Any 8010 compounds present in the sample were below the detection limit.

pH Analysis

The pH of the sample was measured to be 7.9.

Percent Solids Analysis

A known portion of the sample was evaporated in a preweighed evaporating dish. The percent solids was calculated to be as follows.

Sample	Percent Solids (%)	Detection Limit (%)
L1	0.015	0.0005

Total Oil and Grease

A known portion of the water sample was extracted with three 30 milliliter portions of dichloromethane. The extracts were combined and evaporated in a preweighed evaporating dish. The result is as follows.

Sample	Total Oil and Grease (%)	Detection Limit (%)
L1	0.0025	0.0005

EPA 8270 and Flashpoint Analysis

The sample was analyzed for semivolatile organic compounds following EPA method 8270 and for flashpoint. The results of these analyses are enclosed with this report.

Conclusion

Any 8010, 8020, 8080 or 8270 compounds present in sample L1 are below the detection limit. High levels of ammonia and low levels of cyanide, sulfide, copper, mercury, nickel, cadmium, zinc and molybdenum were detected in sample L1. The sample does not show a flashpoint below 140 degrees Fahrenheit.

Samples submitted for analyses must be collected within a two week period following the completion of the analyses. Any samples remaining after the designated period of time will be discarded.

Should you have any questions please call. We look forward to serving you again in the near future.

Client Acct: 634
Client Name: Carter Analytical Labs
NET Log No: 1926

Date: 05-14-90
Page: 2

Ref: Work Order: 9410

SAMPLE DESCRIPTION: 9410 extract
LAB Job No: (-52628)

Parameter	Reporting Limit	Results	Units
Flashpoint	--	>140	Deg F

FAX TRANSMITTAL MEMO
TO: Linda Dewi
DEPT: Carter Labs FAX #: 408-866-0319
FROM: Levi PHONE:
CO: NET Pacific FAX #:
NO. OF PAGES 1
Post-it™ brand fax transmittal memo 7671
5-14-90

METHOD 8270 INPUT DATA
TRAVELLER #: 9005-049 CLIENT: Carter Sheet 1 of 1

DASH NUMBER:	-1				
SAMPLE IDENTIFICATION:	9410				
MATRIX:	? unknown				
ANALYST:	LAB				
DATE ANALYZED:	5-10				
DATE EXTRACTED:	? unknown				
CORRECTION FACTOR:	1				
2-Fluorophenol:	NS				
Phenol-d5:					
Nitrobenzene-d5:					
2-Fluorobiphenyl:					
2,4,6-Tribromophenol:					
p-Terphenyl-d14:					
Phenol	<5				
Bis(2-chloroethyl)ether	<5				
2-Chlorophenol	<5				
1,3-Dichlorobenzene	<5				
1,4-Dichlorobenzene	<5				
Benzyl alcohol	<10				
1,2-Dichlorobenzene	<5				
2-Methylphenol	<5				
Bis(2-chloroisopropyl)ether	<5				
4-Methylphenol	<5				
N-[illegible]troso-di-n-propylamine	<5				
Hexachloroethane	<5				
Nitrobenzene	<5				
Isophorone	<5				
2-Nitrophenol	<5				
2,4-Dimethylphenol	<5				
Benzoic acid	<25				
Bis(2-chloroethoxy)methane	<5				
2,4-Dichlorophenol	<5				
1,2,4-Trichlorobenzene	<5				
Naphthalene	<5				
4-Chloroaniline	<10				
Hexachlorobutadiene	<5				
4-Chloro-3-methylphenol	<5				
2-Methylnaphthalene	~~<10~~ <5				
Hexachlorocyclopentadiene	<5				
2,4,6-Trichlorophenol	<5				
2,4,5-Trichlorophenol	<5				
2-Chloronaphthalene	<5				
2-Nitroaniline	<25				
2-Chloronaphthalene	<25				
Dimethyl phthalate	<5				
Acenaphthylene	<5				
3-Nitroaniline	<25				
Acenaphthene	<5				
2,4-Dinitrophenol	<25				
4-[illegible]rophenol	<25				
Dibenzofuran	<5				
2,4-Dinitrotoluene	<5				
2,6-Dinitrotoluene	<5				

NO Q.C. Extract PROVIDED By Customer

* - input uncorrected data for the target compounds. Reporting assumes ND unless a number is entered.

NS = NOT SPIKED, sample prepared by customer

Report UG/ML

DASH NUMBER:	-1				
-thyl phthalate	<5				
-lorophenyl phenylether	<5				
Fluorene	<5				
4-Nitroaniline	<25				
4,6-Dinitro-2-methylphenol	<25				
N-Nitrosodiphenylamine	<5				
4-Bromophenyl phenylether	<5				
Hexachlorobenzene	<5				
Pentachlorophenol	<25				
Phenanthrene	<5				
Anthracene	<5				
Di-n-Butyl phthalate	<5				
Fluoranthene	<5				
Pyrene	<5				
Butyl benzyl phthalate	<5				
3,3'-Dichlorobenzidine	<10				
Benzo(a)anthracene	<5				
Bis(2-ethylhexyl)phthalate	<5				
Chrysene	<5				
Di-n-octyl phthalate	<5				
Benzo(b)fluoranthene	<5				
Benzo(k)fluoranthene	<5				
Benzo(a)pyrene	<5				
Indeno(1,2,3-cd)pyrene	<5				
Dibenzo(a,h)anthracene	<5				
B-zo(g,h,i)perylene	<5				

Appendix 2

Laboratory Certifications

9/30/2006, 11 pages

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

ENVIRONMENTAL LABORATORY CERTIFICATION

Is hereby granted to

BOLSA ANALYTICAL

2337 TECHNOLOGY PARKWAY, SUITE K

HOLLISTER, CA 95023

Scope of certification is limited to the
"List of Approved Fields of Testing and Analytes"
which accompanies this Certificate.

Continued certification status depends on successful completion of site visit, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No: **1326**
Expiration Date: **09/30/2006**
Effective Date: **09/01/2004**

Berkeley, California
subject to forfeiture or revocation.

George C. Kulasingam

George C. Kulasingam, Ph.D.
Program Chief
Environmental Laboratory Accreditation Program

SANDRA SHEWRY
Director

State of California—Health and Human Services Agency
Department of Health Services

ARNOLD SCHWARZENEGGER
Governor

June 9, 2005

TOMAS MORENO
BOLSA ANALYTICAL
2337 TECHNOLOGY PARKWAY, SUITE K
HOLLISTER, CA 95023

Certificate No.: 1326

Dear TOMAS MORENO:

This is to advise you that the laboratory named above has been certified as an environmental testing laboratory pursuant to the provisions of the California Environmental Laboratory Improvement Act (Health and Safety Code (HSC), Division 101, Part 1, Chapter 4, Section 100825, et seq.).

The Fields of Testing for which this laboratory has been certified under this Act are indicated on the enclosed "Accredited Fields of Testing." Certification shall remain in effect until **September 30, 2006** unless revoked. This certificate is subject to an annual fee as prescribed by Section 100860(a), HSC, due on September 30, 2005.

Your application for renewal must be received 90 days before the expiration of your certificate to remain in force according to the California Code of Regulations, Title 22, Division 4, Chapter 19, Section 64801 through 64827.

Any changes in laboratory location or structural alterations, which may affect adversely the quality of analysis in the fields of testing for which the laboratory has been granted certification, require prior notification. Notification is also required for changes in ownership or laboratory director within 30 days after the change (HSC, Section 100845(b) and (d)).

Your continued cooperation is essential to maintain high quality of the data produced by environmental laboratories certified by the State of California.

If you have any questions, please contact Lancelot Fernando at (510) 540-2800.

Sincerely,

Geo C. Kulasingam

George C. Kulasingam, Ph.D.
Program Chief
Environmental Laboratory Accreditation Program

Enclosure

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

BOLSA ANALYTICAL **Lab Phone** (831) 637-4590

2337 TECHNOLOGY PARKWAY, SUITE K
HOLLISTER, CA 95023

Certificate No: 1326 **Renew Date:** 09/30/2006

Field of Testing: 101 - Microbiology of Drinking Water			
101.010	001	Heterotrophic Bacteria	SM9215B
101.060	002	Total Coliform	SM9223
101.060	003	E. coli	SM9223
101.120	001	Total Coliform (Enumeration)	SM9221A,B,C
101.130	001	Fecal Coliform (Enumeration)	SM9221E (MTF/EC)
Field of Testing: 102 - Inorganic Chemistry of Drinking Water			
102.100	001	Alkalinity	SM2320B
102.120	001	Hardness	SM2340B
102.130	001	Conductivity	SM2510B
102.140	001	Total Dissolved Solids	SM2540C
102.190	001	Cyanide, Total	SM4500-CN E
102.200	001	Fluoride	SM4500-F C
102.220	001	Nitrite	SM4500-NO2 B
102.230	001	Nitrate	SM4500-NO3 D
102.240	001	Phosphate, Ortho	SM4500-P E
102.251	001	Sulfate	SM4500-SO4 E
102.270	001	Surfactants	SM5540C
102.520	001	Calcium	EPA 200.7
102.520	002	Magnesium	EPA 200.7
102.520	003	Potassium	EPA 200.7
102.520	004	Silica	EPA 200.7
102.520	005	Sodium	EPA 200.7
102.520	006	Hardness (calc.)	EPA 200.7
102.533	001	Silica	SM4500-Si D
Field of Testing: 103 - Toxic Chemical Elements of Drinking Water			
103.040	003	Arsenic	SM3113B
103.040	006	Cadmium	SM3113B
103.040	010	Lead	SM3113B
103.040	013	Selenium	SM3113B
103.130	001	Aluminum	EPA 200.7
103.130	002	Arsenic	EPA 200.7
103.130	003	Barium	EPA 200.7
103.130	004	Beryllium	EPA 200.7
103.130	005	Cadmium	EPA 200.7
103.130	007	Chromium	EPA 200.7
103.130	008	Copper	EPA 200.7
103.130	009	Iron	EPA 200.7
103.130	011	Manganese	EPA 200.7
103.130	012	Nickel	EPA 200.7
103.130	015	Silver	EPA 200.7
103.130	017	Zinc	EPA 200.7
103.130	018	Boron	EPA 200.7
Field of Testing: 107 - Microbiology of Wastewater			
107.010	001	Heterotrophic Bacteria	SM9215B

As of 06/09/2005 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

BOLSA ANALYTICAL

Certificate No: 1326
Renew Date: 09/30/2006

107.020	001	Total Coliform	SM9221B
107.040	001	Fecal Coliform	SM9221C,E (MTF/EC)
Field of Testing: 108 - Inorganic Chemistry of Wastewater			
108.112	001	Boron	EPA 200.7
108.112	002	Calcium	EPA 200.7
108.112	003	Hardness (calc.)	EPA 200.7
108.112	004	Magnesium	EPA 200.7
108.112	005	Potassium	EPA 200.7
108.112	006	Silica	EPA 200.7
108.112	007	Sodium	EPA 200.7
108.380	001	Oil and Grease	EPA 1664
108.390	001	Turbidity	SM2130B
108.400	001	Acidity	SM2310B
108.410	001	Alkalinity	SM2320B
108.420	001	Hardness (calc.)	SM2340B
108.430	001	Conductivity	SM2510B
108.440	001	Residue, Total	SM2540B
108.441	001	Residue, Filterable	SM2540C
108.442	001	Residue, Non-filterable	SM2540D
108.443	001	Residue, Settleable	SM2540F
108.445	005	Sodium	SM3111B
108.451	001	Chloride	SM4500-Cl- D
108.470	001	Cyanide, Manual Distillation	SM4500-CN C
108.472	001	Cyanide, Total	SM4500-CN E
108.480	001	Fluoride	SM4500-F C
108.490	001	pH	SM4500-H+ B
108.502	001	Ammonia	SM4500-NH3 E
108.503	001	Kjeldahl Nitrogen	SM4500-NH3 E
108.510	001	Nitrite	SM4500-NO2 B
108.520	001	Nitrate-nitrite, Total	SM4500-NO3 E
108.530	001	Dissolved Oxygen	SM4500-O C
108.531	001	Dissolved Oxygen	SM4500-O G
108.540	001	Phosphate, Ortho	SM4500-P E
108.541	001	Phosphorus, Total	SM4500-P E
108.550	001	Dissolved Silica	SM4500-Si D
108.571	001	Sulfate	SM4500-SO4 D
108.581	001	Sulfide	SM4500-S= E (18th)
108.590	001	Biochemical Oxygen Demand	SM5210B
108.591	001	Carbonaceous BOD	SM5210B
108.602	001	Chemical Oxygen Demand	SM5220D
108.640	001	Surfactants	SM5540C
Field of Testing: 109 - Toxic Chemical Elements of Wastewater			
109.010	001	Aluminum	EPA 200.7
109.010	002	Antimony	EPA 200.7
109.010	003	Arsenic	EPA 200.7
109.010	004	Barium	EPA 200.7
109.010	005	Beryllium	EPA 200.7
109.010	007	Cadmium	EPA 200.7
109.010	009	Chromium	EPA 200.7
109.010	010	Cobalt	EPA 200.7
109.010	011	Copper	EPA 200.7
109.010	012	Iron	EPA 200.7
109.010	013	Lead	EPA 200.7
109.010	015	Manganese	EPA 200.7

As of 06/09/2005, this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

109.010	016	Molybdenum	EPA 200.7
109.010	017	Nickel	EPA 200.7
109.010	019	Selenium	EPA 200.7
109.010	021	Silver	EPA 200.7
109.010	023	Thallium	EPA 200.7
109.010	024	Tin	EPA 200.7
109.010	026	Vanadium	EPA 200.7
109.010	027	Zinc	EPA 200.7
109.410	003	Arsenic	SM3113B
109.410	006	Cadmium	SM3113B
109.410	011	Lead	SM3113B
109.410	015	Selenium	SM3113B

California Department of Health Services

STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM

ENVIRONMENTAL LABORATORY CERTIFICATION

Is hereby granted to

TOXSCAN, INC.

42 HANGAR WAY

WATSONVILLE, CA 95076-2402

Scope of certification is limited to the
"List of Approved Fields of Testing and Analytes"
which accompanies this Certificate.

Continued certification status depends on successful completion of site visit, proficiency testing studies, and payment of applicable fees.

This Certificate is granted in accordance with provisions of Section 100825, et seq. of the Health and Safety Code.

Certificate No:	**1515**
Expiration Date:	**05/31/2007**
Effective Date:	**05/01/2005**

Berkeley, California
subject to forfeiture or revocation.

George C. Kulasingam, Ph.D.
Program Chief
Environmental Laboratory Accreditation Program

SANDRA SHEWRY
Director

State of California—Health and Human Services Agency
Department of Health Services

ARNOLD SCHWARZENEGGER
Governor

May 1, 2005

Certificate No.: **1515**

PHILIP D. CARPENTER, PH.D.
TOXSCAN, INC.
42 HANGAR WAY
WATSONVILLE, CA 95076-2402

Dear PHILIP D. CARPENTER, PH.D.:

This is to advise you that the laboratory named above continues to be certified as an environmental testing laboratory pursuant to the provisions of the California Environmental Laboratory Improvement Act (Health and Safety Code (HSC), Division 101, Part 1, Chapter 4, Section 100825, et seq.). Certification for all currently certified Fields of Testing that the laboratory has applied for renewal shall remain in effect until **05/31/2007** unless revoked.

Please note that the renewal application for certification is subject to an on-site visit, and continued use of the certificate is contingent upon:

* **successful completion of the site visit;**
* **acceptable performance in the required performance evaluation (PE) studies;**
* **timely payment of all fees, including an annual fee due before May 31, 2006;**
* **compliance with Environmental Laboratory Accreditation Program (ELAP) statutes (HSC, Section 100825, et seq.) and Regulations (California Code of Regulations (CCR),Title 22, Division 4, Chapter 19).**

An updated "Approved Fields of Testing" will be issued to the laboratory upon completion of the renewal process. The application for the next renewal must be received 90 days before the expiration of this certificate to remain in force according to the CCR, Section 64801 through 64827.

Please note that the laboratory is required to notify ELAP of any major changes in the laboratory such as the transfer of ownership, change of laboratory director, change in location, or structural alterations which may affect adversely the quality of analyses (HSC, Section 100845(b)(d)). Please include the above certificate number in all your correspondence to ELAP.

If you have any questions, please contact ELAP at (510) 540-2800.

Sincerely,

George C. Kulasingam, Ph.D.
Program Chief
Environmental Laboratory Accreditation Program

Environmental Laboratory Accreditation Program
1625 Shattuck Avenue, Room 101, Berkeley, CA 94709-1611
Phone (510) 540–2800, Fax (510) 849-5106
http://www.dhs.ca.gov/elap

State of California—Health and Human Services Agency

Department of Health Services

,ANDRA SHEWRY
Director

ARNOLD SCHWARZENEGGER
Governor

September 23, 2004

Certificate No.: 1515

PHILIP D. CARPENTER, PH.D.
TOXSCAN, INC.
42 HANGAR WAY
WATSONVILLE, CA 95076-2402

Dear PHILIP D. CARPENTER, PH.D.:

This is to advise you that the laboratory named above has been certified as an environmental testing laboratory pursuant to the provisions of the California Environmental Laboratory Improvement Act (Health and Safety Code (HSC), Division 101, Part 1, Chapter 4, Section 100825, et seq.).

The Fields of Testing for which this laboratory has been certified under this Act are indicated on the enclosed "Accredited Fields of Testing." Certification shall remain in effect until **May 31, 2005** unless revoked. This certificate is subject to an annual fee as prescribed by Section 100860(a), HSC, due on May 31, 2004.

Your application for renewal must be received 90 days before the expiration of your certificate to remain in force according to the California Code of Regulations, Title 22, Division 4, Chapter 19, Section 64801 through 64827.

Any changes in laboratory location or structural alterations, which may affect adversely the quality of analysis in the fields of testing for which the laboratory has been granted certification, require prior notification. Notification is also required for changes in ownership or laboratory director within 30 days after the change (HSC, Section 100845(b) and (d)).

Your continued cooperation is essential to maintain high quality of the data produced by environmental laboratories certified by the State of California.

If you have any questions, please contact Riz Parangalan at (510) 540-2800.

Sincerely,

George C. Kulasingam

George C. Kulasingam, Ph.D.
Program Chief
Environmental Laboratory Accreditation Program

Enclosure

Environmental Laboratory Accreditation Program
1625 Shattuck Avenue, Room 101, Berkeley, CA 94709-1611
Phone (510) 540-2800, Fax (510) 849-5106

CALIFORNIA DEPARTMENT OF HEALTH SERVICES
ENVIRONMENTAL LABORATORY ACCREDITATION PROGRAM
Accredited Fields of Testing

TOXSCAN, INC. Lab Phone (831) 724-4522

42 HANGAR WAY
WATSONVILLE, CA 95076-2402

Certificate No: 1515 **Renew Date:** 05/31/2005

Field of Testing: 108 - Inorganic Chemistry of Wastewater

108.112	001	Boron	EPA 200.7
108.180	001	Cyanide, amenable	EPA 335.1
108.181	001	Cyanide, Total	EPA 335.2
108.201	001	Ammonia	EPA 350.2
108.290	001	Sulfide	EPA 376.1
108.291	001	Sulfide	EPA 376.2
108.380	001	Oil and Grease	EPA 1664
108.530	001	Dissolved Oxygen	SM4500-O C
108.531	001	Dissolved Oxygen	SM4500-O G

Field of Testing: 109 - Toxic Chemical Elements of Wastewater

109.020	001	Aluminum	EPA 200.8
109.020	002	Antimony	EPA 200.8
109.020	003	Arsenic	EPA 200.8
109.020	004	Barium	EPA 200.8
109.020	005	Beryllium	EPA 200.8
109.020	006	Cadmium	EPA 200.8
109.020	007	Chromium	EPA 200.8
109.020	008	Cobalt	EPA 200.8
109.020	009	Copper	EPA 200.8
109.020	010	Lead	EPA 200.8
109.020	011	Manganese	EPA 200.8
109.020	012	Molybdenum	EPA 200.8
109.020	013	Nickel	EPA 200.8
109.020	014	Selenium	EPA 200.8
109.020	015	Silver	EPA 200.8
109.020	016	Thallium	EPA 200.8
109.020	017	Vanadium	EPA 200.8
109.020	018	Zinc	EPA 200.8
109.051	001	Arsenic	EPA 206.3
109.150	001	Iron	EPA 236.1
109.190	001	Mercury	EPA 245.1
109.280	001	Selenium	EPA 270.2
109.811	001	Chromium (VI)	SM3500-Cr D

Field of Testing: 111 - Semi-volatile Organic Chemistry of Wastewater

111.101	032	Polynuclear Aromatic Hydrocarbons	EPA 625
111.101	034	Phthalates	EPA 625
111.101	036	Other Extractables	EPA 625
111.170	030	Organochlorine Pesticides	EPA 608
111.170	031	PCBs	EPA 608

Field of Testing: 113 - Whole Effluent Toxicity of Wastewater

113.010	001A	Fathead Minnow (P. promelas)	EPA 600/4-90/027F, Static
113.010	001B	Fathead Minnow (P. promelas)	EPA 600/4-90/027F, Static Renewal
113.010	003A	Rainbow trout (O. mykiss)	EPA 600/4-90/027F, Static

As of 09/23/2004 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

113.010	003B	Rainbow trout (O. mykiss)	EPA 600/4-90/027F, Static Renewal
113.010	005A	Daphnid (C. dubia)	EPA 600/4-90/027F, Static
113.010	005B	Daphnid (C. dubia)	EPA 600/4-90/027F, Static Renewal
113.010	006A	Daphnia spp.	EPA 600/4-90/027F, Static
113.010	006B	Daphnia spp.	EPA 600/4-90/027F, Static Renewal
113.010	008A	Topsmelt (A. affinis)	EPA 600/4-90/027F, Static
113.010	008B	Topsmelt (A. affinis)	EPA 600/4-90/027F, Static Renewal
113.010	009A	Silverside (Menidia spp.)	EPA 600/4-90/027F, Static
113.010	009B	Silverside (Menidia spp.)	EPA 600/4-90/027F, Static Renewal
113.010	010A	Sanddab (C. sitigmaeus)	EPA 600/4-90/027F, Static
113.010	010B	Sanddab (C. sitigmaeus)	EPA 600/4-90/027F, Static Renewal
113.010	012A	Mysid (M. bahia)	EPA 600/4-90/027F, Static
113.010	012B	Mysid (M. bahia)	EPA 600/4-90/027F, Static Renewal
113.010	014A	Pacific oyster (C. gigas)	EPA 600/4-90/027F, Static
113.010	014B	Pacific oyster (C. gigas)	EPA 600/4-90/027F, Static Renewal
113.010	015A	Sand dollar (D. excentricus)	EPA 600/4-90/027F, Static
113.010	015B	Sand dollar (D. excentricus)	EPA 600/4-90/027F, Static Renewal
113.010	016A	Pacific mysid (H. costata)	EPA 600/4-90/027F, Static
113.010	016B	Pacific mysid (H. costata)	EPA 600/4-90/027F, Static Renewal
113.010	017A	Purple sea urchin (S. purpuratus)	EPA 600/4-90/027F, Static
113.010	017B	Purple sea urchin (S. purpuratus)	EPA 600/4-90/027F, Static Renewal
113.021	001A	Fathead Minnow (P. promelas)	EPA 2000 (EPA-821-R-02-012), Static
113.021	001B	Fathead Minnow (P. promelas)	EPA 2000 (EPA-821-R-02-012), Static R
113.022	003A	Rainbow trout (O. mykiss)	EPA 2019 (EPA-821-R-02-012), Static
113.022	003B	Rainbow trout (O. mykiss)	EPA 2019 (EPA-821-R-02-012), Static R
113.022	004A	Brook trout (S. fontinalis)	EPA 2019 (EPA-821-R-02-012), Static
113.022	004B	Brook trout (S. fontinalis)	EPA 2019 (EPA-821-R-02-012), Static R
113.023	005A	Daphnid (C. dubia)	EPA 2002 (EPA-821-R-02-012), Static
113.023	005B	Daphnid (C. dubia)	EPA 2002 (EPA-821-R-02-012), Static R
113.024	006A	Daphnia spp.	EPA 2021 (EPA-821-R-02-012), Static
113.024	006B	Daphnia spp.	EPA 2021 (EPA-821-R-02-012), Static R
113.025	009A	Silverside (Menidia spp.)	EPA 2006 (EPA-821-R-02-012), Static
113.025	009B	Silverside (Menidia spp.)	EPA 2006 (EPA-821-R-02-012), Static R
113.026	011A	Sheepshead minnow (C. variegatus)	EPA 2004 (EPA-821-R-02-012), Static
113.026	011B	Sheepshead minnow (C. variegatus)	EPA 2004 (EPA-821-R-02-012), Static R
113.027	012A	Mysid (M. bahia)	EPA 2007 (EPA-821-R-02-012), Static
113.027	012B	Mysid (M. bahia)	EPA 2007 (EPA-821-R-02-012), Static R
113.028	016A	Pacific mysid (H. costata)	EPA-821-R-02-012, Static
113.028	016B	Pacific mysid (H. costata)	EPA-821-R-02-012, Static Renewal
113.030	014	Pacific oyster (C. gigas)	ASTM E724-94
113.030	019	Blue mussel (Mytilus spp.)	ASTM E724-94
113.040	001	Fathead Minnow (P. promelas)	EPA 1000 (EPA/600/4-91/002)
113.041	001	Fathead Minnow (P. promelas)	EPA 1000 (EPA-821-R-02-013)
113.050	005	Daphnid (C. dubia)	EPA 1002 (EPA/600/4-91/002)
113.051	005	Daphnid (C. dubia)	EPA 1002 (EPA-821-R-02-013)
113.060	020	Green algae (S. capricornutum)	EPA 1003 (EPA/600/4-91/002)
113.061	020	Green algae (S. capricornutum)	EPA 1003 (EPA-821-R-02-013)
113.070	020	Green algae (S. capricornutum)	ASTM E1218-90
113.080	009	Silverside (Menidia spp.)	EPA 1006 (EPA/600/4-91/003)
113.081	009	Silverside (Menidia spp.)	EPA 1006 (EPA-821-R-02-014)
113.090	012	Mysid (M. bahia)	EPA 1007 (EPA/600/4-91/003)
113.091	012	Mysid (M. bahia)	EPA 1007 (EPA-821-R-02-014)
113.120	008	Topsmelt (A. affinis)	EPA 600/R-95/136
113.120	014	Pacific oyster (C. gigas)	EPA 600/R-95/136

113.120	015	Sand dollar (D. excentricus)	EPA 600/R-95/136
113.120	016	Pacific mysid (H. costata)	EPA 600/R-95/136
113.120	017D	Purple sea urchin (S. purpuratus)	EPA 600/R-95/136, Fertilization Test
113.120	017E	Purple sea urchin (S. purpuratus)	EPA 600/R-95/136, Development Test
113.120	019	Mussels (Mytilus spp.)	EPA 600/R-95/136
113.120	022	Giant kelp (M. pyrifera)	EPA 600/R-95/136
113.120	023	Red abalone (H. rufescens)	EPA 600/R-95/136
113.140	024	Green algae (S. costatum)	ASTM E1218-90
113.140	025	Diatom (T. pseudonana)	ASTM E1218-90

Field of Testing: 114 - Inorganic Chemistry of Hazardous Waste

114.020	001	Antimony	EPA 6020
114.020	002	Arsenic	EPA 6020
114.020	003	Barium	EPA 6020
114.020	004	Beryllium	EPA 6020
114.020	005	Cadmium	EPA 6020
114.020	006	Chromium	EPA 6020
114.020	007	Cobalt	EPA 6020
114.020	008	Copper	EPA 6020
114.020	009	Lead	EPA 6020
114.020	010	Molybdenum	EPA 6020
114.020	011	Nickel	EPA 6020
114.020	012	Selenium	EPA 6020
114.020	013	Silver	EPA 6020
114.020	014	Thallium	EPA 6020
114.020	015	Vanadium	EPA 6020
114.020	016	Zinc	EPA 6020
114.041	001	Arsenic	EPA 7061A
114.103	001	Chromium (VI)	EPA 7196A
114.140	001	Mercury	EPA 7470A
114.141	001	Mercury	EPA 7471A
114.171	001	Selenium	EPA 7741A
114.221	001	Cyanide, Total	EPA 9012A

Field of Testing: 115 - Extraction Test of Hazardous Waste

115.010	001	Extraction Procedure Toxicity (EPTox)	EPA 1310A
115.021	001	TCLP Inorganics	EPA 1311
115.022	001	TCLP Extractables	EPA 1311
115.030	001	Waste Extraction Test (WET)	CCR Chapter11, Article 5, Appendix II
115.040	001	Synthetic Precipitation Leaching Procedure (SPLP)	EPA 1312

Field of Testing: 117 - Semi-volatile Organic Chemistry of Hazardous Waste

117.010	001	Diesel-range Total Petroleum Hydrocarbons	EPA 8015B
117.016	001	Diesel-range Total Petroleum Hydrocarbons	LUFT
117.110	000	Extractable Organics	EPA 8270C
117.210	000	Organochlorine Pesticides	EPA 8081A
117.220	000	PCBs	EPA 8082
117.240	000	Organophosphorus Pesticides	EPA 8141A
117.250	000	Chlorinated Herbicides	EPA 8151A

Field of Testing: 120 - Physical Properties of Hazardous Waste

120.040	001	Reactive Cyanide	Section 7.3 SW-846
120.050	001	Reactive Sulfide	Section 7.3 SW-846
120.070	001	Corrosivity - pH Determination	EPA 9040B
120.080	001	Corrosivity - pH Determination	EPA 9045C

As of 09/23/2004 , this list supersedes all previous lists for this certificate number.
Customers: Please verify the current accreditation standing with the State.

Appendix 3

Sampling Methods

10 pages

Appendix 3
Sampling Methods

A. Analysis

An analysis of each hazardous waste must be obtained before treating, storing, or disposing of any such hazardous waste. The analysis must contain all of the information which must be known to properly process the waste in accordance with the applicable regulations. The analysis may be completed by one of the following:

1. Data Analysis

Data from the production process that created the waste, which provides all of the required information (e.g., "out of specification" batch of explosive). Documentation and controls must have been sufficient to assure correct and complete data.

2. Laboratory Analysis

Laboratory analysis of a representative sample of the waste to obtain detailed chemical and physical data to the extent necessary to treat, store, or dispose of the material. The sampling methods and equipment used for sampling waste materials will vary with the form and consistency of the waste materials lobe samples. Samples collected using the sampling protocols listed below (as updated), for sampling waste with properties similar to the indicated materials, will be considered to be representative of the waste (See 40 CFR, Part 261, Appendix 1).

Extremely viscous liquid-ASTM Standard D140-70

Crushed or powered material — ASTM Standard D346-75

Soil or rock-like material ASTM Standard D420-69

Soil-like material ASTM Standard 01452-65

Fly Ash-like material — ASTM Standard D2234-76

Containerized liquid wastes - 'COLIWASA" described in "Test Methods for the Evaluation of Solid Waste, Physical/Chemical Methods, SW-846, Third Edition, 1986 (as updated)", Chapter Nine, page Nine - 49.

Liquid wastes are not managed in pits, ponds, lagoons, and similar reservoirs at the Pacific Scientific (PSEMC) site.

B. Procedures

1. General

This section addresses the development and implementation of a scientifically credible sampling plan for a waste material and documentation of the chain-of-custody for such a plan. The physical and chemical diversity of the waste materials, as well as the dissimilarity of storage facilities and sampling equipment associated with them, do not allow a detailed consideration of any specific sampling plan.

2. Objective

A Sampling plan must be designed and used by PSEMC personnel when taking samples of waste hazardous materials for testing and analysis. See the PSEMC form entitled 'Sampling Plan for Waste Materials" for guidance. An appropriate sampling plan for solid waste must be responsive to both regulatory and scientific objectives Once those objectives have been clearly identified, a suitable sampling strategy can be developed. The primary objective of any waste sampling effort is to obtain information that can be used to evaluate a waste. It is essential that the specific information needed and its uses are defined in detail at the beginning of the determination of a sampling plan.

3. Requirements

The EPA, in its hazardous. waste management system, has required that certain solid wastes be analyzed for physical and chemical properties. It is mostly chemical properties that are of concern. Sampling requirements are as follows:

a. **Representation Samples.** Representative samples of the waste water must be collected with the representative samples exhibiting average properties of the whole waste (Sampling accuracy).

b. **Waste Exclusions.** Where petitioning to exclude wastes from being listed as hazardous wastes, enough samples (at least 4) must be collected over a-period of time sufficient to represent the variability of the wastes.

c. **Ground Water Monitoring.** Where monitoring ground water, at least four replicates must be taken from each ground water sample intended for chemical analysis and the mean concentration and variance for each chemical constituent must be calculated from those four subsamples and compared with background levels for ground water.

d. **Sampling Accuracy.** A judgment must be made as to the degree of sampling accuracy and precision that is required to estimate reliably the chemical characteristics of a solid waste. Generally, high accuracy and high precision are required if one or more chemical contaminants of a solid waste are present at a concentration that is close to the applicable regulatory threshold. Alternatively, relatively low accuracy and low precision can be tolerated if the contaminants of concern occur at levels far below or far above their applicable thresholds.

4. Sampling Plan Design

a. Documentation. The sampling plan is usually written document that describes the objectives and details the individual tasks of a sampling effort and how it will be performed. Under unusual circumstances, time may not allow for the sampling to be documented in writing (e.g., sampling during an emergency spill).

b. Design Team. To ensure that the sampling plan is designed properly, the sampling plan should be designed by a team including most or all of the following personnel:

(1) The end user of the data - the person responsible for disposition of the material.

(2) The person who will be taking the sample in the field.

(3) An analytical chemist or other person knowledgeable about the requirements for sampling for sampling collection, preservation, volume, and holding times.

(4) A representative of the manufacturing department, if the material is from a complex manufacturing operation.

(5) A statistician who will review the sampling approach and verify that the resulting data will he suitable.

(6) A quality assurance representative who will review the applicability of standard operating procedures and determine the number of blanks, duplicates, spike samples, and other steps required to document the accuracy and precision of the resulting data base.

c. Statistics. During the implementation of a waste sampling plan or a statistical experiment, an effort is made to minimize the possibility of drawing incorrect inferences by obtaining samples that are representative of a population, in that each sample (1) has the properties and chemical composition of the population from which it is collected, and (2) has them in the same average proportions as are found in the population.

For waste sampling, the usual options arc simple or stratified random sampling. See Chapter 9, section 9.1 of EPA Test Methods for Evaluating Solid Waste, SW-846, for examples and discussion of statistical sampling under a variety of circumstances. When applicable, the number and location of sampling sites must be included in the sampling plan. A diagram is preferred.

d. Waste. The sampling plan must address a number of factors in addition to statistical considerations, An important factor is the waste itself and its properties.

(1) Physical state. The physical state of the waste will affect most aspects of a sampling effort. The sampling device and sample container will vary according to whether the sample is liquid, gas, solid, or multiphasic. The sampling strategy will

have to vary if the physical state of the waste allows for stratification, homogenization or random heterogeneity.

(2) Volume. The volume of the waste will have an effect upon the choice of sampling equipment and strategies.

(3) Hazardous properties. Safety and health precautions and methods of sampling and shipping will vary dramatically with the toxicity, ignitability, corrosivity, and reactivity of the waste.

e. Site. Site specific factors must he considered when designing a sampling plan. An examination of these factors will minimize oversights that can affect the success of sampling.

f. Equipment. The choice of sampling equipment and sample containers will depend upon the previously described waste and site considerations. The project chemist front the laboratory that will perform the analysis should he consulted for recommendations on containers, cleaning, and other considerations which will assure sampling accuracy.

The group designing the sampling plan will chose the sampling device and sample container with consideration of the following factors:

(1) Negative, positive, and cross contamination potential.

(2) Required sample volume.

(3) Ease of use of the sampling device and containers.

(4) Degree of hazard associated with use of the device.

(5) Cost of the sampling device and the labor for its use.

See Table I herein for additional information.

g. Sample containers. Glass containers are relatively insert to most chemicals and can be used to collect and store almost all hazardous waste samples, except those that contain strong alkali and hydrofluoric acid. Plastic containers of polyethylene, polypropylene, and neoprene may be used for sampled materials that do not attack the specific plastic used. Glass or Teflon containers must be used for waste samples that will be analyzed for organic compounds. The containers must have tight, screw-type lids. Cap liners are hot usually required for plastic containers. Teflon cap liners should be used with glass containers supplied with rigid plastic screw caps. If the samples are to be submitted for analysis of volatile compounds, the samples must he sealed in air-tight containers.

Prior to sampling, a detailed equipment list should be complied. The categories of materials that should be considered are:

(1) Personnel Protective Equipment (PPE). Personnel equipment, which will include boots, disposal coveralls, apron, face masks and cartridges, gloves, eye protection, etc.

(2) Safety Equipment. Safety equipment, such as portable eye wash station, and a first-aid kit.

(3) Field Test Equipment. Field test equipment, such as ph meter and Draeger tube samplers.

(4) Containers. An ample supply of containers to address the fact that once in the field, the sampling team may want to collect additional samples.

(5) Shipping and Office Supplies. Shipping and office supplies, such as tape, labels, shipping forms, chain-of-custody forms and seals, field notebooks, scissors, pens, etc.

5. Quality Assurance and Quality Control

Quality Assurance (QA) can briefly be defined as the process for ensuring that all data and the decisions based on these data are technically sound, statistically valid, and properly documented. Quality Control (QC) procedures are the tools employed to measure the degree to which these quality assurance objectives are met.

The PSEMC Support Services Manager shall direct the quality control components of the sampling plan. The laboratory that provides the analysis will be consulted for advice on any sampling of new materials or with new sampling conditions. The lab will provide instruction on duplicates, blanks, etc. that they will need. The internal procedures used by the state certified laboratory will not require detailed review by PSEMC.

Quality control requirements for specific analytical methods are given in detail in each method in thc EPA manual, SW-846, "Test Methods for Evaluating Solid Waste".

6. Health and Safety

Safety and health must be considered when implementing a sampling plan. A comprehensive health and safety plan consists of 1) monitoring the health of personnel, 2) routine safety procedures, and 3) emergency procedures.

a. Health Assessments. PSEMC employees who perform field work must have health assessments as directed by a physician. The assessments will be designed to verify initial health of an employee to be satisfactory to do the assigned work, to ensure the maintenance of good health, and to detect early signs of bodily reactions to chemical exposures.

b. Training. PSEMC employees who perform field work must have training on common routes of exposure to chemicals, the proper use of safety equipment, and in the proper use of personal protective equipment. All the necessary protective equipment shall be supplie

c. First Aid. PSEMC employees who perform field work must be aware of basic first aid and have training in emergency response in injury or chemical exposure to themselves and to others in the field crew. They shall be supplied with first aid equipment and a method of immediate communication if an injury or other emergency situation occurs.

Table III-3. Sampling Equipment for Particular Waste Types, Waste Location or Container

Waste Location or Container

Waste Type	Drum	Sacks & bags	Open-Bed Truck	Closed-Bed Truck	Storage tanks or Bins	Waste Piles	Ponds, Lagoons & Pits	Conveyor Belt	Pipe
Free-flowing liquids and slurries	Coli-[1] wasa	N/A	N/A	Coli-wasa	Weight-ed[2] Bottle	N/A	Dipper[3]	N/A	Dipper
Sludges	Trier[5]	N/A	Trier	Trier	Trier				
Moist powders or granules	Trier	Trier	Trier	Trier	Trier	Trier	Trier	Shovel	Dipper
Dry powders or granules	Thief[4]	Thief	Thief	Thief		Thief	Thief	Shovel	Dipper
Sand or packed powders and granules	Auger[6]	Auger	Auger	Auger	Thief	Thief		Dipper	Dipper
Large-grained solids	Large Trier	Large Trier	Large Trier	Large Trier	Large Trier	Large Trier	Large Trier	Trier	Dipper

1. **Composite Liquid Waste Sampler (Coliwasa).** The Coliwasa is a device employed to sample free-flowing liquids and slurries contained in drums, shallow tanks, pits, and similar containers. It consists of a glass, plastic, or metal tube equipped with an end closure that can be opened and closed while the tube is submerged in the material to be sampled.
2. **Weighted Bottle.** This sampler consists of a glass or plastic bottle, sinker, stopper, and a line that is used to lower, raise, and open the bottle. The weighted bottle samples liquids and free-flowing slurries.
3. **Dipper.** The dipper consists of a glass or plastic beaker clamped to the end of a two or three-piece telescoping aluminum or fiberglass pole that serves as the handle.
4. **Thief.** A thief consists of two slotted concentric tubes, usually made of stainless steel or brass. The outer tube has a conical pointed tip that permits the sampler to penetrate the material being sampled. The inner tube is rotated to open and close the sampler.
5. **Trier.** A trier consists of a tube cut in half lengthwise with a sharpened tip that allows the sampler to cut into sticky solids and to loosen soil. A trier samples moist or sticky solids with a particle diameter less than one-half the diameter of the trier.
6. **Auger.** An auger consists of a sharpened spiral blades attached to a hard metal central shaft.

