HAZARD CLASS	UN NA ID NO	WEIGHT OR VOLUME	UNITS	CONTAINERS NUMBER
Ni	WASTE Hazardous Waste, Liquid, NOS	ORM E	NA9189	100	GAL.	DRUMS / BAGS / CARTONS / DUMP TRUCK
cox	WASTE Acid, Liquid, NOS	Corrosive	NA1760	100	GAL.	TANK TRUCK / X OTHER

WASTE CATEGORY: Plating Sol'n, Acid — EX. HAZ. WASTE PERMIT NO.: N/A — GENERATING PROCESS: Plating

LIST COMPONENTS:

	Component	Conc. Range Upper	Lower	Units
A	Nickel salts (as Ni)	0.5	0.1	X %
B	Sulfuric Acid	0.1	--	X %
C				
D				
E	Iron Salts (as Fe)	2	1	X %
F	Hydrofluoric Acid	0.2	0.1	X %
G	Sulfuric Acid	10	6	X %

NONHAZARDOUS MATERIAL: Remainder

WASTE PROPERTIES: pH 0-4 [X] TOXIC [ ] FLAMMABLE [X] CORROSIVE IRRITANT [ ] REACTIVE [ ] SENSITIZER [ ] CARCINOGEN MUTAGEN

PHYSICAL STATE: [ ] SOLID [X] LIQUID [ ] SLUDGE [ ] SLURRY [ ] GAS [ ] OTHER

SPECIAL HANDLING INSTRUCTIONS: [X] GLOVES [X] GOGGLES [ ] RESPIRATOR [ ] OTHER

GENERATOR CERTIFICATION: THIS IS TO CERTIFY THAT THE ABOVE NAMED MATERIALS ARE PROPERLY CLASSIFIED, DESCRIBED, PACKAGED, MARKED & LABELED, AND ARE IN PROPER CONDITION FOR TRANSPORTATION ACCORDING TO THE APPLICABLE REGULATIONS OF THE DEPARTMENT OF TRANSPORTATION AND THE EPA.

IN THE EVENT OF A SPILL CONTACT THE NATIONAL RESPONSE CENTER, U.S. COAST GUARD 1-800-424-8802.

[signature] — SIGNATURE OF AUTHORIZED AGENT & TITLE — DATE SHIPPED

TRANSPORTER (HAULER MUST COMPLETE)

NAME: Teledyne McCormick Selph
EPA I.D.: CAD009220898
ADDRESS: 3601 Union Road
CITY, STATE, ZIP: Hollister, Calif. 95023
PHONE NO.: (408) 637-3731

JOB NO: N/A
UNIT NO: [illegible]
PICK-UP DATE: [illegible]
TIME: [illegible] AM / PM

[signature] — SIGNATURE OF AUTHORIZED AGENT & TITLE

TSD FACILITY (OPERATOR MUST COMPLETE)

NAME:
EPA NO.:
QUANTITY (IF MEASURED): [illegible]
STATE FEE (IF ANY): $ [illegible]

HANDLING OR DISPOSAL METHOD: [X] SURFACE IMPOUNDMENT [ ] LANDFILL [ ] INJECTION WELL [ ] LAND TREATMENT [ ] TREATMENT (SPECIFY) [ ] RECOVERY OR REUSE [ ] STORAGE TRANSFER

INDICATE ANY SIGNIFICANT DISCREPANCIES BETWEEN MANIFEST AND SHIPMENT:

IF WASTE IS HELD FOR DELIVERY ELSEWHERE, SPECIFY THE DESIGNATED TSD FACILITY

NAME: [illegible]

State of California—Health and Welfare Agency
HAZARDOUS MATERIALS MANAGEMENT SECTION
... P Street
Sacramento, CA 95814

Department of Health Services

UNIFORM HAZARDOUS WASTE MANIFEST

Please print or type with ELITE type (12 characters per inch).

GENERATOR NAME AND MAILING ADDRESS Teledyne McCormick Selph POB 6, Hollister, CA 95023 AREA CODE/PHONE NUMBER 408-637-3731	STATE ID NUMBER 8209673 MANIFEST DOCUMENT NUMBER EPA ID NUMBER CAD009220898	00053
TRANSPORTER NO. 1 Teledyne McCormick Selph	VEH./CONTAINER NO. 1	EPA ID NUMBER CAD009220898
TRANSPORTER NO. 2/ALTERNATE TSD FACILITY		EPA ID NUMBER
TREATMENT, STORAGE, OR DISPOSAL (TSD) FACILITY John Smith Waste Site, City of Hollister Hollister, CA AREA CODE/PHONE NUMBER 408-637-8221		EPA ID NUMBER CAD990665432 ~~CAD000000433~~

PROPER U.S. D.O.T. SHIPPING NAME AND HAZARD CLASS	UN/NA NUMBER	TOTAL QUANTITY	UNIT WT/VOL	CONTAINER NO.	CONTAINER TYPE	WASTE CAT. NO.
Sulfuric Acid, Spent CORROSIVE	UN1832	110	G	2	DM	112

COMPONENTS	CONC. UPPER	RANGE LOWER	UNITS %	UNITS ppm
Sulfuric Acid	5	0	x	

SPECIAL HANDLING INSTRUCTIONS
pH - 0.5
Wear glasses, gloves. Avoid splashing in eyes or on body.

This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the EPA.

PRINTED OR TYPED FULL NAME AND SIGNATURE Patricia Childers (signature) MO. 06 DAY 21 YR. 83

CHECK IF CONTINUATION SHEET IS USED. NUMBER OF CONTINUATION SHEETS ______

TRANSPORTER 1 ACKNOWLEDGEMENT OF RECEIPT OF ABOVE MATERIALS — DATE REC'D & ACCEPTED

PRINTED OR TYPED FULL NAME AND SIGNATURE C.A. Mahoney MO. DAY YR.

TRANSPORTER 2 ACKNOWLEDGEMENT OF RECEIPT OF ABOVE MATERIALS — DATE REC'D & ACCEPTED

PRINTED OR TYPED FULL NAME AND SIGNATURE MO. DAY YR.

DISCREPANCY INDICATION SPACE

Dumping FEE 50.00
CIKSI FEE 15.00
State FEE 2.84 67.84

HAZARDOUS MATERIALS MANAGEMENT SECTION
Sacramento, CA 95814

UNIFORM HAZARDOUS WASTE MANIFEST

Please print or type with ELITE type (12 characters per inch).

STATE ID NUMBER 8209677

GENERATOR NAME AND MAILING ADDRESS
Teledyne McCormick Selph
3601 Union Road POB 6 Hollister, CA 95023
AREA CODE/PHONE NUMBER 408-637-3731

MANIFEST DOCUMENT NUMBER
EPA ID NUMBER CAD009220898 00058

TRANSPORTER NO. 1
Teledyne McCormick Selph
VEH./CONTAINER NO. 1
EPA ID NUMBER CAD009220898

TRANSPORTER NO. 2/ALTERNATE TSD FACILITY
EPA ID NUMBER

TREATMENT, STORAGE, OR DISPOSAL (TSD) FACILITY
John Smith Liquid Site
City of Hollister, CA 95023
AREA CODE/PHONE NUMBER 408-637-8221
EPA ID NUMBER CAD222 990665432

PROPER U.S. D.O.T. SHIPPING NAME AND HAZARD CLASS	UN/NA NUMBER	TOTAL QUANTITY	UNIT WT/VOL	CONTAINER NO.	CONTAINER TYPE	WASTE CAT. NO.
Acid, Liquid, NOS, Waste CORROSIVE	NA1760	85	G	17	DF	111

COMPONENTS	CONC. RANGE UPPER	CONC. RANGE LOWER	UNITS %	UNITS ppm
Chromium (VI)	2	0.5	x	
Hydrochloric Acid	1.5	1.0	x	

SPECIAL HANDLING INSTRUCTIONS
Wear glasses, gloves.

This is to certify that the above-named materials are properly classified, described, packaged, marked and labeled, and are in proper condition for transportation according to the applicable regulations of the Department of Transportation and the EPA.

PRINTED OR TYPED FULL NAME AND SIGNATURE Patricia Childers MO. DAY YR.

☐ CHECK IF CONTINUATION SHEET IS USED. NUMBER OF CONTINUATION SHEETS

TRANSPORTER 1 ACKNOWLEDGEMENT OF RECEIPT OF ABOVE MATERIALS — DATE REC'D & ACCEPTED
PRINTED OR TYPED FULL NAME AND SIGNATURE C.A. Mahoney — MO. 07 DAY 08 YR. 83

TRANSPORTER 2 ACKNOWLEDGEMENT OF RECEIPT OF ABOVE MATERIALS — DATE REC'D & ACCEPTED
PRINTED OR TYPED FULL NAME AND SIGNATURE — MO. DAY YR.

DISCREPANCY INDICATION SPACE
GAL DUMPED 85 DUMP FEE $ 56.00
CLASS I FEE $ 15.00
STATE FEE $ 1.42

Facility owner or operator: Certification of receipt of hazardous material covered by this manifest except as noted in the discrepancy indication space above. Note: TSD facility complete waste number. See instructions. — DATE REC'D & ACCEPTED
PRINTED OR TYPED FULL NAME AND SIGNATURE Mike Lawson — EPA ID NUMBER — MO. 7 DAY 8 YR. 83

TO BE FILLED IN BY THE GENERATOR / TO BE FILLED IN BY TRANSPORTER / FILLED IN BY TSDF

APPENDIX B

NOTES FROM MARCH 25, 1991 MEETING AT TELEDYNE

To: File
Teledyne McCormick Selph

March 26, 1991

From: Karen M. Toth
Associate Hazardous Materials Specialist

Subject: Notes From Meeting with Teledyne on March 25, 1991

Present at the meeting were the following:

Edmond Lynam - Teledyne
Larry Barr - Teledyne
Mike Powell - Teledyne
Karen Toth - Department of Health Services

The purpose of the meeting was to gather information on the Solid Waste Management Units identified by Ecology and Environment in the Preliminary Assessment/Preliminary Review of November 1989.

The following information was discussed in order:

Silver Recovery Vessel
The unit started operation on December 12, 1979. Initially it was used to dissolve silver from explosive wastes into a silver nitrate solution. The explosives were then filtered out and the silver nitrate solution was sold. On November 13, 1984 the process was changed to recover silver powder for sale. The unit is vented to a series of scrubbers. First a venturi scrubber than a packed bed scrubber cleans the off gas.

Tank 5042
This tank was built in 1977 and has an as-built capacity of approximately 10,400 gallons. It held deionized water when it was located at hazardous waste storage area #2. In May 1980 it was moved to the location which is designated as TSU-4 in the Operations Plan where it held DI water until 1982. In 1982 this tank began storing TAG nitrate mother liquor. None of the wastes listed in the PA/PR were ever stored in the tank. It is located in a bermed area which is coated with an epoxy coatuing. The tank is vented through a scrubber. No hazardous wastes were ever stored in this tank. There are no records of releases pertaining to this unit.

Upper Drum Storage Area
This unit is actually where the bulk chemical storage area is. The location marked on the map in the PA/PR is a boiler room. The dimensions of this unit are 77'(northside), 60'(westside), 75'(southside), and 75'(eastside). The containment slopes to the southeast corner. Apurchase requisition for the dike is dated April 24, 1987 and describes the dike as cement with vertical and horizantal rebar sealed to the pad with epoxy. There is a slope driveway on the eastside. The 1988 inspection by DHSD cited Teledyne for greater than 90-day storage of flammable liquids with

explosive solids. This would have been methanol, acetone, and tetrahydrofuran. The area stored an average of 7 drums with a maximum of 30. There have been no releases at this location.

Hazardous Waste Storage Area #1

This storage area was also known as the N2O4 dike. It currently contains Tank 794 and Tank 796. In January 1982 Tanks 57683 and 57684 were fabricated and placed in this area. These were two black poly-tanks with a maximum capacity of 6,450 gallons. Tank 57683 initially held a solution of 15-20% sulfuric acid, 5-10% hydrochloric acid, 2% fluorinated aromatic organic compounds, and 68-78% water. In November 1983 it began to store a solution of 10-20% THF, 5-10% methanol, 5-10% acetone, 2-5% explosives waste by-products, and 56-73% water. In 1985 Tank 57683 developed a pinhole leak and was cleaned and removed to another location. In December 1986 Tank 796 was moved into the unit. This is a 6,000 gallon stainless steel tank. It was originally located at the thermal oxidizer facility where it stored make-up water. The area is bermed with a capacity of 14,000 gallons. It was coated in April 1988. There have been no releases from this unit. Teledyne provided a copy of a closure report for Tank 57683.

Hazardous Waste Storage Area #2

This unit was also part of the storage past the 90-day limit discovered in the 1988 inspection. At that time there was an issue as to whether the material was a waste or an intermediate product. This is the original location of Tank 5042 when it held DI water. The unit is made up of two cement dikes which are 29 feet wide by 49 feet long. It is surrounded by a one foot wall with a forklift access ramp which is about 1/2 foot in height.

UDMH Storage Area

This was a product storage area. It was first used in 1977. In 1978-79 it was certified closed by the Airforce. It has dimension of 40' by 22' and is 4' high. Only two products were ever stored in this area. There are two horizantal tanks, T1107 and T1108, which each have a capacity of 13,000 gallons. No hazardous waste was ever stored in this unit and ther have been no releases.

Hazardous Waste Storage Area #3

This unit is described in the current operations plan as TSU-4. It began operation in August of 1983 and is coated. The wastes handled in this unit are described in the operations plan, Chapter 3, Table 2. There have been no releases from this unit.

Hazardous Waste Storage Area #4

This is the current drum storage area. It began operation in August 1983. The wastes handled in this unit are described in the operations plan, Chapter 3, Table 1. There have been no releases from this unit.

Thermal Oxidizer

THis unit was closed under the supervision of Phillip Ashbaugh of the US Air Force in 1979. The closure report is missing but Ed an

Larry remember that air sampling and gas chromatography was done as part of the closure. There were no releases from this unit.

Plating Waste Tank
The PA/PR has the wrong location. It began operation in approx. 1972 and went through closure in 1985. Teledyne provided copies of the records regarding the sludge disposal at the John Smith Road site in Hollister.

Industrial Wastewater Screening Tank
This two part tank is used for screening watsewater to check for hazardous waste before it is discharged on the spray field. The two compartment are 6,000 and 9,000 gallons and the wastewater flows from one into the other like a clarifier. No waste has been processed in this unit. Once the pH was 5.4 and it was adjusted prior to discharge. The unit began operation between january and February of 1986.

Spray Field
This unit began operation in 1969. All wastewater is screened prior to entering this unit (See industrial wastewater screening tank). The 1986 site characterization found no contamination.

Surface Impoundment
This unit operated between 1985 and 1988. It is designated as TSU-8 in the current part B. It was a double lined, poly liner over concrete, diked area which was used to evaporate water from water explosive mixtures. The settlement discusses this unit. There were no releases from this unit.

Old Burn Area
The site characterization fosampled and found no contamination. Procedures included the burning of liquid and solids together as described in the 1983 Part B Application. The unit began operating in 1971 and was closed by a landslide in April 1983. There were no releases.

Lake Teledyne
This unit started operations in approximately 1976. There are no records of hazardous wastes being discharged to this unit and the 1985 site characterization found no contamination.

Surface Impoundment #1
This unit started in approx. 1972. The sludge was disposed of at the John Smith Road facility (see the copies of the hauler records).

Surface Impoundment #2
This unit was built when Teledyne moved in aroun 1969. The last disposal of sludge was made in 1986 when the unit was closed. The sludge was disposed of at the John Smith Road facility (see the copies of the hauler records).

Container Storage Area
This unit can not be located based on the PA/PR. Think that it is actually hazardous waste storage area #4.

Waste Solvent Open Burn
The start-up date was January 1987. The location and unit are described in the current Part B. The quantities and characteristics of the waste are described in the screening risk assessment. There have been no releases from this unit.

Hazardous waste Treatment area #5
This referes to the solvent open burn unit described above.

Burn Pit
This unit began operations in August 1986. The wastes handled are described in the screening risk assessment. Release controls are described in the Part B. There is no history of releases from this unit.

At the end of the meeting we discussed the Closure plans for Tanks 796 and 794 and Teledyne provided a draft of the closure work plan.

We also discussed the mailing list and who to talk with at the Chamber of Commerce.

APPENDIX C

CLOSURE REPORT FOR TANK 57683

TELEDYNE McCORMICK SELPH

CLOSURE REPORT

TSDU - 4

FOR TANK 57683 ONLY

EPA FACILITY ID NUMBER: CAD009220898

OWNER AND OPERATOR: Teledyne McCormick Selph
P.O. Box 6
Hollister, CA 95024-0006

TELEPHONE NUMBER: (408) 637-3731

FACILITY ADDRESS: 3601 Union Road
Hollister, CA 95023

I. FACILITY CONDITIONS:

Tank #57693 was purchased on 3/13/81. It is a 6,450 gallon black polyethylene tank of extra heavy wall construction. It was initially used to store hazardous process waste with the following characteristics.

* Solution of 15-20% H_2SO_4
* 5-10% HCl, 2% max. Flourinated
* Aromatic Organics
* Inorganic Salt Solutions (i.e., Na_2SO_4, K_2SO_4, Carbonates, Nitrates, Ferrous Sulfate)
* Inorganic Base Solutions up to 30% (i.e., NaOH, KOH)
* Inorganic Acid Solutions up to 35% (i.e., HNO_3, H_2SO_4, HCl)
* Solvents (in Aqueous Solutions) (i.e., Acetone, Ethanol, IPA, MEK, Methanol, Acetophenone)

In late 1983, tank T-57683 was used to store process waste from the production of Hexanitrostilbene (HNS-I). This aqueous waste stream contained tetrahydrofuran, methanol, sodium hypochlorite (very dilute), acetone, dimethylformamide and the associated products and by-products typical of the Shipp process for the manufacture of HNS-I.

The by-products of the Shipp process include:

1. 2,4,6-trinitrobenzyl alcohol ($PiCH_2OH$)

2. 2,4,6-trinitrobenzene (TNB)

3. Picric acid (PiOH)

4. 2,4,6-trinitrotoluene (TNT)

5. Chloropicrin

6. 4,6-dinitroanthranil (ANIL)

7. 2,2',4,4',6,6'-hexanitrostilbene (HNS)

8. 2,2',4,4',6,6'-hexanitrobibenzyl (HNBiB)

9. 2,4,6-trinitrobenzyl chloride ($PiCH_2Cl$)

10. 2,4,6-trinitrobenzaldehyde (PiCHO)

11. 2,4,6-trinitrobenzoic acid (PiCOOH)

12. Picryl chloride (PiCl)

13. Trichloronitromethane

TABLE 1

TYPICAL HNS-I WASTE STREAM

Constituent	Quantity in lbs.	Percent by Weight
H_2O	5,000	62.6
THF	1,476	18.5
MeOH	659	8.3
Acetone	330	4.1
Dimethylformamide	393	4.9
Organics (HNS-I by-products)	126	1.6
Total	7,984	

This waste material was stored in tank 57683 until February 1985.

The tank remained idle in TSDU-4 from February 1985 through December 1985.

II. REMOVAL INVENTORY OF HAZARDOUS WASTES:

In February 1985, the tank developed a pin hole leak in the side wall. The tank was immediately drained to a level below the hole in the wall of the tank. The liquid that was drained was then neutralized to a pH in the range of 7-8 with potassium carbonate. The aqueous layer was then heated to reflux and the inherent solvents were distilled off and collected in drums.

The remaining liquid in T-57683 was drained off in 1500 gallon increments and the above procedure was repeated until the tank had been totally emptied.

All the solvents collected in this operation were saved for use in dissolving the residual tars left in the bottom of T-57683. The water heels from the distillation operation were transferred to the E&IH department for disposal. Disposal was through burning in TSDU-2.

III. DECONTAMINATION OF THE UNIT:

The collected solvents were used to dissolve the tars left as residuals after the tank had been emptied. After each rinsing step the solvents were then pumped back out of the tank into drums. A gas chromatograph analysis was run on the contents of each drum as it was filled with the rinsings of the tank. The rinsing continued until nothing but clean solvent was being removed from the tank as depicted by a gas chromatographic analysis. All of the drums were then sealed and sent to the E&IH department for disposal. Disposal was by burning in TSDU-2.