SAMPLE NUMBER ____________________

(From Sample Log Book)

PROJECT NAME ____________________

PROJECT NO. ____________________

CHAIN OF CUSTODY RECORD AND REQUEST FOR ANALYSIS

SHEET NO. ______ OF ______

SAMPLER (S) SIGNATURE ____________________

ADDRESS OR EMPLOYEE NO. ____________________

SAMPLE IDENTIFICATION	SAMPLE SITE OR SOURCE	DATE SAMPLED	SAMPLE TYPE				COMP	GRAB	PROBABLE CONTENT	NO. OF CONTAINERS	TIME COLLECTION BEGINS	INITIAL	TIME COLLECTION COMPLETED	INITIAL	FIELD PARAMETERS
			WATER	SOLID	GAS/AIR	OIL									
LAB ID NUMBER	TIME RECEIVED	DATE RECEIVED	EPA METHOD						ANALYZE FOR	NO. OF SAMPLES	LAB REMARKS				

SAMPLE IDENTIFICATION	SAMPLE SITE OR SOURCE	DATE SAMPLED	SAMPLE TYPE				COMP	GRAB	PROBABLE CONTENT	NO. OF CONTAINERS	TIME COLLECTION BEGINS	INITIAL	TIME COLLECTION COMPLETED	INITIAL	FIELD PARAMETERS
			WATER	SOLID	GAS/AIR	OIL									
LAB ID NUMBER	TIME RECEIVED	DATE RECEIVED	EPA METHOD						ANALYZE FOR	NO. OF SAMPLES	LAB REMARKS				

SAMPLE IDENTIFICATION	SAMPLE SITE OR SOURCE	DATE SAMPLED	SAMPLE TYPE				COMP	GRAB	PROBABLE CONTENT	NO. OF CONTAINERS	TIME COLLECTION BEGINS	INITIAL	TIME COLLECTION COMPLETED	INITIAL	FIELD PARAMETERS
			WATER	SOLID	GAS/AIR	OIL									
LAB ID NUMBER	TIME RECEIVED	DATE RECEIVED	EPA METHOD						ANALYZE FOR	NO. OF SAMPLES	LAB REMARKS				

RELINQUISHED BY NAME ____________________ DATE/TIME ____________ RECEIVED BY NAME ____________ DATE/TIME ____________

RELINQUISHED BY NAME ____________________ DATE/TIME ____________ RECEIVED BY NAME ____________ DATE/TIME ____________

RELINQUISHED BY NAME ____________________ DATE/TIME ____________ RECEIVED BY NAME ____________ DATE/TIME ____________

AUTHORIZATION FOR DISPOSAL ____________________ DATE/TIME ____________ RECEIVED BY NAME ____________ DATE/TIME ____________

Form 1588 A 12/90

PACIFIC SCIENTIFIC

SAMPLING PLAN FOR WASTE MATERIALS

Plan Writer: ______________________ Date: ______________________

Sampling Site and Sampling Method: ______________________

____

Description of Waste to be Sampled: ______________________

____

____

Primary Objective Plan:

____

____

Specific Sampling Objectives: ______________________

____

Lab: ______________________

Telephone: ______________________

Sampling Analysis Requested: ______________________

Sample Container Type and Size Used: ______________________

____

Number of Samples: ____________ Composite: ______________________

Sampling Instructions: ______________________

____

____

Preparation of Sample Devices and Sample Containers: ______________________

____

____

Samples: ______________________

Contamination Potential Warnings: ______________________

____

Hazardous Characteristics of the Waste: ______________________

____

____

PACIFIC SCIENTIFIC

SAMPLING PLAN FOR WASTE MATERIALS

Health and Safety Plan: ______________________________

____

____

Personal Protection Required by Sampler ______________________________

____

____

Warning Properties or Monitoring by: ______________________________

____

____

Emergency Procedures: ______________________________

____

____

Manufacturing Data Input by: ______________________________

____

Environmental Technician: ______________________________

____

Chief Environmental Officer
Approval/Signature: ______________________ Date: ______________

Notes/Changes: ______________________________

____

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____

____

____

____

Appendix 4

TSU-1 Engineering Certification

12/3/2002 14 pages

ATI
ARCHITECTS and ENGINEERS

6 Hangar Way
Watsonville, CA 95076
T: 831.761.6222
F: 831.761.1121

3860 Blackhawk Road
Danville, CA 94506
T: 925.648.8800
F: 925.648.8811

5901 Christie Avenue, #301
Emeryville, CA 94608
T: 510.420.1693
F: 510.420.1691

4200 East Avenue
Livermore, CA 94550
T: 925.447.4017
F: 925.447.9360

2510 Douglas Boulevard
Roseville, CA 95661
T: 916.772.1800
F: 916.772.1820

December 17, 2002

Charles Martin
Manager, Support Services
McCormick Selph, Inc.
3601 Union Road
Hollister, CA 95024-0006

Subject: Updated Certification of TSU-1
McCormick Selph, Inc. Hollister facility
Inspection Date - December 3, 2002
ATI Project M7102

Dear Mr. Martin:

McCormick Selph, Inc. Hazardous Waste treatment unit TSU-1 was inspected on December 3, 2002 by ATI Architects and Engineers to evaluate unit TSU-1 with respect to the requirements of California Code of Regulations (CCR) Section 66264.

Inspection and Review

The treatment unit inspected was TSU-1 – Hazardous Waste Treatment Unit for thermal deactivation of hazardous waste reactives by open burning.

Previous certification: TSU-1 was certified by Charles A. Fisher, California Registered Civil Engineer No. 16073, dated June 19, 1998. It is attached as Appendix 4 of the Part B Application from McCormick Selph, Inc. dated June 28, 2002

The following items were reviewed in updating the certification of TSU-1:

1. Structural Strength – is documented in Appendix 4 of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.
2. Design Standards – is documented in Appendix 4 of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.
3. Characteristics of wastes – the resultant waste from the treatment process is intermittently, lead contaminated ash and debris, and non-hazardous waste. This waste stream is removed from the treatment unit as soon as possible for proper disposition.
4. Existing corrosion protection measures – inspected with no leaks observed.
5. Results of prior tanks tests – none were documented; no tanks present.
6. Integrity of secondary containment – No free liquids are treated at TSU-1; therefore, there is no requirement for secondary containment to contain liquids. However, the concrete floor and the concrete walls above grade (see also item 9 below) were inspected with no cracks in the concrete observed.
7. Secondary containment structural calculations – there is no secondary containment requirement as the treatment combusts solid wastes and, therefore, there is no liquid residue requiring secondary containment.
8. Ancillary equipment – was inspected and is documented in Appendix 4 of Part B Application from McCormick Selph, Inc. dated June 28, 2002.

9. Rain water infiltration – McCormick Selph, Inc. cleans any residue from the combustion of explosive hazardous wastes as soon after the treatment as possible so there is no residue remaining on the concrete floor. The concrete walls of the unit and overhanging roof significantly limit rainwater intrusion to periods of excessive wind and rain. In the rare event of rainwater intrusion, the vast majority of any treatment residue remains dry as it is elevated by the concrete treatment tubes which are approximately one foot thick. Any rainwater infiltration quickly evaporates naturally. Rainwater infiltration diversion equipment was included in the design and construction of the unit.
10. Secondary containment leak detection – there is no secondary containment required as the treatment combusts solid wastes and, therefore, there is no liquid residue requiring secondary containment. The treatment unit is monitored every 24 hours and inspected once every week.
11.

Certification

Unit TSU-1 located at the McCormick Selph, Inc. facility in Hollister, California, is certified per the applicable requirements of California Code of Regulations (CCR) Section 66264 for the treatment of solid hazardous (explosive) wastes listed in Tables III-1 and Table III-2 of Part B Application from McCormick Selph, Inc., dated June 28, 2002.

It is understood that it is not technically or economically feasible to provide total assurance of the suitability of designed or installed, existing equipment and facilities for the service. ATI and David E. Powell, P.E., have used not less than customary care and skill ordinarily employed by engineers engaged in the type of services provided, namely, evaluation and assessment certification. However, ATI and David E. Powell, P.E., make no warranty of any kind, either expressed or implied, as to its estimates, findings, recommendations, advice, specifications or other professional services.

I certify that under the penalty of law that this document and all attachments were prepared under my direction or supervision with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of Mr. Charles Martin, of McCormick Selph, Inc., the information provided/reviewed is, to the best of knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of imprisonment for knowing violations.

LICENSED PROFESSIONAL ENGINEER
David E. Powell
No. CH005122
Exp. 06/30/04
CHEMICAL
STATE OF CALIFORNIA

CERTIFICATION

David E. Powell
Director, Process Engineering

California Registered
Chemical Engineer No. 5122

F:\PF\M7102\CERTIFICATIONS\Letter 1 report and certification TSU1-1.doc

Reference Documents

1. Table III-1 and III-2, regarding "Hazardous Waste Stored in Containers", from Chapter III of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.
2. Chapter IV of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.
3. Appendix 4 of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.

Certification

I certify that the hazardous materials listed in the Teledyne McCormick Selph waste Operations Plan and treated in Teledyne McCormick Selph's TSU 1 and TSU 2 hazardous waste treatment units are explosive/reactive materials capable of causing a detonation as defined in the referenced federal statute.

Teledyne McCormick Selph

T. Gold, P.E., #230
Assistant Director
Resource Protection

Date: 2/6/91

AUSONIO INCORPORATED

July 8, 1998

Rick Hutton
PES Environmental
1682 Novato Blvd. Suite 100
Novato, Ca 94947

SUBJECT: Teledyne Ryan Aeronautical
McCormick Selph Ordnance

Dear Mr Hutton:

The drawings sent to you from Varco-Pruden dated 6/29/98 and Lewis Engineering dated 7/7/98 for the roof canopies and canopy foundations were revised to withstand an over-pressure force of 0.141 psi as was requested by Charlie Martin in his memo to us dated June 5, 1998. This over-pressure force is in addition to the 70 MPH wind load Uniform Building Code requirement.

As stated in Charles A Fisher's letter if June 19, 1998, the concrete barrier walls as originally designed are sufficient to withstand the 0.201 psi over-pressure force.

Hopefully, this clarifies the intent of the revisions. If you have any further questions or comments, please feel free to call Mog Cabatu or me.

Sincerely,

Andrew P Ausonio

Andrew P. Ausonio, P.E.
President

11420 A Commercial Parkway • Castroville, CA 95012
Contractor's License Number 682308
(408) 633-3371 Castroville • 649-6044 Monterey
662-0721 Watsonville • 633-3389 Fax

3601 Union Road P.O. Box 6 Hollister, CA 95024-0006	**TELEDYNE RYAN AERONAUTICAL McCORMICK SELPH ORDNANCE**	FAX/E-Mail No. 633 3389
Facsimile No. (408) 637-54940 Verification 8am to 4:45pm PST (408) 637-3731, Ext. 328	**FACSIMILE TRANSMISSION**	COMMUNICATIONS LOG Message No. 5 Date Sent: 6 15 Initials:____ Time Sent:____

TO: Steven Tibbs

FROM: Charlie Martin CM

TRA/MSO Engineers recently completed over-pressure calculations associated with proposed ordnance treatment operations and proposed TSU-1 modifications. Calculations suggest the roof structure and walls would encounter pressures of 0.141 psi and 0.201 psi respectively. Please advise.

CHARLES A. FISHER, CEEG RCE 16073 EG 262

♦♦♦

975 CLUBHOUSE DRIVE ♦ APTOS,CALIFORNIA 95003 ♦ USA
Phone 408-662-0159 ♦ Fax 408-685-0103 ♦ Email FIVEFISH@MSN.COM

TELEDYNE RYAN AERONAUTICAL
McCORMICK SELPH ORDONANCE
3601 UNION ROAD
P.O. BOX 6
HOLLISTER, CA 95024-0006

JUNE 19, 1998

TSU-1 MODIFICATIONS
RE: CONCRETE BARRIER WALLS (YOUR MESSAGE NO.5)

TO: CHARLIE MARTIN

THE CONCRETE BARRIER WALLS DESIGNED ARE SUFFICIENT TO WITHSTAND OVER-PRESSURE FORCES OF 0.201 PSI. DESIGN CODE REQUIREMENTS FOR SEISMIC FORCES EXCEED THE REQUIREMENTS TO RESIST SHOCK WAVES THAT OCCUR FROM EACH DETONATION BLAST. SEE ATTACHED CALCULATIONS.

SINCERELY,

CHARLES A. FISHER

REGISTERED PROFESSIONAL ENGINEER
CHARLES A. FISHER
No. 16073
6-30-2001
CIVIL
STATE OF CALIFORNIA

VP Buildings

LETTER OF CERTIFICATION

(Project Name: 4384Teledyne Ryan Aeronautical)
(VP Quote No.: CA98021470-000)
(VP Order No.:)

DATE: 06/19/98
TIME: 16:44
PAGE: 02 of 33

I89,11 (TSU-1 Modifications, Unit I)

LETTER OF CERTIFICATION

Contact: Dennis Lefaver
Name: Advantage Construction
Address: 856 Monterey
City/State: Hollister , CA 95023

Job Disposition : Submit Dwgs & Calcs For Appl (F)
MBMA End Use Code: 4 - Manufring. Production

****** PROJECT REFERENCE ****** I89,11

Project Name : 4384Teledyne Ryan Aeronautical
VP Job No.:
Customer Name: Ausonio Incorporated
Street: 3601 Union Rd.
City/State: Hollister, CA 95023
(County : San Benito)

This is to certify that the above referenced VP BUILDINGS project has been designed for the applicable portions of the following Building Code and in accordance with the order documents which have stipulated the following applied environmental loads and conditions:

Overall Width: 28/0/0 Overall Length: 66/0/0 Max/Min Eave Height: 27/1/8 23/0/0 Roof Pitch: 0.750/ 12

Roof Live Load = 20.00 PSF
Reduced Live Load (Bldg)= Yes

Ground Snow Load = 0.00 PSF
Roof Snow Load (flat) = N/A

Wind Load Pressure = 35.00 PSF
Wind Exposure Category = C
Rainfall Intensity = 4.0 Inches per Hour

Building Code/Year = 94UBC
[1994 Uniform Building Code]

Seismic Zone = 4
Building Use Category = 4
Rf Sht+Sundry Dead Ld = 2.84 PSF
Add'l Gravity Collateral = 0.00 PSF
Add'l Uplift Collateral = 0.00 PSF
(User Imposed Loads)

Distance to Coast = 0 Mile
Bldg Enclosure Category = Open

Bldg Base Elevation = 0/0/0
Snow Exposure Category = 3
Thermal Category = 1
Snow Load % for Seismic = 0.0
Built-up Section Spec. = 1989 AISC
Cold-Form Spec. = 1989 AISI
Allow Overstress Ratio = 1.030

1 6/19

The steel design is in accordance with VP BUILDINGS standard design practices, which have been established based upon pertinent procedures and recommendations of the following organizations :

American Institute of Steel Construction (AISC), 9th Edition
American Iron and Steel Institute (AISI), 1986 Edition w/ 1989 Addendum
American Welding Society (AWS) [D1.1]
American Society for Testing and Materials (ASTM)
Metal Buildings Manufacturers Association (MBMA)
AISC Category MB Manufacturer Certification.

This certification DOES NOT apply to the design of the foundation or other on-site structures or components not supplied by VP BUILDINGS, nor does it apply to unauthorized modifications to framing systems provided by VP BUILDINGS.

Furthermore, it is understood that certification is based upon the premise that all components furnished by VP BUILDINGS will be erected or constructed in strict compliance with pertinent documents furnished by VP BUILDINGS.

Sincerely,

Ronald Bennett

VP BUILDINGS

REGISTERED PROFESSIONAL ENGINEER
RONALD W. BENNETT
No. C050732
Exp. 9/30/01
CIVIL
STATE OF CALIFORNIA

Prepared by: SML
Reviewed by:

CHARLES A. FISHER, CEEG
Civil Engineer - Surveyor - Geologist
975 Clubhouse Drive
APTOS, CA 95003
(408) 662-0159
FAX (408) 685-0103

JOB 98003 TELEDYNE HOLLISTER
SHEET NO 2 OF
CALCULATED BY DATE 2-19-98
CHECKED BY REV DATE 6-16-98
SCALE

TSU-1 MOD STRUCTURAL DESIGN

CONCRETE BARRIER WALLS H=8', 6', 5'
SEISMIC ZONE 4 = 0.4
IMPORTANCE FACTOR = 1
$C_p = 0.75$
$F_p = ZI_pC_pW_p = 0.4 \times 1.0 \times 0.75\,W_p = 0.3\,W_p$

MOM @ BASE = 150×0.3 = 45#/1 ×8×4 = 1440'#
SHEAR = 45×8 = 360#/1 = 30 PSI

A_s (REQ'D VERT.) = $\frac{1.44^{1K}}{2.48 \times 6}$ = 0.08 < #4@12 = 0.20

P = A_s VERT #4@12 = $\frac{0.20}{12 \times 12}$ = .0014
P = A_s HOR #4@12 = .0014
.0028 > .0025

TENSION @ TOP OF FOUNDATION DUE TO O.T. MOM.

$\frac{1440}{1.5}$ = 960#/1 #4@12' = 0.2×20000 = 4000#/1 > 960
(SEE FOUNDATION CALCS ATTACHED)

LOAD DUE TO BLAST / FT OF WALL = 0.201×144 = 28.9 ≈ 30#/1

MOM DUE TO BLAST = 30×8×4 = 960'# > 1440'# OK

LEWIS ENGINEERING
P.O. Box 1096
Hollister, CA 95024
Phone: (408) 628-3015
Fax: (408) 628-3323

Dated: February 19, 1998
Revised July 5, 1998 for New Loads

Job Number 98002
Job Name: Advantage Teledyne

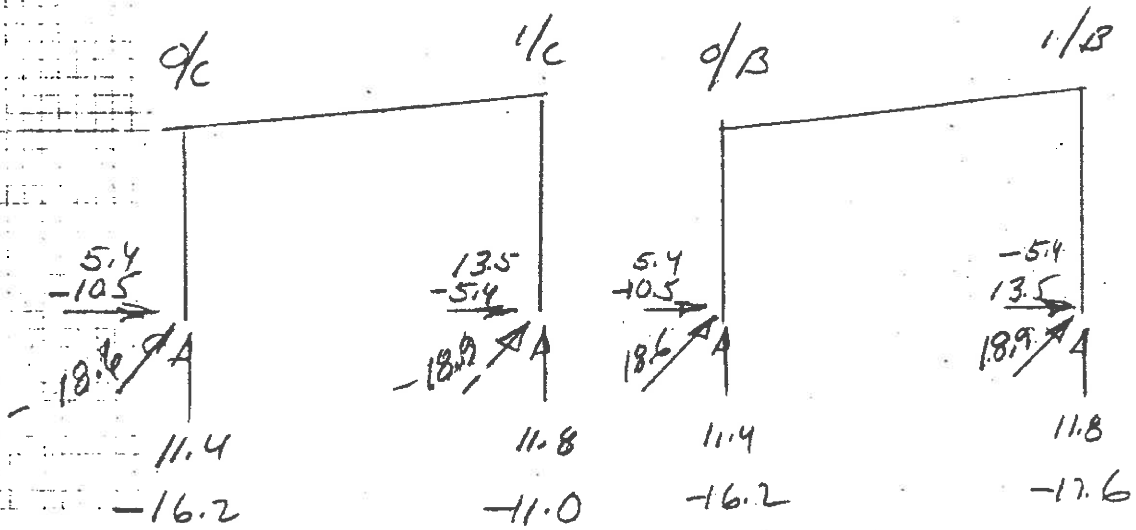
STRUCTURAL CALCULATIONS FOR FOUNDATION FOR TWO 28' X 66' VARCO PRUDEN METAL BUILDINGS TO BE CONSTRUCTED FOR TELEDYNE AS EQUIPMENT COVERS HOLLISTER, CALIFORNIA

prepared by

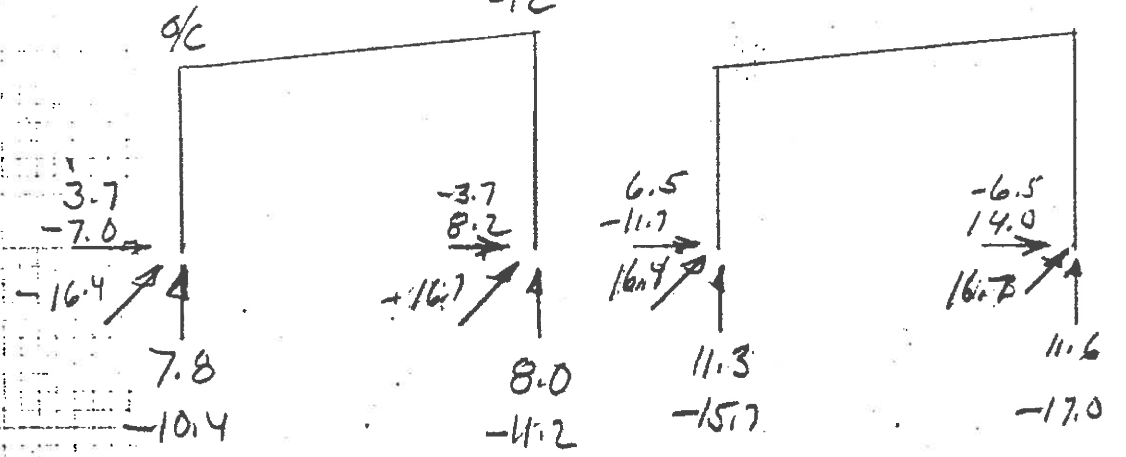
George Lewis
RCE 17611
exp 6/30/01

BY ________ DATE ________ SUBJECT Advantage – Teledyne SHEET NO. 1 OF 5
CHKD. BY ________ DATE ________ JOB NO. 98002

UNIT #1



UNIT #2



MAX VERTICAL DOWN P = 11,800#

FRICTION PIER f = 400 PSF

TRY 2' Ø CAST IN PLACE CONCRETE

R = 2πd 400   d = 4.7' + 2 = 7'0"

CHECK UPLIFT MAX 17,600#

BY .... DATE .... SUBJECT Advantage Teledyne SHEET NO. 2 OF 5

CHKD. BY .... DATE .... JOB NO. 98002

$$R = 2\pi(5)(400)(1.33) + \pi(1)^2(7)150$$

$$= 20{,}012^{\#} > 17{,}600^{\#}$$

Lateral Max = 18,900#

$$d = \frac{A}{2}\left(1 + \sqrt{1 + \frac{4.36h}{A}}\right), \quad A = 2.34P/S_1 b$$

$d = 7'$ $\quad S_1 = \left(\frac{7}{3}\right)(200)(2)$ $\quad b = 2'$ $\quad h = 1'$

$A = 23.69$ $\quad d = 24.74'$

Try 30" Ø 10' deep

$S_1 = \left(\frac{10}{3}\right)(2)(200)$ $\quad b = 2.5$ $\quad h = 1$

$A = 13.27$ $\quad d = 14.28'$

Try 30" Ø 12' deep

$S_1 = \left(\frac{12}{3}\right)(2)200 = 1600$ $\quad b = 2.5$ $\quad h = 1$

$A = 11.06$ $\quad d = \underline{\underline{12'}}$

Use 30" Ø X 12' deep Pier

Peir Moment Design

$M_n = (18{,}900)\left(\frac{12}{3}+1\right) = 94{,}500^{\#\#}$

$A_s = \frac{(94{,}500)(12)}{(20000)(.86)(24)} = 2.75^{\square''}$

Try 4 #8 Ø A_s 3.16 $^{\square''}$

$P = 316/24^2$ 0.0055 np = 0.0549

$K = 0.2809$ $J = 0.9064$

Ms OK by Insp

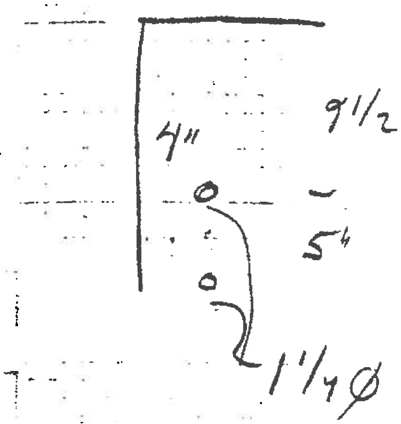
$M_c = (1125)(.2809)(.9064)\frac{1}{2}(24)^3\frac{1}{12}$

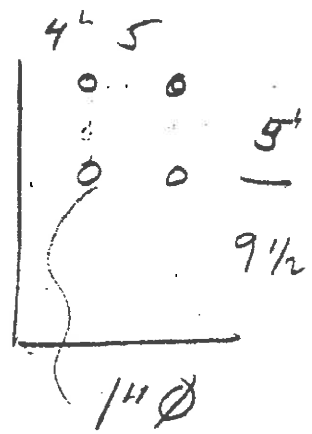
164,986 ✓

SHEAR $\frac{18900}{(\pi)(15)^2} = 26.74$ PSI ✓

Use #4 Ø Ties @ 2", 8", 14", 20"
@ 12" o.c.

BY ________ DATE ________ SUBJECT ADVANTAU SHEET NO. 4 OF 5
CHKD. BY ________ DATE ________ TELEDYNE JOB NO. 98002





MAX SHEAR 18,900#
14,000#
MAX TENSION 17,600#

USE THRUST ANGLE FOR SHEAR

A = 18900/625 30.24 □"
L 2.5 x 2.5 x 1/4 x 10"
14,000/620 22.30 □"

L 2.5 x 2.5 x 1/4 x 9"

UPLIFT CONE PULLOUT

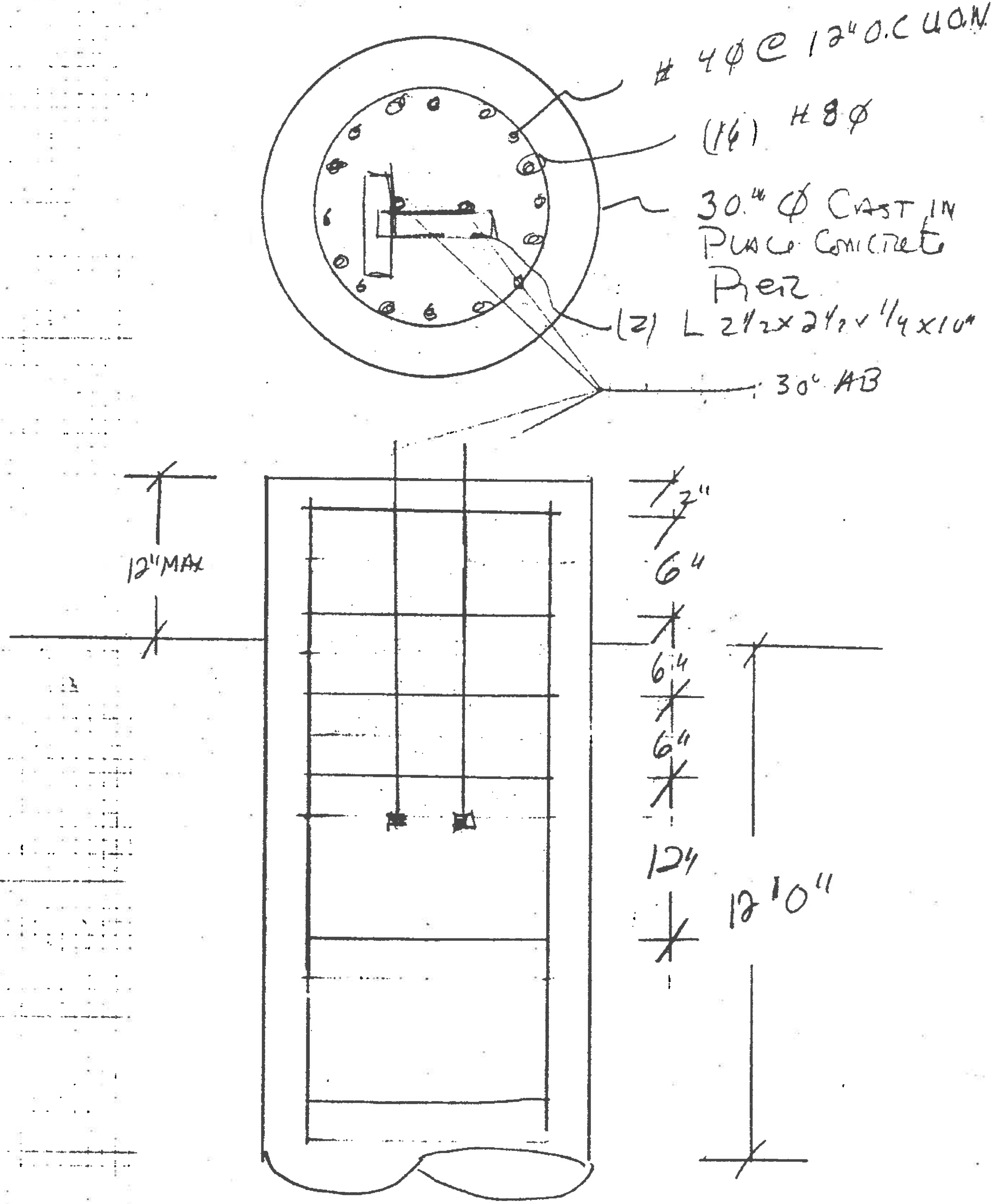
USE AREA OF PIER

$A = \pi (15)^2 = 707$ □"

ALLOW TENS $(707)(1.1)\sqrt{2500} = 38,677$#

MAX TENS 2-1 1/4" Ø 46,600# 4-3/4" Ø 33,600#
4-1" Ø = 60,000#

BY______ DATE______ SUBJECT ADVANTAGE SHEET NO. 5 OF 5
CHKD. BY______ DATE______ TELEDYNE JOB NO. 95002



Appendix 5

TSU-3 Engineering Certification

12/3/2002 103 pages

ATI
ARCHITECTS and ENGINEERS

6 Hangar Way
Watsonville, CA 95076
T: 831.761.6222
F: 831.761.1121

3860 Blackhawk Road
Danville, CA 94506
T: 925.648.8800
F: 925.648.8811

5901 Christie Avenue, #301
Emeryville, CA 94608
T: 510.420.1693
F: 510.420.1691

4200 East Avenue
Livermore, CA 94550
T: 925.447.4017
F: 925.447.9360

2510 Douglas Boulevard
Roseville, CA 95661
T: 916.772.1800
F: 916.772.1820

January 20, 2003

Charles Martin
Manager, Support Services
McCormick Selph, Inc.
3601 Union Road
Hollister, CA 95024-0006

Subject: Updated Certification of TSU-3
McCormick Selph, Inc. Hollister facility
Inspection Date - December 3, 2002
ATI Project M7102

Dear Mr. Martin:

McCormick Selph, Inc. Hazardous Waste Storage Unit TSU-3 was inspected on December 3, 2002 and on January 17, 2003 to verify the status of the information documented in the previous certification and to determine if TSU3 complies with the requirements of California Code of Regulations (CCR) Section 66264.

Inspection and Review

The treatment unit inspected was: TSU-3 – Hazardous Waste Storage Unit for drum storage

Previous certification: TSU-3 was certified by J.W. Schweitzer, California Registered Chemical Engineer No. 3961, dated June 13, 1983. It is attached as Appendix 5 of the Part B Application from McCormick Selph, Inc., dated June 28, 2002

The following items were reviewed in updating the certification of TSU-3.

1. Structural Strength - was documented in Appendix 5 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002
2. Design Standards – were documented in Appendix 5 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002
3. Characteristics of wastes - was documented in Appendix 5 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002
4. Existing corrosion protection measures – inspected with no leaks observed.
5. Results of prior tank tests – none were documented; no tanks present.
6. Integrity of secondary containment – Inspected. There are no problems with the secondary containment.
7. Secondary containment structural calculations – were documented in Appendix 5 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002
8. Ancillary equipment – was inspected and appears to be supported in accordance with normal practices. In addition, no leaks were observed.
9. Rain water infiltration – was documented in Appendix 5 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002 and was observed as not having been

modified since the previous certification. Rainwater is blocked (to a significant degree) from falling on the storage bays by a roof and three concrete walls extending about 2 feet above grade. There is a dedicated, coated sump at one end of each bay to collect any rainwater that may fall in the bay. McCormick Selph, Inc. Environmental Technicians remove rainwater from the sumps when ever necessary.

10. Secondary containment leak detection – The treatment unit is monitored every 24 hours and inspected once every week.

Certification

Unit TSU - 3 located at the McCormick Selph, Inc facility in Hollister, California is certified per the requirements of California Code of Regulations (CCR) Section 66264 for the storage of hazardous wastes listed in the previous certification.

It is understood that it is not technically or economically feasible to provide total assurance of the suitability of designed or installed, existing equipment and facilities for the service. ATI and David E. Powell, P.E., have used not less than customary care and skill ordinarily employed by engineers engaged in the type of services provided, namely, evaluation and assessment certification. However, ATI and David E. Powell, P.E., make no warranty of any kind, either expressed or implied, as to its estimates, findings, recommendations, advice, specifications or other professional services.

I certify that under the penalty of law that this document and all attachments were prepared under my direction or supervision with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of Mr. Charles Martin, of McCormick Selph, Inc., the information provided/reviewed is, to the best of knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of imprisonment for knowing violations.

CERTIFICATION

LICENSED PROFESSIONAL ENGINEER
David E. Powell
No. CH005122
Exp. 06/30/04
CHEMICAL
STATE OF CALIFORNIA

David E. Powell
Director, Process Engineering

California Registered
Chemical Engineer No. 5122

F:\PF\M7102\CERTIFICATIONS\Letter 2 report and certification TSU3.doc

Reference Documents

1. Table III-1, "Hazardous Waste Stored in Containers," from Chapter III of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.
2. Chapter IV of the Part B Application from McCormick Selph Inc., dated June 28, 2002.
3. Appendix 5 of the Part B Application from McCormick Selph Inc., dated June 28, 2002.

IT

IT CORPORATION

RESPONSIVE TO THE NEEDS OF HAZARDOUS WASTE MANAGEMENT

IT

ENVIROSCIENCE

June 15, 1983

Ms. Patricia Childers
Teledyne McCormick Selph
3601 Union Road
P. O. Box 6
Hollister, California 95023

Dear Ms. Childers:

SUBJECT: HAZARDOUS WASTE FACILITY CERTIFICATION

At the request of Teledyne McCormick Selph, IT Enviroscience reviewed drawings and specifications of your hazardous waste facility and inspected the facility itself on February 15, 1983. The facility is described in Teledyne McCormick Selph's Operation Plan, Revision A, dated April 1983.

The requirements of "Instructions for Preparing an Operation Plan for a Hazardous Waste Storage and/or Treatment Facility which Involves Containers and/or Tanks Only," Hazardous Waste Management Branch, California Department of Health Services, Sacramento, California 95814, dated March 3, 1983, pertain to this certification as follows:

A. Section VI.A.5. The design and construction of the container storage area, appurtenant structures, and containers is approved for the intended use. The following conditions and clarifications form the basis for this certification:

   1. Containers are selected as DOT approved containers and are reviewed for compatibility and condition as described in the above-referenced Operation Plan, Page III-5.

   2. Container storage area design as shown in Exhibit 9 of the Operation Plan has been reviewed, (Attachment 1). The collection sump should be reinforced as shown. Periodic inspection of the container storage area collecting sump and prompt repair of cracks is required. Such inspection should occur at weekly intervals. It is recommended that the container storage area sump be added to the checklist of weekly inspections of Exhibit 15 of the Operation Plan.

3. Structural drawings and calculations for the container storage area roof structure were prepared by Varco-Pruden Buildings, (Attachment 2).

4. Containment volume of each section of containment sump is 900 gallons; there are four sections for a total unit capacity of 3,600 gallons. Section VI.A.2.C. of the instructions for preparing an operation plan requires the capacity of the containment system to contain precipitation from a 24-hour, 25-year storm, plus either 10 percent of the volume of containers or 100 percent of the volume of the largest container, whichever is greater.

   Because the unit has a roof, the volume of rainwater which the unit would have to contain during a 24-hour, 25-year rainfall is not known. However, based on the assumptions of Attachment 3, the containment volume is marginal, except for small volumes of stored material.

   Neglecting the requirement for rainfall storage capacity, the maximum container size and total capacity for each section of the containment unit would be 900 gallons and 9,000 gallons, respectively. Based on the assumptions of Attachment 3 and the requirements of DHS instructions, containment volume is marginal for container capacity and total capacity in excess of 25 gallons and 250 gallons, respectively, for each of the four containment sections.

B. Section VI.B.9. The design and construction of tanks 57683 and 57684 are approved for the intended uses based on the following conditions and clarifications:

1. Mechanical calculations (Attachment 4) were based on the estimated maximum specific gravity of tank contents, as listed in Exhibit 4 of the Operation Plan.

2. Compatibility data is not available for all materials listed in Exhibit 4 of the Operation Plan. The tanks are suitable for a broad range of inorganic and organic materials, (Attachment 5). Test strips are available from the tank manufacturer, Polycal Plastics, Inc., to test for chemical attack. Because the specialty chemical manufacturing operations supply wastes to the tank, new wastes should be checked for compatibility by immersion of a test strip prior to storage in the tank. In general, any visually observable physical change in the material or weight loss of the strip should result in the waste not being stored in the tank.

3. Tank condition data are included as Attachment 6.

C. Section VI.B.9. Tank #5042 is approved for its intended use under the following conditions and with the following clarifications:

1. Mechanical analysis shows the tank to be unsuitable for storage of material having a specific gravity of greater than 1.0. Materials listed in Exhibit 4 of the Operation Plan which have specific gravity greater than 1.0 should not be stored in the tank until the compression ring described in Attachment 4 is installed.

2. Anchor bolts should be installed in the slab to anchor the tank support legs. The seismic factor of safety is acceptable, but nearly at the allowable 2.0 (Attachment 8). Anchor bolts would increase the margin of safety.

3. A portion of the discharge piping from the tank to the truck loading area is Kynar lined. Kynar is unsuitable for use with ketones such as acetone and MEK (see Attachment 9), and for primary amines, especially at elevated temperatures. These chemicals are listed in Exhibit 4 of the Operation Plan and should not be discharged through the Kynar pipe without first checking its serviceability for the particular waste.

4. Tank condition data are included as Attachment 10.

D. Section VI.B.9. The design and construction of the 300-gallon reactor vessel is approved for its intended use as described in the Operation Plan. The following conditions and clarifications are the basis for this certification:

1. Mechanical calculations of Attachment 4.

2. Inspection of the vessel on February 15, 1983, by IT Enviroscience and on May 31, 1983, by Ashcraft Associates.

3. Discussions between the vessel manufacturer and IT Enviroscience on June 1, 1983, as documented in Attachment 4.

J. W. Schweizer

J. W. Schweizer
Professional Engineer
Certificate No. 3961

REGISTERED PROFESSIONAL ENGINEER
JOHN W. SCHWEIZER
C-1?
CHEMICAL
STATE OF CALIFORNIA

J. W. Schweizer

JWS/paf

bcc: J. Clark
J. Shellooe

4. As-inspected Condition: The tanks are presently not being used for handling materials and are being used for storage of sulfuric acid sludge. The following modifications should be made to piping and fittings prior to use of the tanks for routine handling of chemicals.

   a. Piping for tank discharge should be rigidly supported from the tank slab to prevent damage to tank bulkhead fittings. All tank connections should be made with flexible couplings. (See Attachment 7 for manufacturer's suggested arrangement.)

   b. Fill and vent piping: Piping should not be supported on the tank. Support structures should meet Uniform Building Code (UBC), Zone 4 requirements.

   c. Vents should be sized in accordance with American Petroleum Institute Standards (API 2,000) and the National Fire Code (NFC #30).

   d. Piping connections to the tanks should be made with flexible couplings. These tanks flex considerably as they are filled or emptied.

   e. Route vent/overflow piping to prevent exposure to personnel. Tank covers should not be used for vent or overflow, since personnel may be exposed when examining tank contents.

   f. Tanks should have a level indicator.

   g. If routine access to top manholes is required, an OSHA-approved ladder should be provided, or a platform built which meets UBC requirements.

   h. Although not specifically required by UBC (Attachments 4 and 8), installation of manufacturer's seismic restraint should be considered to give an additional margin of safety, particularly to reduce the potential for relative motion between the tank and fixed piping.

   i. PVDF (KYNAR) sample valves are not suitable for use with strongly polar solvents, such as acetone and MEK or oxidizing aromatics, such as primary amines (Attachment 9). PVDF sample valves located in the discharge piping should be removed when such chemicals, which are listed in Exhibit 4 of the Operation Plan, are stored in the tank.

ATTACHMENT 1

PO # 15-1360

TELEDYNE McCORMICK SELPH

CHEMICAL STORAGE PAD

OR PLC DATE 6/9/83

PROBLEM: REVIEW THE ADEQUACY OF CONCRETE SLAB-ON-GRADE AND COLLECTING TRENCH

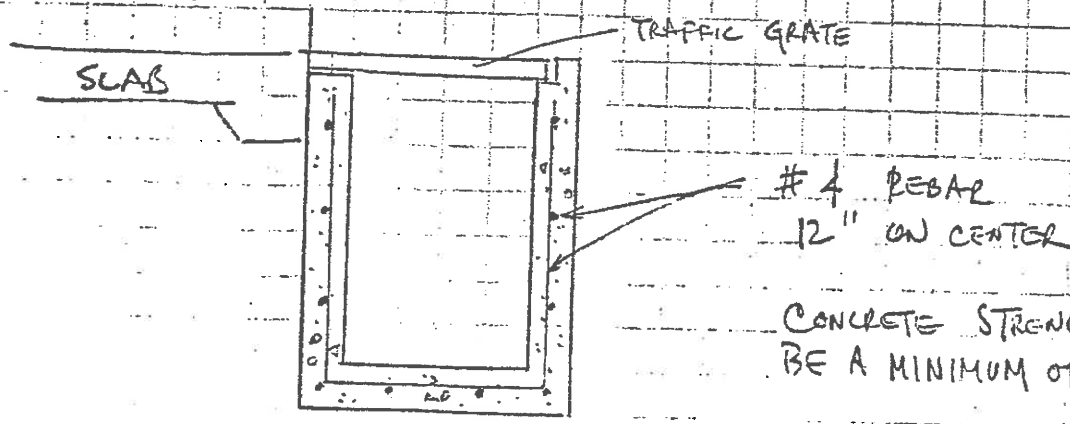
1. CONCRETE SLAB-ON-GRADE

6" THICK SLAB WITH #4 REBAR 12" CENTER TO CENTER EACH WAY WILL ABLE TO SUPPORT APPLIED LOAD UP TO 500 psf. A FORKLIFT WITH DRUMS IS RATED LESS THAN 500 psf. THEREFORE, THE SLAB WILL PERFORM ITS INTENDED PURPOSE

2. COLLECTING SUMP

THE TRAFFIC GRATE (MIN SUPPORT 2000 lbs/in) IS ACCEPTABLE.

THE COLLECTING SUMP SHOULD BE REINFORCE AS FOLLOW IN ORDER MINIMIZE SHRINKAGE AND TEMPURATURE CRACKS.



CONCRETE STRENGTH SHOULD BE A MINIMUM OF 3000 psi

ATTACHMENT 2

VARCO-PRUDEN BUILDINGS
AMCA INTERNATIONAL

DATE: August 27, 1982

JOB NO.: 45591

FOR: Teledyne-McCormck Selph

AT: Hollister, California

Gentlemen;

This letter certifies that the above mentioned Varco Pruden Building System has been designed in accordance with Varco Pruden standard design practices which have been established based upon pertinent procedures and recommendations of such organizations as AISI, AISC, AWS, MBMA, ASTM AND UBC.

The structural integrity of the framing systems and components fabricated by Varco Pruden have been checked by the undersigned Professional Engineer.

Varco Pruden has been issued a Certificate of Approval Number 636 by the Board of Building and Safety Commissioners of the City of Los Angeles as an approved Fabricator of Structural Steel. Varco Pruden has been issued License No. 256149, Classifications B-1, SC-43, and SC-51 for General Building, Sheet Metal, and Structural Steel by the State of California Contractors License Board. Varco Pruden is an approved steel fabricator by the International Conference of Building Officials Report No. FA-240.

This certification does not apply to the design of the foundation or other components supplied by others. Further, it is understood that erection of Varco Pruden furnished items shall be in strict compliance with pertinent documents furnished by Varco Pruden.

Specifications, Data and Dimension Charts, and Calculations are attached.