The tank was then thoroughly washed on the inside with Ajax cleanser and scrubbed with Scotch-Brite scouring pads. A minimum amount of water was used to wash and rinse the tank walls and bottom. This wash water was then identified and drummed before it was sent to the E&IH department for disposal by burning in TDSU-2.

The pin hole leak was repaired using a standard plug patch. The leak was drilled out and a teflon coated plug was inserted and bolted in place.

The tank was then filled with "Reverse Osmosis" water to test for leaks. No leaks were detected. This water was used as process water until the tank was once again totally emptied.

This tank remained idle until December 1985. At this time, the tank was removed from TSDU-4 to make it available for other purposes.

IV. POST-CLOSURE MAINTENANCE AND MONITORING:

No post-closure maintenance and monitoring is required as the tank is clean and was removed from TSDU -4. It was subsequently renumbered and used to store production intermediates, by products and mother liquors.

V. SCHEDULE OF EVENTS TO BE COMPLETED:

None.

==

CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

TELEDYNE McCORMICK SELPH

Edmond O. Lynam
Director, Support Services

29 September 1989

APPENDIX D

CLEAN CLOSURE WORK PLAN FOR TSDU-5

CLEAN CLOSURE WORK PLAN FOR TSDU-5

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INTRODUCTION:

A modified hazardous waste Facility partial closure work plan has been prepared by Teledyne McCormick Selph (TMS) in accordance with Title 40, Code of Federal Regulations (CFR 40); and section 67210-67219 of the California Code of Regulations, Title 22 division 4, Chapter 30 (Title 22). This plan shall be the approved plan which TMS must implement to properly close TMS's Hazardous Waste Facility, TSDU-5.

Once closure activities are initiated, no hazardous waste will be stored in TSDU-5. All material stored in TSDU-5 will be transferred to another HW Unit (TSDU-4), and the residues and rinsate waters generated from cleaning activities at TSDU-5 will be processed for future manufacturing activities. There will be no need for post Closure maintenance, since no material will be disposed or treated on site and there is no record of spills at the unit. Upon completion of closure activities, a California Licensed Engineer will submit to the DOHS a certificate of clean closure.

This Closure Plan has been prepared for the TMS facility located at 3601 Union Road in Hollister California in the County of San Benito. The plan outlines the steps that will be taken by TMS to safely and efficiently close TSDU-5 and to preclude the release of the existing material contained in the unit to the environment at the time of closure.

As of March 1, 1991 it is anticipated that the remaining TSD units located at the TMS facility will remain in operation indefinitely.

PURPOSE:

TMS has reviewed their current and future manufacturing plans, and has decided that this unit, TSDU-5, will not receive hazardous waste (HW) in the future. TMS under the auspices of, the approved DOHS Closure plan Referenced in the 1989 Operations Plan is submitting this Work Plan for the closure of a single permitted HW management unit, TSDU-5.

FACILITY DESCRIPTION:

TMS is a wholly owned subsidiary of Teledyne, Inc. The company is engaged in the production of explosive ordnance items and materials, and small volume specialty chemical manufacture.

Ordnance operations include research, engineering and manufacturing facilities designed to support research, development, and volume production of explosively actuated systems and components.

'he chemical Manufacturing activity is job lot production of nitrogen based chemicals for agriculture, pharmaceutical, and industrial applications, and explosive and pyrotechnic compounds

HW treatment systems onsite include both dedicated HW units and chemical operations facilities that are occasionally used. Dedicated HW units TSDU-1 and TSDU-2 are provided for burning explosive contaminated solvents and destruction of solid explosive waste, respectively. TSDU-3 is used to store HW for more than 90 days. TSDU-4 and TSDU-5 are stationary storage units, TSDU-4 is used for the storage of dilute sulfuric acid and storage of non HW material such as; virgin chemicals, chemical intermediates, and chemical product. TSDU-5 will be described in the next section. TSDU-6 is a precious metal recovery unit recovering silver from silver encased explosive devices.

A site map showing the facility and its TSDUs is shown in Figure 1.

DESCRIPTION OF WASTE MANAGEMENT UNIT TO BE CLOSED:

TSDU-5 consists of two above ground storage tanks and ancillary equipment including a secondary containment surrounding the two tanks. The unit is located on the north eastern portion of the facility (figure 2).

The two above ground storage tanks, T-794 and T-796 located at TSDU-5 are regulated under the 1981 Interim Status Document and the TMS 1989 Closure Plan for Permitted facilities, respectively. The tanks were permitted to store explosive contaminated organic solvent from explosive manufacturing and blending operations. However, T-796 has never stored HW and T-794 has not stored HW since March of 1985. The following is a brief description and history of T-796 and T-794.

T-796 was fabricated by the Aaron Equipment Company, the manufactures nameplate affixed to the vessel does not indicate the year the tank was constructed. The tank is constructed of stainless steel and has dimensions of 96"x 192". The tank has a maximum vertical capacity of 6,000 gallons.

Prior to T-796 being installed at its present site the tank was located at another location at TMS and was used to store make up reverse osmosis water for support of an evaporative cooler. On December 10, 1986 the tank was moved to its present location for the purpose of storing Triaminoguanidine Nitrate (TAGN) Mother Liquor, an intermediate chemical used in manufacturing of explosive materials.

On April 21, 1989, it was noted during the daily inspection of the facility that T-796 was "sweating" and leaving evaporative stains on the outer wall of the tank. The tank was removed from service. Upon further inspection of the tank, very small pin holes were detected along the bottom weld seam of the tank. Corrective action was immediately implemented by sealing the seam with an epoxy based patch. There was no release of the intermediate chemical to the secondary containment due to the pin holes. On April 24, 1989 The tank was subsequently drained and its contents were transferred to tank, T-5042 located in TSDU-4.

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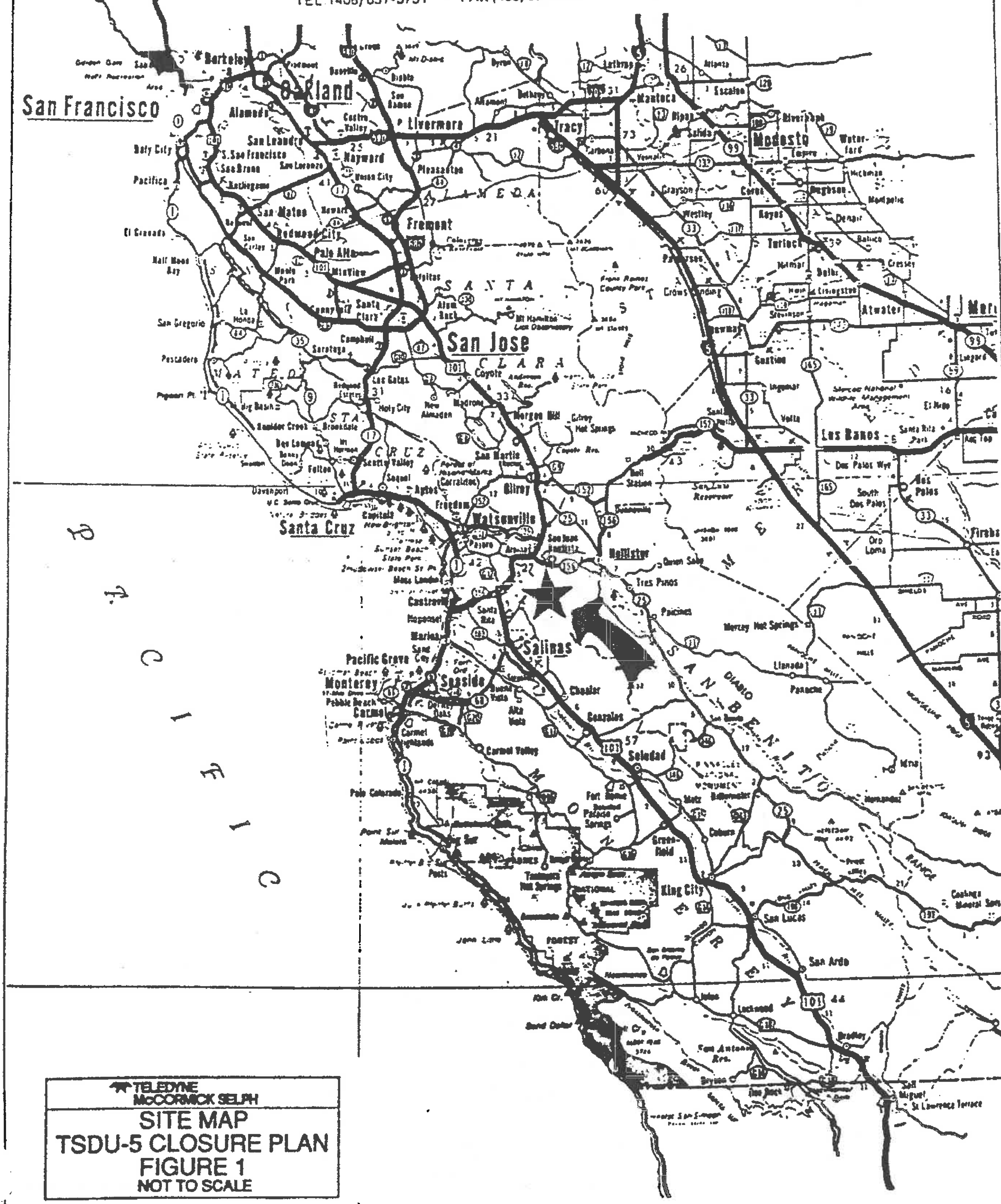
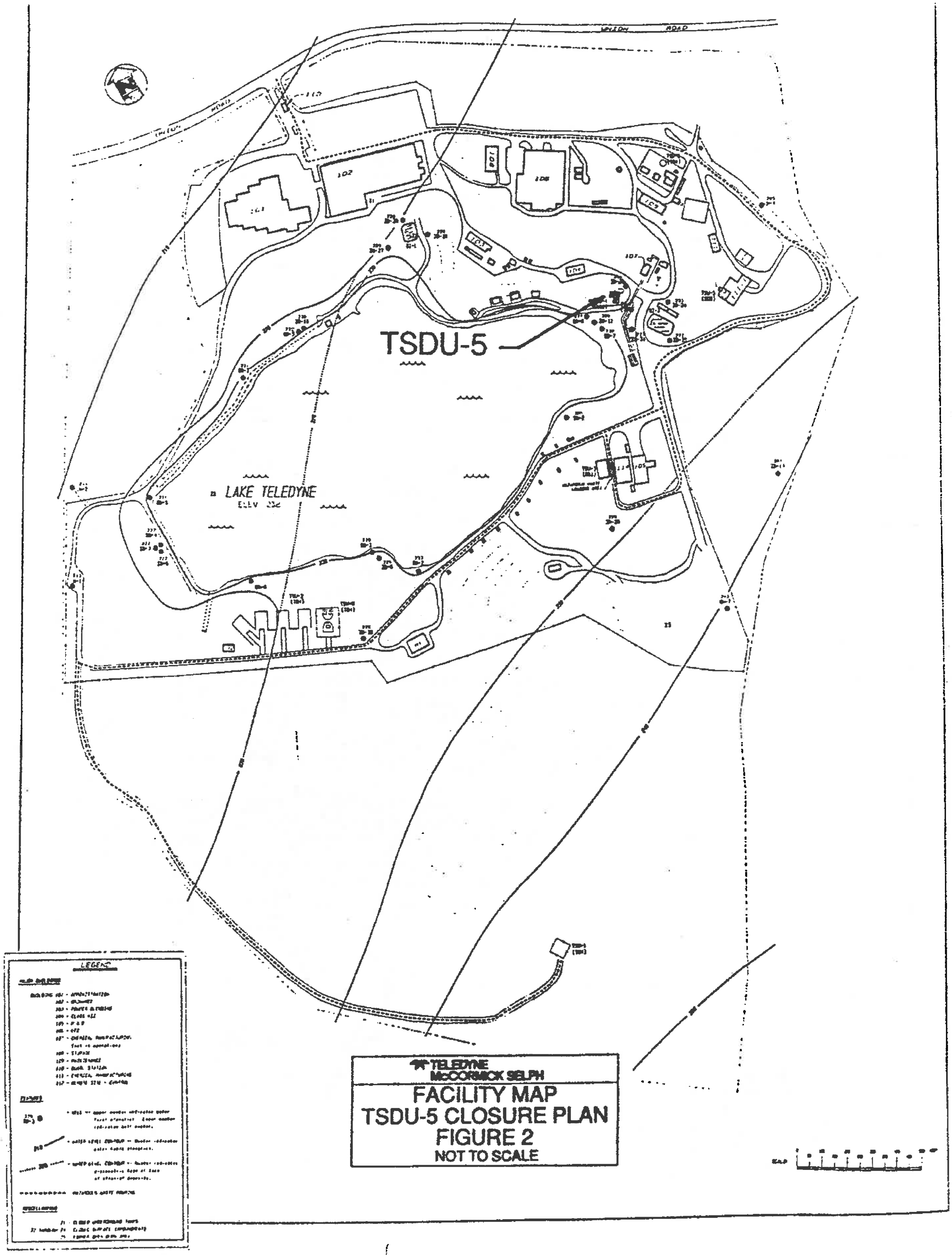