Yours truly,

Clifton D. Hyder

Clifton D. Hyder, P.E.
Engineering Manager

REGISTERED PROFESSIONAL ENGINEER
CLIFTON D. HYDER
No. 27963
CIVIL
STATE OF CALIFORNIA

CDH:ms

ATTACHMENT 3

SUBJECT

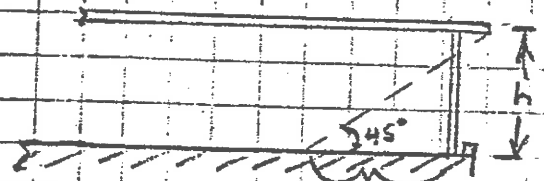
PROBLEM: CALCULATE PRECIPITATION WHICH WOULD ENTER CONTAINER STORAGE AREA SUMP FROM 25 YEAR 24 HOUR RAIN

JOB NO.	SHEET	FILE	BY	DATE
TM/S 3084.1	1 of 1		JWS	6/13/83

A. REF: HERSHFIELD, DAVID M.; RAINFALL FREQUENCY ATLAS OF THE U.S.

DATA: 25 YEAR 24 HOUR RAINFALL = 5 INCHES (REFERENCE ATTACHED)

ASSUMPTIONS: ASSUME THAT THE IMPINGEMENT OF RAIN THROUGH THE SIDE WOULD BE AT A 45° ANGLE FROM THE VERTICAL ON THE LONGEST EXPOSED SIDE:



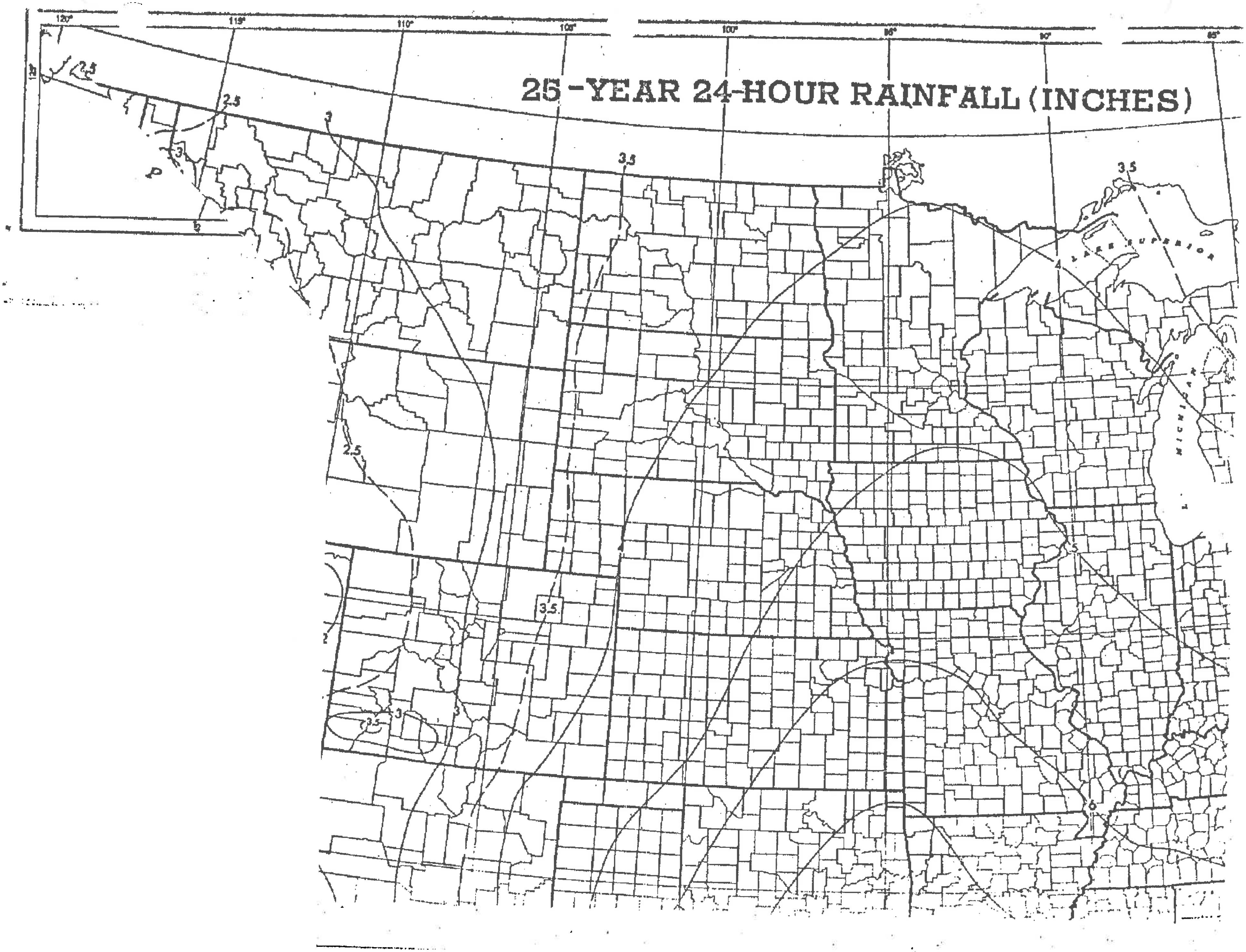
MAXIMUM ROOF height h = 16'

LENGTH OF MAXIMUM SIDE = 70'

AREA EXPOSED TO RAIN = 16' x 70'

VOLUME OF 25 YEAR 24 HOUR RAIN = $16' \times 70' \times \frac{5}{12} = 466\ Ft^3$

GALLONS OF RAINWATER = 466 x 7.48 = 3491 GALLONS: SAY 3500 GALLONS


25-YEAR 24-HOUR RAINFALL (INCHES)
120°
115°
110°
105°
100°
95°
90°
85°
2.5
2.5
3
3
3.5
3.5
4
2.5
3.5
4
5
3.5
3
3
2
6
LAKE SUPERIOR
LAKE MICHIGAN

ATTACHMENT 4

ASHCRAFT CONSULTANTS
715 Hamilton Drive
Pleasant Hill, CA 94523
(415) 934-1957

June 9, 1983

At the request of IT Enviroscience, three vessel types were checked for suitability in their present service and seismic zone location. The vessels are owned and operated by Teledyne McCormick Selph in Hollister, CA. Descriptions of the vessels and the findings are tabulated below:

1. A 300 gallon, glass-lined steel reactor, 4'-0" diameter by 4'-0" T-T, Serial # 13679, NB NR 1104, built by DeDietrich(USA), and repaired and re-glassed by DeDietrich in 1982. The nameplate MAWP is 100 psi, and it is protected from over-pressure by a 68 psi rupture disc. The vessel is jacketed. Original head and shell thicknesses were 5/8". Ultrasonic measurements of the top and bottom heads showed more than 5/8" thickness at every place measured. Shell thickness was not measured, due to the jacketing. Visual inspection of the glass lining revealed it to be in good condition.
   Mr. Sal Carabata of DeDietrich was contacted to ascertain the condition of the vessel after it was repaired in 1982. He stated that at that time, the jacket was removed, and no outer corrosion was found, so the jacket was replaced. Some pitting was evident inside, and this was repaired by welding, bringing all surfaces up to the orig-thickness before the vessel was re-glassed. He stated that the material was SA-285 Grade B. Therefore, based on the assumption that the wall thickness is 0.625" minimum, the vessel and it's supporting structure are satisfactory for the service. Charge to the vessel is 250# of silver, and 200 gallons of sulphuric acid, S.G. 1.12

2. Two cross-linked polyethylene tanks used for the storage of 1.85 S.G. chemicals, numbered 57683 and 57684, nominal diameter 10' by 11'-6" high, supported at grade, manufactured by Poly Cal Plastics Inc., and inspected and wall thickness measurements made by the same company on 4/4/83. The minimum wall thickness reported was 0.48" on one tank at 8' above grade, and the condition was reported as excellent. No inspection of the tanks

2. Ctd.
was made by ASHCRAFT CONSULTANTS, but calculations based on the preceding information show the tanks to be adequate for the service, and that no hold down devices are required to resist either seismic or wind forces, full or empty.

3. A 10,000 gallon stainless steel (Type 304) storage tank for 1.85 S.G. chemicals, Tank #T-5042, manufactured by Perry Products Co. The diameter is 10'-6", and the height 16'-0" w.l. to w.l., and it has a cone bottom. Thicknesses were taken from an ultrasonic inspection done by Testing Engineers, Inc. on 4/12/83, where the minimum thickness readings obtained in the tank wall were: 0.070" top course, 0.090" center course, and 0.100" bottom course. The minimum thickness of the cone bottom was 0.150".
Based on this information, and information on Dwg. No. C-VCW-104 from Perry Products Co., calculations were made which showed the vessel to be structurally sound to meet Zone 4 seismic requirements. However, the calculations showed that a compression ring will be required to be added at the bottom of the shell to resist forces imposed by the conical bottom.
An engineer at the Mfr., Mr. Shah, was contacted to determine whether there was a compression ring inside the tank which did not show on the drawing. Mr. Shah informed us that there probably was not, but that the tank had been designed for a 1.0 S.G. product, and concurred with our conclusion that a compression ring would be required for 1.85 S.G. service. Calculations show that the cross-sectional area required is 2.62 sq. in. for this ring. Therefore, we recommend that a compression ring be installed. Probably the easiest way to do this would be to weld a 6"x3/8" stainless plate inside the tank with a 1/8" fillet weld, as near to the bottom to shell weld as possible. Or, if economically more feasible, carbon steel angle segments of equivalent cross sectional area could be welded on outside the tank, between the eight legs.

W. C. Ashcraft

William C. Ashcraft

REGISTERED PROFESSIONAL ENGINEER
WILLIAM C. ASHCRAFT
No. 14,434
MECHANICAL
STATE OF CALIFORNIA

ATTACHMENT 5

POLY CAL PLASTICS INC.

CHEMICAL RESISTANCE TABLE
For Tanks and Custom Molded Parts

CAUTION: The use of surfactants and/or mixtures of chemicals can change the corrosive characteristics. Test samples before placing in service!

Reagent	Concentration	Temp. 70° F	Temp. 140° F
Acetaldehyde	100%	O	U
Acetic Acid	1-10%	S	S
Acetic Acid	10-60%	S	O
Acetic Acid	80-100%	O	U
Acetic Anhydride		U	U
Acetone		U	U
Acrylic Emulsions		S	S
Allyl Alcohol		U	U
Allyl Chloride		U	U
Aluminum Chloride	Dilute	S	S
Aluminum Chloride	Conc.	S	S
Aluminum Fluoride	Conc.	S	S
Aluminum Sulfate	Conc.	S	S
Alums (all types)	Conc.	S	S
Ammonia 100%	Dry Gas	S	S
Ammonium Carbonate		S	S
Ammonium Chloride	Sat'd	S	S
Ammonium Fluoride	20%	S	S
Ammonium Hydroxide	0.880 s.g.	S	S
Ammonium Metaphosphate	Sat'd	S	S
Ammonium Nitrate	Sat'd	S	S
Ammonium Persulfate	Sat'd	S	S
Ammonium Sulfate	Sat'd	S	S
Ammonium Sulfide	Sat'd	S	S
Ammonium Thiocyanate	Sat'd	S	S
Amyl Acetate	100%	U	U
Amyl Alcohol	100%	S	S
Amyl Chloride	100%	U	U
Aniline	100%	S	U
Aniline Hydrochloride	Sat'd	U	
Antimony Chloride		S	S
Aqua Regia		U	U
Arsenic Acid	100%	S	S
Barium Carbonate	Sat'd	S	S
Barium Chloride	Sat'd	S	S
Barium Hydroxide		S	S
Barium Sulfate	Sat'd	S	S
Barium Sulfide	Sat'd	S	S
Beer		S	S
Benzene		U	U
Benzene Sulfonic Acid		S	S
Benzoic Acid	All Conc.	S	S
Bismuth Carbonate	Sat'd	S	S
Black Liquor		S	S
Bleach Lye	10%	S	S
Borax	Cold Sat'd	S	S
Boric Acid	Dilute	S	S
Boric Acid	Conc.	S	S
Bromic Acid	10%	S	S
Bromine Liquid	100%	U	U
Bromine Water		U	U
Butanediol	10%	S	S
Butanediol	60%	S	S
[illegible]	100%	S	S
Butyl Alcohol	100%	S	S
Butyric Acid	Conc.	U	U
Calcium Bisulfide		S	S

Reagent	Concentration	Temp. 70° F	Temp. 140° F
Calcium Carbonate	Sat'd	S	S
Calcium Chlorate	Sat'd	S	S
Calcium Chloride	Sat'd	S	S
Calcium Hydroxide		S	S
Calcium Hypochlorite	Bleach Sol'n	S	S
Calcium Nitrate	50%	S	S
Calcium Sulfate		S	S
Camphor Oil		U	U
Carbon Dioxide	100% dry	S	S
Carbon Dioxide	100% wet	S	S
Carbon Dioxide	Cold Sat'd	S	S
Carbon Disulfide		U	U
Carbon Monoxide		S	S
Carbon Tetrachloride		U	U
Carbonic Acid		S	S
Castor Oil	Conc.	S	S
Chloracetic Acid	100%	U	U
Chlorine Dry Gas	100%	O	U
Chlorine Moist Gas		O	U
Chlorine Liquid		U	U
Chlorine Water	2% Sat'd Sol'n	S	S
Chlorobenzene		U	U
Chloroform		U	U
Chlorosulfonic Acid	100%	U	U
Chrome Alum	Sat'd	S	S
Chromic Acid	20%	S	S
Chromic Acid	up to 50%	S	S
Chromic Acid & Sulfuric Acid		S	O
Cider		S	S
Citric Acid	Sat'd	S	S
Coconut Oil Alcohols		S	S
Cola Concentrates		S	S
Copper Chloride	Sat'd	S	S
Copper Cyanide	Sat'd	S	S
Copper Fluoride	2%	S	S
Copper Nitrate	Sat'd	S	S
Copper Sulfate	Dilute	S	S
Copper Sulfate	Sat'd	S	S
Cottonseed Oil		S	S
Cresol	100%	U	U
Cresylic Acid	50%	S	S
Cuprous Chloride	Sat'd	S	S
Cyclohexanol		S	S
Cyclohexanone		U	U
Detergents, Synthetic		S	S
Developers, Photographic		S	S
Dextrine	Sat'd	S	S
Dextrose	Sat'd	S	S
Dibutylphthalate		O	O
Disodium Phosphate		S	S
Diazo Salts		S	S
[illegible]		[illegible]	[illegible]
Diglycolic Acid		S	S
Dimethylamine		U	U
Dioctyl Phthalate		O	U

Reagent	Concentration	Temp 70° F	Temp 140° F
Emulsions, Photographic		S	S
Ethyl Acetate	100%	O	U
Ethyl Alcohol	100%	S	S
Ethyl Alcohol	35%	S	S
Ethyl Butyrate		O	U
Ethyl Chloride		U	U
Ethyl Ether		U	U
Ethylene Chloride		U	U
Ethylene Chlorohydrin		U	U
Ethylene Dichloride		U	U
Ethylene Glycol		S	S
Ferric Chloride	Sat'd	S	S
Ferric Nitrate	Sat'd	S	S
Ferrous Chloride	Sat'd	S	S
Ferrous Sulfate		S	S
Fish Solubles		S	S
Fluoboric Acid		S	S
Fluorine		S	U
Fluosilicic Acid	32%	S	S
Fluosilicic Acid	Conc.	S	O
Formaldehyde	40%	S	S
Formic Acid	0-20%	S	S
Formic Acid	20-50%	S	S
Formic Acid	100%	S	S
Fructose	Sat'd	S	S
Fruit Pulp		S	S
Fuel Oil		O	U
Furfural	100%	O	U
Furfuryl Alcohol		U	U
Gallic Acid	Sat'd	S	S
Gasoline		U	U
Gin		U	U
Glucose		S	S
Glycerine		S	S
Glycol		S	S
Glycolic Acid	30%	S	S
Grape Sugar	Sat'd Aq.	S	S
Heptane		U	U
Hexanol, Tert.		S	S
Hydrobromic Acid	50%	S	S
Hydrocyanic Acid	Sat'd	S	S
Hydrochloric Acid	10%	S	S
Hydrochloric Acid	30%	S	S
Hydrochloric Acid	35%	S	S
Hydrochloric Acid	Conc.	S	S
Hydrofluoric Acid	40%	S	S
Hydrofluoric Acid	60%	S	S
Hydrofluoric Acid	75%	S	O
Hydrogen	100%	S	S
Hydrogen Bromide	10%	S	S
Hydrogen Chloride Gas	Dry	S	S
Hydrogen Peroxide	30%	S	O
Hydrogen Peroxide	90%	S	U
Hydrogen Phosphide	100%	S	S
[illegible]		[illegible]	[illegible]
Hydroquinone		S	S
Hypochlorous Acid	Conc.	S	S
Inks		S	S

70°F = 21°C 140°F = 60°C

Key: S = satisfactory O = some attack U = unsatisfactory

CAUTION: The use of surfactants and/or mixtures of chemicals can change the corrosive characteristics. Test samples before placing in service!

Reagent	Concen-tration	Temp 70° F	Temp 140° F
Iodine (in KI Sol'n)	Conc.	O	U
Lactic Acid	10%	S	S
Lactic Acid	90%	S	S
Latex		S	S
Lead Acetate	Sat'd	S	S
Lead Tetra Ethyl	100%	S	
Linseed Oil		O	U
Lube Oil		U	U
Magnesium Carbonate	Sat'd	S	S
Magnesium Chloride	Sat'd	S	S
Magnesium Hydroxide	Sat'd	S	S
Magnesium Nitrate	Sat'd	S	S
Magnesium Sulfate	Sat'd	S	S
Maleic Acid	Sat'd	S	S
Mercuric Chloride	Sat'd	S	S
Mercuric Cyanide	Sat'd	S	S
Mercurous Nitrate	Sat'd	S	S
Mercury		S	S
Methyl Alcohol	100%	S	S
Methyl Bromide		O	U
Methyl Chloride		O	U
Methyl Ethyl Ketone	100%	U	U
Methylene Chloride	100%	U	U
Methylsulfuric Acid		S	S
Milk		S	S
Mineral Oils		O	U
Molasses	Comm.	S	S
Naphtha		S	U
Naphthalene		U	U
Nickel Chloride	Sat'd	S	S
Nickel Nitrate	Conc.	S	S
Nickel Sulfate	Sat'd	S	S
Nicotine	Dilute	S	S
Nicotinic Acid		S	S
Nitric Acid	0-30%	S	S
Nitric Acid	30-50%	S	O
Nitric Acid	70%	S	O
Nitric Acid	95-98%	U	U
Nitrobenzene	100%	U	U
Octyl Cresol		O	U
Oils and Fats		O	U
Oleic Acid	Conc.	O	U
Oleum	Conc.	U	U
Orange Extract		S	S
Oxalic Acid	Dilute	S	S
Oxalic Acid	Sat'd	S	S
Oxygen	100%	S	S
Ozone	100%	O	U
Perchloric Acid	10%	S	S
Petroleum Ether		U	U
Phenol	90%	U	U
Phosphoric Acid	up to 30%	S	S
Phosphoric Acid	30-90%	S	S
Phosphoric Acid	90%	S	U
Phosphorus (Yellow)	100%	S	S
Phosphorus Pentoxide	100%	S	S
Phosphorus Trichloride	100%	S	S
Photographic Solutions		S	S

Reagent	Concen-tration	Temp. 70° F	Temp. 140° F
Pickling Baths			
Hydrochloric Acid		S	S
Sulfuric Acid		S	S
Sulfuric & Nitric		S	S
Picric Acid	1%	S	S
Plating Solutions			
Brass		S	S
Cadmium		S	S
Chromium		U	U
Copper		S	S
Gold		S	S
Indium		S	S
Lead		S	S
Nickel		S	S
Rhodium		S	S
Silver		S	S
Tin		S	S
Zinc		S	S
Potassium Bicarbonate	Sat'd	S	S
Potassium Borate	1%	S	S
Potassium Bromate	10%	S	S
Potassium Bromide	Sat'd	S	S
Potassium Carbonate		S	S
Potassium Chlorate	Sat'd	S	S
Potassium Chloride	Sat'd	S	S
Potassium Chromate	40%	S	S
Potassium Cyanide	Sat'd	S	S
Potassium Dichromate	40%	S	S
Potassium Ferri-Ferro Cyanide	Sat'd	S	S
Potassium Fluoride		S	S
Potassium Hydroxide	20%	S	S
Potassium Hydroxide	Conc.	S	S
Potassium Nitrate	Sat'd	S	S
Potassium Perborate	Sat'd	S	S
Potassium Perchlorate	10%	S	S
Potassium Permanganate	20%	S	S
Potassium Persulfate	Sat'd	S	S
Potassium Sulfate	Conc.	S	S
Potassium Sulfide	Conc.	S	S
Potassium Sulfite	Conc.	S	S
Propargyl Alcohol		S	S
Propyl Alcohol		S	S
Propylene Dichloride	100%	U	U
Propylene Glycol		S	S
Rayon Coagulating Bath		S	S
Sea Water		S	S
Selenic Acid		S	S
Shortening		S	S
Silicic Acid		S	S
Silver Nitrate Sol'n		S	S
Soap Solutions	Any Conc'ns.	S	S
Sodium Acetate	Sat'd	S	S
Sodium Benzoate	35%	S	S
Sodium Bicarbonate	Sat'd	S	S
Sodium Bisulfate	Sat'd	S	S
Sodium Bisulfite	Sat'd	S	S

Reagent	Concen-tration	Temp. 70° F	Temp. 140° F
Sodium Borate		S	S
Sodium Bromide	Dil. Sol'ns	S	S
Sodium Carbonate	Conc.	S	S
Sodium Chlorate	Sat'd	S	S
Sodium Chloride	Sat'd	S	S
Sodium Cyanide		S	S
Sodium Dichromate	Sat'd	S	S
Sodium Ferricyanide	Sat'd	S	S
Sodium Ferrocyanide	Sat'd	S	S
Sodium Fluoride	Sat'd	S	S
Sodium Hydroxide	Conc.	S	S
Sodium Hypochlorite		S	S
Sodium Nitrate		S	S
Sodium Sulfate		S	S
Sodium Sulfide	25%	S	S
Sodium Sulfide	Sat'd Sol'ns	S	S
Sodium Sulfite	Sat'd	S	S
Stannic Chloride	Sat'd	S	S
Stannous Chloride	Sat'd Sol'ns	S	S
Starch Solution	Sat'd	S	S
Stearic Acid	100%	S	S
Sulfur	Colloidal	S	S
Sulfur Dioxide	Dry 100%	S	S
Sulfur Dioxide	Wet 100%	S	S
Sulfur Trioxide		S	S
Sulfuric Acid	0-50%	S	S
Sulfuric Acid	70%	S	S
Sulfuric Acid	80%	S	S
Sulfuric Acid	96%	S	S
Sulfuric Acid	98% (Conc.)	S	S
Sulfuric Acid, Fuming		U	U
Sulfurous Acid		S	S
Tallow		S	O
Tannic Acid	10%	S	S
Tanning Extracts	Comm.	S	S
Tartaric Acid	10%	S	S
Tartaric Acid	Sat'd	U	U
Tetrahydrofurane		U	U
Titanium Tetrachloride	Sat'd	U	U
Toluene		U	U
Transformer Oils		O	U
Trichloroethylene		U	U
Triethanolamine	100%	S	U
Trisodium Phosphate	Sat'd	S	S
Turpentine		S	U
Urea	up to 30%	S	S
Urine		S	S
Vinegar	Comm.	S	S
Vanilla Extract		S	S
Wetting Agents		S	S
Whiskey		S	S
Wines		S	S
Xylene		U	U
Yeast		S	S
Zinc Chloride	Sat'd	S	S
Zinc Sulfate	Sat'd	S	S

.nc Acid over 70% – use special extra heavy tanks.

POLY CAL PLASTICS INC.
8055 SOUTH ASH ST., P. O. BOX E • FRENCH CAMP, CALIFORNIA 95231 • PHONE (209) 982-4904

ATTACHMENT 6

Teledyne [illegible]

DOME-TOP TANK
Standard Wall
Specifications:

DOME-TOP TANK
Extra-Heavy Wall
Specifications:

Extra-Heavy Wall Specifications
25/100
25/100
25/100
25/100
25/100
30/100
35/100
45/100
55/100
63/100
70/100
75/100

Stock No. 15 - 6500 gal
Color: Black
Date: 4-4-83

180°

10	.72
9	.65
8	.48
7	.58
6	.66
5	.70
4	.75
3	.78
2	.72
1ft	.77

Serial # X-5-3-81

Stock No.
Color:
Date:

0°

10	.70
9	.76
8	.59
7	.61
6	.51
5	.56
4	.71
3	.75
2	.73
1	.73

Stock No.
Color:
Date:

Stock No.
Color:
Date:

Stock No.
Color:
Date:

Stock No.
Color:
Date:

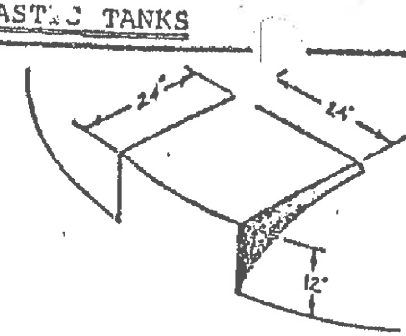
Stock No.
Color:
Date:

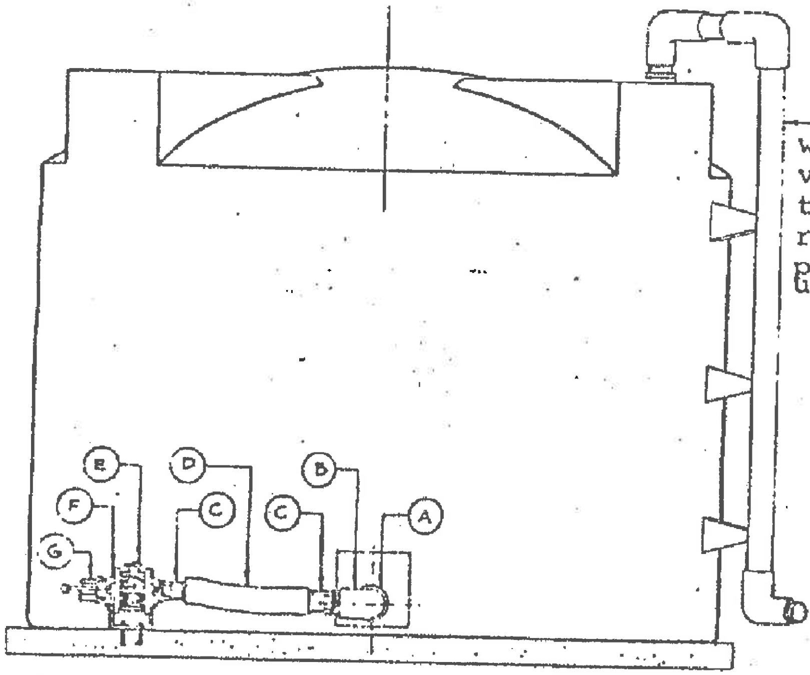
Stock No.
Color:
Date:

ATTACHMENT 7

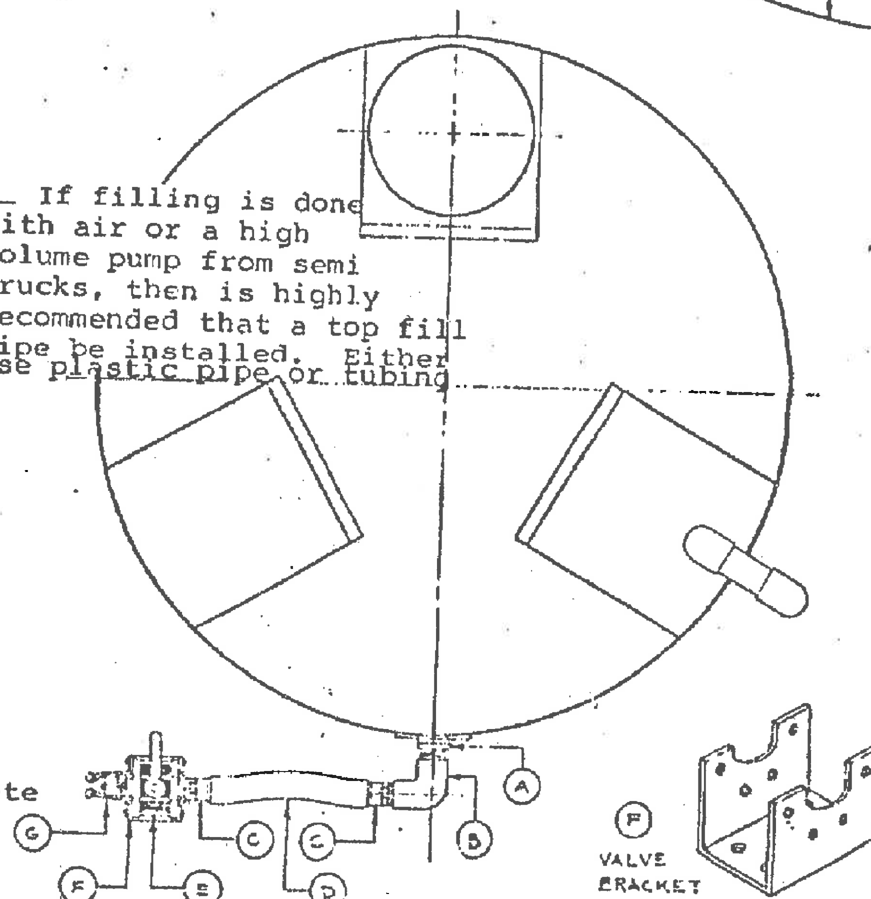
RECOMMENDATIONS ON INSTALLING PLASTIC VALVES AND PIPING TO UPRIGHT PLASTIC TANKS

*There must be a flexible connection to allow flexing of the tank.
*Install a 90° elbow directly out of tank fitting.
*Attach a 24" or more in length of flexible hose.
(Reason for using a 90° elbow in first, if the flexible connection is not put at an angle it will not allow the tank to flex.





If filling is done with air or a high volume pump from semi trucks, then is highly recommended that a top fill pipe be installed. Either use plastic pipe or tubing



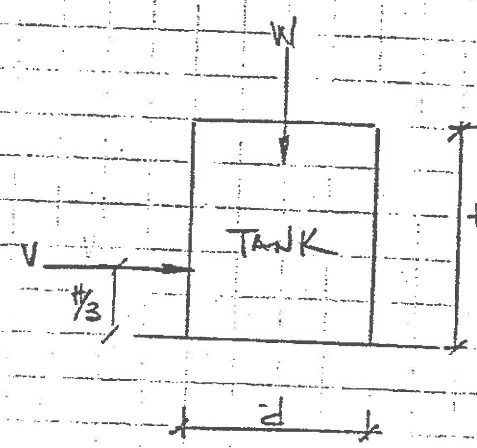
*The valve should be attached solidly to the concrete slab on ground by using a valve bracket. Secure with studs or spikes. The vibration from pumping will be absorbed by the valve and bracket rather than the tank fitting.

A: TANK FITTING	E: VALVE
B: 90° ELBOW	F: BRACKET
C: HOSE BARBED FITTING	G: KAMLOCK FITTING
D: 24 FLEXIBLE HOSE	

POLY-CAL PLASTICS, INC.
8055 South Ash Street
P.O. Box E
French Camp, Calif. 95231
Stockton Exchange (209) 982-4904

ATTACHMENT 8

TELEDYNE McCORMICK SELPH
TANK STABILITY ANALYSIS
1-308d 1 9 PLL 2-22-83



W = DEAD WT OF TANK

V = LATERAL FORCE FROM SEISMIC CONSIDERATION

d = DIA. OF TANK

H = HEIGHT OF TANK

V = ZIKCSW

Z = SEISMIC FACTOR
I = OCCUPANCY IMPORTANT FACTOR
K = HORIZONTAL FORCE FACTOR
C = NUMERICAL COEFFICIENT (HEIGHT)
S = NUMERICAL COEFFICIENT FOR SITE-STRUCTURAL RESONANCE
W = DEAD LOAD

$$F.S = \frac{M_r}{M_o} = \frac{\text{RESISTING MOMENT}}{\text{OVERTURNING MOMENT}} = \frac{Wd/2}{VH/3}$$

TELEDYNE McCORMICK SELPH

1-30924 = 9 PLC 2/22/83

LATERAL FORCES — EARTHQUAKE AND WIND

FOR THE LOCATION OF THE SITE, EARTHQUAKE FORCE SHOULD BE THE GOVERNING.

$V = ZIKCSW$

FOR SEISMIC ZONE 4 $Z = 1$

OCCUPANCY IMPORTANCE FACTOR I, $I = 1.0$

HORIZONTAL FORCE FACTOR K, $K = 2.0$

NUMERICAL COEFFICIENT C, $C = 1/15\sqrt{T}$, $C \leq 0.12$

NUMERICAL COEFFICIENT FOR SITE-STRUCTURAL RESONANCE, S $CS \leq 0.14$

$S \leq 0.14/0.12$

$S \leq 1.167$

USE $S = 1.2$

TOTAL DEAD LOAD W

DESIGN PARAMETERS:

USE: $Z = 1.$

$I = 1.0$

$K = 2.0$

$C = 0.12$

$S = 1.2$

$KC \leq 0.24$ ✓

$CS \leq 0.144$. ✓

3 9 PLC 2-22-83

(4) SURFURIC ACID TANKS - POLY TANKS. (57683)

(57684)

D = 10'   W = 1600#

H = 12'

$$T = \frac{0.05\,h_n}{\sqrt{D}} = \frac{0.05\,(12)}{\sqrt{10}} = 0.19$$

$C = 1/15\sqrt{T}$

$C = 0.153$ USE $C = 0.12$

$KC = .24$

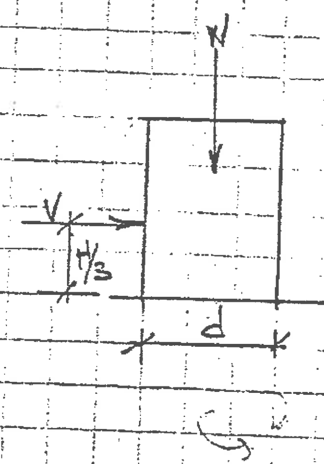
$K = 0.24/0.12$

$K = 2.0$

$V = Kc(1.2)(W)$

$V = 0.24(1.2)(1600\#)$

$V = 460\#$



$$F.S. = \frac{Wd/2}{VH/3}$$

$$= \frac{1600(\cancel{10'}^{5})/\cancel{2}}{480(\cancel{12}_{4})/\cancel{3}}$$

$$= \frac{8000}{1840}$$

$F.S. = 4.35 > 2.0$ ok

TABLE 1. TANK STABILITY

CONTAINMENT VESSEL	MATERIAL OF CONSTRUCTION	IDENTIFICATION NUMBER	OVERTURNING F.S. REQUIRED	OVERTURNING F.S. COMPUTED
1.) UNDERGROUND CONCRETE TANK			N/A	N/A
2) SURFACE IMPOUNDMENT #1	CONCRETE	SI #1 (IWTP)	N/A	N/A
3) SURFACE IMPOUNDMENT #2	CONCRETE	SI #2 (PWIP)	N/A	N/A
4.) SURFURIC ACID TANK	POLY TANK	57683 57684	2.0	4.4
5) CHILL WATER TANK	POLYTANK	57682	2.0	4.4
6) TELEZINE STAINLESS STEEL TANK #802		T802	2.0	3.8
7) TELEZINE STAINLESS STEEL TANK #803		T 803	2.0	2.2
9) NEUTRALIZATION TANK		NEUTRALIZATION TANK #1	2.0	4.2
10) NEUTRALIZATION		NEUTRALIZATION TANK #2	2.0	2.4

2-22-08

SUBJECT: OVERTURNING MOMENT TANK 5042

REF: PRECEEDING CIVIL ENGINEER'S CALCS

JOB NO. 3084.1 SHEET 1 / 1 FILE BY JWS DATE 6-14-83

$H = 19.17'$

$D = 10.5'$

$V = ZIKCSW$

$Z = 1.0, \; I = 1.0$

$K = 2.5$ (UBC TABLE 23-I)

$C = 1/15\sqrt{T}$ $\qquad C \le 0.12$

$$T = \frac{0.05 h_n}{\sqrt{D}} = \frac{0.05(19.17)}{\sqrt{10.5}} = .296$$

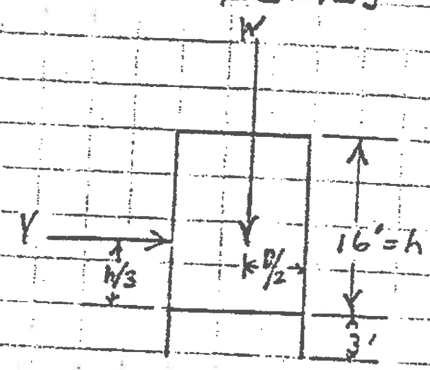
$C = 1.2$ ✓

$KC = .306 \qquad .12 \le KC \le .25$ $\qquad$ USE $KC = .25$

USE $S = 1.2$

$CS \le 0.144$ ✓

$V = KC(1.2)(W) = 0.3W$



$$F.S. = \frac{W\,D/2}{V(3 + h/3)} = \frac{W\,\frac{10.5}{2}}{0.3W\,(8.33)}$$

$$F.S. = \frac{5.25W}{2.5W} = 2.1 > 2.0 \quad O.K.$$

ATTACHMENT 9

ENGINEERING

HARRINGTON

Chemical Resistance Chart

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

CHEMICALS	PLASTICS										ELASTOMERS								ALLOYS				
	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
ACETALDEHYDE	D	D	A	D	B		A	A			D	B	D	C	D	D	D	D	A	A	A		A
ACETAMIDE			A				A				A	A	A	C					A				
ACETATE SOLV.	C	C	D										C	C	D		D	D	A				
ACETIC ACID, 10%	A	A	A	A	A	A	A	A	A	A	D	B	A						A	A	B	A	A
ACETIC ACID, 20%	A	B	A	A	A	A	A	A	C	A	D	B	A	A		A	C	A	A	A		A	A
ACETIC ACID, 50%	A	D	A	A	A	A	A		C	A	D	B	A	C		C	C	A	A	A		A	A
ACETIC ACID, 80%	B	B			A	B	A	A	C	C	D	B	A	C					A	A		A	A
ACETIC ACID GLACIAL	D	D	B	B				A	B		D	B							A		B	A	A
ACETIC ANHYDRIDE	D	C		B			A	A		C	D	D	D	C	D	A	D	A	A	A	B	B	A
ACETONE	D	D	B	D	B	C	C	A	A	C	D	A	C	C					A	A	A	A	A
ACETONITRILE			B	A			C	A	A	C	C	A	C	C	C				A	A			B
ACETOPHENONE			B	D							D		C						A	A			
ACETYL CHLORIDE	C	C	A	A			C	A			D	D	C						A	A			
ACETYLENE	D	C	A	A				A			A	A	A	C	C	C	C	D	A	A			
ACETYLNITRILE	D			B							D	D	C										
ACID MINE WATER	A	A	B	A				A			A							A					
ACRIFLAUINE							A																
ACRYLIC ACID	D								C	C													
ACRYLIC EMULSIONS					A	A																	
ACRYLONITRILE	D	D	B	B			A		A	C	D	D	C										B
ADIPIC ACID	A	A	A	A	A	A	A	A			A	A	A		A								
ALCOHOL, ALLYL	D	D	A	A			A	A			A	C	A		A								
ALCOHOL, AMYL	A	B	A	A	A		A	A	A	A	A	A	A	A		A		A	A		A	A	A
ALCOHOL, BENZYL	D		A	A							A	A	A	C					A		A	A	A
ALCOHOL, BUTYL	A	B	A	B	A		A	A	A	A	B	A	A	A	B	A	A	A	A	A	A	A	A
ALCOHOL, DIACETONE			A	B				A	A		D	A	C	A	D	A		C	A		A	A	A
ALCOHOL, ETHYL	A	A	A	A	A			A	A	A	A	A	A	A	A	A	A	A	A			A	A
ALCOHOL, HEXYL	A				A	A		A	A		A	B	A	A	A				A		A	A	A
ALCOHOL, ISOBUTYL					A			A	A	B	A	D	B		A			A	A		A	A	A
ALCOHOL, ISOPROPYL	A	A	A	B	A			A	A	B	A	A	B	A	D				A		A	A	A
ALCOHOL, METHYL	A	A	A	A	A			A	A	A	D	A	A	A	A	A	A	A	A		A	A	A
ALCOHOL, OCTYL									A		A		B	A					A		A	A	A
ALCOHOL, POLYVINYL	A	A	A					A	A		A	A			A								
ALCOHOL, PROPARGYL	A																						
ALCOHOL, PROPYL	A	A	A	A	A		A	A			A	A	A	A	A	A	A	A	A		A	A	A
ALLYL, CHLORIDE	D			A	A		A	B	A	D	B	D			B								
ALUM	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A				A		A		A
ALUM, AMMONIUM	A		A	A			A				A	A	A	A	A	A	A	A					
ALUM, CHROME	A	A	A				A				A		A	A	A	A	A	A					
ALUM, POTASSIUM	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A	A	A	A					
ALUMINUM, CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C	C	A	A	A
ALUMINUM, CHLOROHYDROXIDE								A	A														

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS										ELASTOMERS								ALLOYS				
	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
ALUMINUM CITRATE									A	A													
ALUMINUM, FLUORIDE	A	A		A	A	A	A				A	A	A	A	A	A	A	A	C	B	B		B
ALUMINUM, HYDROXIDE	A	A	A	A	A	A	A	A	A	A	A	A	A		A				A	A	A		
ALUMINUM, NITRATE	A	A	A	A		A	A	A	A	A	A	A	A	A	A		A	A					
ALUMINUM, OXYCHLORIDE	A	A					A				D												
ALUMINUM, POTASSIUM SULFATE									A	A													
ALUMINUM, SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A
AMINES				B							D		D	C					A	A	B		
AMMONIA, ANHYDROUS				B				A			D		C	A	A	A	A	A	A	B	B	B	A
AMMONIA, AQUA 10%	A	B	B	A			A				D	A	A										
AMMONIA, AQUEUS 25%								A												A	A		
AMMONIA, CONCENTRATED																							
AMMONIA, DRY GAS	A	A	A		A			A			D	A	A		A						A		A
AMMONIA, GAS	A	A	A	A			A	A			D	B	A		A								
AMMONIA, NITRATE	B	B	A	A			A				A	A	C	C	A				A				
AMMONIUM, ACETATE	A	A	A				A	A			B	A	A	A	A		A	A					
AMMONIUM, BICARBONATE									A	A													
AMMONIUM, BIFLUORIDE	A	A	A	A				A			A	A	A	A	A				A				B
AMMONIUM, BISUFIDE	A			A																			
AMMONIUM, CARBONATE	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	A	B		A	B	B
AMMONIUM, CASENITE									A					A					A				
AMMONIUM, CHLORIDE	A	A	A	A	A	A		A	A	A	A	A	B	A	A	A	A	A	B		A	B	A
AMMONIUM, DICHROMATE	A													A				A					
AMMONIUM, FLUORIDE 10%	A		A	A	A		A	A	A		A	A		A							B		A
AMMONIUM, FLUORIDE 25%	B			A	A	A	A					B									B		A
AMMONIUM, HYDROXIDE	A	A	A	A		A		A			B	A	A	A	B				A	B	A	A	A
AMMONIUM, METAPHOSPATE	A	A	A	A	A	A		A			A	A	A		A								
AMMONIUM, NITRATE	B	B	A	A	A	A	A		A	A	A	A	A	A	A	A	A	A	A			C	A
AMMONIUM, OXALATE													A	A					A				A
AMMONIUM, PERSULPHATE	A	A	A		A	A	A		A	A	A	A	C	D				C	A		A	C	A
AMMONIUM, PHOSPHATE	A	A	A	A	A		A	A	A	A	A	A	A	A		A		A					
AMMONIUM, PHOSPHATE DI BASIC		A	A		A						A		A	A					C		A	A	A
AMMONIUM, PHOSPHATE MONOBASIC		A	A		A						A		A	A					C		A		A
AMMONIUM, PHOSPHATE TRIBASIC		A	A		A						A		A	C					A		A		A
AMMONIUM, SULFATE	A	A	A	A	A		A	A	A	A	A	A	A	A	A	A	A	A	B		A		A
AMMONIUM, SULFIDE	A	A	A	A	A		A				D	A	A										
AMMONIUM, THIOCYANATE	A				A		A	A	A	A	A												
AMMONIUM, THIOSULFATE									A	A			A	A							A		
AMYL ACETATE	D	D	D	B	B	C	A	A	A	C	D	A	A	A	D	D	D	D	A		D		A
AMYL ALCOHOL	A	A	A		A	A	A	A			A	A	A	A	B				A		C		D
AMYL CHLORIDE	D			A		D	A		A	C	A	D	C	C				D			C		C
ANILINE	D	D	A	C	A	A	A	A	D	D	D	A	C	C	D	D		A	A		B		C
ANILINE CHLOROHYDRATE	A																						B
ANILINE HYDROCHLORIDE	B						A	A			A	A	C			B							
ANISOLE							A																
ANTHRAQUINONE	A						A				A												
ANTHRAQUINONE SULFONIC ACID	A						A				A												

Chemical Resistance Chart (Continued)

CHEMICALS	PVC	CPVC	Polypropylene®	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
	PLASTICS										ELASTOMERS								ALLOYS				
ANTI-FREEZE									A				A	C					A				
ANTIMONY CHLORIDE					A	A		A															
ANTIMONY PENTACHLORIDE										A													
ANTIMONY TRICHLORIDE	A		A	A			A	A	A	A	A	B											
AQUA REGIA	C	C	C	A	B	D	A	A	D	D	C	C	C	C	D	D	D	D	D		B		C
AROCHLOR 1248					B				A		A		C	D									
ARSENIC ACID	A	A	A	A	A		A	A	A	A	A	A	A	A	A			A	B				
ARSENOUS ACID									A	A													
ARYL SULFONIC ACID	A	A		A			A				A	A											
ASPHALT	D	D	A		D			A	A		A	D	B	C	B	C		D	A	A			
AVIATION FUEL (115-145 oct)							B																
AVIATION TURBINE FUEL							B																
BARIUM ACETATE									A	A													
BARIUM CARBONATE	A	A	A	A	A	A	A	A	A	A	A	A	A		A				B		A		
BARIUM CHLORIDE	A	A	A	A	A	A	A	A			A	A	A	A	A	A	A	A	B	B	A	A	A
BARIUM CYANIDE					C				A		A		C	A					A				
BARIUM HYDROXIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	B
BARIUM NITRATE	A	A	A					A	B		A		A	A	A			A	A		A		
BARIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A		A	A	A				A	A			
BARIUM SULFIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A				
BEER	A	A	A		A	A	A	A	A		A	A	A	A	B	A	A	A	A				
BEET SUGAR LIQ.	A	A	A		A			A			A	A	A	A	A	A		A	A				
BENZALDEHYDE	A	D	A	C	A		A		A	D	C	C	C	D	D	D	D	D	A				
BENZALKONIUM CHLORIDE	A																						
BENZENE	C	C		B	D	D	A	A	A	C	B	D	C	C	D	D	D	D	B	A	A	B	B
BENZENE SULFONIC ACID	D	D	D	B	A	A	A	A	A	A	A	D	C		D			A		A			
BENZOIC ACID	A	A	A	A	A	D	A	A	A	A	A	D	C	C	B				B		A		A
BENZOL			A				A				A		C	D									A
BENZYL ALCOHOL			A				A	A			A	B	C	D									
BENZYL CHLORIDE			A				C	A			D	D		D		D	D	D					
BISMUTH CARBONATE	A				A	A	A								D								
BLACK LIQUOR	A	A	A	A	A	A	A	A	B	B	A	D	A	A	A	A		A					
BLEACH 12.5% ACTIVE CL_2	A	A	A	A							A	B	C		C								
BLEACH 5.5% ACTIVE CL_2	A	A	A	A			A	A			A	B	C		C								
BORAX	A	A	A	A	A			A			A	A	A	C	D				A	A	A	A	A
BORIC ACID	A	A	A	A	A	A	A	A	A	A	A	A	C	C	A	A	A	A	B		A	A	A
BREEDER PELLETS DERIV. FISH																							
BREWERY SLOP											A		A						A				
BRINE ACID	A	A	A		A		A	A			A	A	A		A								A
BROMIC ACID	A	A	D	A		A		A			A	B											
BROMINE GAS					C		C		C	C			C										
BROMINE LIQUID	D			A	C	D			C	C	A	D	C	D		D	D	D					
BROMINE WATER	B	C	C	A	B		C	A	C	C	A	D	C	D		D	D	D					
BROMOBENZENE	A										A	D	C										
BROMOTOLUENE	D		D																				
BUTADIENE	A	A		A			A	A	A		A	D	A	D	D	D		D	A	A			
BUTANE	A	A	A	A			A	A	A		A	D	A	A	A	A		D	A	A		B	B
BUTANEDIOL	A	B		A	A						A	D											
BUTANOL, PRIMARY																							
BUTANOL, SECONDARY																							

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Reco[illegible] severe effect.