TELEDYNE McCORMICK SELPH

SITE MAP
TSDU-5 CLOSURE PLAN
FIGURE 1
NOT TO SCALE



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FACILITY MAP
TSDU-5 CLOSURE PLAN
FIGURE 2
NOT TO SCALE

Once T-796 was completely drained, it was decontaminated by triple rinsing the interior of the tank, the rinsate water was collected and combined with the contents of T-5042. T-796 was then allowed to dry and on July 29, 1989 a confined space entry permit was obtained for entry into the tank. The tank walls were then washed with soap and water, scoured and then rinsed. Once the tank was allowed to dry the stress cracks along the seam of the tank were welded. It was determined by TMS that the failure of the tank weld seam was a result of moving operations of the tank on December 18, 1986, not a result of chemical corrosion.

After completing the repairs to T-796, it was tested for leaks by filling the tank with water. The tank passed the water test and has sat idle in a clean, ready for use state up to the present.

Tank, T-794 was fabricated by Polycal Plastics in 1981 and purchased by TMS on March 13, 1981. The tank is constructed of a high density crossed linked polyethylene material and has a 6,450 gallon vertical capacity.

From January 1982 to April 1982, T-794 was put into operation to store the following aqueous hazardous waste; sulfuric acid, hydrochloric acid and fluorinated aromatic organic compounds. In November 1983 to December 5, 1985, T-794 was used to store Tetrahydrofuran (THF) which was used in the manufacture of Hexanitrostilbene (HNS). During May of 1985, the tank was emptied and the HW was containerized for solvent recovery and treatment.

The recovered solvents were then reintroduced into T-794 for use in dissolving the residual tars left in the bottom of the tank and pumped back into drums. This process of rinsing the tank with solvent and then treating the solvent was continued until the solvent being flushed through the tank appeared clean and was verified as being such by analyzing the solvent with a gas chromatographic analysis. All the HW containers were sealed and relinquished to the Environmental and Industrial Health department for treatment by burning at TSDU-2

The interior of T-794 was then thoroughly washed with a commercial cleaner and scrubbed with scouring pads. The tank was then rinsed with pressurized water. The rinsate water was drummed and labeled as HW, and sent to the E&IH department for treatment.

Since December 31, 1986 to February 28, 1991, T-794 has been used to store the intermediate chemical TACN Mother Liquor.

Ancillary Equipment for both T-796 and T-794 include stainless steel and PVC piping, the feed systems are pumped and gravity feed with manual valve cutoff systems. Since all transfer of liquid through the facility is accomplished with manually controlled pumps and support equipment and under supervision, an overflow has never occurred

Both tanks are constructed on a reinforced concrete slab. The slab is enclosed by a concrete block containment berm or wall with a solvent resistant polyurethane coating to create a secondary containment area to prevent a spill from impacting the surrounding environment. The dimensions of the secondary containment are 25'x 30'x 32". The basic design parameters of TSDU-5 in plan view are provided in Figure 3.

Both tanks T-794 and T-796 will remain in place for future storage of virgin chemicals, intermediates, and or chemical products.

DECONTAMINATION PROCEDURES:

Once it was determined by TMS that the contents of T-794 would no longer be used in manufacture operations the tank was drained and then decontaminated following normal operating procedures. The procedures followed are outlined in Attachment A. and summarized below.

On February 19, 1991 the contents of T-794 were pumped from the tank and transferred to T-5042 located at TSDU-4. Once the tank was free of liquid a residual layer of TACN crystals were dissolved in a solution of heated deionized water. The TACN, deionized water solution was then pumped out and combined with the rest of the TACN Mother Liquor in T-5042. T-794 was then triple rinsed with pressurized water. The rinsewater generated during triple rinsing was collected and added to T-5042 for reclamation of the TACN. T-794 was then allowed to air dry. Once the tank had dried an environmental technician probed the tank with an LEL Meter to scan for percent oxygen concentration and lower explosive limit. Once permissible levels had been achieved, by monitoring, a permit to enter the tank was approved and the inside of the tank was cleaned with a commercial cleaner and scrubbed with scouring pads. The rinsate from these activities was then collected and transferred to T-5042. The interior walls of T-794 were then allowed to air dry. Once the walls were completely dried the manway was closed and the tank was labeled with NFPA labels describing the tank cleaned and dry.

T-796 has remained empty since April 24, 1989, the decontamination of the tank followed the above operation procedures for decommissioning of a storage tank no longer needed for storage of chemical intermediates, virgin chemicals or manufactured chemicals.

REMOVAL OF WASTE AND EQUIPMENT:

Both tanks T-704 and T-706 and their ancillary equipment will remain in place for future storage of chemical raw materials, intermediates, and/or chemical products. Since there are no HW presently stored in this unit and all rinsate water will be processed into TACN there will be no anticipated waste generated from the closure of TSDU-5.

ANALYTICAL ANALYSIS:

The analytical analysis for this closure plan is designed to provide data that will be used to verify that clean closure has occurred at TSDU-5. To accomplish this TMS has researched the HW that have been stored in the tanks and has determined that the only tank at TSDU-5 that has stored HW was T-704. The following is a summary of those compounds.

15-20% sulfuric acid (1982)
5-10% Hydrochloric acid (1982)
0- 2% fluorinated aromatic compounds (1982)
tetrahydrofuran (1983-1985)
methanol (1983-1985)

To Analyze for this constituents, verification wipe samples will be taken and will be analyzed for Volatile Organics using EPA Method 8240 and pH using EPA Method 9040.

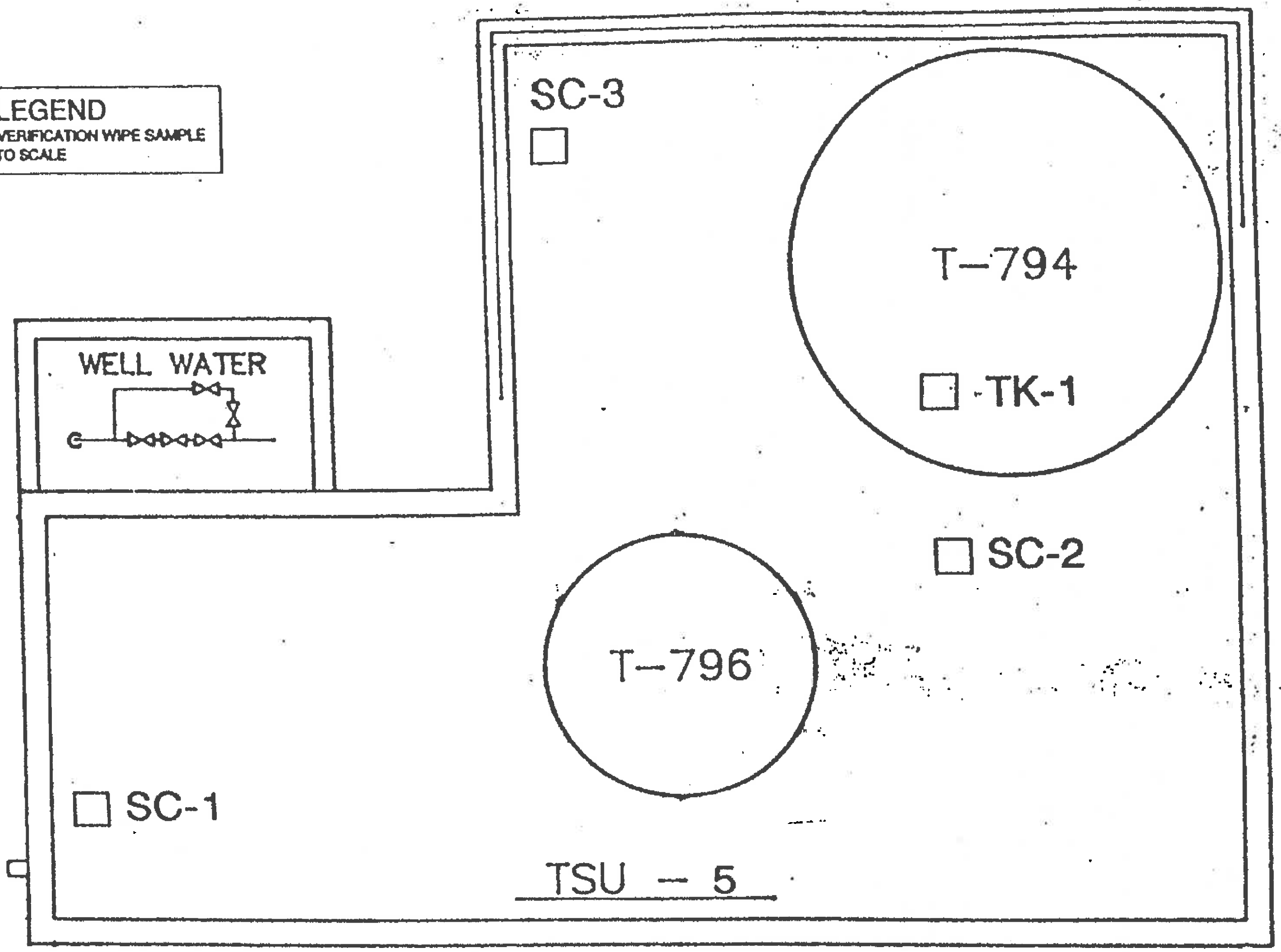
SAMPLING PLAN:

Once decontamination of TSDU-5 is complete TMS will collect a total of four wipe samples from the secondary containment area and the interior walls of T-704. These samples will be collected with the procedures outlined in USEPA Superfund Field Operation Methods, 1987.

Using a clean impervious disposable glove a qualified technician will remove a cheese cloth moistened with deionized water from a laboratory supplied container. Deionized water is the sampling media that will be used because this media can be used in laboratory preparation of the wipe samples without interfering with the laboratory analysis. For analysis, the cheese cloth (2.5cm x 2.5cm) will be used to thoroughly wipe an approximately 10cm x 10cm sampling area. The cheese cloth will then be folded with the exposed side in, and placed in a clean laboratory supplied glass jar. Figure 3 is presented for the proposed location for verification wipe sampling at TSDU-5.

LEGEND

☐ - SC-2 VERIFICATION WIPE SAMPLE
- NOT TO SCALE



TELEDYNE McCORMICK SELPH

TSDU-5 SITE & SAMPLING LOCATION FIGURE 3

NOT TO SCA

The verification wipe sample (TK-1) will be taken from the interior wall of T-704. The sample will be analyzed for the purpose of confirming that the tank has been properly decontaminated. If the sample analysis results indicate chemical residue is still present the tank will be decontaminated again and analytical testing will be repeated. If the results from testing are below threshold levels, T-704 will be considered decontaminated and no further action will be necessary. As stated earlier T-706 has never stored HW, therefore the tank can be safely closed in its current state without further cleaning or testing.

The location of sample SC-1 is chosen because it is the low point in the secondary containment area. In the unlikely event that there was ever a leak or spill associated with TSDU-5 the contents would have collected at that location.

The sample protocol will require that SC-1 be sampled first. If sample SC-1 is below acceptable levels the containment area will be considered decontaminated for closure and no further field action necessary. If SC-1 is above action levels for the waste compounds, the remaining samples will also be analyzed. If only SC-1 is above acceptable levels only that portion of the containment area will be decontaminated. If any of the additional samples are above action levels the entire secondary containment area will be decontaminated and analytical testing procedure repeated.

All samples collected will be placed in clean laboratory supplied containers. A label will be affixed to the sample stating the type of preservative used, TSDU name and location of where the sample was taken, the sample number, date, time sample was obtained, person taking the sample, and the analysis to be performed by the laboratory.

All samples will be packaged carefully to avoid breakage or contamination, and will be transported to the state certified analytical laboratory within 24 hours of collection. The samples will be kept in a chilled state until samples are relinquished to the lab.

CHAIN OF CUSTODY:

A chain of custody record of the samples collected will follow the samples to allow the tracing of possession and handling of samples from the field collection through laboratory analysis.

NOTICE OF CLEAN CLOSURE:

Upon completion of closure, TMS will submit to DOHS, certification, both by themselves and by an independent registered engineer, that the partial closure of the TSDU-5 facility has been closed in accordance with the specifications in this approved modified closure plan.

TMS will certify that activities performed in closing the facility are in accordance with the specifications of the modified closure plan approved by DOHS. By signing the certification, TMS is not guaranteeing technical adequacy of closure, but rather that the plan was implemented.

An independent registered professional engineer must certify that the HW facility has been closed in accordance with the approved modified closure plan. The engineer will be certifying the adequacy of the activities and the plan. He is also certifying that, in his judgement, the activities performed were in accordance with the specifications in the modified plan.

SCHEDULE:

The following closure schedule will apply for the HW unit TSDU-5

Notify DOHS at least 180 days in advance of expected closure.

Week 1: Receive last collection of the intermediate chemical, TACN mother liquor from chemical manufacturing. Ensure that Emergency Coordinator and Environmental Manager will be available to oversee and monitor HW unit closure activities. (This activity has been completed, February 22, 1991.)

Weeks 2-4 Pump TACN stored in T-704 into T-5042 located at TSDU-4. (This activity has been completed as of February 28,1991.)

Weeks 4-12: Rinse and pressure wash all pipes, equipment and surfaces. Transport and pump rinse water generated from decontamination of TSDU-5 to T-5042 for processing TACN to manufacturing grade.

Weeks 5-12: Have preliminary inspection by Environmental Manager to determine if samples should be taken.

Weeks 6-25: Collect and analyze wipe samples for confirmation of decontamination.

Week 25: Final inspection by an independent Engineer and environmental manager and the filling of appropriate closure documents with the DOHS.

ATTACHMENT A

TELEDYNE McCORMICK SELPH

M E M O R A N D U M

MARCH 15, 1991

TO: Ed Lynam

FROM: Larry Barr

SUBJECT: T-794 CLOSURE: MATERIAL TRANSFER AND CLEAN OUT

RECEIVED
MAR 18 1991
TELEDYNE McCORMICK SELPH
SUPPORT SERVICES

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Per your memo to me dated 30 October 1990, and our subsequent conversations, we have transferred the TAGN mother liquor from T-794 to T-5042. Once the storage tank was drained of all the free standing liquid, the interior of the tank was thoroughly cleaned using the following outlined procedure:

1. The contents of T-794 were transferred to T-5042. The work started on 2-19-91 and was completed on 2-22-91. The contents of T-794 were pumped into 200 gallon polyethylene tote tanks, using an M-4 Wilden Pump for the transfer up the hill to the T-5042 loading station.

2. Once the free liquid had been removed, a layer of TAGN crystals were found on the bottom of T-794. At this point approximately 130 gallons of deionized water was heated to 50°C and pumped into T-794. The TAGN readily dissolved into the water and the solution was then pumped out of T-794 and combined with the rest of the contents of TAGN Mother Liquor in T-5042.

3. The interior walls of T-794 were rinsed thoroughly with a minimum amount of deionized water and the rinsate was then pumped back out of T-794. The tank was rinsed three times following this procedure and the combined rinsate was transferred to T-5042.

4. A confined space entry permit was obtained to enter T-794 for the next phase in cleaning this storage tank on 25 February 91. The interior walls of this tank were scrubbed with Scotch Brite scouring pads and Ajax cleanser. The walls were scoured using only a minimum amount of water.

5. The storage tank walls were then rinsed with a minimum amount of fresh water. This water was pumped out and combined with the TAGN Mother Liquor in T-5042. A total of three rinsing following this procedure were completed.

6. The clean interior walls of T-794 were then allowed to air dry. Once the walls were completely dried, the 18" manway was closed and the tank was labeled with NFPA labels describing the storage tank clean and dry.

Should you require any further information regarding the transfer and clean out, please feel free to contact me.

LB/bjb

cc: Dick Glover
Mike Powell
T-794 - History File

MEMO:LB066.WR1

APPENDIX E

AGREED SETTLEMENT AND ORDER

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ENDORSED
FILED
San Francisco County Superior Court

NOV - 9 1989

DONALD W. DICKINSON, Clerk
BY: S. DOUGLAS
Deputy Clerk

SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF SAN FRANCISCO

PEOPLE OF THE STATE OF CALIFORNIA, ex rel Kenneth W. Kizer, Director, State Department of Health Services,

Plaintiffs,

v.

TELEDYNE-McCORMICK-SELPH, a division of TELEDYNE INDUSTRIES, INC., a California Corporation, and DOES 1-10,

Defendants.

No. 912599

AGREED SETTLEMENT AND ORDER

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1. Introduction.

On September __, 1989, the People of the State of California, ex rel. Kenneth W. Kizer, Director, State Department of Health Services ("Department"), filed a complaint in the San Francisco County Superior Court, against Teledyne-McCormick-Selph, a division of Teledyne Industries, Inc., ("Teledyne") as a generator of hazardous waste and the operator of a hazardous waste facility ("facility") located at 3601 Union Road, Hollister, California. The Department and Teledyne now settle that action on the terms set forth in this Agreed Settlement and Order (hereafter "Agreement.")

2. Complaint.

The complaint in this action (attached as Exhibit A, and hereafter "Complaint") alleges that Teledyne violated provisions of the Hazardous Waste Control Act (HWCA), Health and Safety Code sections 25100 et seq., HWCA regulations (California Code of Regulations, Title 22, hereafter "Title 22"), its interim status document ("ISD") number CAD 009220898, and its Hazardous Waste Facility Permit ("permit") with respect to Teledyne's hazardous waste operations at the facility in Hollister.