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS: PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	ELASTOMERS: Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	ALLOYS: 316SS	304SS	Titanium	Hastelloy B	Hastelloy C
BUTTER					A				A		A		A	C					A				
BUTTERMILK											A		A	A					A				
BUTYLENE	A			A	B		A	A	A		A	D	A	D					A	A			
BUTYL ACETATE	C	C	C	B	A		A	A		C	D	B	C	C	D	D	D	D	C	A		A	B
BUTYL ALCOHOL	A	B	A	B	A	A	A	A	A	A	B	A		A	B	A	A	A	A		A	A	A
BUTYL AMINE	D	D	D				A	A			A	D			A					A			
BUTYL CELLOSOLVE	A							A	A	C	D	C	C		D					A			
BUTYL ETHER	D	D	D				A	A			A	A			A					A			
BUTYL PHENOL	B			A			A	A				B			D								
BUTYL PHTHALATE			A					A			B	B	C		D								
BUTYL SEARATE	A							A			A	D	A		B								
BUTYNEDIOL	B					A	A																
BUTYRALDEHYDE									A			D		D		D	D	D					
BUTYRIC ACID	B	A	A	A	B		A	A	A	A	B	B	C	C	D				B		A	B	A
CADMIUM CYANIDE	A	A																					
CADMIUM SALT				A																			
CAFFEINE CITRATE	A							A															
CALCIUM BISULFIDE	A	A	A	A	D		A	A	A		A		A	A	A		A	A	B		A		
CALCIUM BISULFITE	A	A	A	A	D	A	A		A	A	A	B	A	A	C	A	A	A					
CALCIUM CARBONATE	A	A	A	A	A	A	A	A		A	A	A	A	A	A				A		A	A	A
CALCIUM CHLORATE	A	A	A	A	A	A	A	A		A	A	A	A	C	C		A	D					
CALCIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A	B	B	A	B	A
CALCIUM HYDROXIDE	A	A	A	A	A	A	A	A	A	A	A	A	B	C		A	A	A	A		A	A	A
CALCIUM HYPOCHLORITE	A	A	B	A	A	A	A	A	C	A	A	A	B	D		A	A	A	D		B		A
CALCIUM NITRATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A					
CALCIUM OXIDE	A			A			A					A											
CALCIUM PHOSPHATE																							
CALCIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	A	A	A	B	A		B	B
CALCIUM SULFITE																							
CALGON													A	A					A				
CAMPHOR CRYSTALS	A																						
CAMPHOR OIL					B	D																	
CANE SUGAR LIQUORS	A	A	A				A	A			A	A	A	A	A	A	A	A	A				
CAPRYLIC ACID							A	A	A	A													
CARBITOL	A							A			A	A	A		A								
CARBOLIC ACID		A	A										C	C	D	D	D	D	A		B	A	A
CARBON BISULFIDE					D						A		A	C					B				
CARBON DIOXIDE	A	A	A		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
CARBON DISULFIDE	C	C	D	A	C	D	C	A		C	A	D	C	C	D		D	D	A	A			
CARBON MONOXIDE	A	A	A		A	A		A	A	A	A	A		A	A				A			A	
CARBON TETRACHLORIDE	C	C	D	A	C	D	A	A	A	C	B	D	C	C	D	D	D	D	A	C	A	B	A
CARBONATER WATER													A	A					A	A			
CARBONIC ACID	A	A	A	A	A	A	A		A	A	A	A	B	A	A	A	A	A	B			A	A
CASTOR OIL	A	A	A	A	A	A	A	A	A	A	A	B		A	A	A	A	A					
CATSUP	A	A	A								A		A	C					A				
CAUSTIC POTASH	A	A	A	A			A	A			D	A	A		B								
CAUSTIC SODA							A							A	A	A	A	A					
CELLOSOLVE	B		A	A			A	A			C	B	C							A			
CELLOSOLVE ACETATE	A										D	B	C										

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

Chemical Resistance Chart (Continued)

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

	PLASTICS										ELASTOMERS								ALLOYS				
CHEMICALS	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
CETYL ALCOHOL							A																
CHLORAL HYDRATE	A						A				A		C										
CHLORAMINE	A																						
CHLORIC ACID	A							A															
CHLORINATED GLUE													C						A				
CHLORINE GAS	A	A	D	C		C	A	C	A		D	D	B		D						A		
CHLORINE LIQUID	D	D		A	C	C	C		C	A			C										
CHLORINE WATER	A	A	C	A	A		A	A	C	A	C	B	C		D								
CHLOROACETIC ACID	A	A		A	B		A			B	D	B	D	C	C		A	D	D		A	A	A
CHLOROACETIC CETYL CHLORINE																							
CHLOROACETIC BENZENE					C		A	A	A	C			C	C	D		D		D	A	A	B	A
CHLOROACETIC BENZYL CHLORINE							A																
CHLOROACETIC FORM	D	D		B	B	A	A	C	C		B	D	C	C	D	D	D		D	A	A		B
CHLOROACETIC PICRIN																							
CHLOROACETIC SULFONIC ACID	D	D	D		C		C	A		C	D	D	C	C	D		A		D	C			B
CHLOROX BLEACH	A		D								A		B						A				A
CHOCOLATE SYRUP											A		A						A				
CHROME ALUM					A		A		A	A			A										
CHROMIC ACID 20%	A	A	D		A	A	A	A	C	C	B	B	C	C	D	A	D	D		C	A	A	A
CHROMIC ACID 50%	C	C	D	C	A	A		A	C	C	D	D	C	C	D	A	D	D	D	C	A	C	A
CHROMIC SULFURIC					A	B	B																
CIDER		A	A		A	A					A		A	A					A				
CITRIC ACID	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A
CITRIC OILS											A		A	D					A				
COCONUT OIL	A	A	A	A	A	A	A	A	A	A	A	B	A	D	A								
COD LIVER OIL														A									
COFFEE		A	A								A		A	A					A				
COKE OVEN GAS	A		A	A				A			A	D	D	B									
COLA CONCENTRATES					A																		
COPPER ACETATE	A	A	A					A	A	A	A	A			A								
COPPER CARBONATE	A	A	A				A	A			A	A	D										
COPPER CHLORIDE	A	A	A	A	A	A	A	A	B	B	A	A	A	D	A	A	A	A	B		A		
COPPER CYANIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A	B	A
COPPER FLUOBORATE											A		A	A					D			B	B
COPPER FLUORIDE	A	A	A	A		A	A	A			A	A											
COPPER NITRATE	A	A	A	A		A	A	A	A	A	A	A	A	A	A						A	D	A
COPPER SALTS																							
COPPER SULFATE	A	A	A	A		A	A	A	A	A	A	A	A	A	A	A	C	A	A	C	A		A
CORN OIL	A	A	A						A	A		B		A	A								
CORN SYRUP	A	A	A	A				A	A	A	A	B	A		A								
COTTON SEED OIL	A	A	A	A	A	A	A	A	A	A	A	D	A	A	A					A			
CREAM		A	A						A		A		A	C					A				
CREOSOTE	D	D						A			A	A		D	A								
CREOSOLS	C	D	C	C	C	D	A	A	A		A	D	D	D	D				A	A			
CRESYLIC ACID 50%	A			B	D		A		D	D	A		D	D					A			B	B
CROTON ALDEHYDE	D			C			D	A			A	B			C								
CRUDE OIL	A	A		A			B	A	A	A	A	D	D	B	C		D	D		A			
CUPRIC FLOURIDE	A	A	A	A	A		A	A	A		A	A			A								
CUPRIC CHLORIDE					A																		

Chemical Resistance Chart (Continued)

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

CHEMICALS	PLASTICS										ELASTOMERS								ALLOYS				
	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
CUPRIC CYANIDE					A																		
CUPRIC NITRATE					A																		
CUPRIC SULFATE	A	A	A	A	A		A	A			A	A	A		A								
CUPROUS CHLORIDE	A	A	A		A	A	A	A			A	A	A		A						B		A
CYANIC ACID													C	D									
CYCLOHEXANE	D	D	C	A	C		A	A	A	B	A	D	B	D	B					A	A		
CYCLOHEXANOL	D	D	A	C		A	A	A	A		A		B							A			
CYCLOHEXANONE	D	D	B	C		C	B	A			D	C	C		D					A			
DECALAN							A	A			A	D	D		D								
DESOCYEPHEDRINE HYDROCHLORIDE	A																						
DETERGENTS	A	A	A		A	A	A	A	A	A	A	A	A	A					A	A			
DETERGENTS, HEAVY DUTY	A	A	A								A	A	A										
DETERGENTS, SYNTHETIC					A																		
DEVELOPERS					A	A		A	A	A			A	A							A		A
DEXTRIN	A	A	A	A	A	A		A			A	A			A								
DEXTROSE	A	A	A	A	A			A	A	A	A	A	A	A									
DIALLYL PHTHALATE									A	A													
DIAMMONIUM PHOSPHATE														A	A		A	A					
DIAZO SALTS	A				A	A																	
DIBENZYL														D									
DIBUTOXY ETHYL PHTHALATE	D																						
DIBUTYL ETHER											D	D		D		B							
DIBUTYL PHTHALATE	D		B			C	A	A	A	A	B	A	D			D							
DIBUTYL SEBACATE	B										C	B				D							
DICALCIUM PHOSPHATE									A	A													
DICHLOROACETALDEHYDE										D													
DICHLORO BENZENE	D							A	A	D	B	D	D			D							
DICHLOROETHYLENE	D		D					A			A	D	D			D							
DICHLOROMETHANE									D	D				D									
DIEMETHYL PHTHALATE									B	B													
DIESEL FUEL	A	A		A	D		A	A	A	A	A	D	A	D		D				A			
DIETHYLAMINE	D	D	A	D			A	A	D	D	C	C											
DIETHYL CELLOSOLVE				A			A					D											
DIETHYL ETHER	D	D	C	C			A	A	B	D	C	C	D			C							
DIETHYL KEYTONE										D	D												
DIETHYL SEBECATE	B											C		D									
DIETHYLAMINE	D	D	A	D			A	A			D	A	B			D							
DIETHYLENE GLYCOL		A			A	A			A	A	A		A	A					A				
DIETHYLENE TRIAMINE									D	D													
DIGLYCOLIC ACID	A		A	A		A	A	A			A	A				A							
DIISOBUTYLENE								A			A	D				A				A			
DIISOOCTYL PHTHALATE								A			B	B				D							
DIMETHYL FORMAMIDE	D	D	A	D			D	A	D	D	D	B	C			D				A			
DIMETHYL HYDRAZONE													C										
DIMETHYL PHATHALATE								A			B	B				D				A			
DIMETHYL SULFOXIDE							A																
DIMETHYLAMINE	A		A			C	A		D	D	D	D											
DIMETHYL AQUEOUS																							
DIOCTYL PHTHALATE	D	D	D	D	B		A	A			A	A	D			B				A			

HARRINGTON ENGINEERING

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS: PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	ELASTOMERS: Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	ALLOYS: 316SS	304SS	Titanium	Hastelloy B	Hastelloy C
DIOXANE	D		B	D			D	A			D	D	D		D					C			
DIOXANE 1 & 4	D			D							D		D										
DIPHNOL ETHER							C	A	B											A			
DIPHENYL ETHER										B													
DIPHENYL OXIDE											A		D	D	D								
DIPROPYLENE GLYCOL									A	A													
DISODIUM METHYL ARSENATE									A														
DISODIUM PHOSPHATE	A	A		A	A		A	A				A											
DISTILLED WATER																							
DIVINYLBENZENE							A																
DOWTHERM							A							D									
EMULSIONS, PHOTOGRAPHIC					A	A																	
EPICHLOROHYDRIN								A												A			
EPSOM SALTS	A			A				A			A	A	A	A	A				B		A	A	B
ESTERS								A															
ETHANE					D						A		A	D					A		A		
ETHANOL																							
ETHANOLAMINE	D	D	D				A	A				A	B	D	A					A			
ETHERS	D	D	C		C			A			C		D	D					A	A			B
ETHYL ACETATE	D	D	C	D	B	D	C	A	B	D	D	C	D	D					A	A			B
ETHYL ACETOACETATE	D			C			A				D	C	D		D								
ETHYL ALCOHOL	A	A	A			A	A	A			A	A			A								
ETHYL ACRYLATE	D			C			B	A			D	C	D		D								
ETHYL BENZENE								A			A	D		D	C								
ETHYL BROMIDE					D																		
ETHYL BUTYRATE					D	D																	
ETHYL CHLORIDE	D		C	A	C	D	A	A	D	D	A	A	A	C	B	D	D	D	A			B	B
ETHYL CHLORIDE (WET)							C	A												D			
ETHYL CELLOSOLVE									B	D													
ETHYL CELLULOSE														A		A	A						
ETHYL ETHER					D	D		A	C	D	C	C	D		D								
ETHYL CHLORDACETATE	D																						
ETHYL SULFATE											A		A						D				
ETHYLENE BROMIDE	D			A			C	A			C	D											
ETHYLENE CHLORIDE	D		B	A		D	C	A			A	D	D	D	D				A	C	B	B	B
ETHYLENE DIAMINE				D			D	A	D	D	D	A	A		A					A			
ETHYLENE DICHLORIDE	D	D	D		C	C	D	A	C	D	A	D	D	D	D	D	D	D	A	C		A	B
ETHYLENE GLYCOL	A	A	B	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			
ETHYLENE OXIDE	D	D		A	C		D	A			D	D	D	D	D								
ETHYLENE TRICHLORIDE																		D					
ETHYLENE CHLOROHYDRIN			A			D		A	B	A	D	A	D		D								
FATTY ACIDS	A	B	A	A	C			A	A	A	A	D	B	D	A	A	A	D	A			A	A
FERRIC ACETATE	B								A	B													
FERRIC CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	D	D	A	D	A
FERRIC HYDROXIDE	A	A	A					A			A	A			A								
FERRIC NITRATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B				A
FERRIC SULFATE	A	A	A	A	A		A		A	A	A	A	B	A	A	A	A	A	A		A		A
FERROUS CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A		A	A		A	A	D	D	A	D	B
FERROUS HYDROXIDE	A	A	A					A			A	A			A								

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS										ELASTOMERS								ALLOYS				
	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
FERROUS NITRATE	A	A	A	A			A	A	A	A	A	A			A								
FERROUS SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A	A			A	B	B
FISH SOLUBLES	A				A	A																	
FLUORIDE SALTS														A	A	A	A	A					
FLUORINE GAS (WET)	A	A	A	A			D	A			A	A	D	D	C	D	C	D					
FLUORINE GAS (DRY)														D	D		D	D					
FLUOBORIC ACID	A	B	A		A	A			A	A	A			A	A	A	A	A	B		D		A
FLUOSILICIC ACID	B	A	A	A	A	A	A	A	C	C	A	A	A	A	A	A	A	A	B				
FLUORINE						C			D	D													
FORMALDEHYDE	A	A	A		A	A	A	A	B	A	A	B	C	D	D	A	A	A	A	B	B	B	B
FORMIC ACID	A	A	A	A	A	A	A		D	C	D	A	D	D	D	A	A	A	B		B	B	A
FREON 11	A	A					A	A			B	C	A	D	D				A	A			
FREON 12	A	A	A		B		A	A			B	B	B	D	C				A	A			
FREON 21	D						A	A			C	C	D		D					A			
FREON 22	D				A		A	A			D	B	D	D	D				A	A			
FREON 113	A					A	A				B	D	C	D	D					A			
FREON 114	A						A				A		A		B					A			
FREON TF		B			D			A			B		C	D					A	A			
FREON E-3								A												A			
FRUCTOSE	A	A			A	A	A	A			A	A	A		A								
FRUIT JUICE	A	A	A				A	A			A		A	A	A		A	A	A				
FRUIT PULP	A				A	A	A				A												
FUEL OIL					C	C		A	A	A	A		A	D	A	A	D	A	A	A			
FUMARIC ACID																							
FURAN								A			D	D		A	D					A			
FURFURAL	A		C	A	D	C		A	D		B	A	D	D	D	C	C	D		A		B	B
FURFURYL ALCOHOL					D	C		A			D	C			D								
GALUC ACID	A	B	A	C	A	A	B				A	C	C	A	A		A	A					
GAS, MANUFACTURED	A		D	A	C	C	C	A			A	D		D						A		A	A
GAS, NATURAL	A		A	A			A				A	D	A		A								
GASOLINE, BENZENE			D		D																		
GASOLINE, LEADED	A		D	A			A	A			B	D	A		B								
GASOLINE, UNLEADED	A		D	A			A	A			B	D	A		B								
GASOLINE, SOUR	A		D	A				A			A	D	A		B								
GASOLINE, REFINED			D											C	A	D	D	D					
GELATIN	A	A	A					A			A	A	A	A	A	A	A	A		B		B	
GIN			A		A	C	A																
GLAUBERS SALTS																		A					
GLUCONIC ACID																							
GLUCOSE	A	A	A	A	A	A	A				A	A	A	A	A	A	A	A					
GLUE			A					A			A	A	A	A		A		A					
GLYCERIN	A	A	A	A		A	A				A	A	A	A	A	A	A	A	A	A	A	A	A
GLYCEROL	A	A	A	A	A						A	A		A									
GLYCOLIC ACID	A		A	C		A	A	A			A	A		A									
GLYCOLS	A	A	A	A	A	A		A			A	A	A	A									
GLYOXAL											A												
GOLD MONOCYANIDE											A		A	A					A				
GRAPE JUICE		A									A		A	A					A				
GRAPE SUGAR	A	A	A		A			A			A	A	A	A									
GREASE														D	A	C	D	D	A				
GREEN LIQUOR														A	A		A	A					

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS: PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	ELASTOMERS: Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	ALLOYS: 316SS	304SS	Titanium	Hastelloy B	Hastelloy C
HEPTANE	A	A	D	A	D		A	A	A	A	A	D	A	D	A	A		D	A	A			
HEXANE	A	A	B	A	D		A	A		B	A	D	A	D	A	A	D	D	A	A			A
HEXANOL						A																	
HONEY			A		A						A		A	A					A				
HYDRAULIC FLUID										B									A				
HYDRAULIC OIL					D						D			A									
(PETROLEUM)										A			A	A									
HYDRAULIC OIL																							
(SYNTHETIC)										A	A		C	C					A				
HYDRAZINE	D				A			A			D	A	A	A	A				A				
HYDROBROMIC ACID 20%	A	A	A	A	A	A		A			A	A	D	A	C				D		C	B	A
HYDROBROMIC ACID 50%	A	A	B	A	A	A		A			A	A	D	A	C				C		D	B	B
HYDROBROMIC ACID DILUTE			A										D										
HYDROCHLORIC ACID 10%	A		A	A						C	A	A	C	A	A		A	A			C	B	A
HYDROCHLORIC ACID 20%		A	A		A		A	A		C	A		C	A			A	A	D	D	C	B	A
HYDROCHLORIC ACID 40%	B	D	B	B			A			C	B	B	D		A		A	A					
HYDROCHLORIC ACID 50%	B	D	A	B							C	C											
HYDROCHLORIC ACID DILUTE			A																		A	A	A
HYDROCYANIC ACID	A	A	A	A	A	A	A	A			A	A	B	A	A	A	A	A	A	A	A	A	A
HYDROCYANIC ACID 10%	A		A	A	A	A	A				A	A	B	A	A	A	A	A					
HYDROFLUORIC ACID 20%			A		C	A	A			D	A		C	C	A	C	A	A	C		D	B	B
HYDROFLUORIC ACID 50%	B	B	A	B	C	A	A	A			A	A	C	C	D		C	A	C	D	D	B	B
HYDROFLUORIC ACID 75%			C		C	A	A				A		D	D					D		D	B	
HYDROFLUORIC ACID 100%							A						D										
HYDROFLUORIC ACID DILUTE	A	A	A	A		A	A	A			A	A	D		D								
HYDROFLUORSILICIC ACID	A	A		A	A						A	A	A	C	A	A	A	A	D		A	B	
HYDROGEN	A	A	A	A		A	A	A			A	A	A	A	A		A						
HYDROGENCHLORIDE			A		A	A																	
HYDROGENCYANIDE	A		B	A										A	A		A	A					
HYDROGEN FLUORIDE							D						D										
HYDROGEN GAS							A	A												A			
HYDROGEN PEROXIDE 30%	A	D	C		A	A		A		C			D	D	A		A	D		C			
HYDROGEN PEROXIDE 50%	B	D	C	A		B	A	A			A	C	D	D	A	A	A	D					
HYDROGEN PEROXIDE 90%	A			A		C	A	A			A	D	D	D	D	A	A	D					
HYDROGEN PHOSPHIDE					A	A								C	C		A	A					
HYDROGEN SULFIDE (DRY)	A	A	A	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A					
HYDROGEN SULFIDE																							
(AQ. SOL.)	A	A	A		A		A	A	A	A	A	A	D	D	A	A	A	A	A		A		
HYDROGEN SULFIDE (WET)					A		C	A	A	A				A	A	A	A	A		A			
HYDROQUINONE	A			A	A	A		A			A	A	D	A	A	A	A	A					
HYDROXYACETIC ACID		A			A						A		A	A							A		
HYDROXYLAMINE SULFATE	A											A								A			
HYPD SOLUTIONS														A	A	A	A	A					
HYPOCHLOROS ACID	A	A	A	A	A	A		A		A	A	A	D	D	C		A	C					
HYPO. SODIUM THIOSULFATE																							

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

Chemical Resistance Chart (Continued)

	PLASTICS										ELASTOMERS								ALLOYS				
CHEMICALS	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
INK					A	A							A	A	A		A	A	A				
IODINE	B	B	A	A	B	C		A		C	B	B	A	A	A	A	A	D	D		A		B
IODINE SOLUTION	A			A			B	A			A	A	C										
ISOTANE													A										
ISODODECANE														A		A		D					
ISO OCTANE			C					A			A	D	A	A	A	A		D					
ISOPROPYL ACETATE					B			A			D	B	D	D	D				B				
ISOPROPYL ALCOHOL		A	A	A				A			A	A			A								
ISOPROPYL ETHER			A		D			A			C	C	A	D	A	D		D	A				
JP-3			A		D		C	A	A	A	A		B	D					A	A			
JP-4	A	A	A	A	D		C	A	A	A	A	D	B	D	B				A	A			
JP-5	A	A	A	A	D		C	A	A	A	A	D	B	D					A	A			
KEROSENE	A	A	A	A	B		C	A	A	A	A	D	A	D	A	C	D	D	A	A			
KEYTONES		D	A	A	A		D	A			D		D	D					A	A			
KRAFT LIQUOR	A	A																					
LACQUERS					D						D	D	D	D	D	D	D	D	A				
LACTIC ACID	A	A	A	B	A	A	C	A	A	A	A	C	A	C	A	A	A	A	A	A	B	B	
LARD	A	A	A	A	B		A	A			A	A	A	C	A	C	D	D	A				
LATEX					A	A			B	B	A		A	C					A				
LPG								A												A			
LAURIC ACID	A			A			A	A	A	A										A			
LAURYL CHLORIDE	A			A				A															
LEAD ACETATE	A	A	A	A	A	A	A	A	A	A		A	A	A	A		A	A	B		A		
LEAD CHLORIDE	A	A	A					A			A	A			A								
LEAD NITRATE	A	A	A					A	A	A	A	A	A		A			A					
LEAD SULFAMATE	A	A	A		A			A			A		B	A	A								
LEAD SULFATE	A	A	A					A			A	A			A								
LEMON OIL			D	A			A	A															
LEVULINIC ACID									A	A													
LIGROINE			A		D						A	D	A						A				
LIME			A		A						A		A	A			A				A		
LIME BLEACH														A	A			A					
LIME SLURRY									A	B													
LIME SULFUR													D										
LINOLEIC ACID	B			A			A	A			A	D	B		B								
LINOLEIC OIL	B							A			C		C										
LINSEED OIL	A	A	A	A	C		A	A	A	A	A	B	A	A	B	A	D	D					
LIQUERS	A																						
LITHIUM BROMODE	A							A			A		A										
LUBE OIL	A				D		A	A	A	A	A	A	A	D	A	C	D	D		A			
LYE SOLUTION																		A					
MACHINE OIL	A		A									D											
MAGNESIUM BISULFITE														C	C		A	A					
MAGNESIUM CARBONATE	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A							B	B
MAGNESIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A	A	A
[illegible]																							
MAGNESIUM HYDROXIDE	A	A	A	A	A	A	C	A	A	B	A	A	A	A	A				A	A	A		
MAGNESIUM NITRATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A					A				
MAGNESIUM OXIDE													A	A					A				
MAGNESIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A	A	B
MALEIC ACID	A	A	A		D		A	A	A	A	A	A	D	D	A		A	A	A		A		

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS										ELASTOMERS								ALLOYS				
	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
MALEIC ANHYDRIDE					D						A		D	D								A	A
MALIC ACID	A	A	A	A	D		A	A	A	A	A	D	A	D	B			A			A	B	
MANGANESE CHLORIDE														A	A		D	A					
MANGANESE SALTS	A	A	A																				
MANGANESE SULFATE	A	A	A					A			A	A		A	A	A		A					
MASH													A	A					A				
MAYONNAISE											A		A						A				
MELAMINE													C						D				
MERCURIC CHLORIDE	A	A	A	A	A		A	A	A	A	A	A	A	A	A	A	A	A			A		B
MERCURIC CYANIDE	A	A	A	A	A		A	A			A	A	A	A	A	A	A	A	A		A		
MERCURIC NITRATE								A			A	A		A	A	A	A	A					
MERCURIC SULFATE	A	A	A					A			A	A	A		A								
MERCUROUS CHLORIDE									A	A													
MERCUROUS NITRATE	A			A	A		A	A			A	A			A								
MERCURY	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		B	B	
METHANE	A			A				A			A		A		A								
METHACRYLIC ACID GLACIAL	D								D	D													
METHOXYETHYL OLEATE	A																						
METHELENE CHLOROBROMIDE	D																						
METHYL ACETATE	D	D	B					A			D	B	D	D	D				A			B	A
METHYL ACETONE					D								D	D					A				
METHYL ACRYLATE								A			D	B	D	D	D				A				
METHYL ALCOHOL	A	A	A		A	A		A			B	A			B								
METHYLAMINE	D	D	D					A				A	B		C								
METHYL BROMIDE	D			A	D	C	A	A			A	D	D	D	D								
METHYL BUTYL KEYTONE											D			D					A			B	
METHYL CELLOSOLVE	D			A			A				D	C	D	D									
METHYL CHLORIDE	D	D		A	C		A	A	D	D	D	B	C	D	D	D	D	D	A			B	
METHYL CHLOROFORM	D			A				A			B	D			D								
METHYL DICHLORIDE													D	D									
METHYL ETHYL KETONE	D	D	B	D	C	C	D	A	C	D	D	B	D	D	D		D	D	A	A		B	
METHYL ISOBUTYL ALCOHOL									B	C			D	D									
METHYL ISOBUTYL CARBITOL								A	C		A	A			A								
METHYL ISOBUTYL KEYTONE							D	A	B	D	D	B	D		D				A	A			
METHYL ISOPROPYL KEYTONE	D	D	B					A			D	D	D	D	D				A				
METHYL METHACRYLATE	A							A	C	D	D	D	D	C	D								
METHYL SULFATE	B			A										C	A		A	A					
METHYL SULFURIC ACID	A			A	A	A																	
METHYL SULFONIC									D	D													
METHYLENE BROMIDE				D																			
METHYLENE CHLORIDE	D		D	D	C	C	A	A	D	D	C	D	D	D	D	D	D	D	A			A	A
[illegible]								A			A												
METHYLISOBUTYL CARBINOL			A					A			A	A			A								

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended.- severe effect.

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS: PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	ELASTOMERS: Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	ALLOYS: 316SS	304SS	Titanium	Hastelloy B	Hastelloy C
MILK	B	A	A	A	A	A		A			A	A	A	A			A		A				
MINE WATER														A	A	A	D	A					
MINERAL OIL	B	A	C	A	C	C	C	A	A	A	A	D	A	D	A	D	A	D		A			
MOLASSES	A	A	A		A	A	A				A	A	A	A	A			A	A				
MONOETHANOLAMINE	D			D			A	A			A	A	A	D	A								
MOTOR OIL	A	A	C					A			A	D	A		A								
MORPHOLINE								A												A			
MUSTARD		A									A		B	C				A	A				
NAPHTHA	A	A	A	A	D		A	A	A	A	A	D	A	D	C	D	D	D	A	A		B	B
NAPHTHALENE	D	D	B	B	C		C	A	A	A	A	D	D	D	D	D	D	D	B	A			
N-HEPTANE																							
NATURAL GAS	A		A								A	D	A										
NICKEL ACETATE	A								A		C	A	D	A	A	A	A	A					
NICKEL CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C			A	
NICKEL NITRATE	A			A	A	A	A	A	A	A	A	A	A	A	A	A	A	A					
NICKEL SALT																							
NICKEL SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C				B
NICOTINE	A			C	A	A		A						C	C		D	D					
NICOTINE ACID	A			A	A	A	A	A				A											
NITRIC ACID 10%	A	A	A	B	A	A	C	A	D	C	A	C	D	A	D	A	A	A	A	A	A	D	A
NITRIC ACID 20%			A		A	A			D	C	A		D	D					A		A	D	A
NITRIC ACID 30%	A	A	A	B	A	A	D	A			A	B	D	D	D	D	A	D		A			
NITRIC ACID 40%	A	A	C	B	C	B	D				A	D	D										
NITRIC ACID 50%	A	A	A	B	C	B	D	A			A	D	D	D	D				A		A	D	A
NITRIC ACID 70%	A	B	C	C	C	B	D	A			C	D	D	D	D	D	D	D					
NITRIC ACID CONCENTRATE			D		D		D	A			A		D	D					A	A	A		B
NITROBENZENE	D	D	B	C	D	D	D	A		D	A	B	C	D	D	D	C	D		A		D	B
NITROGEN							A	A							A					A			
NITROGEN SOL.									B	C				A		A	A	A					
NITROGLYCERINE	D						A							A			A	A					
NITROUS ACID	B		D	A			A				A	B			D								
NITROUS OXIDE	A		A				A	A			A	A	D										
NITROGLYCOL	D																						
OCENOL																							
—OILS—					C				A	A													
ANIUNE													D	D									B
ANISE														D					A				
BAY											A			D					A				
BONE											A		A	D					A				
CASTOR	A										A		A	D					A				
CINNAMON	A										A			D					A				
CITRIC											A			D					A				
CLOVE													A						A				
COCONUT											A		A	A					A				
COD LIVER											A		A	A					A				
CORN		A									A		A	D					A				
COTTONSEED	A	A									A		A	D					A				
CREOSOTE											A		B	D					A				
DIESEL FUEL		A							A		A			D					A				
FUEL											A		B	D					A				

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

ENGINEERING

HARRINGTON

Chemical Resistance Chart (Continued)

	PLASTICS										ELASTOMERS								ALLOYS				
CHEMICALS	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
—OILS— (CONT.)																							
GINGER											A		A	A					A				
LEMON											A			D					A				
LINSEED		A	A								A		A	D					A				
MINERAL		A	A								A			A					A				
OLIVE	A	A	A					A		A	A	B	A	D	A	A	A	D	A				
ORANGE		A			A						A		A	D					A				
PALM		A									A		A	D					A				
PEANUT		A									A		A	D					A				
PEPPERMINT											A		D	D					A				
PINE		A									A		D	D					A				
RAPE SEED		A									A		D	D					A				
ROSIN											A		A						A				
SESAME SEED		A									A		A	D					A				
SILICONE			A								A		A	A					A				
SOYBEAN		A									A		A	D					A				
SPERM		A									A		A	D					A				
TANNING											A		A	D					A				
TURBINE		A									A		A	A					A				
VEGETABLE						A					A		A										
OLEIC ACID	A	B	A	A	C	C	A	A	A	A	A	D	A	D	D	C	A	D	A			B	B
OLEUM	D	D	D	D		D	D	A	D	D	D	D	D	D	D	D	D	D	A			A	
OXALIC ACID	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		B	B	
OXALIC ACID 50%	A	A	A	C		A	A	A		A	A	A	C		A								
OXYGEN GAS	A	A	A	A			A	A			A	A	D	A	A	A	A	A					
OZONE	B	B	C	A	C	C	A				A	A	D										
PAINT														A	A	A	A	A					
PALMITIC ACID 10%	A	A	A	A	B		A	A	A	A	A	B	A	C	A	C	A	C					
PALMITIC ACID 70%	B	A	A		B		A	A	A	A	A	B	A	C	A	C	A	C					
PARAFFIN	A	A	A					A			B	D	A		A				A				
PENTANE											A		A									B	B
PERACETIC ACID	A	A	A					A			A	B			D								
PERCHLORIC ACID 10%		A	A	A	A	A	A	A	D		A	B	D	D	D	D	D	D					
PERCHLORIC ACID 70%	B	A	A	A			D	A	D		A	A	D	D	D	D	D	D					
PERCHLOROETHYLENE								A	B		D		D	D	D	D	D	D	A	A			
PERMANGANIC ACID														C	C		A	D					
PERPHOSPHATE	A	A	A					A			A	A			A								
PETROLATUM											A		A	A					A				
PETROLATUM ETHER					C	D			C	D													
PETROLEUM OILS	A	A	B					A			A	D		C	A	C	D	D					
PETROLEUM (SOUR)	A										A	D	A										
PETROLEUM (REFINED)	A										A	D	A										
PHENOL	A	A	A	B	B	D	A	A	D	D	B	A	D	D	A				A	C	B	A	A
PHENYHYLDRAZINE	D			A				A			D	B	D		D								
PHENYHYLDRAZINE HYDROCHLORIC	A													C	A		A	A					
PHOSGENE LIQUID	D		D				A				D	A	D	C	C		C	C					
PHOSGENE GAS	B		D				A				D	A	D	C	C		C	C					

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

HARRINGTON

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS										ELASTOMERS								ALLOYS				
	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
PHOSPHORIC ACID 10%	A	A	A	A		A	A	A	C	A	A	A	C	D	A	A	A	A	A	D	B	D	A
PHOSPHORIC ACID 50%	A	A	A	A	A	A	A	A	C	A	A	A	C	D	A	A	A	A	B	D	B	D	A
PHOSPHORIC ACID 85%	A	B	A	B	B	A	A	A	C	A	A	A	C	D	A	A	A	A	B	D	C	D	A
PHOSPHORIC ACID CRUDE							A	A	C	A	A		C	D	A	A	A	A	C	D	C	D	A
PHOSPHORUS YELLOW	A	A	A			A	A	A						C			C	D					
PHOSPHORUS RED	A	A	A				A	A															
PHOSPHORUS PENTOXIDE	A	A		A	A	A	A					A		A			A	C					
PHOSPHORUS TRICHLORIDE	D	A		A	A		D	A			A	A	D	D	D		C	D	A	A			
PHOSPHORUS OXYCHLORIDE										D													
PHOTOGRAPHIC DEVELOPER		A	A										A	A					A		A	A	A
PHOTOGRAPHIC SOLUTIONS	A	A	A		A	A	A	A			A		A										
PHTHALIC ANHYDRIDE	D	D	D					A	A	A	A	A			A								
PICKLE BRINE														A	A	A	A	A					
—PICKLING BATHS—																							
HYDROCHLORIC ACID					A	A																	
SULFURIC ACID					A	A																	
SULFURIC NITRIC					B	B																	
PICRIC ACID	D		A	A	B		A		C		A	A	B	A	A	A	A	A					
PINE OIL									B	B				A	D	D	D	A					
—PLATING SOLUTIONS—														A				A					
ANTIMONY		A	A								A		A	A					A				
ARSENIC		A	A								A		A	A					A				
BRASS	A	A	A		A	A	A	A			A	A	A	A				A	A			A	
BRONZE		A	A								A		A	A					A				
CADIUM	A	A	D		A	A	A	A			A	A	A	D				D				A	
CHROME	A	A	A		A		B	A			A	A		A				A					
COPPER	A	A	A		A	A	A				A	A	A	A				A				A	
CYANIDE														A				A					
GOLD	A	A	D		A	A	A	A			A	A	A	A				A	A				
INDIUM		A	A		A	A					A		A					A	A				
IRON		A	A								A		A	A					A			A	
LEAD	A	A	A		A	A	A	A			A	A	A	A				A				A	
NICKEL	A	A	A		A	A	A	A			A	A	A	A				A				A	
RHODIUM	A	A	A		A	A	A	A			A		A	A				A					
SILVER	A	A	A		A	A	A	A			A	A	A	A				A	A				
TIN	A	A	A		A	A	A	A			A	A	A	A				A				A	
ZINC	A	A	A		A	A	A	A			A	A	A	A				A				A	
POLYVINYL ACETATE EMULSION								A	B	C	A	A			A								
POLYVINYL ALCOHOL	A	A	A					A	B	C	A	A			A								
POTASH	A	A	A	A				A			A	A	A	D	A				A				
POTASSIUM ACETATE	A	A	A					A			A	A		A	A	A	A	A					
POTASSIUM ALUM	A	A	A	A				A			A	A			A								
POTASSIUM ALUMINUM SULFATE	A	A		A				A			A	A		A	A	A	A	A					
POTASSIUM AMYL XANTHATE	B																						
POTASSIUM BICARBONATE	A	B			A	A	A		B		A		A	A	A	A	A	A	B			B	
POTASSIUM BICHROMATE	A	A	A	A		A	A				A	A		A	C	A	A	D					
POTASSIUM BISULFATE	A	A	A	A							A	A	A										
POTASSIUM BORATE	A	A	A		A	A	A					A	A	A	A	A	A	A					