3. Jurisdiction.

The Department and Teledyne agree that the San Francisco County Superior Court has subject matter jurisdiction over the matters alleged in this action and personal jurisdiction over the parties to this Agreement.

4. Settlement of Disputed Claims.

The parties enter into this Agreement pursuant to a compromise and settlement of disputed claims set forth in the attached Complaint for the purpose of furthering the public interest. For the purpose of this Agreement, Teledyne admits none of the allegations of the Complaint. Nothing in this Agreement shall be construed as an admission by Teledyne of any violation of law or of any issue of law or fact, nor shall anything in the Agreement prejudice, waive, or impair any right, remedy, or defense Teledyne may have in any other or further legal proceeding. This paragraph shall have no effect upon any of the obligations, responsibilities, and duties of Teledyne under this Agreement.

5. BASIC SETTLEMENT.

Teledyne agrees to settle this case for $180,000, to be paid as follows:

(a) Within ten days of entry of this agreement, Teledyne shall pay civil penalties to the Department in the amount of One Hundred Thousand Dollars ($100,000.)

(b) Teledyne will also pay San Benito High School Eighty Thousand Dollars ($80,000) to fund a multidisciplinary environmental education program for San Benito High School as described in Exhibit B, attached hereto and incorporated herein by reference as if fully set forth.

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6. Compliance Schedule

a. Teledyne has submitted evidence that it has met all of the following requirements, which are made a part of this Agreement and Order, which the Department will review under the procedures described in paragraph 6. b. of this Agreement and Order:

(1) Post warning signs on its perimeter fencing, auxiliary entrances, and hazardous waste storage areas;

(2) Maintain tank 796 so as to prevent leakage;

(3) Repair and maintain berms around the facility's tanks and storage area so as to minimize the possibility of a hazardous release to the environment;

(4) Dispose of all hazardous waste with an accumulation date prior to one year before the date of this Agreement, and not store any hazardous waste for more than one year without written approval from the Department to store such waste;

(5) Place and maintain internationally recognized hazard identification system placards developed by the National Fire Prevention Association on all hazardous waste treatment and storage tanks at the facility;

(6) Maintain adequate aisle space in all hazardous waste storage areas of the facility

sufficient to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment in an emergency;

(7) Store hazardous waste in containers which are in good condition and do not leak and transfer hazardous waste in any leaking or deteriorated containers to containers in good condition which do not leak;

(8) Clearly and accurately label all hazardous waste drums, including dates of accumulation, generator name and address, composition of waste, the words "hazardous waste", and all other information required by section 66508 of Title 22 and Paragraph IV 2(c)(4)(i-v) of its permit;

(9) Separate all containers storing incompatible hazardous wastes or residues in its drum storage areas as required under section 67247(c) of Title 22 and Paragraphs IV 2(b), 2(c)(5) and III 10(d) of its permit;

(10) Repair and maintain eyewash and emergency shc wer facilities in good condition near all ha: rdous waste tanks, and maintain emergency con nication capability in the area of all haz dous waste tanks at the facility;

(11) Mai ain the following documents:

a) a written job description, job title, and names of those persons filling positions that relate to hazardous waste management;

b) a written description of the type and amount of introductory and continuing training that will be given to hazardous waste management employees;

c) records documenting training or job experience that has been given to, or completed by, each employee;

d) records documenting that employees receive an annual review of their initial training;

(12) Prepare and submit to the Department an annually adjusted estimate of closure costs;

(13) Prepare and follow a daily and weekly schedule of inspections of the hazardous waste treatment and storage areas at the facility in compliance with sections 67104, 67244, 67254 and 67259 of Title 22;

(14) Include in its contingency plan the names, home addresses, and telephone numbers of persons qualified to act as emergency coordinators for its hazardous waste facilities;

(15) (a) Determine the status of all wastes for which 35 days have passed without the receipt

by Teledyne of a return copy of the hazardous waste manifest and (b) file an exception report when a return copy of the hazardous waste manifest is not returned to Teledyne within 45 days of shipment;

(16) Submit to the Department a Revised Part A application and operations plan fully describing the method for the handling of "safety bucket water" containing explosive scrap and particles at the facility;

(17) Prepare a revised waste analysis plan which provides for the analysis of constituents making wastes ineligible for land disposal as required in sections 67102 (a) and (b) and 67740 of Title 22, and Title 40, Part 268 of the Federal Code of Regulations as incorporated by section 25159.6(a) of the Health and Safety Code;

(18) Record in an inspection log or summary the times that hazardous waste inspections are conducted at the facility and have the log or summary continuously available for inspection by the Department;

(19) Maintain an operating record documenting the location, quantity and description of each hazardous waste at each hazardous waste unit at the facility which includes the methods

and dates of treatment, storage, and/or disposal of each hazardous waste at the facility;

(20) Maintain copies of all insurance policies at the facility for all hazardous waste hauling vehicles registered to and used off the facility site by Teledyne;

(21) Have available for review a closure plan for Teledyne's permitted facility which includes (a) a description of how the closure performance standard required by section 67211 of Title 22 will be met and (b) a schedule for final closure which includes an accurate statement of the time required for all closure activities;

(22) Have available for review a closure plan for Teledyne's interim status facility which includes a description of how the closure performance standard required by section 67211 of Title 22 will be met;

(23) Refrain from storing for greater than 90 days containers of hazardous waste in any area not designated in an operation plan approved by the Department;

(24) Refrain from burning more than 150 gallons per day in its solvent burning facility unless approved in writing by the Department;

(25) Submit evidence demonstrating that tank 57683 was closed in accordance with the closure plan in Teledyne's approved Operations Plan;

(26) Provide an assessment by a registered engineer of the integrity of the containment system for hazardous waste tanks numbered 5038 and 5040 and all other interim status tanks demonstrating that all interim status tanks have containment meeting the requirements of section 265.193 of Title 40 of the Code of Federal Regulations. If the Department determines, following the procedures outlined in paragraph 6. b., that the assessment provided by Teledyne does not satisfy the requirements of section 265.193 (b-d) of Title 40 of the Code of Federal Regulations, the Department can require further certification by a registered engineer, or Teledyne may in the alternative provide a contingent post-closure plan, post-closure cost estimate, and post-closure financial assurance for all interim status tank systems which do not have containment meeting the requirements of section 265.193(b-f) of Title 40 of the Code of Federal Regulations.

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(27) Submit a current closure cost estimate to the Department as part of the revised closure plan dated April 1989 which includes cost estimates based on the cost of hiring a third party to close the facility;

(28) Provide documentation that treatment, storage, disposal, or other recycling facilities which receive shipments of land disposal restricted hazardous waste from Teledyne have received notification from Teledyne which includes all information required concerning these wastes as required by Part 268.7(a) of Title 40 of the Code of Federal Regulations; and institute procedures which insure that such notification will be made at all times in the future as required by law;

(29) Submit a written report meeting the requirements of section 67145(j) of Title 22 concerning the explosion that occurred on or about August 3, 1988, with a written plan describing how all future actions requiring implementation of Teledyne's contingency plan will be reported to the Department;

(30) Have a laboratory accredited by or certified by the Department perform all laboratory waste analyses done by or on behalf of

Teledyne after the effective date of this agreement which are done in order to comply with section 67102(a)(1) of Title 22.

b. With the exception of paragraphs 6. a. (16), (17), and (21), above, the Department will review and comment upon all materials submitted by Teledyne within ninety days of receipt or effective date of this order, whichever is later. If the Department cannot complete review within that time period , it shall so notify Teledyne within that ninety day period and state the date by which review shall be completed. Submittals pursuant to paragraphs 6.a. (16), (17), and (21) shall be reviewed by the Department's facility permitting unit as part of Teledyne's permit renewal process currently in progress. Until final action is taken by the Department on those submittals, Teledyne shall comply with all aspects of its April 1989 Operations Plan. If the Department rejects the submissions, in whole or in part, it shall specify in writing why the plan, action, or proposal fails to be satisfactory. Upon receipt of the written notification, Teledyne shall have thirty days in which to submit a revised action, plan, or proposal and documentation that addresses the issues raised in the notification. Failure by Teledyne to submit an acceptable revised plan or proposal and documentation may, at the option of DHS, be considered a material breach of this Agreement. Approval by the Department shall not be unreasonably withheld. Except as noted above for paragraphs 6. a., (16), (17), and (21), if the Department does not provide comments or notify

Teledyne that it cannot complete review within 90 days of the effective date of this order or receipt of an action, plan, or proposal, whichever is later, it shall be deemed to be accepted by the Department and Teledyne shall implement it in accordance with this Agreement. Teledyne shall begin implementation of plans as they are approved by the Department and shall submit a statement to the Department certifying commencement of such implementation within 30 days of approval of each plan.

c. Teledyne shall cooperate fully with the San Benito High School in implementing the educational program described in Exhibit B. Teledyne shall submit three annual reports describing the implementation of the program, with the first report due on July 30, 1990. Teledyne shall work with the San Benito High School in establishing an accounting system which demonstrates that the $80,000 given to the San Benito High School by Teledyne has been used for the program described in Exhibit B, and the records of this accounting system will be included in the report submitted annually to the Department.

7. Matters Covered by This Agreement.

a. This Agreement settles all violations alleged by the Complaint in this matter and all violations or other non-compliance items described in any Notice of Violation, Report of Violation, or other Complaint dated on or before the date of execution of this agreement. For the purposes of this agreement, "described" in this paragraph includes both violations and non-compliance items which are explicitly described in any Notice of

Violation, Report of Violation or other Complaint dated on or before the effective date of this agreement, as well as violations growing out of facts which are described in any of these documents. The parties further agree that items (2) and (4) of the Report of Violation dated August 1, 1989 will be dealt with in the permit review process now underway. The provisions of this paragraph are expressly conditioned on full and complete performance by Teledyne of the terms and conditions of this Agreement.

b. Except as expressly provided in this Agreement, nothing in this Agreement is intended nor shall it be construed to preclude the Department from exercising its authority under any law, statute or regulation. Furthermore, nothing in this Agreement is intended nor shall it be construed to preclude any state agency, department, board or entity from exercising its authority under any law, statute, or regulation.

8. <u>Notice</u>.

All submissions and notices required by this Agreement shall be sent to:

DHS: Doug Krause
Chief, Surveillance and Enforcement Unit
North Coast California Section
Toxic Substances Control Division
Department of Health Services
55850 Shellmound Suite, Suite 390
Emeryville, CA 94680

Teledyne: Marney E. Buchanan, Esq.
Teledyne, Inc.
1901 Avenue of the Stars
Los Angeles, California 90067

//

Copies to:

Donald E. Kearney
Teledyne McCormick Selph
P.O. Box 6
Hollister, California 95024 -0006

Patrick J. Cafferty, Jr.
Tuttle & Taylor
33 New Montgomery, Suite 1900
San Francisco, California

All approvals and decisions of the Department regarding any matter requiring approval or decision under the terms of this Agreement shall be communicated in writing to Teledyne by Doug Krause or his designee. No oral advice, guidance, suggestions or comments by employees or officials of the Department regarding submittals or notices shall be construed to relieve Teledyne of its obligation to obtain the final written approvals required by this Agreement.

9. Department Not Liable.

The Department shall not be liable for any injury or damage to persons or property resulting from acts or omissions by Teledyne, its directors, officers, employees, agents, representatives or contractors in carrying out activities pursuant to this Agreement, nor shall the Department be held as a party to or guarantor of any contract entered into by Teledyne, its directors, officers, employees, agents, representatives or contractors in carrying out activities required pursuant to this Agreement.

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10. Modification of Agreement.

This Agreement may be modified upon written approval of the parties hereto and the court.

11. Application of Agreement.

This Agreement shall apply to and be binding upon the Department and Teledyne, their directors, officers, employees and agents and the successors or assigns of either of them, except that Teledyne, its successors or assigns or either of them shall be solely liable for payment of civil penalties and reimbursement of administrative and investigative costs as required by the Agreement.

12. Authority to Enter Agreement.

Each signatory to this Agreement certifies that he or she is fully authorized by the party he or she represents to enter into this Agreement, to execute it on behalf of the party represented and legally to bind that party.

13. Integration.

This Agreement constitutes the entire agreement between the parties and may not be amended or supplemented except as provided for in the Agreement.

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IT IS SO STIPULATED

JOHN K. VAN DE KAMP, Attorney General of the State of California
ANDREA SHERIDAN ORDIN, Chief Assistant Attorney General
THEODORA BERGER, Assistant Attorney General
EDWIN F. LOWRY
Deputy Attorney General

Dated: November 7, 89 By: [signature]
EDWIN F. LOWRY, Deputy Attorney General
Attorneys for Department of Health Services

DEPARTMENT OF HEALTH SERVICES

Dated: 11/7/89 By: [signature]
KENNETH W. KIZER, Director Department of Health Services

TELEDYNE-McCORMICK-SELPH

Dated: 11/7/89 By: [signature]
DONALD KEARNEY, President
Teledyne-McCormick-Selph

PATRICK J. CAFFERTY, JR.
TUTTLE & TAYLOR

Dated: Nov 7, 1989 By: [signature]
PATRICK J. CAFFERTY, JR.
Attorneys for Teledyne-McCormick-Selph

IT IS SO ORDERED:

OLLIE MARIE-VICTOIRE
PRESIDING JUDGE
JUDGE OF THE SUPERIOR COURT

Dated: NOV 8 1989

APPENDIX F

WASTE STORED IN TANKS

Table III-2. Wastes Stored in Tanks or Containers

Calif. Waste Code	EPA Waste Code	TMc/S Waste Code	Description of Waste	Annual Quantity (lb)	Waste Source	Process	Capacity	Hazard Class.
343	D001	78	Hydrazine aqueous solution (L)	100,000	Chemical Manufacturing	Storage in tank 5382, 5040, 5042	20,000 gal	Ignitable, toxic
135	D002	79	Amines, Imines, nitrosos (L)		Chemical Manufacturing	Storage in tank 5042 Tanks 5038 and 5040	10,000 gal 6,000 gal	Corrosive (specific chemicals)
791*	D002	80	Inorganic acid solutions up to 35% HNO_3, H_2SO_4, HCl (L)	55,000	Chemical Manufacturing	Storage in tanks 5038 and 5040	6,000 gal	Corrosive

Legend:
(L) Liquid
* California Restricted Waste

APPENDIX G

WASTE STORED IN CONTAINERS

Table III-1. HW Stored in Containers (Sheet 1 of 5)

Calif. Waste Code	EPA Waste Code	TMc/S Waste Code	Description of Waste	Annual Quantity (lbs)	Waste Source	TSU-3 Location	Container Selection (Table IV-2)	Hazard Class
212	U002	1	Acetone (L)	2000	Chemical and ordnance manufacturing	Container or tankstorage	Line 1	Toxic, ignitable
212	U003	2	Acetonitrile (L)	2000	Chemical manufacturing	Container storage	Line 1	Toxic ignitable
212	U031	3	N-buty l alcohol (L)	2000	Chemical and ordnance manufacturing	Container storage	Line 2	Ignitable, toxic, irri-tant
211	U044	4	Chloroform (L)	2000	Chemical manufacturing	Container storage	Line 3	Toxic
213	U056	5	Cyclohexane (L)	2000	Chemical and ordnance manufacturing	Container storage	Line 1	Toxic, ig-nitable
213	U105 U106	6	Dinitrotoluene (L)	2000	Chemical and ordnance manufacturing	Container storage Stored then burned	Line 6	Toxic, ignitable, reactive
212	U154	7	Methanol (L)	2000	Chemical and ordnance manufacturing	Container storage	Line 1	Ignitable, toxic
212	U159	8	Methyl ethyl ketone (L)	2000	Chemical and ordnance manufacturing	Container or tank storage	Line 1	Toxic, ignitable
214	U160	9	MEK peroxide (L)	400	Ordnance manufactur-ing	Container storage Storage then burning	Line 4	Reactive, toxic
212	U161	10	Methyl iso-butylketone(L)	2000	Chemical and ordnance manufacturing	Container storage	Line 1	Toxic, ignitable
214	U213	11	Tetrahydro-furan (L)	2000	Chemical and ordnance manufacturing	Container storage	Line 1	Toxic, ignitable, irritant

Table III-1. HW Stored in Containers (Sheet 2 of 5)

Calif. Waste Code	EPA Waste Code	TMc/S Waste Code	Description of Waste	Annual Quantity (lbs)	Waste Source	TSU-3 Location	Container Selection (Table IV-2)	Hazard Class
213	U220	12	Toluene (L)	2000	Chemical and ordnance manufacturing	Container storage	Line 1	Toxic, ignitable
211	U228	13	Trichloro-ethane (L)	2000	Degreasing operations	Container storage	Line 5	Toxic
213	U234	14	1,3,5 Trinitro-benzene (L)	2000	Ordnance manufactur-ing	Container storage Storage then burning	Line 4	Reactive, toxic
213	Title 22-CA	15	Trinitrotoluene (L)	2000	Chemical and ordnance manufacturing	Container storage Storage then burning	Line 4	Reactive, toxic
212	U239	16	Xylene (L)	2000	Chemical and ordnance manufacturing	Container storage		Toxic, ignitable
211	F001 F002	17	Chlorinated Hydrocarbon (other) (L)	2000	Chemical manufactur-ing	Container storage	Line 1	Toxic
172	D001	18 19 20 21 22 23 24	Aluminum powder Magnesium powder Manganese powder Titanium powder Powdered metals Boranes Zirconium (S)	1000	Chemical and ordnance manufacturing	Container storage Storage then burning	Line 6 Line 6 Line 6 Line 7	Ignitable

Table III-1. HW Stored in Containers (Sheet 3 of 5)

Calif. Waste Code	EPA Waste Code	TMc/S Waste Code	Description of Waste	Annual Quantity (lbs)	Waste Source	TSU-3 Location	Container Selection (Table IV-2)	Hazard Class
213	D001	25	Cycloheptane	3000	Chemical and ordnance manufacturing	Container storage	Line 1	Ignitable
		26	N-Butyl - acetate				Line 1	
		27	Ethyl alcohol				Line 3	
		28	Gasoline				Line 10	
		29	n-Heptane				Line 10	
		30	Isopropanol				Line 10	
		31	n-Propyl alcohol				Line 10	
		32	Paint/varnish remover				Line 10	
		33	Paint thinner				Line 11	
		34	Solvents				Line 11	
		35	Paints/ adhesive (L)	300	Industrial painting	Reaction and curing agents	Line 11	
181	D001	39	Ammonium nitrate (S)	4000	Ordnance manufacturing	Container storage	Line 13	Oxidizer
		40	Ammonium perchlorate (S)				Line 14	
		41	Guanidine nitrate (S)				Line 14	
		42	Hydrogen peroxide (L)				Line 15	
		43	Potassium perchlorate (S)				Line 14	
		44	Potassium chlor. (S)			Storage then burning	Line 16	
		45	Molybdenum triox (S)				Line 1	
		46	Sodium nitrate (S)				Line 1	
		47	Potassium nitrate (S)				Line 1	

Table III-1. HW Stored in Containers (Sheet 4 of 5)

Calif. Waste Code	EPA Waste Code	TMc/S Waste Code	Description of Waste	Annual Quantity (lbs)	Waste Source	TSU-3 Location	Container Selection (Table IV-2)	Hazard Class
791*	D002	48	Actic acid (L)	50,000	Chemical and ordnance manufacturing	Container storage or neutralization	Line 17	Corrosive
791*		49	Ammonium Peracetic acid (L)				Line 18	
791*		50	Nitric acid (L)				Line 19	
791*		51	Phosphoric acid (L)				Line 17	
122		52	Potassium hydroxide (S)				Line 17	
122		53	Sodium hydroxide/lye (S)				Line 20	
122		54	Potassium carbonate (S)				Line 1	
122		55	Sodium carb. (S)				Line 1	
791*		56	Sulfuric acid (L)				Line 21	
791*		57	Acid and water (L)				Line 21	
122		58	Alkaline/caustic liquid (L)				Line 22	
791*		59	Spent acid (L)				Line 22	
122		60	Spent caustic (L)(S)				Line 23	
352	D003	61	Obsolete or retrograde explosives (S)	5000	Explosives and ordnance manufacturer	Container storage	Line 24	Reactive (explosives)
		62	Benzoyl peroxide (S)			Storage and then burning	Line 25	