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS										ELASTOMERS								ALLOYS				
	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
POTASSIUM BROMATE	A	A	A		A	A	A	A			A	A	A	A	A		A	C					
POTASSIUM BROMIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A	A	B		A	A	A
POTASSIUM CARBONATE	A	A	A	A	A	A	A	A	C	C	A	A	A	A	A		A	A	A			B	B
POTASSIUM CHLORATE	A	A	A	A	A	A	A	A			A	A	A	C	C		A	A	A				
POTASSIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	B	B
POTASSIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	C	A	B	B
POTASSIUM CHROMATE	A	A	A	A	A	A	A				A	A	A	A	A		A	A	B			A	A
POTASSIUM CYANIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A			B	
POTASSIUM DICHROMATE	A	A	A	A	A	A	A	A	B	B	A	A	A	A					A		A		B
POTASSIUM ETHYL XANTHATE	B																						
POTASSIUM FERRICYANIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A					
POTASSIUM FERROCYANIDE	A	A	A	A	A	A	A	A	A	A	A	A	A		A								
POTASSIUM FLUORIDE	A	A	A		A	A	A	A			A	A	A	A	A	A	A	A					
POTASSIUM HYDROXIDE	A	A	A	A	A	A	A	A	B	B	D	A	A	A	B	A	A	A	B	C	B	B	B
POTASSIUM HYPOCHLORITE	A	A					A	A			A	A		D	B		A	C					
POTASSIUM IODIDE	A	A	A	A				A			A	A		A	A		A	A					
POTASSIUM NITRATE	A	A		A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	B				B
POTASSIUM PERBORATE	A	A	A		A	A	A							A	A		A	C					
POTASSIUM PERCHLORATE	A	A	A		A	A	A	A				A		C	C		A	D					
POTASSIUM PERMANGANATE	A	A	A	A	A		A	A	D	C	A	A	D	A	C		A	A	B		A		A
POTASSIUM PERSULFATE	A	A	A		A	A	A	A	D	B		A		C	A		A	D					
POTASSIUM PHOSPHATE									B	C				A	A		A	A					
POTASSIUM SULFATE	A	A	A	A	A	A	A	A			A	A	A	A	A	A	A	A	B		A		B
POTASSIUM SULFIDE					A	A								A		A	A	A					
POTASSIUM SULFITE					A	A								A		A	A	A					
POTASSIUM THIOSULFATE														A				A					
PROPANE	A	A	A	A			A	A	B	C	A	D	A		A				A				
PROPARGYL ALCOHOL					A	A																	
PROPYL ALCOHOL	A	A	A		A	A		A			A	A			B								
PROPYLENE CHLOROHYDRIN								A															
PROPYLENE DICHLORIDE	D				C	D					B	D		D	D		D	D					
PROPYLENE GLYCOL					A	A			A	A	A		A	C					A				
PROPYLENE OXIDE	D			D							D	D	D		D							B	
PYROGALLIC ACID	B			A										A	A		A		A			A	B
PYRIDINE	D		C	D	B			A			D		D	D	D		D		B	A			A
QUATERNARY AMMONIUM SALTS									B														
RAYON ACID WATER														A	A		A	A					
RAYON COAGULATING BATH					A	A																	
RAYON SPIN BATH														C	A		C	A					
ROSINS													A						A				
RUM											A		A						A				
RUST INHIBITORS			A								A		A	C					A				
SALAD DRESSING													A						A				
SALENIC ACID								A			A	A			A								
SALICYLIC ACID	A			A			A	A			A	A	C	A	A		A	A					
SALINE SOLUTIONS														A	A		A	A					

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS: PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	ELASTOMERS: Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	ALLOYS: 316SS	304SS	Titanium	Hastelloy B	Hastelloy C
SALT BRINE														A	A		A	A					
SALICYLALDEHYDE	D			C			B																
SEA WATER	A	A	A		A	A					A		A	A				A	A		A		
SELENIC ACID	A				B	A								A	A		A	A					
SEWAGE	A	A	A				A				A	A		A	A		A	A					
SHELLAC BLEACHED																			A				
SHELLAC ORANGE																			A				
SHORTENING					A	A																	
SILICIC ACID	A	A	A		A	A		A			A	A			A								
SILICONE OIL		A	A					A			A	A	A	A	A				A				
SILVER CYANIDE	A	A	A	A			A	A			A	A		A	A		A	A					
SILVER BROMIDE																			B			B	A
SILVER NITRATE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A		A	B	A
SILVER SULFATE	A	A	A	A				A			A	A	C	A	A						A	B	
SOAP	A	A	A				A	A			A	A	A		A								
SOAP SOLUTIONS		A	A		A	A					A		A	A	A		A	C	A				
SODIUM ACETATE	A	A	A	A	A	A	A	A	A	A	D	A	A	A					B		A		
SODIUM ALUM	A	A	A	A				A			A	A			A								
SODIUM ALUMINATE													A	A					A		B	B	
SODIUM BENZOATE	A	A	A	A	A	A	A	A	A	B		A											
SODIUM BICARTONATE	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A				A			B	B
SODIUM BICHROMATE	A	A	A				A	A			A	A			A								
SODIUM BISULFATE	A	A	A	A	A	A	A		A	A	A	A	B	C	A				A		A	B	B
SODIUM BISULFITE	A	A	A	A	A	A	A	A			A	A	A	A	A				A		A		A
SODIUM BORATE			A		A	A	A	A			A	A	A		A								
SODIUM BROMIDE	A	A	A	A	A	A	A		A	A	A	A			A								
SODIUM CARBONATE	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A				A		A	B	
SODIUM CHLORATE	A	A	A	A	A	A	A	A		B	A	B	A	A	A				B		A		A
SODIUM BROMATE										A													
SODIUM CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A				B	C	A	A	A
SODIUM CHLORITE	D	D	D				A	B			D	D			D								
SODIUM CHROMATE													A	A									
SODIUM CYANIDE	A	A	A	A	A	A	A		A	A	A	A	A	A	A				A		A		
SODIUM DICHROMATE	A	A	A		A	A	A		A	A													
SODIUM FERRICYANIDE	A	A	A		A	A	A	A	A	A	A	A			A								
SODIUM FERROCYANIDE	A	A	A		A	A	A		A	A	A	A			A								
SODIUM FLUORIDE	A	A	A	A	A		A	A			A	A			A								
SODIUM HYDROXIDE 15%	A	A	A	A		A	A	A	B	C	C	A	A	A	A	A	A	A	B	A	A		
SODIUM HYDROXIDE 30%	A	A	A	A		A	A	A	C	C	C	A		A	A	A	A	B	B				
SODIUM HYDROXIDE 50%	A	A	A	A		A	A	A	C	C	C	A	D	A	A			A	B	B	A	A	A
SODIUM HYDROXIDE 70%	A		B			A	A	A			D	A	D	A	D	A		A			A	B	B
SODIUM HYDROXIDE SOLUTION					A	A								A		A		A					
SODIUM HYPOCHLORITE CONC.	A	A	B		A	A	A	A	D	B	D	D	D	D	D	A							
SODIUM HYPOCHLORITE SOLUTION	A	A	B	A		A	D	A			A	A		D	C	A			C	D	A		A
SODIUM HEXAMETAPHOSPHATE					A																		

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS										ELASTOMERS								ALLOYS				
	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
SODIUM IODIDE							A																
SODIUM METAPHOSPHATE			A	A							A	A	A	B					A				
SODIUM METASILICATE	A	A	A					A			A	A	A		A				A				
SODIUM NITRATE	A	A	A	A	A	A	A	A	A	A	B	A	C	C	A				B		A		
SODIUM NITRITE	A	A	A	A			A	A	A	A	A	A			A				B				
SODIUM PALMITRATE			A					A															
SODIUM PERBORATE	A		A					A			A	A	C	D	B				C				
SODIUM PERCHLORATE	A	A	A					A															
SODIUM PEROXIDE	A	A	A	A				A			A	A	C	D					A				
SODIUM PHOSPHATE ALKALINE	A	A	A	A				A			A	A	A		A							B	B
SODIUM PHOSPHATE ACID	A	A	A	A				A			A	A	A		A								
SODIUM PHOSPHATE NEUTRAL	A	A	A	A				A			A	A	A		A								
SODIUM POLYPHOSPHATE													B	D					B				
SODIUM SILICATE			A	A					A	A	A	A	A	A					B		A		
SODIUM SULFATE	A	A	A	A	A	A	A	A	A	A	A	A	A		A				B		A	B	B
SODIUM SULFIDE	A	A	A	A	A	A	A	A	A	B	A	A	A	A	A				B		A	B	
SODIUM SULFITE	A	A	A	A	A	A	A	A	A	A	A	A	A		A								
SODIUM TETRABORATE											A		A						A				
SODIUM THIOSULFATE	A	A	A	A			A	A	B	A	A	A	B		A				A				
SODIUM THIOCYANATE	A	A	A					A	A	B	A	A			A								
SOUR CRUDE OIL	A		A	A	B			A			A	D	D		B								
SORGHUM													A	A					A				
SOY JUICE													A	A					A				
SOY BEAN OIL	A	A	A					A			A	A		A	A	A		D					
STANNIC CHLORIDE	A	A	A	A	A		A	A	A	A	A	A	A	C	A	A	A	A	A		A		
STANNIC FLUOBORATE													A	A									
STANNOUS CHLORIDE	A	A	A	A	A		A	A	A	A	A	B	A	C	A	A	A	A					
STARCH	A	A	A		A			A			A	A	A	A	A	A	A	A	A				
STEAM 300°F								A											A	A			
STEARIC ACID	A	A	A		A		A	A	A	A	A	D	B	C	A	C	C	C	B		A	A	A
STRONTIUM CARBONATE									A	A													
STODDARD SOLVENT	D			A				A			A	D	B	D					A	A			
STYRENE								A	C		C	D	D	D	C				A				
SUCCINIC ACID	A	A	A	A				A			A	A			A								
SULFAMIC ACID	D	D	D				A																
SUGAR ION-EXCHANGE														A	A		A	A				B	A
SUGAR SOLUTIONS									A	A			A	A	A	A	A	A	A				
SULFATED DETERGENTS																							A
SULFATE LIQUORS			A								A	A		A	A	A	A	A	C				
SULFITE LIQUORS	A	A	A					A	B	A	A	A	B	C	A		C	D					
SULFINOL								A											A	A			
SULFUR	A	A	D	A	B		A	A			A	C	D		D								
SULFUR SLURRYS																							
SULFUR CHLORIDE			C	A			D	A	D	D	A	D	D	A	C	A		D	D				
SULFUR DIOXIDE WET	A	A	A	A	B		A	A	D	A	A	A	D	C	C		C	A					
SULFUR DIOXIDE DRY	A	A	A	A			C	A			A	A		D				A	B	A			B
SULFUR TRIOXIDE	D	D	D	D			D	B		B	C	C	D	D	D			A	C				
SULFUR TRIOXIDE GAS	A			D			A				A		D	C	C	C	C						
SULFURIC ACID 10%	A	A	A	A	A		A	A	B	B	A	A	A	A	A	A	A		C	D	C	C	A
SULFURIC ACID 30%	A	A	A	A	A		A	A	B	B	A	A	C	A	A	A	A		D	D	C	C	B

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

Chemical Resistance Chart (Continued)

CHEMICALS	PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	316SS	304SS	Titanium	Hastelloy B	Hastelloy C
	PLASTICS										ELASTOMERS								ALLOYS				
SULFURIC ACID 50%	A	A	A	B	A		D	A	B	B	A	A	C	C	A	A	A		D	D	C	C	B
SULFURIC ACID 60%	A	A	A	B	B		A	A	C	C	A	A	C	D	A				D		C	C	B
SULFURIC ACID 70%	A	A	A	B	B		A	A	C	C	A	A	C	D	A				D		C	C	B
SULFURIC ACID 80%	A	A	A	B	C		A	A	D		A	A	C	D	B	A	C	D	D		D	C	A
SULFURIC ACID 90%	A	A	A	B	D		A	A	D	D	A	A	C	D	A				D		D	C	A
SULFURIC ACID 95%	A	A	C	B	D		D	A	D	D	A	D	C	D	D	C	D	D	D	A	D	C	A
SULFURIC ACID 100%	D	D	D				D	B	D	D	D	D	D	D					A		D	A	A
SULFUROUS ACID			A	A	A		A		A	A	A	A	C	C	C		C	A	B				B
SYRUP													A	A					A				
TALL OIL	A			A			A	A	A	A	A	D	C		A								
TALLOW					A						A		A						A				
TANNIC ACID	A	A	A	A	A		A		A	A		B		A	A	A	A	A	C		A		
TANNING LIQUORS	A	A	A				A	A			A	B	C	A	A		C	C	A				A
TAR	D	D	B					A			A	D	C		A								
TARTARIC ACID	A	A	A	A	A		A	A	A	A	A	A	A	A	A	A	A	A	B		A	B	B
TETRAETHYL LEAD	B			A			A	A	C			D	C		D								
TETRACHLORETHANE								A			A	D	C		D				A				
TETRA HYDRODURANE	D			D								D											
TETRA HYDROFURAN	D	D		D	C		C	A			D	D	D		D				A	A			
TETRA SODIUM PHOSPHATE	A																						
TETRALIN											A	D			C								
THIONYL CHLORIDE	D				D		D		D	D													
THREAD CUTTING OIL	A						A					D											
TIRPINEOL	D											D											
TITANIUM TETRACHLORIDE	D					C	A				A	D	C										
TOLUENE	D	D	B		C	C	D	A	B	D	B	D			D				A	A			
TOLUENE TOLUOL	D	D	D	B			A				B	D	D	D	D	D	D	D	A				
TOLUENE KEROSENE 25%-75%																							
TOMATO JUICE	A		A	A			C	A				A	A	A					A	A			
TOXAPHENE—XYLENE																							
TRANSFORMER OIL	A		B		C	B	B		A	A	A	D	A										
TRIBUTYL PHOSPHATE	D		B	C			A				A	A	D	D	D	D	D	D					
TRIBUTYL CITRATE	A																						
TRICHLOROACETIC ACID	A		A	C			D	A			D	D	D	D	D	D	D	D	D	D			
TRICHLOROETHANE													D	D	C				A				
TRICHLOROETHYLENE	D	D	B	A			D	A	C	D	A	D	C	D	D	D	D	D	A	C	B		
TRICHLOROPROPANE							A	A	C				A	C			C	D	A				
TRICRESYL PHOSPHATE						A							D	D	C		C	D	A				A
TRIETHANOLAMINE	B		D	C					B		D	A			C								
TRIETHYLAMINE	A			C			A		C		A		A	C			C	D					
TRIETHYL PHOSPHATE	A	A	A	A			D	A			A	A							A	A			
TRIMETHYL PROPANE							A	A															
TRIPHENYL PHOSPHATE										B													
TRISODIUM PHOSPHATE					A		C	A	B	B			A	A	A		A	A	A	A			
[illegible]							A		A				D	A	A	A	A	A					
TUNG OIL											A			A		A		D					
TUNGSTIC ACID														A	A		A	A					
TUNGSTIC OIL														A	A		A	A					
TURPENTINE	A	A	B		C		C	A	B		A	B	A	D	B	D		D	A	A			

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

ENGINEERING

HARRINGTON

Chemical Resistance Chart (Continued)

CHEMICALS	PLASTICS: PVC	CPVC	Polypropylene	Kynar	Polyethylene	Cross-Linked PE	Ryton	Teflon	Epoxy	Polyester FRP	ELASTOMERS: Viton	EPDM	Buna-N	Neoprene	Nitrile	Hypalon	Butyl	Natural Rubber	ALLOYS: 316SS	304SS	Titanium	Hastelloy B	Hastelloy C
UNICHROME SOLUTION ALKALI														A	A		A	C					
UREA	A	A	A	A	A	A	A	A	A	A	A	A	D	A	A	A	A	A					
UREA AMMONIA LIQUOR														A	A	A	A	A					
URINE	A	A	A		A	A	A	A			A	A	A	D	A				A				
VANILLA EXTRACT					A	A																	
VARNISH								A			A	D		D	C	D	D	D					
VASELINE	A	A	A	B				A			A	D			B								
VEGETABLE OIL	A	A	A					A			A	A	A	D	A				A				
VINEGAR	A		A	A	A		C	A	A	A	A	A	B	C	C	A	A	A	A	A			
VINEGAR WHITE			A	A		A	A				A	A	C						A	A			
VINYL ACETATE	D	D		A				A	B	D	D			A			C	D					
VINYL CHLORIDE														A	A		C	D					
WATER	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A					
WATER ACID MINE	A	A		A			A				A		A	C					A				
WATER DEIONIZED	A	A	A	A	A	A	C	A	A	A	A	A	A	A	A	A	A	A	A	A			
WATER DEMINERALIZED	A	A	A	A			A		A	A	A	A	A										
WATER DISTILLED	A	A	A	A			A	A	A	A	A	A	A	A	A				A				
WATER POTABLE	A	A	A	A			A	A	A	A	A	A	A	A					A	A			
WATER SALT	A	A	A	A			A	A	A	A	A	A	A	A	A				A				
WATER SEA	A	A	A	A			C	A	A	A	A	A	A						C	C			
WATER SEWAGE	A	A	A	A			A	A			A	A	A		A								
WATER STEAM CONDENSATE									A														
WEED KILLERS													B	C					A				
WETTING AGENTS					A																		
WHEY													A						A				
WHISKEY	A	A	A	A	A	A	A	A			A	A	A	A	A	A	A	A	A				
WHITE LIQUOR	A	A	A	A			A	A	A	B	A	A	B	A	A		A	A	A				
WHITE WATER														A				A	A				
WINE	A	A	A	A	A	A	A	A			A	A	A	A	A	A	A	A	A				
XYLENE	D	D	D	A	C	A	B	A	B	D		D	D	D		D	D	D	A	A		B	A
X-RAY DEVELOPER BATH														A	A		A	A					
YEAST					A	A																	
ZEOLITE WATER														A	A		A	A					
ZINC ACETATE	A	A	A					A	A	A	A	A			A								
ZINC CHLORIDE	A	A	A	A	A	A	A	A	A	A	A	A		A	A			A	C	D	A	B	C
ZINC NITRATE	A	A	A	A				A			A	A			A								
ZINC PHOSPHATE									A	A													
ZINC SULFATE	A	A	A	A		A	A	A	A	A	A	A		A	A			A	A		A		
ZINC SALTS														A	A	A	A	A					

A — Excellent, no effect; B — Good, minor effect; C — Fair, moderate effect; D — Not Recommended, severe effect.

ATTACHMENT 10

STEBBINS ENGINEERING AND MANUFACTURING CO.
Telex 937397 363 Eastern Blvd. Watertown, N.Y. 13601 Tel. 315-782-3000

REPLY TO
STEBBINS LININGS DIV.
River Road North
Port Allen, La. 70767
504-343-6671

KYNAR LININGS

Kynar Dispersion Lining as applied by the STEBBINS Linings Division is a dispersion of vinylidene fluoride resin in a non-reactive medium. *Kynar is a registered trademark of Pennwalt Corporation who formulates and sells the Kynar dispersion. STEBBINS Linings Division is licensed by Pennwalt to apply Kynar Dispersion.* This is spray applied in multiple coats and heat cured. Each coat is applied at a film build of 5 to 6 mils on a cured film basis. The cure temperature after each coat varies between 485° and 525° F. and is regulated to cure that coat and fuse it to the previous coats. These cure cycles result in a single monolithic lining with a thickness of 25 to 30 mils. STEBBINS Linings Division also applies glass and carbon cloth reinforced Kynar laminates in thicknesses of 45 mils and 60 mils (Thicker laminates are also available from STEBBINS). Sheet Kynar Laminates are available for "Field Lining" applications.

The Kynar lining combines a high degree of mechanical strength impact, and abrasion resistance with excellent chemical resistance over a broad temperature range. It is used as a lining and coating in pipe, fittings, valves, and pumps; process vessels, tanks, agitators; seals, valve seats, diaphragms; as a base in exterior finishes, and in many other applications in the CPI and related industries. Due to the fact that Kynar and Carbon Steel have very similiar coefficients of thermal expansion, Kynar is physically a very sound lining for Carbon Steel vessels, tanks, and piping.

The information on chemical resistance is derived from laboratory tests, actual industrial applications and careful judgment. The chemicals included do not represent the exclusive applications for KYNAR, nor does the absence of data necessarily indicate lack of serviceability. Similarly, the use temperatures are not limiting in all cases, and service over the range from below +30° to 275° F. can be expected in many of the environments listed. The information on this chart represents the basic chemical resistance of the kynar resin. For detailed information on what thickness and/or type of Kynar lining is most suitable for a particular service, [illegible] Linings Division.

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The information is intended as a guide for the potential use of KYNAR and should not be interpreted as a guarantee of performance. Whenever a doubt exists as to the utility of KYNAR for a particular application, as a chemically resistant material and as a barrier to corrosive environments, appropriate environmental tests should be conducted.

In summary, KYNAR is resistant to most acids and bases except fuming sulfuric, fuming nitric, oleum and other sulfonating agents, and concentrated caustic have some effect at high temperatures. Among the organics nearly complete resistance is shown to aliphatics, aromatics, alcohols, acids and chlorinated solvents. Strong reducing agents such as the primary amines have an effect depending upon temperature. Strongly polar solvents such as ketones and esters cause partial solvation, particularly at elevated temperatures. KYNAR is resistant to other corrosive chemicals such as oxidizing agents and the halogens.

KEY TO RATING

1 - Little or no effect
2 - Some effect, but no indicative of impared serviceability
3 - Noticeable effect, although possible serviceability
NR - Not Recommended

DATA TAKEN FROM PENNSALT CHEMICAL CORPORATION BULLETIN KC-65A

CHEMICAL RESISTANCE

KYNAR POLYVINYLIDENE FLUORIDE

	70°F	120°F	150°F	212°F	230°F	250°F	275°F
Acetic Acid (Glacial)	1	1	2	3	NR		
Acetic Acid, Dilute (50% H_2O)	1	1	1	1	1		
Acetic Anhydride	2	3	NR				
Acetone	3	NR					
Acetone (50% H_2O)	2	2	3				
Acetonitrille	1	1	2				
Acetophonone	1	3	3	NR			
Acetylchloride	1	1					
Acrylenitrile	1	2					
Aklyl Chloride	1	1	1	1			
Aluminum Ammonium Sulfate	1	1	1	1			
Aluminum Chloride	1	1	1	1	1	1	1
Aluminum Fluoride	1	1	1	1	1	1	1
Aluminum Hydroxide	1	1	1	1	1	1	1
Aluminum Nitrate	1	1	1	1	1	1	1
Aluminum Potassium Sulfate	1	1	1	1	1	1	1
Ammonia (Anhydrous)	1	1	1	1	1	1	1
Ammonia Aqua (30%)	1	1	1	1	1	1	1
Ammonium Rifluoride	1	1	1	1			
Ammonium Carbonate	1	1	1	1	1	1	1
Ammonium Chloride	1	1	1	1	1	1	1
Ammonium Fluoride (25%)	1	1	1	1	1	1	1
Ammonium Hydroxide	1	1	1	1	1	1	1
Ammonium Nitrate	1	1	1	1	1	1	1
Ammonium Phosphate	1	1	1	1	1	1	1
Ammonium Sulfate	1	1	1	1	1	1	1
Ammonium Sulfide	1	1	1	1	1	1	1
Amyl Acetate	1	1	2	3	NR		
Amyl Alcohol	1	1	1	1	1	1	1
Amyl Chloride	1	1	1	1	1	1	1
Aniline	1	2	2	3			
Antimony Trichloride	1						
Aqua Regia	1						
Arsenic Acid	1	1	1	1	1	1	1
Barium Carbonate	1	1	1	1	1	1	1
Barium Chloride	1	1	1	1	1	1	1
Barium Hydroxide	1	1	1	1	1	1	1
Barium Sulfide	1	1	1	1	1	1	1

DATA TAKEN FROM PENNSALT CHEMICAL CORPORATION BULLETIN KC–65A

	70°F	120°F	150°F	212°F	230°F	250°F	275°F
Benzaldehyde	1	2					
Benzene	1	2	2				
Benzene Sulfonic Acid	1	3					
Benzoic Acid	1	1	1	1	1	1	
Benzyl Alcohol	1	1	1	1	1	1	1
Benzyl Chloride	1	1	1	1	1	1	1
Black Liquor	1	1	1	1	1	1	1
Borax	1	1	1	1	1	1	1
Boric Acid	1	1	1	1	1	1	1
Brine	1	1	1	1	1	1	1
Bromic Acid	1	1	1	1	1		
Bromine (Dry)	1	1	1				
Bromine Water	1	1	1	1			
Butadiene	1	1	1	1	1		
Butyl Acetate	1	2	3	NR			
Butyl Acrylate	1	2	3	NR			
n-Butyl Alcohol	1	1	1	1	1	1	1
sec-Butyl Alcohol	1	1	1	1	1	1	1
tert-Butyl Alcohol	1	1	1	1	1	1	1
n-Butylamine	2	NR					
sec-Butylamine	1	2	3	NR			
tert-Butylamine	1	2	2	3			
Butylene	1	1	1	1	1	1	1
Butyl Bromide	1	1	1	1	1	1	1
Butyl Chloride	1	1	1	1	1	1	1
Butyl Phenol	1	1	1	1			
Butyric Acid	1	1	1	1	1		
n-Butyl Mercaptan	1	1	1	1	1	1	1
Calcium Bisulfate	1	1	1	1	1	1	1
Calcium Bisulfide	1	1	1	1	1	1	1
Calcium Carbonate	1	1	1	1	1	1	1
Calcium Chlorate	1	1	1	1	1	1	1
Calcium Chloride	1	1	1	1	1	1	1
Calcium Hydroxide	1	1	1	1	1	1	1
Calcium Hypochlorite	1	1	1	1	1	1	1
Calcium Nitrate	1	1	1	1	1	1	1
Calcium Sulfate	1	1	1	1	1	1	1
Caprylic Acid	1	1	1	2			
Carbon Dioxide (Wet)	1	1	1	1	1	1	1
Carbon Dioxide (Dry)	1	1	1	1	1	1	1
Carbon Disulfide	1						
Carbon Tetrachloride	1	1	1	1	1	1	1
Castor Oil	1	1	1	1	1	1	1
Cellosolve	1	1	1	1	1	1	1
Chlorine (Dry Gas)	1	1	1	1			
Chlorine (Wet Gas)	1	1	1	1			
Chlorine Dioxide	1	1	1	1			

STEBBINS

DATA TAKEN FROM PENNSALT CHEMICAL CORPORATION BULLETIN KC-65A

	70°F	120°F	150°F	212°F	230°F	250°F	275°F
Chlorine, Liquid	1	1	1	1			
Chlorine Water	1	1	1	1			
Chlorine (5% in CC14)	1	1	1	1			
Chloroacetic Acid (50% H_2O)	1	1	1	1			
Chlorobenzene	1	1	1	2			
Chloroform	1	1	1	1			
Chlorosulfonic Acid	3	NR					
Chromic Acid (50%)	1	1	2				
Citric Acid	1	1	1	1	1	1	
Coconut Oil	1	1	1	1	1	1	1
Chromyl Chloride	1	1					
Coal Gas	1	1	1	1			
Copper Chloride	1	1	1	1	1	1	1
Copper Cyanide	1	1	1	1	1	1	1
Copper Fluoride	1	1	1	1	1	1	1
Copper Nitrate	1	1	1	1	1	1	1
Copper Sulfate	1	1	1	1	1	1	1
Corn Oil	1	1	1	1	1	1	1
Cottonseed Oil	1	1	1	1	1	1	1
Cresol	1	1	1	2			
Cresylic Acid	1	1	1	2			
Crotonaldehyde	1	1	2	3			
Crude Oil	1	1	1	1	1	1	1
Cyclohexane	1	1	1	1	1	1	1
Cyclohexanol	1	1	1	2			
Cyclohezanone	1	3	3	NR			
Dextrin	1	1	1	1	1		
Diacetone Alcohol	1	2	3	NR			
Diesel Fuels	1	1	1	1	1	1	1
Diethylamine	1	3	3				
Diethyl Cellosolve	1	1	1	1	1	1	1
Diethyl Ether	1	2					
Diethylene Triamine	1	1	2	3			
Diglycolic Acid	1						
Diisobutyl Keton	1	1	1	1			
Diisobutylene	1	1	1	1	1	1	1
Dimethylamine	2	3	3	3			
Dimethylaniline	1	2	3	3	NR		
Dimethyl phthalate	1	2	3	NR			
p-Dioxane	3	3	NR				
Epichlorohydrin	3	NR					
Ether	1	2					
Ethyl Acetate	1	2	2				
Ethyl Alcohol	1	1	1	1	1	1	1

DATA TAKEN FROM PENNSALT CHEMICAL CORPORATION BULLETIN KC–65A

	70°F	120°F	150°F	212°F	230°F	250°F	275°F
Esters	1	2	3	NR			
Ethylacetoacetate	1	2	3	NR			
Ethyl Acrylate	1	2	3	NR			
Ethyl Chloride	1	1	1	1	1	1	1
Ethylene Bromide	1	1	1	1	1	1	1
Ethylene Chloride	1	1	1	1	1	1	1
Ethylene Chlorohydrin	1	2	3	NR			
Ethylene Diamine	2	NR					
Ethylene Glycol	1	1	1	1	1	1	1
Ethylene Oxide	1	1	1	1			
Fatty Acids	1	1	1	1	1	1	1
Ferric Chloride (50% in H_2O)	1	1	1	1	1	1	1
Ferric Nitrate	1	1	1	1	1	1	1
Ferric Sulfate	1	1	1	1	1	1	1
Ferrous Chloride	1	1	1	1	1	1	1
Ferrous Nitrate	1	1	1	1	1	1	1
Ferrous Sulfate	1	1	1	1	1	1	1
Fluorine	1						
Formaldehyde (37% in H_2O)	1	1					
Formic Acid	1	1	1	1	1	1	
Fuel Oil	1	1	1	1	1	1	1
Furane	3	NR					
Furfural	2	2	3	NR			
Gallic Acid	1	2					
Gas — Manufactured	1	1	1	1	1	1	1
Gas — Natural	1	1	1	1	1	1	1
Gasoline — Leaded	1	1	1	1	1	1	1
Gasoline — Unleaded	1	1	1	1	1	1	1
Gasoline — Sour	1	1	1	1	1	1	1
Glucose	1	1	1	1	1	1	1
Glycerol	1	1	1	1	1	1	1
Glycelic Acid	1	2	3	NR			
Glycol	1	1	1	1	1	1	1
Heptane	1	1	1	1	1	1	1
Hexane	1	1	1	1	1	1	1
Hydriedic Acid (48% + 12% I_2)	1	1	1	1	1	1	1
Hydrobromic Acid (50%)	1	1	1	1	1	1	1
Hydrochloric Acid (20%)	1	1	1	1	1	1	1
Hydrochloric Acid (Conc.)	1	1	1	1	1	1	1
Hydrochloric Acid (Gas)	1	1	1	1	1	1	1
Hydrocyanic Acid	1	1	1	1	1	[illegible]	[illegible]
Hydrofluoric Acid (35%)	1	1	1	1	1	1	
Hydrofluoric Acid (70%)	1	1	1	1			
Hydrofluoric Acid (100%)	1	1	1	1			

DATA TAKEN FROM PENNSALT CHEMICAL CORPORATION BULLETIN KC–65A

	70°F	120°F	150°F	212°F	230°F	250°F	275°F
Hydrofluosilicic Acid	1	1	1	1	1	1	1
Hydrogen	1	1	1	1	1	1	1
Hydrogen Cyanide	1	1	1	1	1	1	1
Hydrogen Peroxide (30%)	1	1	1	1	1	1	
Hydrogen Peroxide (90%)	1						
Hydrogen Phosphide	1	1					
Hydrogen Sulfide (Dry)	1	1	1	1	1	1	1
Hydrogen Sulfide (Wet)	1	1	1	1	1	1	1
Hypochlorous Acid	1	1	1	1	1	1	1
Iodine (Dry)	1	1	1				
Iodine (Wet)	1	1	1				
Iodoform	1	1	1	1			
Jet Fuel — JP4	1	1	1	1			
Jet Fuel — JP5	1	1	1	1			
Kerosene	1	1	1	1	1	1	1
Ketones	1	2	3	NR			
Lactic Acid	1	2	3	NR			
Lard Oil	1	1	1	1	1	1	1
Lauric Acid	1	1	1	1	1		
uryl Chloride	1	1	1	1	1	1	
Lead Acetate	1	1	1	1	1	1	1
Lemon Oil	1	1	1	1	1	1	
Linoleic Acid	1	1	1	1	1	1	
Linseed Oil	1	1	1	1	1	1	1
Lubricating Oil	1	1	1	1	1	1	1
Magnesium Carbonate	1	1	1	1	1	1	1
Magnesium Chloride	1	1	1	1	1	1	1
Magnesium Hydroxide	1	1	1	1	1	1	1
Magnesium Nitrate	1	1	1	1	1	1	1
Magnesium Sulfate	1	1	1	1	1	1	1
Maleic Acid	1	1	1	1	1	1	
Malic Acid	1	1	1	1	1	1	
Mercaptan, n-Butyl	1	1	1	1	1	1	1
Mercuric Chloride	1	1	1	1	1	1	
Mercuric Cyanide	1	1	1	1	1	1	
Mercuric Nitrate	1	1	1	1	1	1	1
Mercury	1	1	1	1	1	1	1
Methane	1	1	1	1	1		
Methane Sulfonic Acid (50%)	1	1	1	1			
Methyl Alcohol	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
[illegible] Bromide	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
Methyl Cellosolve	1	1	1	1	1	1	1
Methyl Chloride	1	1	1	1	1	1	1
Methyl Chloroform	1	1					

DATA TAKEN FROM PENNSALT CHEMICAL CORPORATION BULLETIN KC–65A

	70°F	120°F	150°F	212°F	230°F	250°F	275°F
Methyl Ethyl Ketone	3	3	3	NR			
Methyl Sulfuric Acid	1	1					
Methylene Chloride	2	2					
Methyl Isobutyl Ketone	1	2	3	NR			
Milk	1	1	1	1			
Mineral Oil	1	1	1	1	1	1	1
Monoethanolamine	3	NR					
Monochlorobenzene	1	1	1	2			
Morpholine	2	3	NR				
Naphtha	1	1	1	1	1	1	1
Naphthalene	1	1	1	1	1	1	1
Nickel Chloride	1	1	1	1	1	1	1
Nickel Nitrate	1	1	1	1	1	1	1
Nickel Sulfate	1	1	1	1	1	1	1
Nicotine	1	2	2				
Nicotonic Acid	1	1	1	1	1	1	
Nitric Acid — Conc.	1	1					
Nitric Acid — Fuming	2	2					
Nitric Acid — Sulfuric Acid 50/50	1	1	2				
Nitrobenzene	1	2	2				
Nitrogen Dioxide	1	1	1	1			
Nitromethane	1	1					
Nitrous Acid	1	1	1	1			
Octane	1	1	1	1	1	1	1
Octene	1	1	1	1	1	1.	1
Oleic Acid	1	1	1	1	1	1	
Oleum	NR						
Oxalic Acid	1	1	2	3			
Oxygen	1	1	1	1	1	1	1
Ozone	1	1	1	1	1	1	1
Palmitic Acid	1	1	1	1	1	1	
Perchloric Acid (72%)	1	1					
Perchloric Acid (10%)	1	1	1	1			
Perchlorethylene	1	1	1	1	1	1	1
Phenol (100%)	1	1	1	2			
Phenol (10%)	1	1	1	1			
Phenylhydrazine	1	1					
Phosphoric Acid (30%)	1	1	1	1	1	1	1
Phosphoric Acid (85%)	1	1	1	1	1		
Phosphorus Pentoxide	1	1	1	1			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			
Picric Acid	1						
Polyvinyl Acetate	1	1	1	1	1	1	1
Potassium Bromide	1	1	1	1	1	1	1

DATA TAKEN FROM PENNSALT CHEMICAL CORPORATION BULLETIN KC–65A

	70°F	120°F	150°F	212°F	230°F	250°F	275°F
Potassium Carbonate	1	1	1	1	1	1	1
Potassium Chlorate	1	1	1	1	1	1	1
Potassium Chloride	1	1	1	1	1	1	1
Potassium Cyanide	1	1	1	1	1	1	1
Potassium Dichromate	1	1	1	1	1	1	1
Potassium Ferrocyanide	1	1	1	1	1	1	1
Potassium Hydroxide	1	1	1	1			
Potassium Nitrate	1	1	1	1	1	1	1
Potassium Permanganate	1	1	1	1	1	1	1
Potassium Sulfate	1	1	1	1	1	1	1
Potassium Sulfide	1	1	1	1	1	1	1
Propane	1	1	1	1	1	1	1
Propyl Alcohol	1	1	2	3			
Propylene Oxide	3						
Pyridine	3	3	NR				
Pyrogallol	1	1					
Refrigerant 11	1	1	1	1			
Refrigerant 12	1	1	1	1			
Refrigerant 22	1	1	1	1			
Salicylic Acid	1	1	1	1			
Salicyl-aldehyde	1	1	1	1			
Sea Water	1	1	1	1	1	1	1
Silver Cyanide	1	1	1	1	1	1	1
Silver Nitrate	1	1	1	1	1	1	1
Sodium Acetate	1	1	1	1	1	1	1
Sodium Benzoate	1	1	1	1	1	1	1
Sodium Bicarbonate	1	1	1	1	1	1	1
Sodium Bisulfate	1	1	1	1	1	1	1
Sodium Bisulfite	1	1	1	1	1	1	1
Sodium Bromide	1	1	1	1	1	1	1
Sodium Carbonate	1	1	1	1	1	1	1
Sodium Chlorate	1	1	1	1	1	1	1
Sodium Chloride	1	1	1	1	1	1	1
Sodium Cyanide	1	1	1	1	1	1	1
Sodium Fluoride	1	1	1	1	1	1	1
Sodium Hydorxide (50%)	1	1	1	1			
Sodium Hydorxide (10%)	1	1	1	1			
Sodium Hypochlorite	1	1	1	1	1	1	1
Sodium Nitrate	1	1	1	1	1	1	1
Sodium Nitrite	1	1	1	1	1	1	1
Sodium Peroxide	1	1	1	1	1	1	1
Sodium Phosphate							
Sodium Silicate							

DATA TAKEN FROM PENNSALT CHEMICAL CORPORATION BULLETIN KC–65A

	70°F	120°F	150°F	212°F	230°F	250°F	275°F
Sodium Sulfate	1	1	1	1	1	1	1
Sodium Sulfide	1	1	1	1	1	1	1
Sodium Sulfite	1	1	1	1	1	1	1
Sodium Thiosulfate	1	1	1	1	1	1	1
Sour Crude Oil	1	1	1	1	1	1	1
Stannic Chloride	1	1	1	1	1	1	1
Stannous Chloride	1	1	1	1	1	1	1
Stearic Acid	1	1	1	1	1	1	1
Stoddard's Solvent	1	1	1	1	1	1	
Sulfur (Molten)	1	1	1	1	1	1	
Sulfur Chloride	1						
Sulfur Dichloride	1						
Sulfur Dioxide	1	1	1	1			
Sulfur Trioxide	3	NR					
Sulfuric Acid (60%)	1	1	1	1			
Sulfuric Acid (Conc.)	1	1	1	1			
Sulfuric Acid (Fuming)	3	NR					
Sulfurous Acid	1	1	1	1			
Tall Oil	1	1	1	1	1	1	1
Tannic Acid	1	1	1	1	1		
Tartaric Acid	1	1	1	1	1	1	
Tetraethyl Lead	1	1	1	1	1	1	1
Tetrahydrofuran	2	3					
Tetramethyl Ammonium Hydroxide (50%)	1	1	1	1			
Toluene	1	1	1	1			
Tributyl Phosphate	1	2	NR				
Trichloracetic Acid	1	2	3	NR			
Trichlorethylene	1	1	1	1	1	1	1
Triethylamine	1	1	2	3			
Trisodium Phosphate	1	1	1	1	1	1	1
Turpentine	1	1	1	1	1	1	1
UDMH-Hydrazine (50-50)	1	2					
Urea (50% H_2O)	1	1	1	1	1	1	
Varsol	1	1	1	1	1	1	
Vinyl Acetate	1	1	1	1	1	1	
Water	1	1	1	1	1	1	1
White Acid	1	1	1	1	1	1	
Xylol	1	1	1	1			
Zinc Chloride	1	1	1	1	1	1	1
Zinc Nitrate	1	1	1	1	1	1	1
Zinc Sulfate	1	1	1	1	1	1	1

KLEINFELDER

Specification No.
Project No. 10-2236-01
Date - April 30, 1991

SECTION 09800
COATINGS

PART 1.0 GENERAL

1.01 SCOPE

A. This section covers protective coatings and preparation and filling of substrate surfaces for four secondary containment sumps adjacent to the chemical drum storage area, TSU-3, at the Teledyne McCormick Self facilities in Hollister, California. The painting contractor shall provide everything necessary to perform the coating operation as specified herein which includes (but may not be limited to): labor, materials, equipment and services.

B. Refer to Sheet 1 for location map and Sheet 2 for site plan.

C. This specification covers the coating materials, surface preparation and spray application of the materials onto deteriorated or previously coated concrete. It does not cover resurfacing of the concrete by means other than those described in this specification, application to new concrete or water saturated concrete.

D. The approximate square footage of the sumps (Sheet 3), including the L-shaped metal rims, is as follows:

Sump 1	199 sq. ft.
Sump 2	191 sq. ft.
Sump 3	191 sq. ft.
Sump 4	199 sq. ft.

1.02 SUBMITTALS

A. The coating described in this specification is suitable for all surfaces described herein. If the Contractor chooses to submit for consideration coating of a manufacturer other than specified, there shall be no additional cost to the Owner. Products other than the one specified may be submitted to the Owner for review but shall be accompanied by a letter from the coating manufacturer recommending the use of the coating for the purpose and conditions encountered on this project. Submit complete data on past performance under similar conditions, composition or type, and directions for use and application of the submitted coating with the request for approval of other-than-specified products. The Owner may further require the Contractor to furnish test results from an independent coating laboratory comparing the proposed substitution with the named product, at no additional cost to the Owner.

1.03 DELIVERY AND STORAGE OF MATERIALS

A. The Contractor shall deliver all materials in unopened containers with manufacturer's label, which must include name, batch number and date.

B. The Contractor shall store all materials in assigned areas, maintain storage area clean and fire safe, and shall remove all used rags, thinner and buckets to an offsite disposal area of the Contractor's choice.

1.04 OPERATION AND MAINTENANCE DATA

The Contractor shall submit maintenance and cleaning requirements for coating and for repair and patching techniques.

1.05 REGULATORY REQUIREMENTS

A. Regional Air Quality Control regulations prohibit the manufacture, sale or application of architectural and specialty coatings having greater than stipulated levels of volatile organic compounds (VOC)[1] after specified dates in 1987. Products specified herein are, to the best of the Engineer's knowledge, in compliance with the applicable VOC levels allowable after January 1988.

B. The Contractor shall base his bid on using the product specified. If the product specified is not available in formulations that meet applicable regulations on VOC levels at time of notice to proceed is issued, the Contractor shall submit for review products of equivalent quality and function that do comply. In which case, any difference in cost between the first named item specified and the product that is favorably reviewed and used will be adjusted by Change Order.

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1 Measured in grams per liter by weight of coating as applied.

C. If the Contractor applies any coating for which he has not submitted certificates indicating actual VOC content, or if he applies a coating that has been modified or thinned other than is recommended by manufacturer, he shall be responsible for any fines, costs, remedies, or legal actions that may result.

1.06 SAFETY PRECAUTIONS

A. The application contractor will provide safe and secure access to work area.

B. Other contract services will be halted as necessary so as not to interfere with the work flow of application.

C. Protective clothing shall be worn by any personnel possibly exposed to direct spray or overspray of precoats and topcoats. This includes hair, eyes and other skin areas and the use of appropriate respirators.

D. Personnel not familiar with the standard health hazards involved in the handling of these products shall be briefed on the risks that are present and precautions to be taken.

E. Material Safety Data Sheets are to be made available to all personnel that could come into contact with the coatings.

F. All personnel of application crews shall be informed of regulations regarding smoking, auto traffic, restrictions, meanings of warning bells, horns, whistles, fire warnings and restricted areas.

G. All Local, State and Federal Occupational Health and Safety Standards shall be strictly adhered to by all parties involved.

1.07 REFERENCES

A. ASTM D-412a

B. FTMS 101C

1.08 ENVIRONMENTAL REQUIREMENTS

A. Do not install materials when temperature is below 40 °F or above 120 °F.

B. Restrict traffic from area where coating is being applied or is curing.

1.09 WARRANTY

A. Provide three year warranty for application. Warranty shall include coverage for bond to substrate. Warranty shall also include degradation of chemical resistance to those chemicals which compound has been tested and approved for usage.

PART 2.0 MATERIALS

2.01 MANUFACTURER

The coatings shall be as supplied by E.A. Wilcox Company of So. San Francisco, CA or approved equal.

2.02 MATERIALS

A. Coating - two component catalyzed elastomeric polyurethane shown below, or equal product:

Coat No.	Product	Thickness
1	Endura-Flex 1947 Precoat	10 Mils
2	Endura-Flex 1947 Topcoat	90 Mils
	Total	100 Mils

B. The materials shall be approved by the Engineer prior to commencing the application. Once the coating formulation is accepted and approved by the Engineer, it shall not be changed except by authority of the Engineer.

C. All coatings, precoat and topcoat, shall be 100% solids tar filled elastomeric aromatic polyurethane in a 1 part resin to 1 part catalyst ration by volume. Neither component shall contain solvents, fillers or extenders.

D. The protective coating materials shall be corrosion, abrasion and impact resistant; with a Shore "A" hardness of 65 to 70 at 78 ^{o}F; a tensile strength of 1350 psi at an elongation of 50% as per ASTM D-412a; and shall be resistant to puncture per FTMS 101C at 100 mils equal to 80 lbs.

E. The applied coating shall be capable of repair at any time during its life.

PART 3.0 EXECUTION

3.01 APPLICATION SCHEDULE

A. All sump surfaces shall receive one precoat of Endura-Flex 1947 Precoat and one topcoat of Endura-Flex 1947 Topcoat.

3.02 SURFACE PREPARATION

A. If grease, oils or other contaminants are present, they must be removed with low pressure water blasting or steam cleaned. An emulsifying detergent wash is also acceptable as long as it is promptly rinsed down with plenty of fresh water so as to remove residual detergents.

B. Once the concrete surface has been cleaned and has been allowed to dry, it is grit blasted via "brush blast" techniques. for the purpose of removing any deteriorated concrete, aggregate or laitence and produce a firm grade of sound concrete with an adequate surface profile that will enhance the adhesion of the coating. Unless otherwise specified, any existing coatings must be removed completely, whether by abrasive blasting or by any other method.

C. The entire area to be coated shall be cleaned of any loose matter such as blasting residues, aggregate, or laitence prior to coating. Vertical or inverted surfaces may be blown off with clean, oil-free compressed air but the floors and at least the lower section of the vertical walls <u>must be vacuumed</u>. If blowing off with compressed air creates unacceptable levels of dust in the air, which may later settle on the cleaned surfaces, then the entire surface shall be vacuumed instead.

D. Allow the concrete to dry thoroughly before coating. In order to determine the moisture content of the concrete, a test shall be performed where a one foot square section of clear polyethylene plastic is securely taped around its edges to the concrete surface. The plastic is allowed to remain attached to the surface overnight and if water condensation is evident on the interior surface when inspected the following day, then it shall be considered too humid for coating. Consult the manufacturer for further recommendations if necessary.

3.03 RESURFACING

A. Hand mixing of the urethane coating materials is allowed only for filling small voids, cracks or joints in the concrete surface to be coated.

B. Larger scale resurfacing of the concrete surface, if needed, may be accomplished by the use of quick set cementitious mortars or sand filled solventless epoxy putties.

3.04 MIXING

A. The precoat and topcoat shall be two component systems that are simultaneously proportioned, mixed and sprayed in a 1A : 1B volume ratio by plural component spray equipment specially designed for use with these coating systems. The containers of the resin (Side "A") component shall be thoroughly mixed with an air driven agitator for at least 15 minutes before hooking up to the spray rig. Mixing of the isocyanate component is not required. Once this is done, no further mixing or proportioning is required. Avoid contamination of moisture.

3.05 APPLICATION OF PRECOAT

A. Do not apply precoat in damp or rainy weather.

B. The precoating material is applied at the thickness specified before the application of the topcoat. It is applied with the special equipment that is described in Section 3.04A of this specification.

C. The precoat is allowed to cure for no less than twenty minutes or more than two hours prior to topcoating at an ambient temperature of 72 ^{o}F. If more than two (2) hours pass from the time of application of the precoat, it shall be given a very light abrasive brush blast and vacuum prior to application of the topcoat.

3.06 APPLICATION OF TOPCOAT

A. The topcoat is spray applied with the plural component described in Section 3.03B, to all primed surfaces at a pressure of 2500 psi at the desired thickness in one single coat accomplished by various passes of the spray gun at a rate of approximately 10 mils per pass. The total thickness of material shall be applied at one spraying. Multiple coats, so as to build up thickness gradually, may be applied over already applied and untreated topcoating material as long as the undercoat is no older than 2 hours. Longer periods between coats require cleaning and abrading of the undercoat prior to the application of an additional coat.

B. No moisture condensation, precipitation, water vapor or contamination will be acceptable on the primed surface.

C. The acceptable ambient temperature range for application of the topcoat is 40 °F to 120 °F. The maximum acceptable relative humidity range is 95% or 5 °F above the dew point.

D. The acceptable minimum cure time after completion of coating and exposure to splash or immersion is 2 hours. A 48 hour cure period is desirable. Impact, abrasion or high traffic applications should allow at least seven days at 70 °F or four days at 120 °F for full cure.

E. Ladders and items such as hoses, boards, cables, and braces must be placed at least 18" away from the surfaces to be coated so as not to interfere with the space normally required for spray gun operations.

3.07 APPEARANCE OF FINISHED COATING

A. The finished coating shall be generally smooth and free of sags, drips or holidays. All surfaces shall have the required minimum thickness. In general, the surface of the coating shall be no rougher than the concrete substrate. The color must be uniform.

3.08 PINHOLE AND CONTINUITY TESTING

A. The Contractor will test the coating and the Engineer shall witness the testing. The Contractor will use a low voltage electrical resistance meter or similar testing equipment to test for pinholes and check thickness with a magnetic thickness gauge to verify to the Engineer's satisfaction that a pinhole free condition and specified film thickness of the coating system has been achieved over all of the coated surfaces. Repair all deficiencies in film integrity and thickness per manufacturer's recommendations.

3.09 LEAK TESTING

A. Following completion and curing of the coating, the sumps shall be tested for liquid-tightness by filling the sumps to approximately 45 1/2" depth, i.e., to the level just below the angle irons at the top of the sumps. Leak testing shall be performed by the Contractor and witnessed by the Engineer.

B. Leak testing procedures shall be approved by the Engineer prior to testing.

C. Only two non-adjacent sumps shall be measured during one 24-hour period.

D. The sumps shall be filled once at the start of a 24-hour test. The water depth shall be measured using a stilling well. The sumps shall be covered and left undisturbed. After 24 hours the depths shall be remeasured.

E. The Contractor shall supply all materials necessary for the leak test.

F. Any leaks disclosed by the test shall be corrected by the Contractor in accordance with the manufacturer's recommendations.

G. Water required for testing shall be supplied by the Owner.

3.10 INSPECTION

A. The quality and grade of cleanliness of all blasted and prepared surfaces, including removal of the blast grit from these surfaces, shall be inspected by the painting contractor and verified by the Owner's representative prior to the application of the precoat.

B. The quality of all precoated surfaces are to be inspected for uniformity in coverage and color. The proper recoat times are also monitored by the Owner's representative before topcoating.

C. A final inspection of the coated concrete shall be undertaken:

1. Coated surfaces shall be inspected visually for blisters. Blisters, if any, shall be removed and repaired as per manufacturer's recommendations.

2. If the coating thickness cannot be determined by the continuity testing described in 3.08, the Contractor shall furnish as many plugs as are requested by the Owner's representative in order to measure the coating thickness for proper coverage. Areas where the coating has been removed must be repaired as per manufacturer's recommendations.

3. Absolutely no pinholes shall be allowed on the coated surface.

3.11 CLEANING AND COMPLETION

A. At the completion of this portion of the work, remove all debris, remove all coating and stains from work for which coated finish is not intended, touch up all marred surfaces, and leave all structures in a clean condition, ready for use.

B. Refinish all damaged or imperfect coating to the satisfaction of the Engineer prior to final acceptance of the facility.

END OF SECTION

May 30, 1991
File: 10-2236-01

Mr. Ed Lynam
Teledyne McCormick Selph
3601 Union Road
P.O. Box 6
Hollister, California 95023

SUBJECT: Documentation for the recoating, containment volume calculations, and the structural stability calculations of the Hazardous Waste Secondary Containment Sumps in Area TSU-3 at Teledyne McCormick Selph (TMc/S), 3601 Union Road, Hollister, California

Dear Mr. Lynam:

Kleinfelder is pleased to submit the following documentation of the hazardous waste secondary containment sumps for Area TSU-3 of the TMc/S facility located at 3601 Union Road, Hollister, California (Plate 1). This document was prepared at the request of TMc/S to be used as a supplement to TMc/S' "Hazardous Waste Operations Plan". The "Hazardous Waste Operations Plan" will be submitted to the Department of Health Services (DHS) as an application for renewal of TMc/S' Hazardous Waste Operational Permit. The following documentation summarizes the recoating operation of the TSU-3 Secondary Containment Sumps, their containment volume calculation and their structural stability calculation.

1.0 BACKGROUND

Area TSU-3 is used to store 55-gallon drums of hazardous materials and hazardous waste. The materials stored are as described in Chapter IV of Part B of the aforementioned "Hazardous Waste Operational Plan". Area TSU-3 is a concrete slab of approximately 4200 square feet. The slab is covered with a corrugated plastic roof which is supported by a steel frame (Plate 2). The slab is divided into four storage bays of approximately equal areas. Each bay is separated by a concrete curb approximately 11 inches in height and 6 inches in width. Each bay drains to it's own reinforced concrete sump (Plate 3). In 1983, Area TSU-3 was certified by IT Enviroscience, June 15, 1983, for hazardous materials and hazardous waste storage.

KLEINFELDER 2121 N. California Blvd. Suite 570 Walnut Creek, CA 94596 (415) 938-5610

2.0 DOCUMENTATION

The following conditions and clarifications form the basis for documentation.

2.1. Site Inspection

A site inspection of the TSU-3 Secondary Containment Sumps was performed on April 12, 1991. There appeared to be cracks on the westerly walls of Sumps A, B, and C. The cracks appeared to be temperature or shrinkage cracks common to reinforced concrete structures. The sumps had an existing epoxy coating which appeared weathered and not elastic enough to prevent possible migration of liquids through the cracking in the concrete sumps. The aging, non-resilient epoxy coating prompted TMc/S to have the sump walls and floors recoated with an elastomeric coating. The coating operation is described below. Also, during the site inspection, measurements were taken of the pertinent areas of the sumps and storage bays.

2.2 Review of TMc/S As-Built Information

To facilitate preparation of the TSU-3 Secondary Containment Documentation, TMc/S supplied Kleinfelder with a draft copy of the Facility's "Hazardous Waste Operations Plan", Chapter III and IV, a TSU-3 Storage Area site plan (Plate 2), photographs of the sumps, and a letter from the construction contractor certifying the wall thickness and the size and quantity of rebar used in the sump construction (Appendix A).

2.3 Recoating of the TSU-3 Secondary Containment Sump Walls and Floors

A recoating operation was performed on the TSU-3 Secondary Containment Sumps. The purpose of the recoating was to reduce the potential for liquids to migrate through the existing concrete sump walls to the surrounding soil. The recoating operation consisted of machine grinding down the high spots of the concrete and sandblasting the surfaces to be coated to remove the existing epoxy coating, thus creating a clean and uniform surface. Damp and wet areas appearing at the seam between the walls and the sump floors were sealed with Waterplug, an epoxy sealer. Next, a skim coat of Dudick brand polyester filler was applied to all sump surfaces. Finally, the application of the coating was performed.

The recoating operations were performed in accordance with the Coating Specification (Section 9800) included in Appendix B. The coating material used was "Endura-Flex EF-1947" as manufactured by E.A. Wilcox Company. "EF-1947" is a 100% coal tar solids polyurethane elastomer product. Physical properties of the coating were supplied by the distributor and are included in Appendix B. After coating the sumps, the coating was tested for adherence to the required mil thickness and for continuity. The sumps were subsequently leak tested.

The coating thickness and integrity were tested by visual observation and by field testing using a wet film thickness gauge. Continuous wet film thickness testing was performed on all sump walls and floors during the coating operation. One representative test plug was taken from the westerly wall of Sump C. Wall thicknesses ranged from 110 to 130 mils. Floor thicknesses ranged from 200 to 250 mils. The dry film thickness is calculated to equal the wet film thickness based on the equation recommended by the Steel Structures Painting Council (SPCC):

Dry Film Thickness = Wet Film Thickness x % Solids
where % Solids = 100 %.

The continuity of the coating was visually inspected and tested using a high voltage spark test. The voltage was set as recommended by the distributor and by the National Association of Corrosion Engineers (NACE). Several pinholes and air bubbles were detected, repaired, and retested.

The sumps were leak tested by filling the sumps to the base of the traffic grates. The grates were subsequently covered with plastic sheeting and plywood to allow vehicle access to the storage bays without disturbing the water-filled sumps. The sumps were left undisturbed for 24-hours. The water levels were then measured by Teledyne McCormick Selph personnel. There appeared to be no measurable amount of change in the water levels of the containment sumps. Refer to Appendix B for photographic record of the leak test.

2.4 Sump Containment Volumes and Loading Capability

The requirements set forth in the "Hazardous Waste Operation Plan", Chapter IV states that the storage capacity of the sumps must be adequate to contain the total volume of rainfall from a 25 year storm for a duration of 24 hours, plus either 10 percent of the total volume of hazardous waste stored in each bay or 100 percent of the volume of the largest container stored in each bay, whichever is greater.

Because the storage area is covered, only rain falling at an angle would be able to enter the storage bays through the open sides. The volume of rain entering in this manner has been calculated based on assumptions included in Appendix B. TMc/S' experience suggests the predominant weather fronts approach this facility from the westerly direction. A wind rose record of wind direction at the site indicates that the prevailing wind comes from the west. From our site visits this appears to be true. Therefore, the rainfall volume calculations were performed with the rainfall entering the storage bays through the longest side of the storage area from the westerly direction. The secondary containment storage capacity, volume of rainfall and the allowable hazardous waste storage volumes for TSU-3 Area are shown Table I.

TABLE I
TSU-3 STORAGE VOLUMES

Bay	Total Sump Volume (gallons)	Total Rainfall Volume (gallons)	10% of Allowable Hazard Waste Volume (gallons)	Total Allowable Hazard Waste Volume (gallons)
A	1077	663	414	4,140
B	1025	660	365	3,650
C	1025	692	333	3,330
D	1077	767	310	3,100

The total volume of hazardous materials and/or waste that may be stored at TSU-3 Hazardous Waste Storage Area, for Bays A, B, C, and D, are 4140, 3650, 3330, and 3100 gallons, respectively.

2.5 TSU-3 Secondary Containment Sump Structural Stability Calculations

The structural stability of the sumps was calculated using a structural analysis computer program for concrete retaining structures named "Enercalc". The program input and output sheets are included in Appendix D. The calculations are based on documents provided by TMc/S including the certification letter by the containment sump contractor, Mark Nicholson Inc., certifying the construction of the containment sumps. The letter states the containment sumps are constructed of reinforced concrete, having a wall and floor thickness of 6 inches with one-half inch reinforcement bars located 12" on center in both directions. The loading conditions for the containment sumps are shown in Plate 4 and are listed below:

Surface Loading = H-10 traffic loading (simulated by one foot additional soil height surcharge).

Soil bearing (assumed) = 2000 pounds per square foot (psf)

Active Fluid Pressure = 40 pounds per cubic foot (pcf)

Passive Pressure (assumed) = 250 pcf

Soil Density (assumed) = 120 pcf

Soil Friction (assumed) = 0.35

Based on the information described herein, the calculations indicate that the sump is adequately designed to resist sliding, overturning, and shear against the existing loading conditions listed above. Also, the area of steel to wall ratio is adequate to meet the minimum requirements of the Uniform Building Code (UBC) and American Concrete Institute (ACI) code for reinforced concrete walls. The minimum of steel to total area ratio required by ACI code vertical and horizontal steel is 0.0015 and 0.002, respectively. The stated, existing ratio is .0027 and 0.0027, respectively.

3.0 CONCLUSION

This documentation is not a ratification, but rather a supplement to the previous certification performed by IT Enviroscience. The documentation is based on the information received from TMc/S certifying the existing conditions of the TSU-3 Hazardous Waste Storage Area and from data obtained from independent observation of the site and the work described herein. Based on this information the new coating, existing volumes and the existing structural stability of the TSU-3 secondary containment sumps appear to be adequate to contain the volume of rainfall and hazardous waste material as reported within this documentation.

4.0 LIMITATIONS

This report was prepared in general accordance with the accepted standard of practice which exists in Northern California at the time the investigation was performed. It should be recognized that definition and evaluation of environmental conditions is a difficult and inexact art. Judgements leading to conclusions and recommendations are generally made with an incomplete knowledge of the conditions present. More extensive studies, including additional environmental investigations, can tend to reduce the inherent uncertainties associated with such studies. If the Client wishes to reduce the uncertainty beyond the level associated with this study, Kleinfelder should be notified for additional consultation.

Our firm has prepared this report for the Client's exclusive use for this particular project and in accordance with generally accepted engineering practices within the area at the time of our investigation. No other representations, expressed or implied, and no warranty or guarantee is included or intended.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both onsite and offsite) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify

Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

Sincerely,

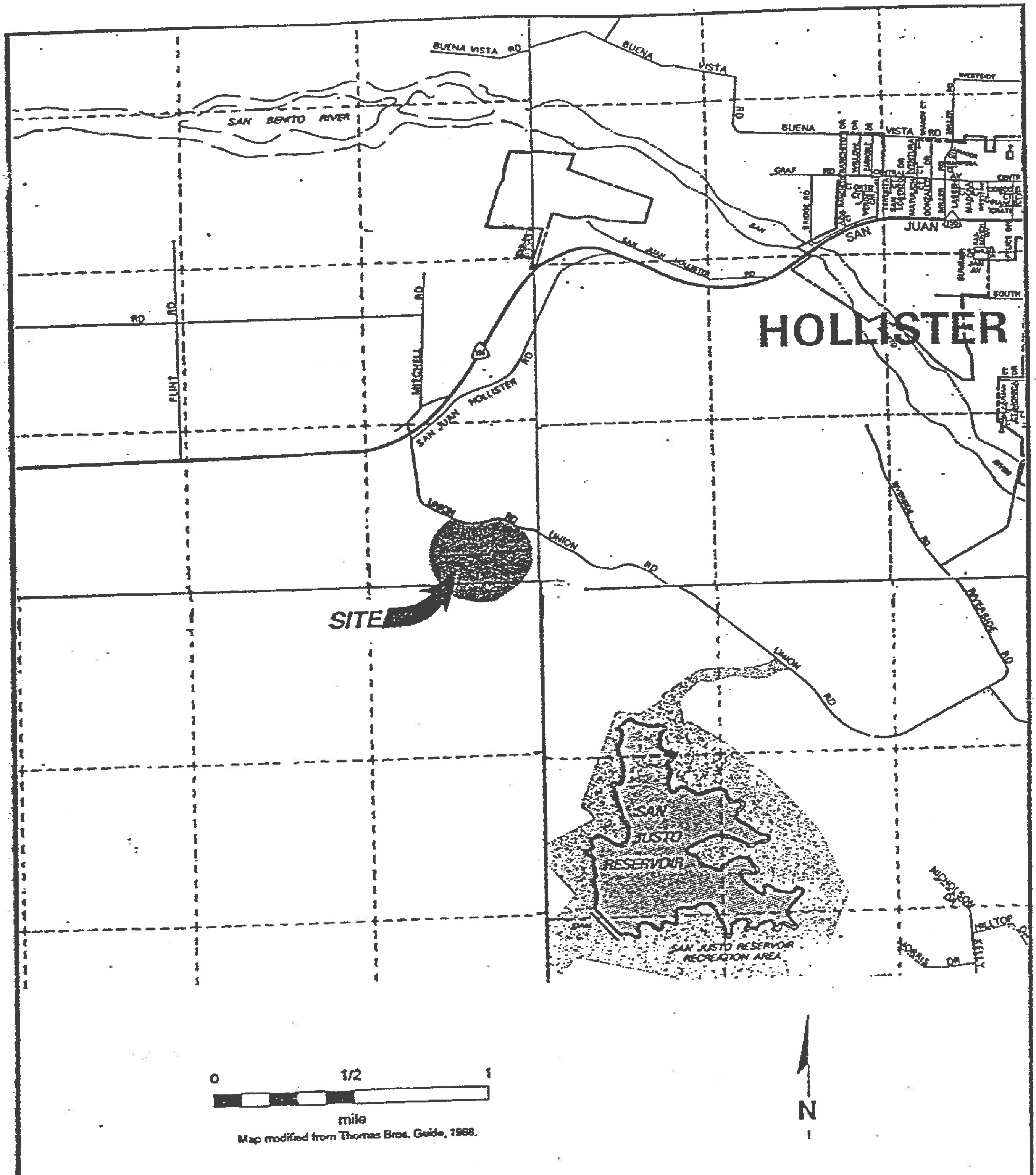
KLEINFELDER

David Behrens, MSCE/PE
Senior Engineer
R.C.E No. 32807

REGISTERED PROFESSIONAL ENGINEER
DAVID K. BEHRENS
No. 32807
Exp. 6-30-94
CIVIL
STATE OF CALIFORNIA

DKB:ko

KLEINFELDER 2121 N. California Blvd., Suite 570, Walnut Creek, CA 94596 (415) 938-5610



KLEINFELDER
WALNUT CREEK, CALIFORNIA

DRAFTED: KPK	CHECKED: BRB	PROJ. ENGR: BRB
SCALE: SEE BAR SCALE		PROJ. MGR. DKB
PROJECT NUMBER: 10-2236-01		CAD FILE:

SITE LOCATION MAP
TELEDYNE MCCORMICK SELPH

DRAWING NO: PLATE 1

REV: 0

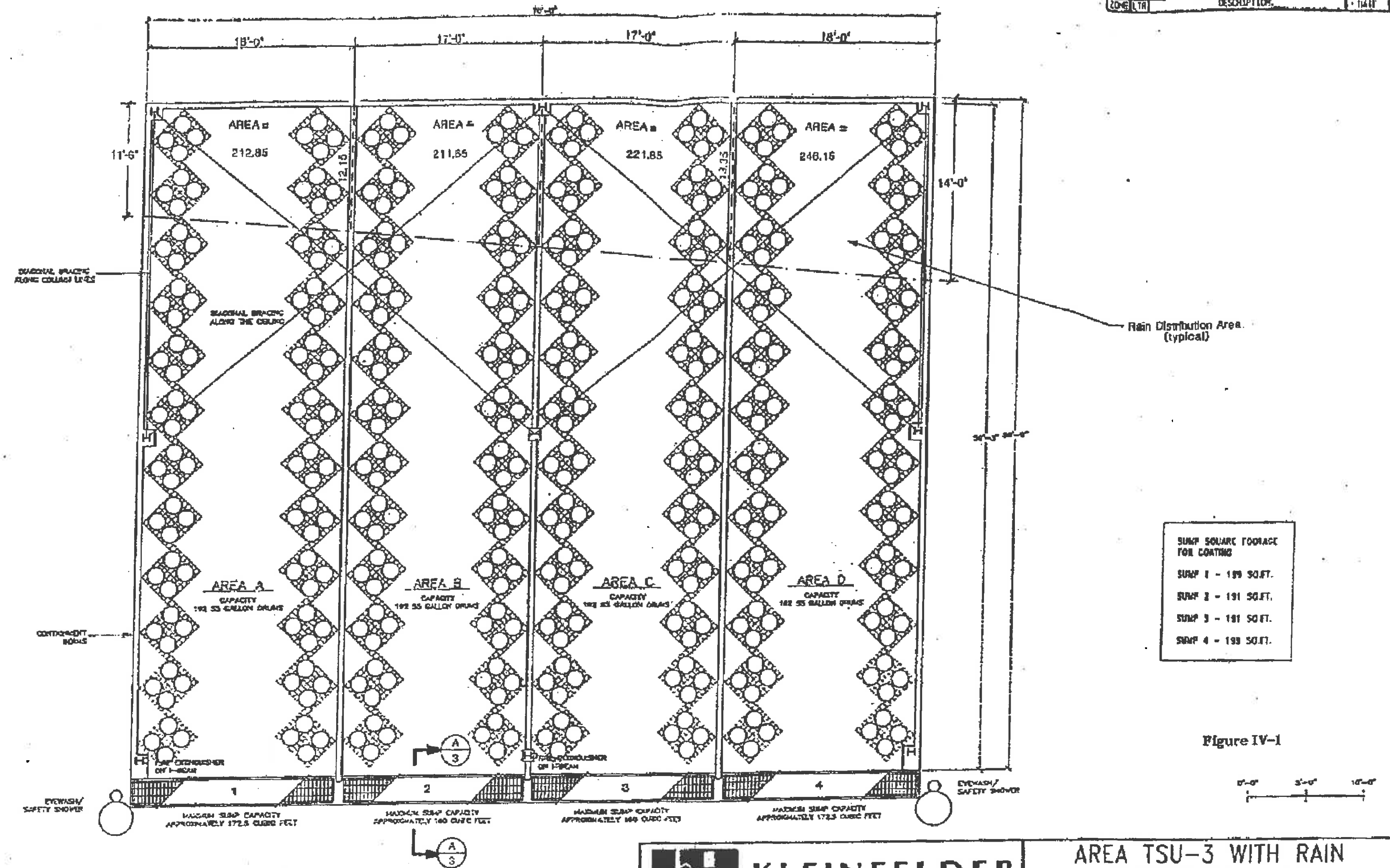
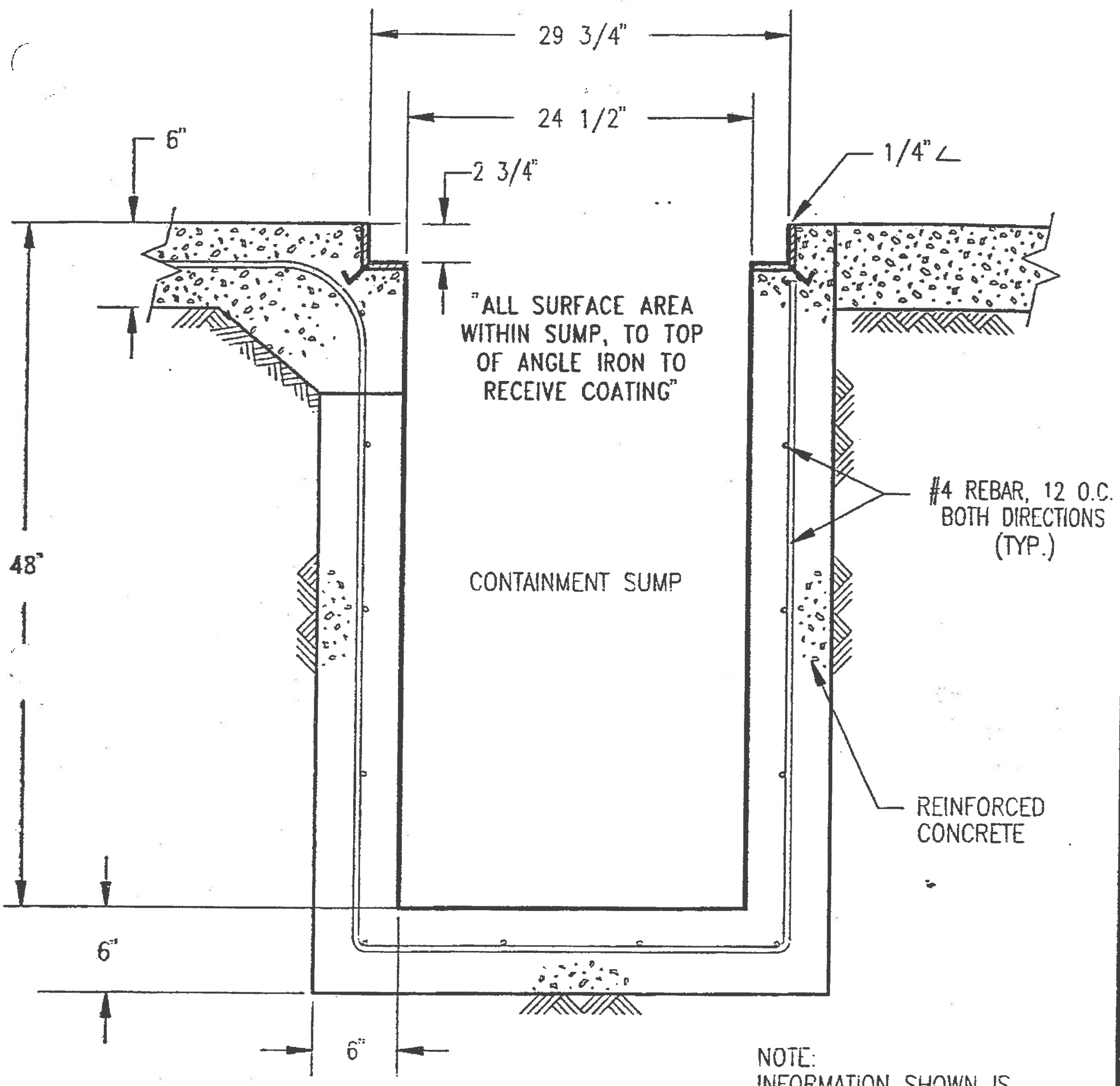


Figure IV-1

Base Map Source: Drawing No. 401056, Teledyne McCormick Selph

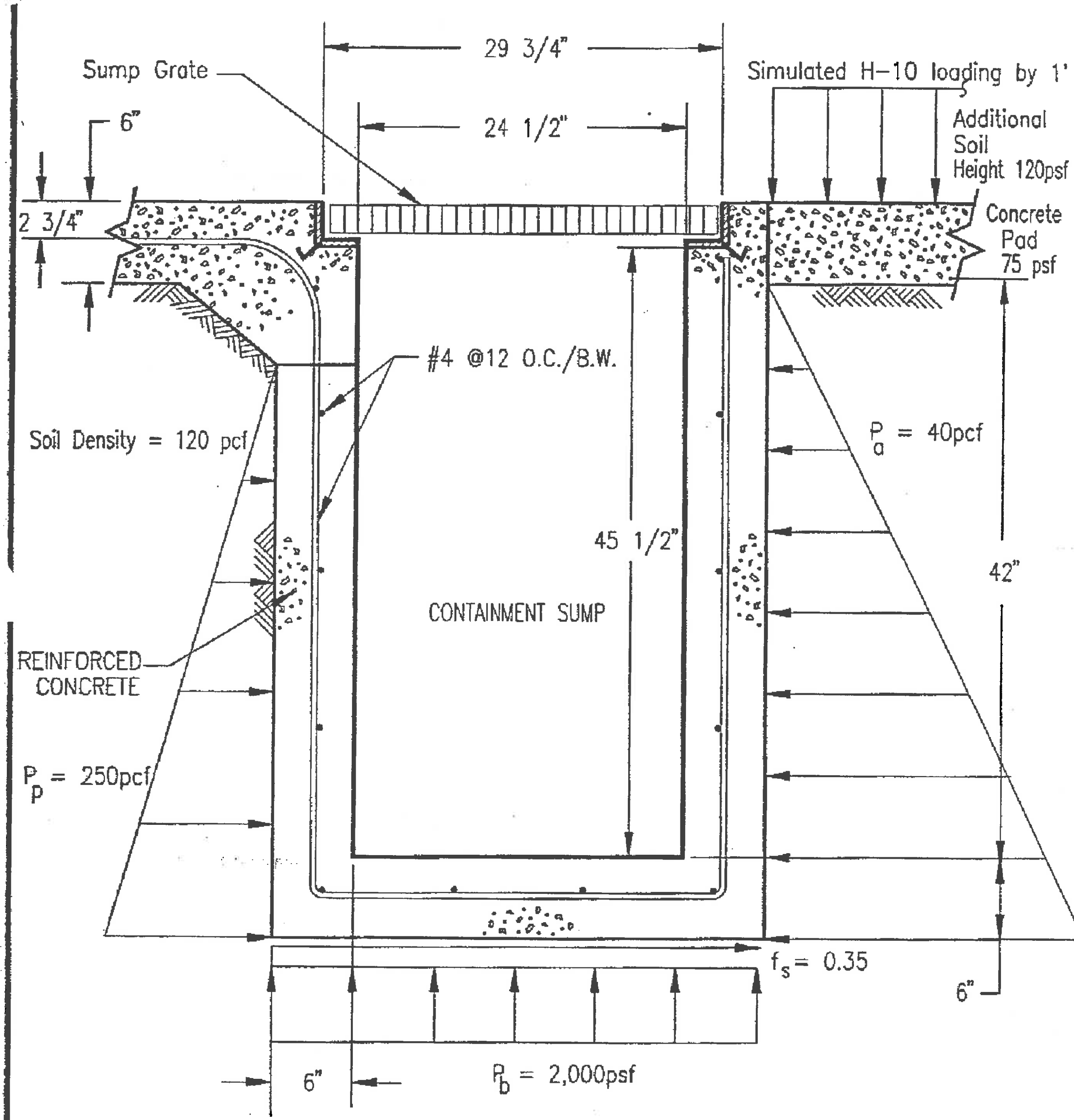
KLEINFELDER — WALNUT CREEK, CALIFORNIA			AREA TSU-3 WITH RAIN DISTRIBUTION AREA TELEDYNE MCCORMICK SELPH
DRAFTED: KPK	CHECKED: BRB	PROJ. ENGR: BRB	DRAWING NO. PLATE 2
SCALE: N.T.S.		PROJ. MGR: DKB	REV 0
PROJECT NUMBER: 10-2236-01		CAD FILE:	



NOTE:
INFORMATION SHOWN IS
AS SUPPLIED TO KLEINFELDER
BY TMc/S

A/2 ELEVATION VIEW

KLEINFELDER WALNUT CREEK, CALIFORNIA		EXISTING CONTAINMENT SUMPS FOR TSU-3 TELEDYNE MCCORMICK SELPH
DRAFTED: KPK	CHECKED: BRB	PROJ. ENGR: BRB
SCALE: N.T.S.		PROJ. MGR: DKB
PROJECT NUMBER: 10-2236-01		CAD FILE: SUMP
DRAWING NO. PLATE 3		REV. 0



KLEINFELDER
WALNUT CREEK CALIFORNIA

LOAD DIAGRAM FOR SUMPS AT TSU-3
TELEDYNE MCCORMICK SELPH

DRAFTED: LEL	CHECKED: BRB	PROJ. ENGR: BRB
SCALE: N.T.S.		PROJ. MGR: DKB
PROJECT NUMBER: 10-2236-01		CAD FILE: MOMENT

DRAWING NO. PLATE 4
REV. 0

MARK NICHOLSON, Inc.
CONTRACTOR NO. 286893
701 McCRAY STREET P.O. BOX 58
HOLLISTER, CALIFORNIA 95024

PHONE (408) 637-5728

MN

General Building and Engineering Contractors

November 15, 1990

TO WHOM IT MAY CONCERN

I certify that the attached drawing, dated July 24, 1982 and bearing my signature, represents the as built condition of the sump structure for the hazardous waste containerized storage unit at Teledyne McCormick Selph, 3601 Union Road, Hollister, CA 95023. The structure is reinforced on all sides, the bottom, and interior partitions with number 4 steel reinforcement bars on a 12" grid.

Respectfully submitted,

Larry Nicholson

LARRY NICHOLSON
President

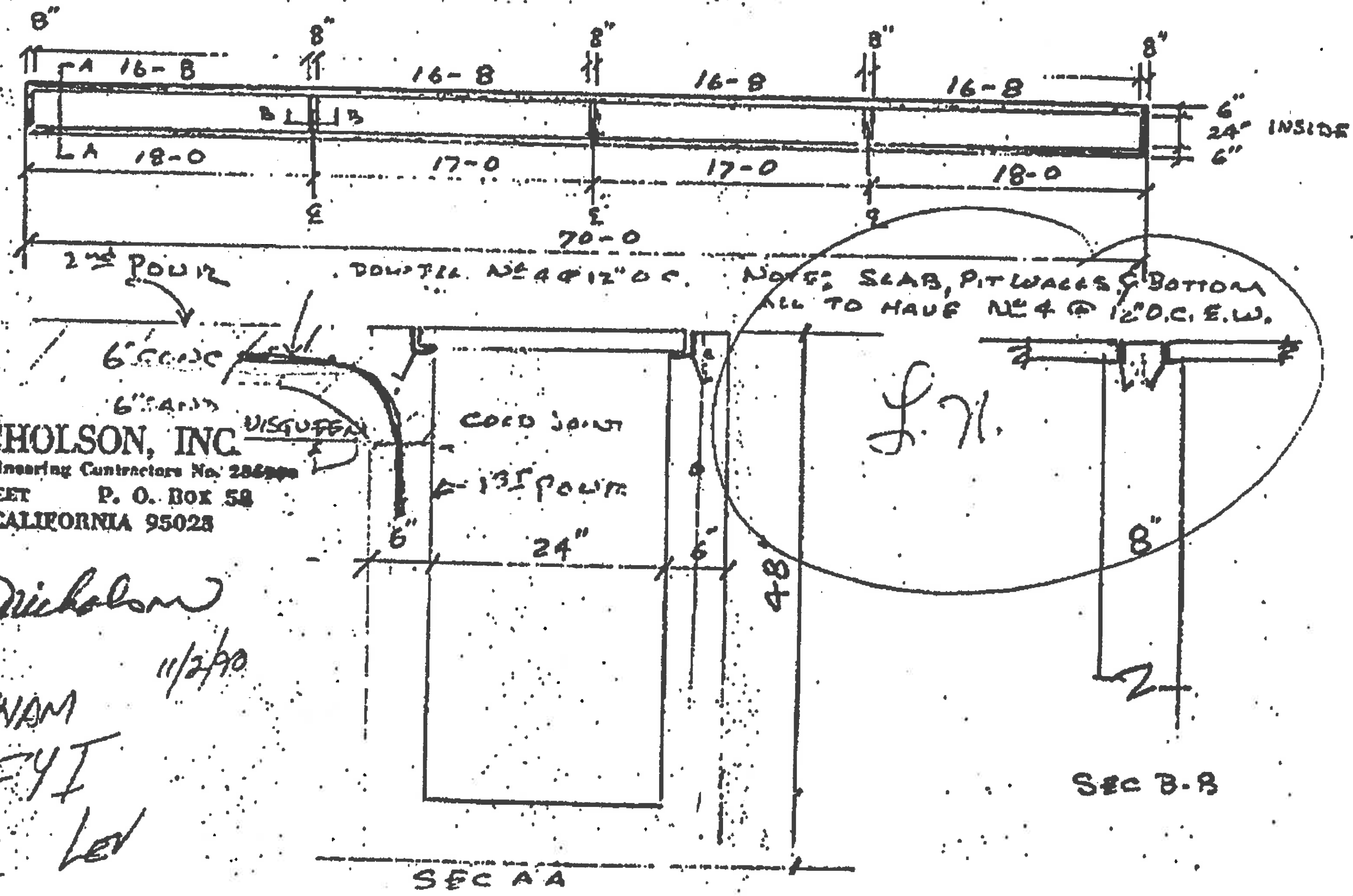
SEPARATE COMPARTMENTS
FURNISH STEEL & WITH ANCHORS
GRATE TO HAVE H-10 WHEEL LOADING
NO GALVANIZING.

JULY 24,

RECEIVED
NOV 2 1990
TELEDYNE McCORMICK SELPH
SUPPORT SERVICES

JOB: TELEDYNE McCORMICK - SELF
CONTRACTOR: MARK NICHOLSON, INC
PO BOX 58
HOLLISTER, CA 95023

408-637-5728
LARRY NICHOLSON



MARK NICHOLSON, INC.
General Building and Engineering Contractors No. 286900
701 McCRAY STREET P. O. BOX 58
HOLLISTER, CALIFORNIA 95023

Larry Nicholson

11/2/90

LYNAM
FYI
Lev

Endura-Flex Systems
EF-1947 COAL TAR URETHANE
(Formerly Black Magic Plus & Ref-Flex)

PRODUCT DESCRIPTION

EF-1947, A 100% SOLIDS COAL TAR POLYURETHANE ELASTOMER, DESIGNED AS AN EXTERIOR SECONDARY CONTAINMENT COATING FOR SPLASH AND SPILL OF VARIOUS CHEMICALS. BY UTILIZING PLURAL COMPONENT SPRAY EQUIPMENT, EF-1947 CAN BE APPLIED, PINHOLE FREE, OVER CONCRETE, ASPHALT, WOOD AND STEEL. WHEN COMBINED WITH A REINFORCEMENT FABRIC, EF-1947 CAN BE APPLIED DIRECT TO THE EARTH.

TYPICAL USE AREAS

LOADING RACKS (TRUCK/RAIL)	NON-SKID FLOOR COATINGS
PLATING AREAS	CHEMICAL SUMPS
FUEL/CHEMICAL TANKS	PROCESS AREAS
CATCH BASINS	GUNITE TRENCHES
FUEL DISPENSERS	EVAPORATION PONDS
WASTE STORAGE	SLUDGE PITS

REPRESENTED BY:
E. A. WILCOX CO.
173 UTAH AVE.
SO. SAN FRANCISCO, CA 94080
(415) 871-5350

REPRESENTED BY:
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(415) 871-5350

PRODUCT CHARACTERISTICS
EF-1947

COMPONENTS: RESIN
ACTIVATOR

MIX RATIO: 1:1

FLASH POINT: 200 DF

THINNER: NONE

WEIGHT/USG: 9 LBS.