Table III-1. HW Stored in Containers (Sheet 5 of 5)

Calif. Waste Code	EPA Waste Code	TMc/S Waste Code	Description of Waste	Annual Quantity (lbs)	Waste Source	TSU-3 Location	Container Selection (Table IV-2)	Hazard Class
352	D003	63	Nitrocellulose/ guncotton (S)	5000	Explosives/ordnance manufacturing	Container storage	Line 24	Reactive (explosive)
791*		64	Picric acid (L)			Storage and then burning	Line 26	
352		65	Retrograde/ obsolete ordnance or hardware (S)				Line 24	
352		66	Pentarythrol tetranitrate (S)				Line 24	
723*	D005	67	Barium chromate (S)	500	Explosive/ordnance manufacturing	Container storage	Line 1	EP toxic
132		68	Barium compounds (sol) (L)				Line 1	
		69	Barium nitrate (S)				Line 1	
		70	Barium oxide (S)				Line 1	
		71	Barium monoxide (S)				Line 1	
722*	D006	72	Cadmium compounds	1000	Explosives/ordnance manufacturing	Container storage	Line 1	EP toxuc
181	D008	73	Lead compounds	5000	Explosives/ordnance manufacturing		Line 1	
		74	Lead oxide (S)		Explosive cable manufacturing		Line 22	
		75	Lead styphnate (S)			Storage then burning	Line 24	Reactive
132	D011	76	Silver compounds	600	Explosive cable manufacturing	Container storage, silver recovery	Line 24	EP toxic
	Not listed	77	Ethylene glycol (L)		Chemical manufacturing	55 gallon container	Line 77	Not listed

Legend:
(L) Liquid
(S) Solid
* CaliforniaRestricted Waste

NOTE: 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 TMc/S, 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 the above table.

Table III-2. Wastes Stored in Tanks or Containers

Calif. Waste Code	EPA Waste Code	TMc/S Waste Code	Description of Waste	Annual Quantity (lb)	Waste Source	Process	Capacity	Hazard Class.
343	D001	78	Hydrazine aqueous solution (L)	100,000	Chemical Manufacturing	Storage in tank 5382, 5040, 5042	20,000 gal	Ignitable, toxic
135	D002	79	Amines, Imines, nitrosos (L)		Chemical Manufacturing	Storage in tank 5042 Tanks 5038 and 5040	10,000 gal 6,000 gal	Corrosive (specific chemicals)
791*	D002	80	Inorganic acid solutions up to 35%HNO_3, H_2SO_4, HCl (L)	55,000	Chemical Manufacturing	Storage in tanks 5038 and 5040	6,000 gal	Corrosive

Legend:

(L) Liquid

* California Restricted Waste

APPENDIX H

WASTE QUANTITIES BURNED

Charles Martin
November 15, 1990

EXPLOSIVE DISPOSAL BURNS (TSU-1)
1989

ORDNANCE TYPE	GROSS WEIGHT	NET EXPLO-SIVE WEIGHT (IN LBS)	REACTIVE MATERIAL	% OF TOTAL BASED ON NET WEIGHT
LEAD FLSC	268.0	8.0	Hexanitrostilbene	0.3
LEAD FLSC	122.0	3.6	Cyclotrimethylene trinitramine, cyclonite/CH6	0.1
LEAD FLSC	73.0	2.2	Hivilite	0.08
LEAD FLSC	13.0	0.4	PETN	0.01
LEAD FLSC	13.0	0.4	SCID	0.01
LEAD LSC	114.0	3.4	Hexanitrostilbene	0.1
[illegible] LSC	52.0	1.6	Cyclotrimethylene trinitramine, cyclonite/CH6	0.06
LEAD LSC	31.0	0.9	Hivilite	.03
LEAD LSC	5.0	0.2	PETN	.007
LEAD LSC	5.0	0.2	SCID	.007
FLSC ALUMINUM	1593.0	334.0	Cyclotrimethylene trinitramine, cyclonite/CH6	12.2
MISC. HARDWARE: SMDC, MDC, LSC, PRIMER, ETC.	228.0	2.3	Miscellaneous	.08
POTASSIUM PERMANGANATE	57.0	57.0	Potassium Permanganate	2.1
N-9 PROPELLANT MIX AND DIRT	320.0	<1.0	N-9 Propellant	0.04
N-9 PROPELLANT	114.0	114.0	N-9 Propellant	4.1

(Continued on the next page)

EXPLOSIVE DISPOSAL BURNS (TSU-1)
1989
(Continued)

ORDNANCE TYPE	GROSS WEIGHT	NET EXPLOSIVE WEIGHT (IN LBS)	REACTIVE MATERIAL	% OF TOTAL BASED ON NET WEIGHT
HEXANITROSTILBENE	120.0	120.0	Hexanitrostilbene	4.4
DINITROMESITYLENE/ TRINITROMESITYLENE	233.0*	233.0	Dinitromesitylene/ Trinitromesitylene	8.5
PBXN-5	83.0	83.0	PBXN-5	3.0
PETN	4.5	4.5	PETN	0.2
CYCLOTRIMETHYLENET RINITRAMINE, CYCLONITE/CH6	74.0	74.0	Cyclotrimethylenet rinitramine, Cyclonite/CH6	2.7
DINITRODIPHENYLSUL FONE ISOMERS	78.0*	78.0	Dinitrodiphenylsul fone Isomers	2.8
BOROHYDRIDES	61.0	61.0	Borohydrides	2.2
TRIAMINOGUANIDINE NITRATE	1533.0*	1533.0	Triaminoguanidine Nitrate	55.8
EXPLOSIVE CONTAMINATED (RESIDUES), KIM WIPES, FOIL CUPS, GLOVES, APPLICATORS, ETC.	6442.0	32.2	Miscellaneous	1.2
TOTAL WEIGHT	11636.5	2747.9		

* Unlikely future waste stream.

Charles Martin
November 15, 1990

EXPLOSIVE DISPOSAL
SOLVENT BURNS (TSU-2)
1989

SOLVENT	GROSS WEIGHT	% OF TOTAL
METHANOL	22,131	54.0
ISOPROPYL ALCOHOL	5,734	14.0
ACETONE	7,782	19.0
PYRADINE	10	6.5
TETRAHYDROFURAN	10	6.5
TOTAL WEIGHT	35,667	

The above solvents contain approximately 972 pounds of explosive as follows:

	NET EXPLOSIVE WEIGHT	% OF TOTAL
HEXANITROBIBENZYL	953	98.0
HEXANITROSTILBENE	10	1.0
HIVILITE	10	1.0
TOTAL WEIGHT	973	

NOTE: Known future bulk waste streams will consist of the following solvents and their respective percentages:

METHANOL 80%
ACETONE 15%
ACETONITRILE 5%

Charles Martin
November 15, 1990

EXPLOSIVE DISPOSAL DETONATIONS (TSU-1)
1989

ORDNANCE TYPE	GROSS WEIGHT	NET EXPLOSIVE WEIGHT (IN LBS)	REACTIVE MATERIAL	% OF TOTAL BASED ON NET WEIGHT
FLSC ALUMINUM	438	92	Cyclotrimethylene trinitramine, cyclonite/CH6	45.1
FLSC ALUMINUM	14	3	Hexanitrostilbene	1.5
LSC ALUMINUM	740	100	Cyclotrimethylene trinitramine, cyclonite/CH6	49.0
LSC ALUMINUM	22	3	Hexanitrostilbene	1.5
L[illegible] AZIDE	6	6	Lead Azide	2.9
TOTAL WEIGHT	1220	204		

Charlie Martin
November 15, 1990

REACTIVE MATERIAL DISPOSAL OPERATIONS
TSU-1 AND TSU-2
1989

DAYS UTILIZED:	77
ORDNANCE BURN OPERATIONS:	55
DETONATION OPERATIONS:	11
SOLVENT BURN OPERATION;	32

Charles Martin
November 15, 1990

EXPLOSIVE DISPOSAL
TSU-1 and TSU-2
1988

TOTAL SOLVENTS BURNED:	108,500 LBS GROSS
TOTAL ORDNANCE BURNED:	25,411 LBS GROSS
TOTAL ORDNANCE DETONATED:	4,189 LBS GROSS

DAYS UTILIZED:	149
ORDNANCE BURN OPERATIONS:	67
DETONATION OPERATIONS:	28
SOLVENT BURN OPERATIONS:	74

Charles Martin
November 15, 1990

EXPLOSIVE DISPOSAL
TSU-1 and TSU-2
1987

TOTAL SOLVENT BURNED:	28,800 LBS GROSS
TOTAL ORDNANCE BURNED:	10,000 LBS GROSS
TOTAL ORDNANCE DETONATED:	219 LBS GROSS

DAYS UTILIZED:	67
ORDNANCE BURN OPERATIONS:	37
DETONATION OPERATIONS:	6
SOLVENT BURN OPERATIONS:	24

APPENDIX I

RESULTS OF VISUAL SITE INSPECTION

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

PETE WILSON, *Governor*

D̶EPARTMENT OF HEALTH SERVICES
; SUBSTANCES CONTROL PROGRAM
…EINZ AVE., BLDG. F, SUITE 200
BERKELEY, CA 94710-2737

To: File
Teledyne McCormick Selph

March 26, 1991

From: Karen M. Toth
Associate Hazardous Materials Specialist

Subject: Results of Visual Site Inspection, October 5, 1990.

This visual site inspect was done when I was onsite to observe consultants who were bidding on the screening risk assessment for the faility. After a meeting with the consultants, Ed Lynam escorted me on a tour of the hazardous waste facilities and we viewed all the areas where past and present activities were located. The tour followed the following itinerary:

Silver Recovery Vessel
Bulk Chemical Storage Area
Hazardous Waste Storage Area #2
Hazardous Waste Storage Area #3
Surface Impoundment #2
Industrial Wastewater Screening Tank
Hazardous Waste Storage Area #1
Spray Field
Thermal Oxidizer Location
Container Storage Area
Old Burn Area
Waste Solvent Open Burn Area
Surface Impoundment for water evap.
Open Burn of Explosive solids
Surface Impoundment #1
Plating Waste Tanks

None of the locations had any visible sign of release and seemed to be well kept (good housekeeping)

Mr. Lynam also gave me a tour of the production areas of the facility and discussed the production processes.

No samples or photographs were taken.