TENSILE: 1350 PSI
ASTM D-412

ELONGATION: 50%
ASTM D-412

TEAR STRENGTH: 141.8 PSI
ASTM D-1004

COLD FLEX: PASS
10-15 DEGREES F/80 MILS

ACTUAL COVERAGE: (PER USG)
12 SQF - 100 MIL
15 SQF - 80 MIL
20 SQF - 60 MIL

CLEAN UP: MEK RECOMMENDED

VOLUME OF SOLIDS: 100%

HARDNESS: @ 77 DEGREES F.

SHORE A	30-40	15 MIN.
	45-55	30 MIN.
	60-70	60 MIN.
FULL CURE	96	

DRY TIME: @ 77 DEGREES F.

TOUCH	15 - 20 MIN.
LT. FOOT	30 - 40 MIN.
HVY. FOOT	2 HRS.
TOTAL CURE	168 HRS.

PUNCTURE RESISTANCE FTMS 101C
100 MILS THICK
MAXIMUM FORCE: 60-80 LBS.

IMPACT RESISTANCE IN LBS.
50 MILS THICK

FORWARD	120
REVERSE	120

CHEMICAL CONTAINMENT DATA
EF-1947

CONTAINMENT TIME FOR 60 MIL FILM

CHEMICAL	24 HRS	48 HRS	72 HRS	168 HRS
ACIDS				
ACETIC ACID, 10%	YES	YES	YES	YES
ACETIC ACID, 50%	YES	YES	YES	YES
ACETIC ACID, GLACIAL	YES	NO	---	---
HYDROCHLORIC ACID, 37%	YES	YES	YES	YES
NITRIC ACID, 70%	NO	---	---	---
PHOSPHORIC ACID, 20%	YES	YES	YES	YES
PHOSPHORIC ACID, 50%	YES	YES	YES	YES
SULFURIC ACID, 20%	YES	YES	YES	YES
SULFURIC ACID, 50%	YES	YES	YES	YES
SULFURIC ACID, 98%	NO	---	---	---
ALKALIES				
AMMONIUM HYDROXIDE, 5%	YES	YES	YES	YES
AMMONIUM HYDROXIDE, 20%	YES	YES	YES	YES
SODIUM HYDROXIDE, 20%	YES	YES	YES	YES
SODIUM HYDROXIDE, 50%	YES	YES	YES	YES
OILS AND FUELS				
HYDRAULIC FLUID	YES	YES	YES	YES
MOTOR OIL	YES	YES	YES	YES
UNLEADED GAS-REG.	YES	YES	YES	YES
UNLEADED GAS-PREM.	YES	YES	YES	YES
JP-4 JET FUEL	YES	YES	YES	YES
SOLVENTS				
ACETONE	NO	---	---	---
CELLOSOLVE	NO	---	---	---
HEXANE	YES	YES	YES	YES
M.E.K.	NO	---	---	---
M.I.B.K.	NO	---	---	---
N-BUTYL ACETATE	NO	---	---	---
TOLUENE	NO	---	---	---
TRICHLORETHYLENE	YES	NO	---	---
XYLOL	NO	---	---	---

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List)
ENDURA-FLEX 1947 BASE

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name
Polycoat Products

Address (Number, Street, City, State, and ZIP Code)
14722 Spring Avenue
Santa Fe Springs, CA 90670

DISTRIBUTOR: E.A. WILCOX COMPANY

Emergency Telephone Number
CHEMTREC (800) 424-9300

Telephone Number for Information
(415) 871-5350

Date Prepared
AUGUST 1990

Signature of Preparer (optional)

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Coal Tar Pitch Volatiles	0.2 mg/m^3	0.2 mg/m^3 - TWA		
1,4-Butanediol			50 ppm PEL-TWA	

Section III — Physical/Chemical Characteristics

Boiling Point	< 200°F	Specific Gravity (H_2O = 1)	1.1093
Vapor Pressure (mm Hg.)	1.0	Melting Point	N/A
Vapor Density (AIR = 1)	< 1	Evaporation Rate (Butyl Acetate = 1)	< 1

Solubility in Water
Insoluble

Appearance and Odor
Black with Coal Tar Odor

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
> 200°F	N.A.	N.A.	N.A.

Extinguishing Media
N/A

Special Fire Fighting Procedures
N/A

Unusual Fire and Explosion Hazards
Closed containers may rupture due to very high temperature.

ection V — Reactivity Data

ility	Unstable		Conditions to Avoid
	Stable	X	N/A

o ility (Materials to Avoid) N/A

zardous Decomposition or Byproducts
May produce fumes of CO, CO_2, NO_2 when heated to decomposition.

zardous lymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	N/A

ection VI — Health Hazard Data

ute(s) of Entry: Inhalation? X Skin? X Ingestion? X

alth Hazards (Acute and Chronic)
Acute: May cause eye & skin primary irritation. Inhalation may cause headache and nausea.

rcinogenicity: ACGIH NTP? IARC Monographs? OSHA Regulated?

Coal Tar Pitch volatiles is listed as a proven human carcinogen.

ns and Symptoms of Exposure
Chronic exposure may lead to changes in skin pigmentation, benign skin growths and in some cases result in skin cancer.

dical Conditions
nerally Aggravated by Exposure None known

cy and First Aid Procedures
emove to fresh air & restore breathing. Flush eyes with cool water for 15 minutes. Wash skin thoroughly with ap and water.

ection VII — Precautions for Safe Handling and Use

ps to Be Taken in Case Material is Released or Spilled
Soak up and remove with inert absorbent material. Provide adequate ventilation.

aste Disposal Method
Dispose in accordance with local, state, and federal regulations. Do not incinerate closed containers.

ecautions to Be Taken in Handling and Storing
Keep from freezing. Avoid prolonged contact with skin. Protect from moisture.

her Precautions

ection VIII — Control Measures

spiratory Protection (Specify Type)
Provide adequate ventilation. Use NIOSH/OSHA approved mechanical respirators or positive pressure mask.

ntilation	Local Exhaust: Provide sufficient ventilation in vo	Special: lume & pattern to keep contaminant
	Mechanical (General): concentration below OSHA PEL.	Other

tective Gloves: Impermeable synthetic	Eye Protection: Chemical safety goggles

he ective Clothing or Equipment
rotective overalls recommended.

ork/Hygienic Practices
Remove & wash contaminated clothing. Discard shoes.

* USGPO 1986-491-529/45775

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List)
1947 ACTIVATOR (Endura-Flex B)

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name: Mobay Chemical Company	Emergency Telephone Number: Chemtrec (800) 424-9300
Address (Number, Street, City, State, and ZIP Code): Penn Lincoln Parkway West, Pittsburgh, PA 15205	Telephone Number for Information: (412) 923-1800
	Date Prepared: January 1990
Distributor: E.A. Wilcox Company	Signature of Preparer (optional)

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Diphenylmethane Diisocyanate	0.2 mg/m^3	0.005 ppm	OSHA 0.02 ppm	

Section III — Physical/Chemical Characteristics

Boiling Point	< 212°F	Specific Gravity (H_2O = 1)	1.1405
Vapor Pressure (mm Hg.)	0.01	Melting Point	N/A
Vapor Density (AIR = 1)	< 1	Evaporation Rate (Butyl Acetate = 1)	< 1

Solubility in Water
Reacts with water

Appearance and Odor
Dark Brown Viscous Liquid

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
> 200°F.	N.A.	N.A.	N.A.

Extinguishing Media
N/A

Special Fire Fighting Procedures
N/A

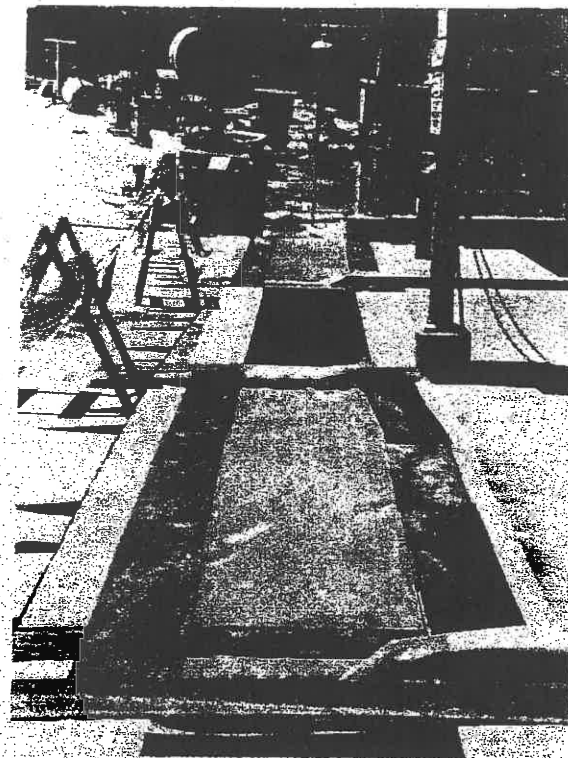
Unusual Fire and Explosion Hazards
Sealed containers may rupture due to very high temperature or when exposed to extreme heat.

(Reproduce locally)

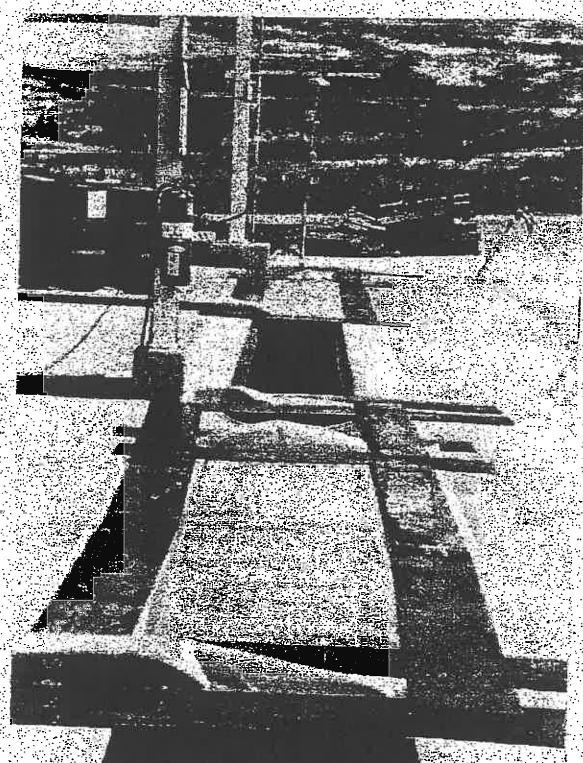
KLEINFELDER

Specification No.
Project No. 10-2236-01
Date - April 30, 1991

TABLE OF CONTENTS

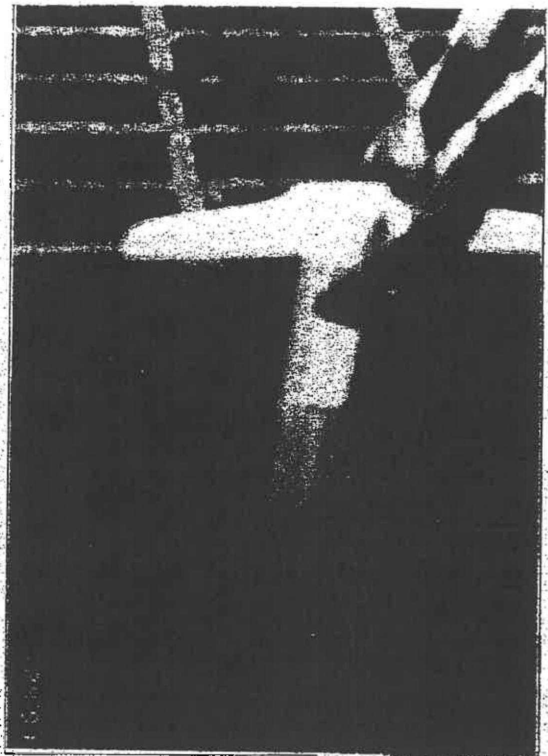


Sumps A and C covered and undisturbed during leak test.

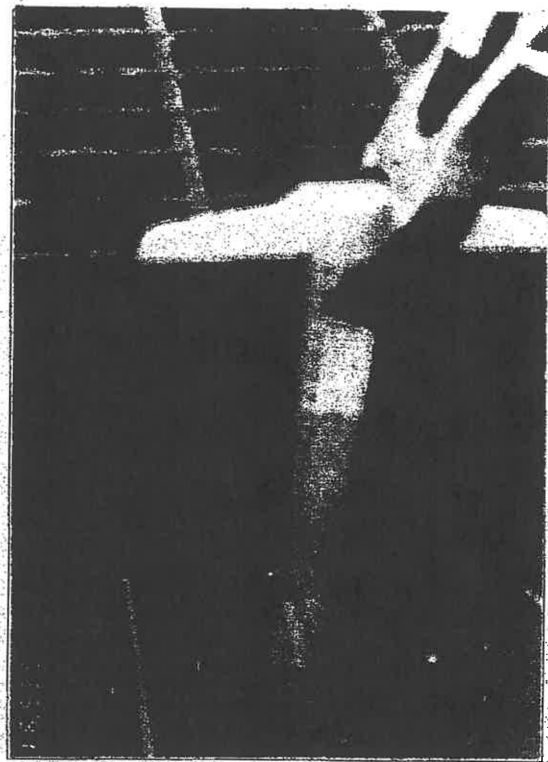


Sumps B and D covered and undisturbed during leak test.

KLEINFELDER
Project #10-2236-01

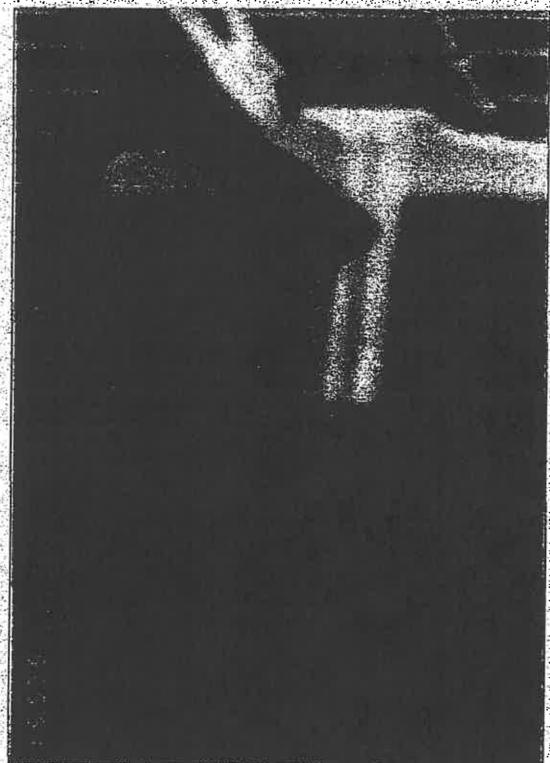


Sump B at start of 24-hour leak test on May 24, 1991.



Sump B at finish of 24-hour leak test on May 25, 1991.

Sump D at start of 24-hour leak test on May 24, 1991.



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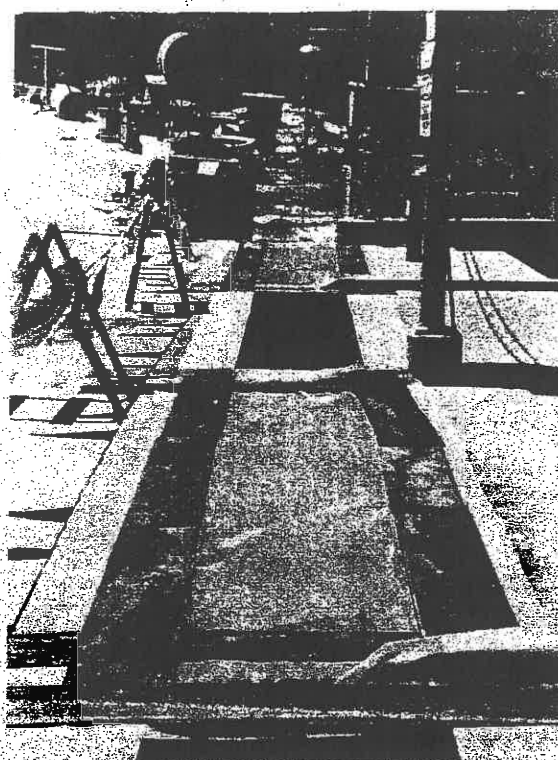
KLEINFELDER
Project #10-2236-01



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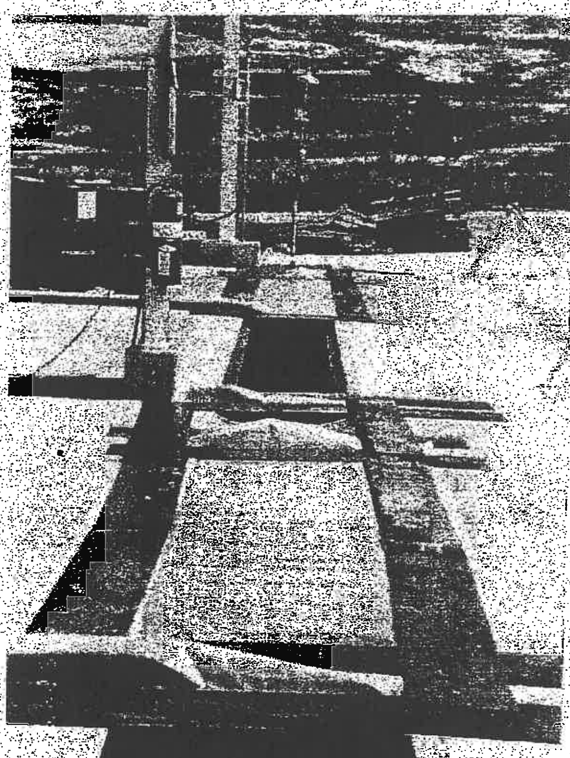
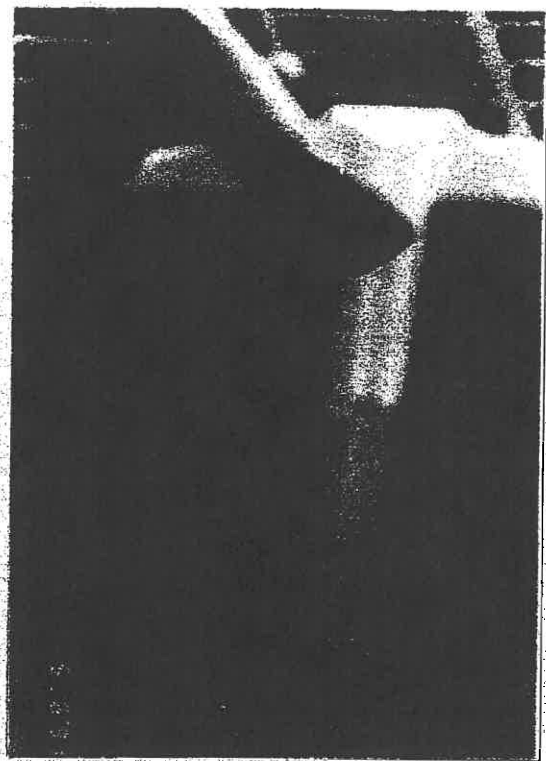


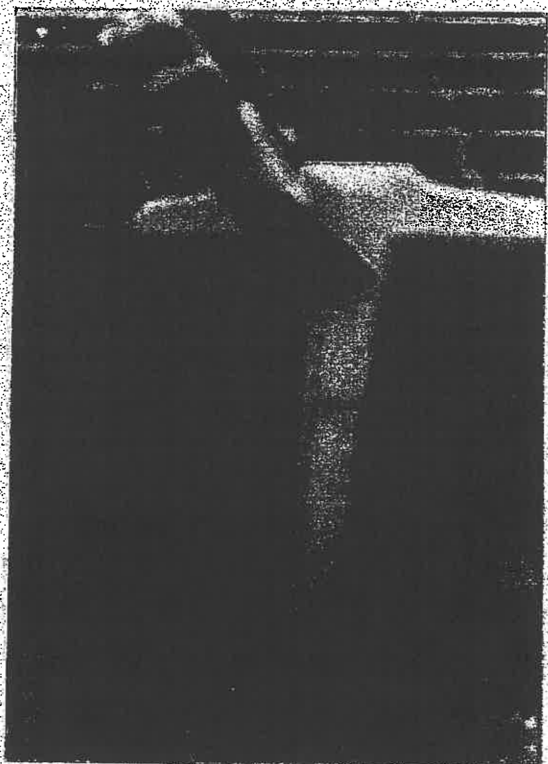
Sumps B and D covered and undisturbed during leak test.

KLEINFELDER
Project #10-2236-01

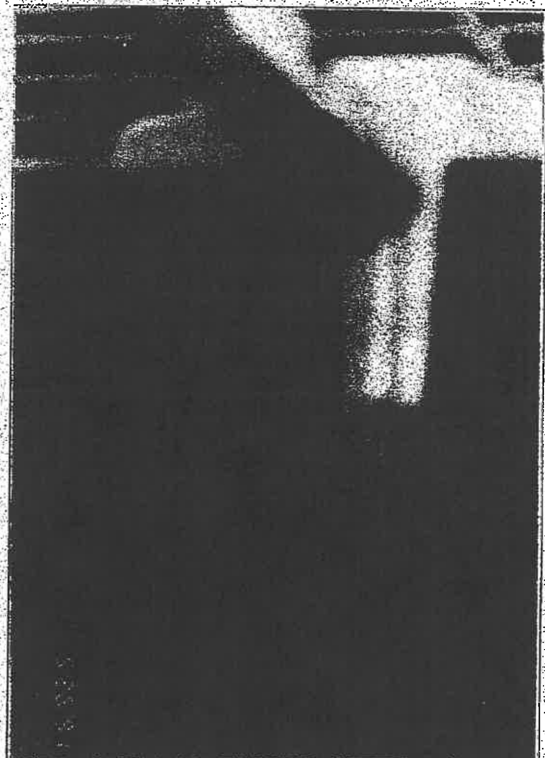
Sump A at start of 24-hour leak test on May 25, 1991.



Sump A at finish of 24-hour leak test on May 26, 1991.

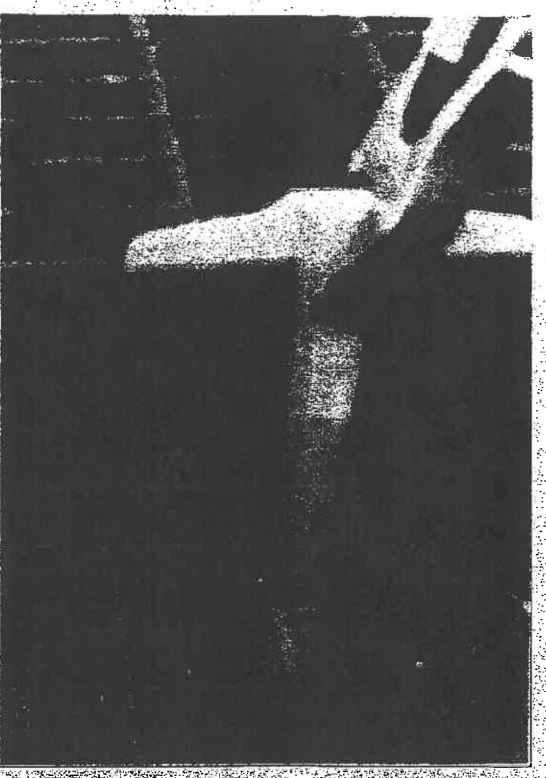


Sump C at start of 24-hour leak test on May 25, 1991.

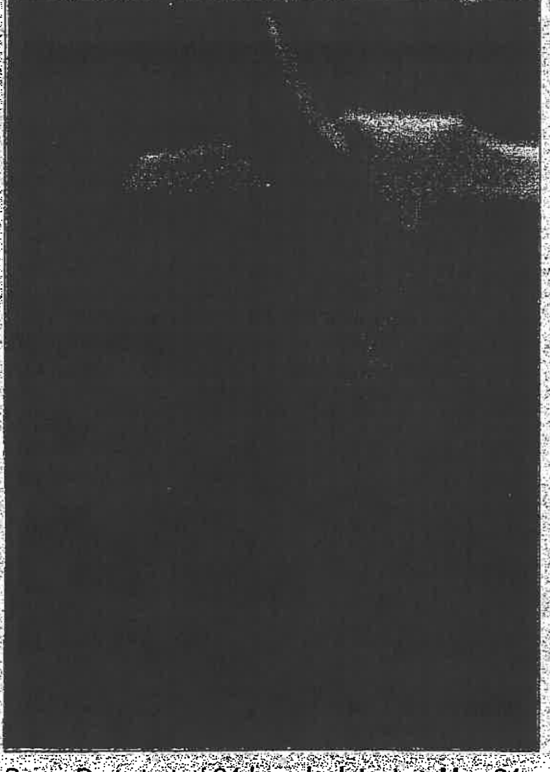


Sump C at finish of 24-hour leak test on May 26, 1991.

Sump B at start of 24-hour leak test on May 24, 1991.



Sump B at finish of 24-hour leak test on May 25, 1991.



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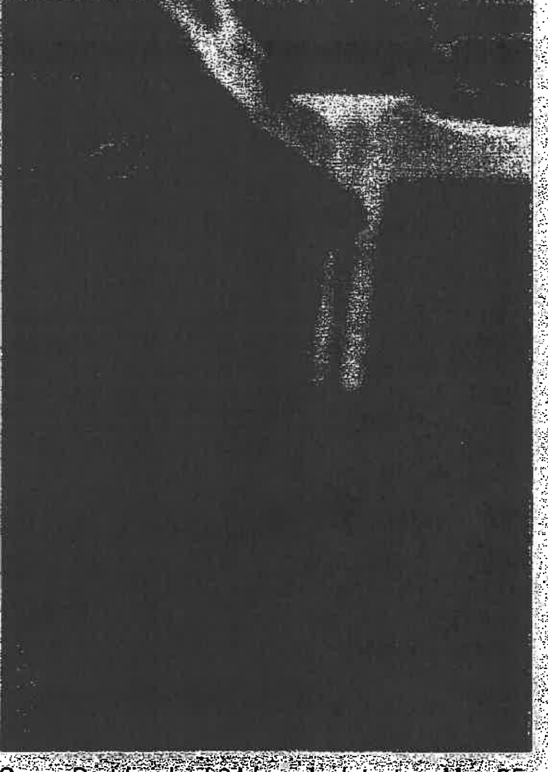

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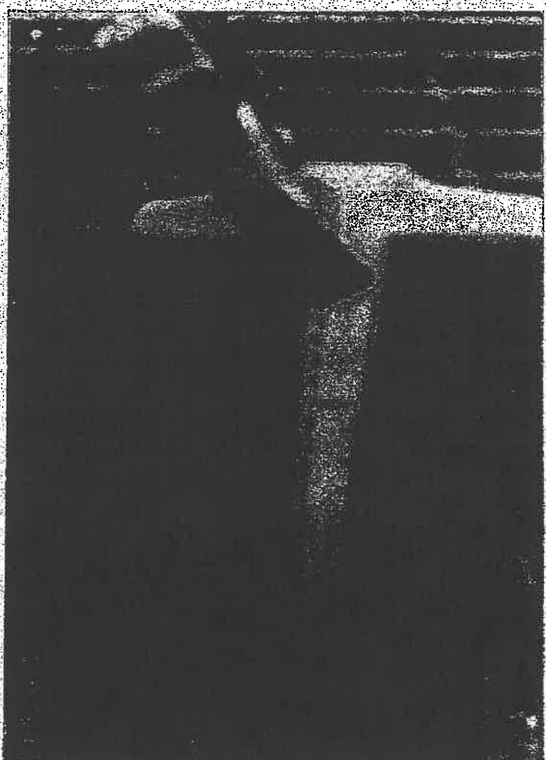
KLEINFELDER

Project #10-2236-01

Sump A at start of 24-hour leak test on May 25, 1991.

Sump A at finish of 24-hour leak test on May 26, 1991.



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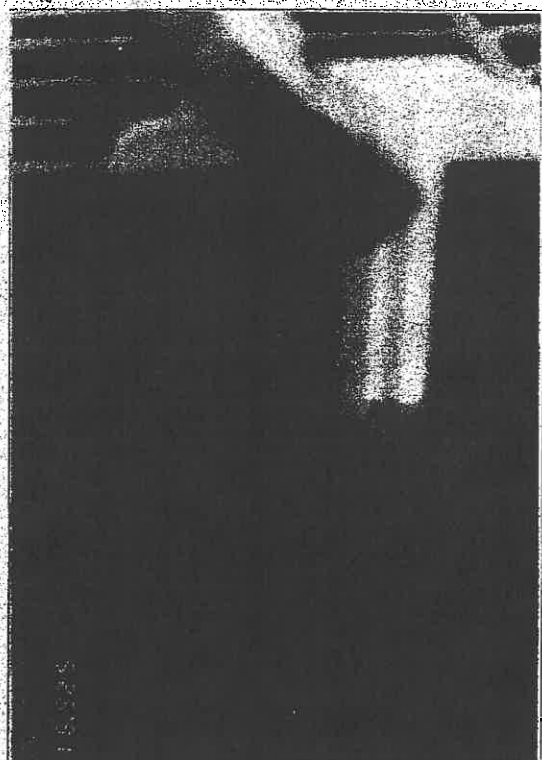


Sump C at finish of 24-hour leak test on May 26, 1991.

KLEINFELDER

Project #10-2236-01

KLEINFELDER

SHEET 1 OF 3

PROJECT TMc/S PROJECT NO. 10-2236-01

SUBJECT TSU-3 SUMP CAPACITY BY B BRADLEY DATE 4/26/91

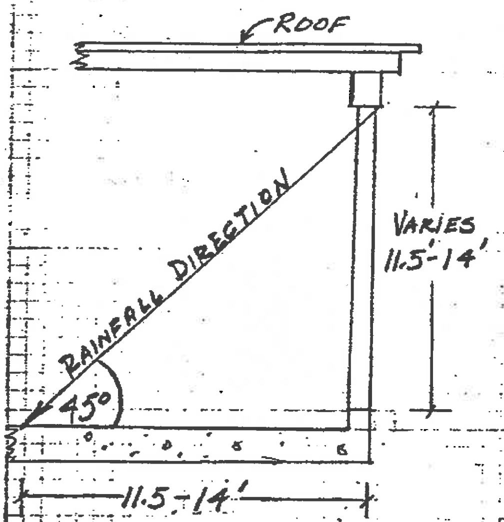
REVIEWED BY ___ DATE ___

REQUIRED : VOLUME OF RAINFALL THAT WOULD ENTER AREA TSU-3 CONTAINMENT BAYS A, B, C, & D FROM A 25 YEAR STORM WITH A 24 HOUR DURATION.

GIVEN: 25 YEAR STORM / 24 HOUR PRECIPITATION = 5"

(SOURCE: "RAINFALL FREQUENCY ATLAS OF THE UNITED STATES," HERSHFIELD, DAVID M., 1961), SITE WIND ROSE, AND OPERATION PLAN, TMc/S CHAPTER IV. B.

ASSUME: RAINFALL AT 45° ANGLE FROM WEST ONLY



ROOF HEIGHT = 16'

LONGEST SIDE OPENING HEIGHT: 11.5'-14'

LONGEST SIDE LENGTH = 70'0"

BAY A + BAY D:

LENGTH = 18'

BAY B & BAY C:

LENGTH = 17'

AREA EXPOSED TO RAIN ALONG LONGEST SIDE

BAY A AREA = $\frac{11.5+12.15}{2}$ x 18' = 212.85 S.F.

BAY B AREA = 12.15+12.75/2 x 17' = 211.65'

BAY C AREA = 12.75+13.35/2 x 17' = 221.85'

BAY D AREA = 13.35+14/2 x 18' = 246.15'

M-4

KLEINFELDER

SHEET 2 OF 3

PROJECT TMc/S PROJECT NO. 1D-2236-01

SUBJECT TSU-3 SUMP CAPACITY BY B. BRADLEY DATE 5/14

REVIEWED BY ______ DATE ______

VOLUME OF 25 YEAR STORM 24 HOUR RAINFALL

BAY A VOLUME = 212.85 x 5/12' = 88.67 CF = 663 GALLONS

BAY B VOLUME = 211.65 x 5/12' = 88.19 CF = 660 GAL

BAY C VOLUME = 221.85 x 5/12' = 92.44 CF = 692 GAL

BAY D VOLUME = 246.15 x 5/12' = 102.56 CF = 767 GAL.

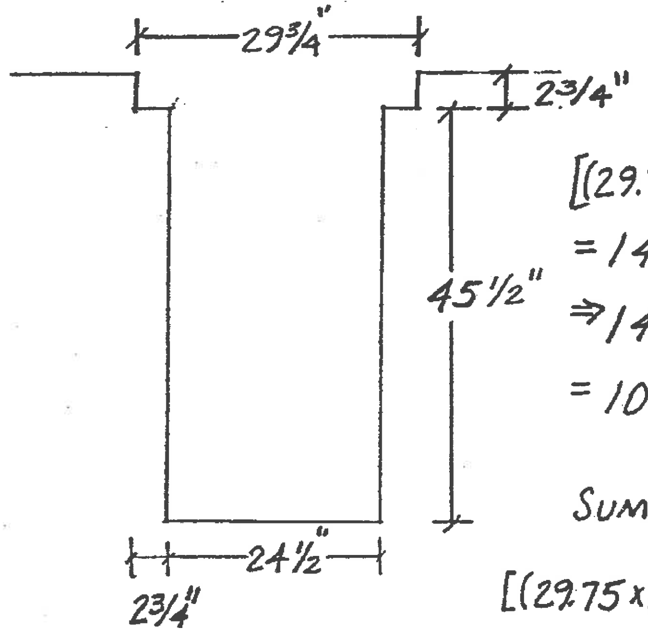
TOTAL VOLUME = 371.86 CF = 2,782 GAL.

PROJECT TMc/S PROJECT NO. 10-2236-01

SUBJECT TSU-3 STORAGE BY B. BRADLEY DATE 4/26

CAPACITY OF SUMPS REVIEWED BY DATE

REQUIRED: TOTAL VOLUME OF LIQUID HAZARDOUS MATERIALS WHICH MAY BE STORED IN BAYS A, B, C, & D OF AREA TSU-3



SUMP SECTION
(ALL BAYS)

SUMP VOLUMES FOR BAYS A & D:

$$\left[(29.75 \times 2.75) + (24.5 \times 45.5)\right] \frac{207.5}{1{,}728}$$

$= 143.68$ CF

$\Rightarrow 145$ CF

$= 1077$ GAL

SUMP VOLUMES FOR BAYS B & C:

$$\left[(29.75 \times 2.75) + (24.5 \times 45.5)\right] \frac{198.25}{1{,}728}$$

$= 137.28$

$\Rightarrow 137$ CF

$= 1{,}025$ GAL

BAY	SUMP VOLUME (GALLONS)	RAINFALL VOLUME (GAL.)	10% OF ALLOWABLE HAZARDOUS WASTE VOLUME (GAL)	TOTAL ALLOWABLE HAZARDOUS WASTE VOLUME (GAL.)
A	1,077	− 663	= 414	x10 = 4,140
B	1,025	660	365	3,650
C	1,025	692	333	3,330
D	1,077	767	310	3,100

PROJECT: 10-2236-01
SUBJECT: TELEDYNE TSU-3 WALL CALCULATION
DATE: 5/7/91 BY: DKB

RETAINING WALL DESIGN

> DESCRIPTION :

> DESIGN DATA

Soil Bearing Press =	2,000 psf	FOOTING :	
Active Fluid Press =	40 pcf	Ftg/Soil Friction =	0.35
Passive Pressure =	250 pcf	f'c - Concrete =	3,000 psi
Soil Density =	120 pcf	Fy - Reinforcement =	40,000 psi

> WALL LOADING CONDITIONS

Slope of Backfill = (horiz:vert,0=Level)	0 :1	Design Fluid Pressure = (Corrected for Slope)	40.0 pcf
Surcharge over Toe =	0 psf	Surcharge over Heel =	195 psf

Shall Surcharge be used in Resisting Moment? Y=1, N=0 --> 0 <--

Soil Ht over Toe =	0 in	Axial Load on Stem =	0 plf
Wall Ht above Soil =	0.5 ft	Load @ Wall Above Soil=	~~0 psf~~
ADJACENT FOOTING LOAD :		Width of Footing =	0 ft
Footing Load =	0 plf	Ftg. Dist. from Wall =	0 ft
Spread Footing ? Y=1 , N=0 : -->	0	Depth of Bearing Below Soil @ Rear F.O.W. =	0 ft
UNIFORM LOAD (Added)=	0 plf	Bottom Above T.O.F. =	0.00 ft
		Top Above T.O.F. =	0.00 ft

WALL & FOOTING GEOMETRY

> RETAINED HEIGHT = (above T.O.F.)	3.5 ft	> Footing Thickness =	6 in
		> Key Depth =	36 in
> Toe Width =	2.5 ft	> Key Width =	6 in
Stem Width =	0.50 ft	> Toe / Key Dist. =	0 ft
> Heel Width =	0 ft		
FOOTING WIDTH =	3.00 ft		

- STABILITY SUMMARY

SOIL PRESSURE @ TOE = 826 psf : 2,000 = Allow
SOIL PRESSURE @ HEEL = 0 psf

FACTOR OF SAFETY : Overturning = 1.63 > 1.5, --> OK
FACTOR OF SAFETY : Sliding = 3.09 > 1.5, --> OK

ONE-WAY SHEAR AT TOE SIDE OF STEM = < 1 > OK
ONE-WAY SHEAR AT HEEL SIDE OF STEM = < NA >

STABILITY CHECK

> NOTE: Should 1/3 of Active Pressure be used as Vertical Pressure at rear face of stem? Y=1 , N = 0 --->> 1

OVERTURNING MOMENT = 947 ft-#
RESISTING MOMENT = 1,539 ft-#   MAX. LATERAL FORCE = 580 #

FACTOR OF SAFETY : Overturning --> 1.63

SLIDING CHECK

Max. Lateral Force = 580 #   > Ht. of Soil to Neglect = 0.00 in
Max. Resis. Force = 1,794 #   Passive Pressure = 1,531 #
F.S. : Sliding = 3.09   Friction Pressure = 263 #

SOIL PRESSURE

Eccentricity from CL = 0.81 ft   Kern Distance = 0.50 ft

		UN-FACTORED	FACTORED
> SOIL PRESSURE @ TOE	=	826 psf	1,405 psf
> SOIL PRESSURE @ HEEL	=	0 psf	0 psf

TOE DESIGN

Mu'' = Upward = 2634.29 ft-#   Mu : DESIGN MOMENT = 2317.1 ft-#
Mu' = Downward = 317.187 ft-#
Rebar Cover = 3.5 in
> % Steel Minimum = 0.0012   d = Thk-Cover = 2.50 in
As : Required = 0.339 in^2/ft   'm' = = 15.69
As : Provided = 0.339 in^2/ft   R-u = 411.93 psi

One Way Shear: Try: #4 @ 7.5 " #7 @ 21.5 "
Fv = 2*(f'c^.5) = 109.54 psi   #5 @ 10.5 " #8 @ 27.5 "
Actual Shear / Phi= 68.86 psi   #6 @ 15.5 " #9 @ 35.5 "

HEEL DESIGN

> Neglect Upward Soil Pressure? Y=1,N=0 --> 0

Mu'' = Downward = NA ft-#   Mu : DESIGN MOMENT = NA ft-#
Mu' = Upward = NA ft-#
Rebar Cover = 2
> % Steel Minimum = 0.0012   d = Thk-Cover = NA in
As : Required = NA in^2/ft   'm' = = NA
As : Provided = NA in^2/ft   R-u = NA psi

One Way Shear: Try: #4 @ NA " #7 @ NA "
Fv = 2*(f'c^.5) = NA psi   #5 @ NA " #8 @ NA "
Actual Shear / Phi= NA psi   #6 @ NA " #9 @ NA "

PROJECT:10-2236-01
SUBJECT:TELEDYNE TSU-3 WALL
CALCULATION
DATE:'5/7/91 BY :DKB

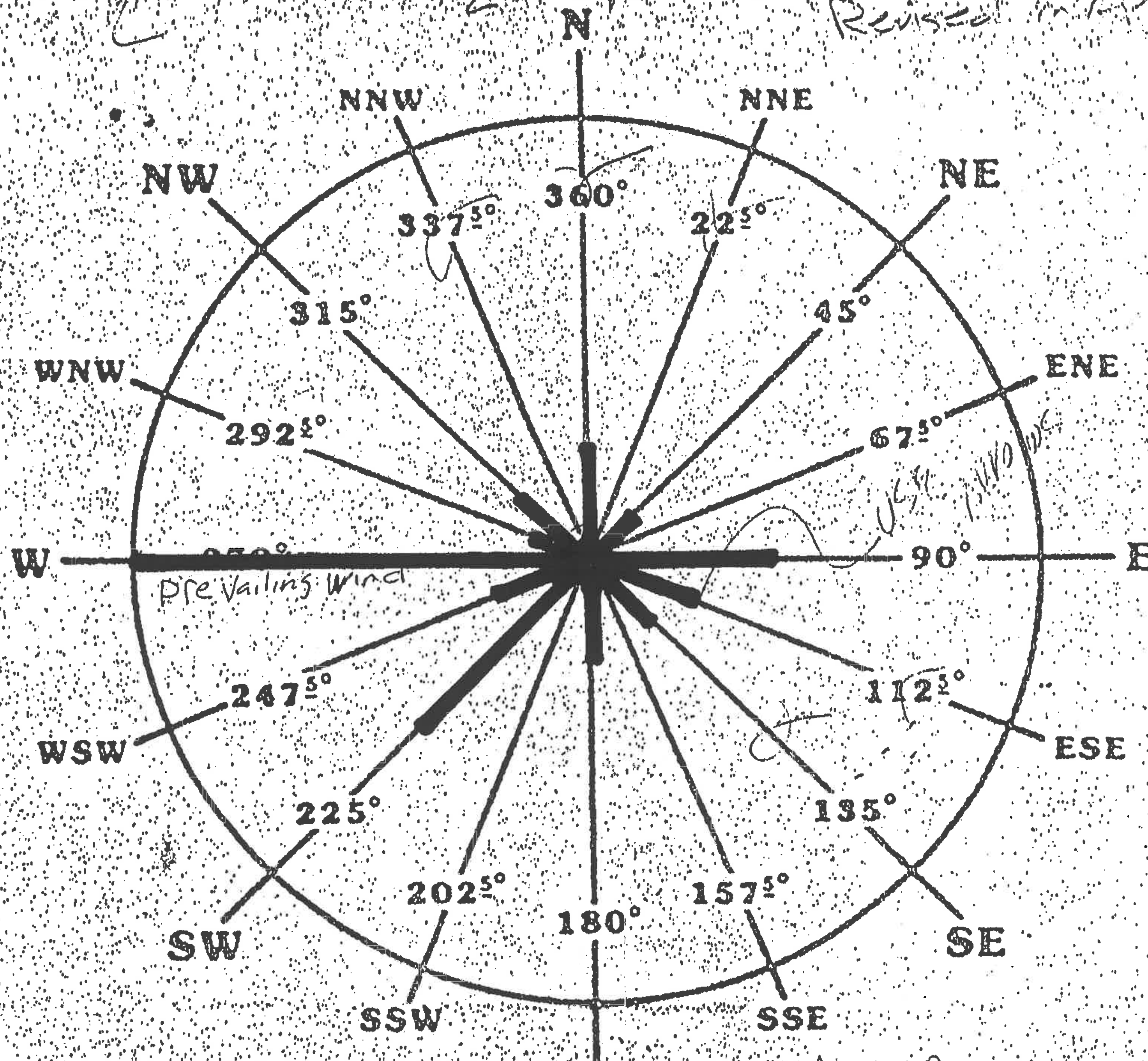
TOP STEM SECTION DESIGN

> WALL MATERIAL : CONCRETE = 1, MASONRY = 2 : -->> 1 <<--

> f'm Masonry	= 1,500 psi	> Bottom Ht. above TOF	= 0 ft
> Fs : For Masonry	= 24,000 psi	Loaded Section Height	= 4.00 ft
> f'c Concrete	= 3,000 psi		
> Fy : For Concrete	= 40,000 psi	Total Lateral Press.	= 472.5 #
> Load Factor	= 1.00	Maximum Ms:Service	= 683.95 ft-#
> Grouting? Y=1 N=0 >	0		
> Inspected ? Y=1 N=0>	0	> WALL THICKNESS	= 6 in
> Center=1 , Edge=2 ->	1		

Masonry :	Actual	Allow.		
			> REBAR SIZE	# 4
			REQ'D SPACING	= 13.50 in
f'm =	NA	NA psi	Rebar Area Supplied	= 0.17 in^2
fs =	NA	NA psi	'd' for design	= 3.00 in
Bond Length Req'd =		NA in	Allowable Unit Shear	= 109.5 psi
			Actual Unit Shear	= 22.3 psi

2 copies of ~~[illegible]~~ Revised



Appendix 6

TSU-8 Engineering Certification

12/3/2002 44 pages

D.A. COOK & ASSOCIATES
1130 Denise Drive
Calistoga, CA 94515
P: 707-942-4911 F: 707-942-4724
Email: d_a_cook1@sbcglobal.net

August 31, 2005

Mr. Charles F. Martin
Manager, Environment & Security
Pacific Scientific Energetic Materials Company/Hollister Division
3601 Union Road
Hollister, CA 95024

RE: Updated Engineering Certification of TSU-8 at the McCormick Selph, Inc. Hollister Facility
DACA Project No. 0120

Dear Charlie:

At your request, I have evaluated the proposed modifications to Hazardous Waste Treatment Unit TSU-8 at the Pacific Scientific Energetic Materials Company (PSEMC— McCormick Selph, Inc., or MSI) Hollister Facility to determine if the modified facility complies with the requirements of California Code of Regulations (CCR) Title 22, Section 66264.

Background

PSEMC proposes to modify the existing procedure and equipment for handling inerted aqueous solutions of low concentrations of explosive and energetic wastes at TSU-8 at their facility on Union Road in Hollister, California.

PSEMC collects scrap ordinance and contaminated debris in "safety water buckets" (SWB) containers with sufficient volumes of water to render the debris safe to transport. The inerted material in water is collected from SBW recycling stations throughout the facility and transported to TSU-8 for treatment.

At TSU-8, SBW is transferred into one of two evaporation troughs to evaporate water from the collected material. At present PSEMC siphons the SBW into the troughs using PVC pipes. The proposed change is to siphon or hand pump the collected SBW waste into the evaporation troughs using a primary pipe totally enclosed within a larger pipe to provide secondary containment. The SBW will flow by gravity drain into the evaporation troughs.

TSU-8 was inspected on December 3, 2002. A report dated December 17, 2002 documented the compliance of the existing equipment and procedures with CCR, Title 22, Section 66264. The report from this inspection is attached to this present certification.

The 2002 certification report reviewed the documentation of the equipment and procedures to be used at TSU-8 to establish conformance with the applicable regulatory criteria. For <u>this</u> certification, the site was not visited as PSEMC has not modified the equipment nor the procedures used for concentrating SBW wastes by evaporation. This evaluation/certification addresses recent modifications to the design previously certified; specifically, the addition of secondary containment for the transfer pipes.

Therefore, it is assumed that the following criteria are still met:

1. Structural strength of the existing equipment.

2. Design standards
3. Characterization of wastes – PSEMC stated that they do not treat any new category of waste materials in TSU-8.
4. Existing corrosion protection measures
5. Integrity of former secondary containment.
6. Secondary containment structural calculations
7. Ancillary equipment – PSEM stated that no changes to ancillary equipment have been completed since the last certification review.
8. Rainwater intrusion

Proposed Modification

PSEMC proposes to use secondarily contained pipe to drain collected wastes into one of the two treatment troughs. PSEMC states that the SBW will be transferred to the inner pipe by siphoning or hand pumping containers of the waste.

PSEMC states that the inner, primary pipe will be stainless steel and the secondary containment pipe will be constructed of PVC pipe.

PSEMC states that an operator will be present at all times during the transfer of wastes to an evaporation tank.

PSEMC has provided drawings of the proposed configuration showing the length of the piping from the filling point to one trough of 25.5 feet and to the other trough of 32 feet (drawing 401063). In this full length of pipe there are five pipe supports shown on the drawing – one at each end of the piping span and three supports supporting the pipe over an overall length of about 18.5 feet where the piping system transverses approximately four feet above the ground surface and the containment berms. This nominal 6-foot on center support system is, in my judgment, within normal engineering practice. In the transverse the pipe drops about one foot in elevation (drawing 401064).

PSEMC states that the primary stainless pipe shall be 2 inches in diameter and the secondary containment pipe shall be 4 inches in diameter.

PSEMC states that the pumping rate shall be between 1 and 3 gallons per minute.

Engineering Assessment

1. Compatibility of the piping materials – stainless steel was rated compatible with the chemicals in dilute water mixtures.
2. Suitability of design – a 2 inch pipe at a nominal slope between ¼ inch per lineal foot of pipe is suitable to flow about 10 gallons per minute with the pipe half full of water. This estimated drain flow rate exceeds the design flow rate and is therefore adequate for the transfer of the waste to the tanks by gravity.
3. Containment – secondary containment is the PVC pipe through which the stainless steel pipe is placed. If, during operations, there were a failure of the primary piping, the PVC secondary containment would drain the wastes to the treatment tanks. Since an operator is always present during the transfer operation, the transfer of wastes would be stopped immediately in the case a failure of the primary piping was observed.

4. Containment – TSU-8 has containment berms constructed for the existing unloading and evaporation operations that would now become tertiary containment for the modified pipe-in-pipe configuration.
5. Procedures to mitigate spills – PSEMC procedure "EH&S No.007 – Explosive Spill Management" is in place and in practice for operations after the proposed modifications are installed. This procedure provides operators with approved actions to be undertaken in response to any potential spill of the SBW at TSU-8.
6. The TSU-8 Safety Bucket Water Treatment by Evaporation Standard Operating Procedure, SOP 235128, Rev N/C, 25 November 2002 remains in effect and would still be followed. In this procedure, the operations, the record keeping and the responsibilities for the evaporation of water from safety bucket water are specified and documented.

Certification

The proposed design modification of the TSU-8 system described herein, namely,

1. the charging of the treatment troughs by gravity drain of siphoned or hand pumping\
2. the modifying of the piping configuration to a 2 inch stainless steel primary pipe with a 4 inch secondary containment pipe
3. the installation of the piping system according to the PSEMC drawings,

is certified per the requirements of CCR Title 22, Section 66264 for the reduction of volume of hazardous wastes listed in the Part B application by natural evaporation.

Because there have been no equipment modifications since the previous inspection in December 2002, no inspections were undertaken for this certification.

TSU-8 must be re-certified when the modifications to the treatment unit are completed and installed and can be inspected.

It is understood that it is not technically or economically feasible to provide total assurance of suitability of designed or installed existing equipment and facilities for this service. David Powell, P.E., has used not less than customary care and skill ordinarily employed by engineers engaged in the type of services provided, namely, evaluation and assessment certification. However, David Powell, P.E. makes no warranty of any king, either expressed or implied as to his estimates, findings, recommendations, advice, specifications or other professional services.

I certify that this document was prepared under my direction with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of Mr. Charles Martin, of PSEMC, the information provided and reviewed is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

We appreciate the opportunity to provide PSEMC with our services on this matter If you have any questions regarding this DOCUMENT, please do not hesitate to call me at 831 479-0456 or Doug Cook at (707) 942-4911 (office) or (831) 818-0390 (cell).

Sincerely,

D. A. COOK AND ASSOCIATES

Douglas A. Cook
Principal

David E. Powell
California Registered
Chemical Engineer No. 5122

LICENSED PROFESSIONAL ENGINEER
David E. Powell
No. CH005122
Exp. 6/30/06
CHEMICAL
STATE OF CALIFORNIA

REFERENCE DOCUMENTS:

1. The December 17, 2002 "Updated Certification of TSU-8"
2. PSEMC Drawings 401063 and 401064

DAC/dc

6 Hangar Way
Watsonville, CA 95076
T: 831.761.6222
F: 831.761.1121

3860 Blackhawk Road
Danville, CA 94506
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F: 925.648.8811

5901 Christie Avenue, #301
Emeryville, CA 94608
T: 510.420.1693
F: 510.420.1691

4200 East Avenue
Livermore, CA 94550
T: 925.447.4017
F: 925.447.9360

2510 Douglas Boulevard
Roseville, CA 95661
T: 916.772.1800
F: 916.772.1820

ATI
ARCHITECTS and ENGINEERS

December 17, 2002

Charles Martin
Manager, Support Services
McCormick Selph, Inc.
3601 Union Road
Hollister, CA 95024-0006

Subject: Updated Certification of TSU-8
McCormick Selph, Inc. Hollister facility
Inspection Date - December 3, 2002
ATI Project M7102

Dear Mr. Martin:

McCormick Selph, Inc. requested certification of the plans for modifying Hazardous Waste Treatment Unit TSU-8, which was inspected on December 3, 2002. The certification would verify the status of the modification as documented in the previous certification and the new plans to determine the modified facility complies with the requirements of California Code of Regulations (CCR) Section 66264.

Inspection and Review

The treatment unit inspected was: TSU-8 – Hazardous Waste Treatment Unit for reduction of volume of hazardous waste by natural evaporation.

Previous certification: TSU-8 was certified by David Behrens, California Registered Civil Engineer No. 32807, dated February 6, 1992. It is attached as Appendix 6 of the Part B Application from McCormick Selph, Inc., dated June 28, 2002

The following items were reviewed in updating the certification of TSU-8.

1. Structural Strength - was documented for the original carbon steel tanks in Appendix 6 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002. Since the new tanks are going to be made from sections of stainless steel tank, it is assumed to have the same structural strength.
2. Design Standards – were documented in Appendix 6 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002.
3. Characteristics of wastes - was documented in Appendix 6 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002.
4. Existing corrosion protection measures – stainless steel is rated as compatible with all dilute water mixtures. Teflon, used as a gasket material for one of the new tanks, is suitable for dilute water mixtures and is rated acceptable for the solvents listed in Table IV-3 in the Part B Application for ambient temperatures.
5. Results of prior tank tests – none were documented; no tanks present.
6. Integrity of secondary containment - inspection of the secondary containment did not show any indication of any loss of integrity since the previous certification.

7. Secondary containment structural calculations – were documented in Appendix 6 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002.
8. Ancillary equipment – was inspected and appears to be supported in accordance with normal practices. In addition, no leaks were observed.
9. Rain water infiltration – was documented in Appendix 6 of the Part B Application for McCormick Selph, Inc., dated June 28, 2002 and was observed as not having been modified since the previous certification.
10. Secondary containment leak detection -The treatment unit is monitored every 24 hours and is inspected once every week.

Certification

Unit TSU-8 located at the McCormick Selph, Inc. facility in Hollister, California, including the proposed modifications described in the attached references, is certified per the requirements of California Code of Regulations (CCR) Section 66264 for the reduction of volume of hazardous wastes listed in the Part B Application by natural evaporation.

TSU-8 must be re-certified when the modifications to the treatment unit are completed and installed, and can be inspected.

It is understood that it is not technically or economically feasible to provide total assurance of the suitability of designed or installed, existing equipment and facilities for the service. ATI and David E. Powell, P.E., have used not less than customary care and skill ordinarily employed by engineers engaged in the type of services provided, namely, evaluation and assessment certification. However, ATI and David E. Powell, P.E., make no warranty of any kind, either expressed or implied, as to its estimates, findings, recommendations, advice, specifications or other professional services.

I certify that under the penalty of law that this document and all attachments were prepared under my direction or supervision with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of Mr. Charles Martin, of McCormick Selph, Inc., the information provided/reviewed is, to the best of knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of imprisonment for knowing violations.

CERTIFICATION

LICENSED PROFESSIONAL ENGINEER
David E Powell
No. CH005122
Exp. 06/30/01
CHEMICAL
STATE OF CALIFORNIA

David E. Powell
Director, Process Engineering

California Registered
Chemical Engineer No. 5122

F:\PF\M7102\CERTIFICATIONS\Letter 4 report and certification TSU8.doc

Reference Documents

1. Table IV-3 from Chapter IV of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.
2. Chapter IV of the Part B Application from Selph Inc., dated June 28, 2002.
3. Appendix 6 of the Part B Application from McCormick Selph Inc., dated June 28, 2002.
4. New Figures IV-12 and IV-13 to be included in the Part B Application from McCormick Selph, Inc., Revision C, December 18, 2002.

KLEINFELDER

February 6, 1992
File: 10-2236-03

Mr. Ed Lynam
Teledyne McCormick Selph
3601 Union Road
P.O. Box 6
Hollister, California 95023

SUBJECT: Documentation for the Suitability of the Existing Structures at Area TSU-7 "Electrical Safety Bucket Evaporation Unit", and at Area TSU-8 "Natural Safety Bucket Evaporation Unit" to Provide Secondary Containment of Safety Bucket Waste at Teledyne McCormick Selph (TMc/S), 3601 Union Road, Hollister, California

Dear Mr. Lynam:

Kleinfelder is pleased to submit the following documentation for the suitability of the existing structures at Area TSU-7 "Electrical Safety Bucket Evaporation Unit", and for Area TSU-8 "Natural Safety Bucket Evaporation Unit" to provide secondary containment of safety bucket waste at the TMc/S facility located at 3601 Union Road, Hollister, California (Plate 1). This document was prepared at the request of TMc/S to be used as a supplement to TMc/S' "Hazardous Waste Operations Plan". The documentation described herein is ~~based on~~ information provided Kleinfelder by TMc/S and on information gathered during the site observation of Area TSU-7 and Area TSU-8 on February 3, 1991.

1.0 AREA TSU-7, "ELECTRICAL SAFETY BUCKET EVAPORATION UNIT"

This unit is used to evaporate water which is used to inert waste explosives. The waste is not subject to mass detonation while in treatment in this unit.

1.1 TSU-7 Background

The secondary containment sump at Area TSU-7 consists of a concrete slab on which sit one 50 gallon drum (evaporation container) and 27 cubic feet (CF) of sand bags (Plate 2). The slab area is contained by a reinforced masonry wall. The evaporation container is a Department of Transportation (DOT) approved stainless steel drum suitable for storage of the safety bucket waste. The drum is equipped with two thermostatically controlled electrical heating belts with separate overheat protection. The materials stored are described by TMc/S to be non-hazardous and are listed in Chapters III and IV of the TMc/S "Hazardous Waste Operational Plan".

A documentation letter report for TMc/S' Secondary Containment Area TSU-4, dated May 30, 1991 was prepared for TMc/S by Kleinfelder. The letter report provided documentation as to the adequacy of Area TSU-4 to provide secondary containment for the materials stored. Area TSU-4 and Area TSU-7 were both constructed in 1973 and coated in 1986. Since the two areas were constructed and coated simultaneously it is assumed for purposes of this documentation that the materials and methods for both areas were similiar. This assumption is important due to the lack of as-built information available for TSU-7. A copy of the May 30, 1991 documentation for Area TSU-4 is included in Appendix A.

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1.2 TSU-7 Site Observation

A site observation of the secondary containment unit at Area TSU-7, was performed on February 3, 1992. The concrete slab and masonry wall did not appear to have visible cracks. The containment area concrete slab and masonry wall is coated with a coal tar elastomeric polyurethane coating. Upon visual inspection the coating did not show any apparent cracks or holidays.

During the site observation of TSU-7, comparisons were made to the as-built drawings provided by TMc/S (Plate 3 & Plate 4). The masonry blocks appear to be a horizontal interlocking, hollow concrete unit with interlocking horizontal joints placed in running bond. The masonry block dimensions are 8"W X 12"H X 16"L. The masonry wall height varies from 21 inches to 28 inches.

1.3 Review of TSU-7 As-Built Information

To facilitate preparation of the TSU-7 Secondary Containment Documentation, TMc/S supplied Kleinfelder with the following information: A draft copy of the Facility's "Hazardous Waste Operations Plan", Chapters III and IV, a TSU-7 Storage Area site plan and four x-rays of the masonry wall at Area TSU-4.

The purpose of the TSU-4 x-rays was to show size and location of the reinforcement steel in the masonry wall. This was necessary due to the absence of construction as-built drawings of the masonry wall. From the review of the x-rays, it appears that the TSU-4 masonry wall contains two 1/2-inch diameter, vertical reinforcement steel bars spaced 16 inches on center. It was not apparent from the x-rays whether the wall contains horizontal steel. For the purpose of our review, it was assumed that this configuration of reinforcing steel is consistent throughout the masonry wall and that it is fully grouted. Assumed details are shown in the TSU-4 letter report included in Appendix A.

1.4 TSU-7 Secondary Containment Volume Calculations

The storage capacity requirements of the containment area are set forth in the "Hazardous Waste Operation Plan", Chapter IV. The storage capacity of the containment area must be adequate to contain the total volume of rainfall from a 25 year storm for a duration of 24 hours, plus 10 percent of the total volume of hazardous waste stored within the containment sump or 100 percent of the volume of the largest container, whichever is greater. There is only one 55 gallon drum (evaporation container) in Area TSU-7, therefore, the TSU-7 secondary containment volume must be large enough to contain the total 24 hour rainfall volume plus the contents of the evaporation container. The storage volumes are listed below:

Available TSU-7 Secondary Containment Volume = 450 Cubic Feet (CF)

Total 25 Year Storm, 24 Hour Duration Volume = <92> CF

55 Gallon Drum = <7> CF

Sand Bags Voume = <27> CF

Surplus Volume = 324 CF

Details of the calculations are contained in the storage volume calculation work sheets in Appendix B.

The combined rainfall, safety bucket waste and sand bag volume is 126 CF or 943 gallons. This volume would fill the containment area to a height of 10.4 inches, measured from the bottom of the 28 inch wall. This would leave a 17.6 inch freeboard between the water surface and the top of the masonry wall.

1.5 TSU-7 Secondary Containment Sump Structural Stability

Area TSU-4 and Area TSU-7 were constructed at the same time in 1973. The structural stability of the secondary containment sump masonry wall at Area TSU-4 was calculated using a structural analysis computer program for masonry retaining structures named "Enercalc". The program input and output sheets are shown in the Area TSU-4 letter report dated May 30, 1991 included in Appendix A. The calculations are based on a site observation and x-ray review of the masonry wall. The construction of the wall is described above under x-ray review and shown on Plate 3 of the May 30, 1991 letter report.

It is assumed for purposes of this documentation that Area TSU-4 and Area TSU-7 were constructed under similiar conditions, using similiar methods and materials. Since Area TSU-4 has a wall height of 31 inches (versus 28 inches for TSU-7) with a freeboard of only 8 inches (versus 17.6 inches for TSU-7) Area TSU-4 would be a worse case scenario for structural stability calculations. Therefore, based on the structural calculations performed on Area TSU-4 (letter report in Appendix A) and the assumptions listed herein TSU-7 appears to be adequately constructed to resist sliding, overturning and shear against the existing loading conditions.

1.6 TSU-7 Coating

Area TSU-4 and Area TSU-7 were coated in 1986 with a coal tar elastomeric polyurethane coating named "Endura Flex Coal Tar Urethane Coating System" (a typical specification for the coating and a manufacturers cut sheet is included in Appendix C). Area TSU-4 coating was previously certified and is not included in this documentation, although TSU-4 appears to be withstanding the elements adequately. In May of 1991 Area TSU-3 sumps were coated with the same material. In January of 1992 the entire drum bay of TSU-3 was coated with the same material as was Area TSU-8. Area TSU-3 coating documentation for the sumps and the bays were provided in letter reports provided to TMc/S by Kleinfelder dated May 30, 1991 and January 23, 1992, respectively.

The history of the "Endura-Flex" coal tar urethane coating systems as used at the TMc/S facility is important in showing TMc/S' confidence in the material and it's apparent durability and applicability to the secondary containment uses. Considering this historical reliability and visual inspection of the existing coating of TSU-7 the coating appears to be adequate to contain the safety bucket waste evaporated in Area TSU-7.

2.0 AREA TSU-8, "NATURAL SAFETY BUCKET EVAPORATION UNIT"

This unit is used to evaporate water which is used to inert waste explosives. The waste is not subject to mass detonation while in treatment in this unit.

2.1 TSU-8 Background

The secondary containment sump at Area TSU-8 consists of a concrete slab on which sit two 526 gallon, three sixteenths inch thick carbon steel evaporation troughs (Plate 2). The slab area is contained by a concrete curb. The materials stored are described by TMc/S to be non-hazardous and are listed in Chapters III and IV of the TMc/S "Hazardous Waste Operational Plan".

2.2 TSU-8 Site Observation

A site observation of the secondary containment unit at Area TSU-8, was performed on February 3, 1992. The concrete slab and curb did not appear to have visible cracks. The exterior of the concrete curb did have surface folds or blemishes caused by building paper during construction. The surface blemishes do not appear to affect the integrity of the curb. The containment area concrete slab, curb and evaporation troughs are coated with a coal tar elastomeric polyurethane coating (Endura Flex, described in Section 1.6). Upon visual inspection the coating did not show any apparent cracks or holidays.

During the site observation of TSU-8, comparisons were made to the as-built drawings provided by TMc/S (Plate 5 & Section A of Plate 6). The site dimensions appear to be consistent with the as-built dimensions. The concrete curb height varies from 11 inches to 13 inches.

2.3 Review of TSU-8 As-Built Information

To facilitate preparation of the TSU-8 Secondary Containment Documentation, TMc/S supplied Kleinfelder with the following information: A draft copy of the Facility's "Hazardous Waste Operations Plan", Chapters III and IV, and a TSU-8 Storage Area site plan. In addition a statement by Mr. Frank Rubio as to the construction of TSU-8 is outlined below. Mr. Frank Rubio was involved with the construction of TSU-8 as an employee of TMc/S.

- In 1984 the original 6 inch slab and monolithic 4 inch curb was constructed.
- The 6 inch slab and 4 inch curb were reinforced with 6x6x10 welded wire fabric (WWF).
- In 1985 a 8x12 inch curb was poured as a cap over the 4 inch curb, and extended to the bottom of the slab footing.
- The 8x12 inch curb was reinforced with #4 reinforcement steel bars (stirrups) and doweled into the top and sides of the existing slab with #4 rebar.
- A wet set epoxy bond was placed between the existing slab and the 8x12 inch curb during the pouring of the concrete.

2.4 TSU-8 Secondary Containment Volume Calculations

The storage capacity requirements of the containment area are set forth in the "Hazardous Waste Operation Plan", Chapter IV. The storage capacity of the containment area must be adequate to contain the total volume of rainfall from a 25 year storm for a duration of 24 hours, plus 10 percent of the total volume of hazardous waste stored within the containment sump or 100 percent of the volume of the largest container, whichever is greater. There are

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two 526 gallon drum evaporation troughs in Area TSU-8; the troughs are elevated above the slab and do not displace any storage volume. Therefore, the TSU-8 secondary containment volume must be large enough to contain the total 24 hour rainfall volume plus the contents of one evaporation trough. The storage volumes are listed below:

Available TSU-8 Secondary Containment Volume = 163 Cubic Feet (CF)

Total 25 Year Storm, 24 Hour Duration Volume = <66> CF

One Evaporation Trough = <70> CF

Surplus Volume = 27 CF

Details of the calculations are contained in the storage volume calculation work sheets in Appendix B.

The combined rainfall and safety bucket waste storage volume is 136 CF or 1020 gallons. This volume would fill the containment area to a height of 11.0 inches, measured from the bottom of the 13 inch curb. This would leave a 2.0 inch freeboard between the water surface and the top of the concrete curb.

2.5 TSU-8 Secondary Containment Sump Structural Stability

The previously described visual inspection performed on February 3, 1992 showed no signs of cracking of the concrete slab or curb. The as-built information provided by Mr. Rubio, describes conditions that meet the minimum requirements of the Uniform Building Code (UBC) for a concrete slab on grade. Experience dictates that a concrete slab of this area and an eight by twelve inch concrete curb formed on expansive soil, as found at the TSU-8 site, would show signs of differential settlement and cracking if unreinforced. TSU-8 Flash Pit slab has been onsite for approximately 8 years and shows no apparent signs of differential settlement or cracking. Therefore, for purposes of this report it is assumed TSU-8 to be adequately reinforced to support the existing loading conditions.

2.6 TSU-8 Coating

Area TSU-3, Area TSU-8 and the evaporation troughs at TSU-8 were coated on January 17, 1992 with a coal tar elastomeric polyurethane coating named "Endura Flex Coal Tar Urethane Coating System" (a typical specification for the coating and a manufacturers cut sheet is included in Appendix C). As stated in Section 1.6, TMc/S has a history of successful application of this coating. Again, the history of the "Endura-Flex" coal tar urethane coating systems as used at the TMc/S facility is important in showing TMc/S' confidence in the material and it's apparent durability and applicability to the secondary containment uses. Considering this historical reliability and visual inspection of the existing coating of TSU-8 the coating appears to be adequate to contain the safety bucket waste evaporated in Area TSU-8.

3.0 CONCLUSION

The documentation contained herein is based on the information received from TMc/S and the data obtained from the site observation of the TMc/S facility. Based on this information Area TSU-7 and Area TSU-8 appear to be adequate and suitable for containment of the volume of rainfall and safety bucket waste as reported within this documentation under existing conditions. In addition the DOT approved stainless steel drum (and appurtenances) located at TSU-7 and the carbon steel troughs located at TSU-8 appear to be suitable vessels for the present treatment process and storage of the safety bucket waste.

4.0 LIMITATIONS

This report was prepared in general accordance with the accepted standard of practice which exists in Northern California at the time the observation was performed. It should be recognized that definition and evaluation of environmental conditions is a difficult and inexact art. Judgements leading to conclusions and recommendations are generally made with an incomplete knowledge of the conditions present. More extensive studies, including additional environmental investigations, can tend to reduce the inherent uncertainties associated with such studies. If the Client wishes to reduce the uncertainty beyond the level associated with this study, Kleinfelder should be notified for additional consultation.

Our firm has prepared this report for the Client's exclusive use for this particular project and in accordance with generally accepted engineering practices within the area at the time of our observation. No other representations, expressed or implied, and no warranty or guarantee is included or intended.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both onsite and offsite) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

Sincerely,

KLEINFELDER, INC.

David Behrens, P.E.
Senior Engineer
R.C.E No. 32807

REGISTERED PROFESSIONAL ENGINEER
DAVID K. BEHRENS
No. 32807
Exp. 6-30-94
CIVIL
STATE OF CALIFORNIA

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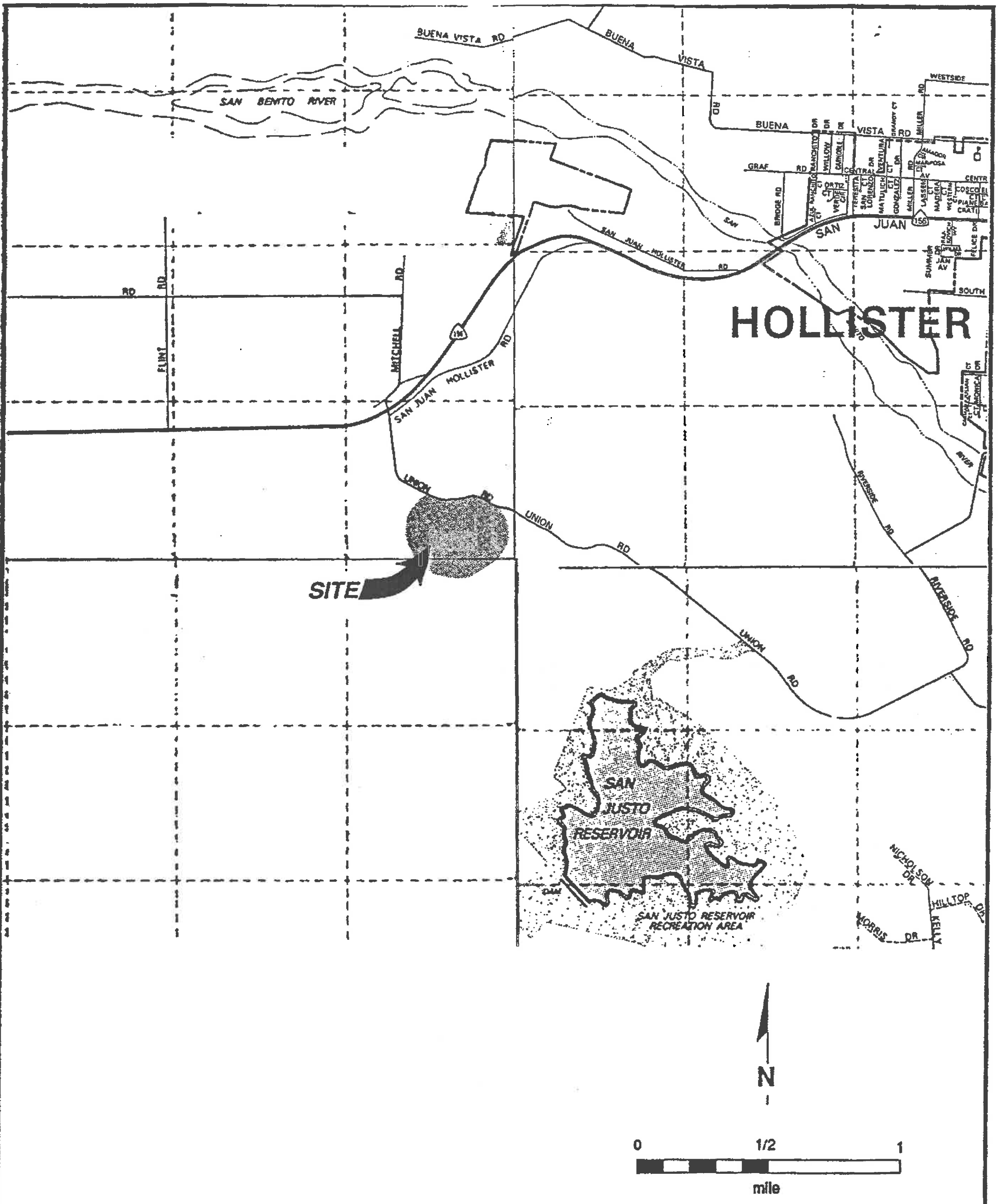


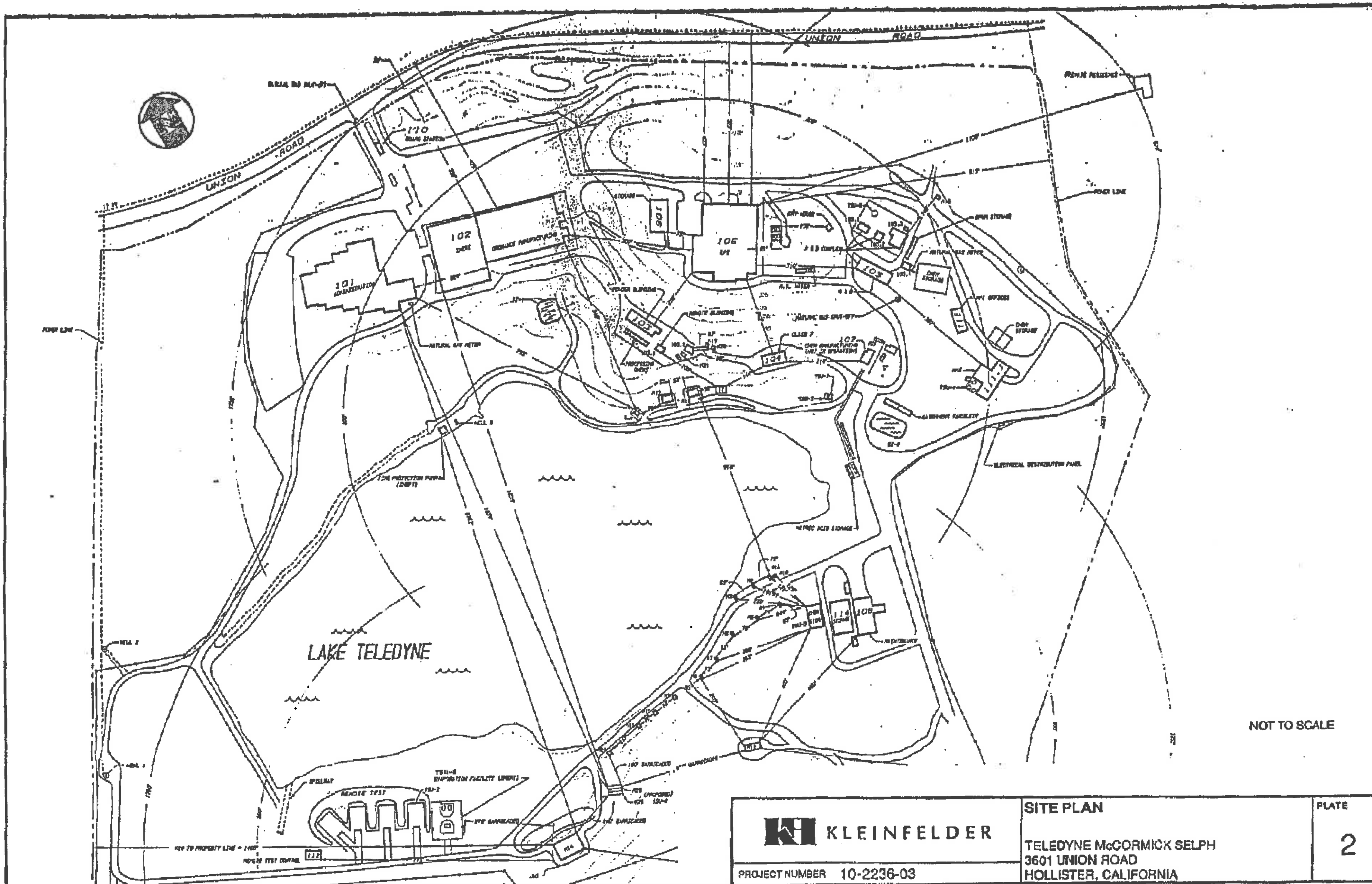
KLEINFELDER

PROJECT NUMBER 10-2236-03

SITE LOCATION MAP

TEDEDYNE McCORMICK SELPH
3601 UNION ROAD
HOLLISTER, CALIFORNIA

PLATE 1



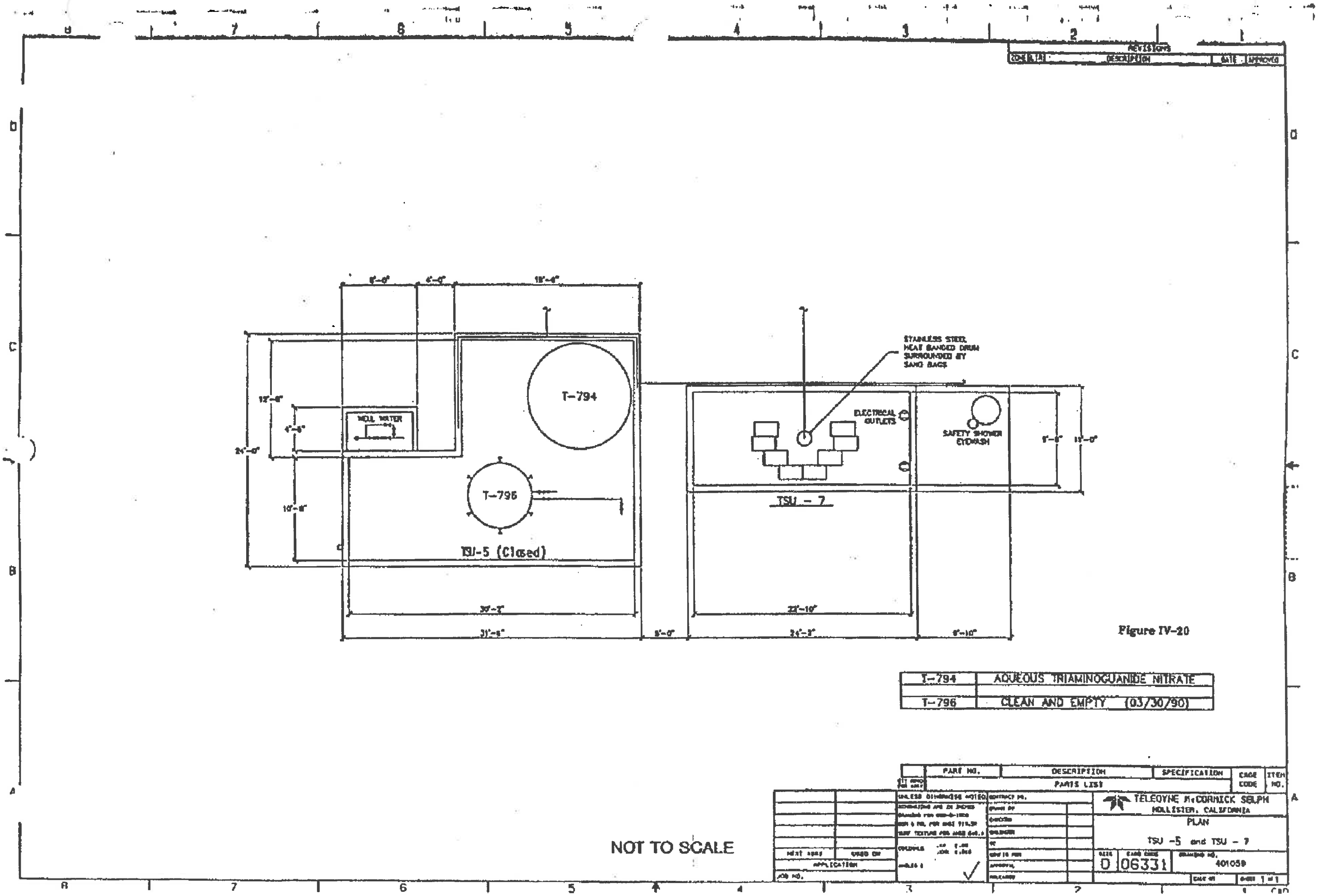
KLEINFELDER

PROJECT NUMBER 10-2236-03

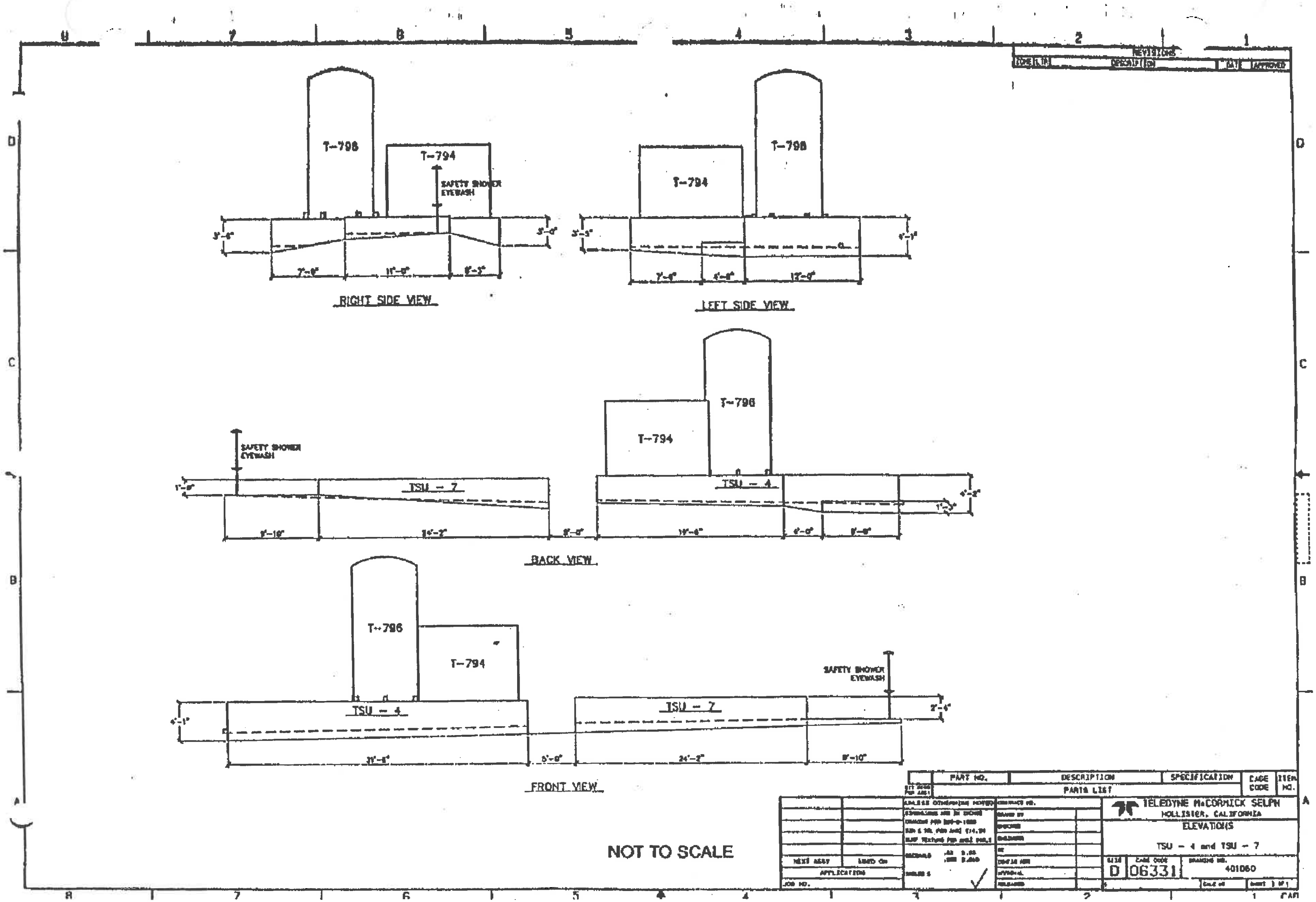
SITE PLAN

TELEDYNE McCORMICK SELPH
3601 UNION ROAD
HOLLISTER, CALIFORNIA

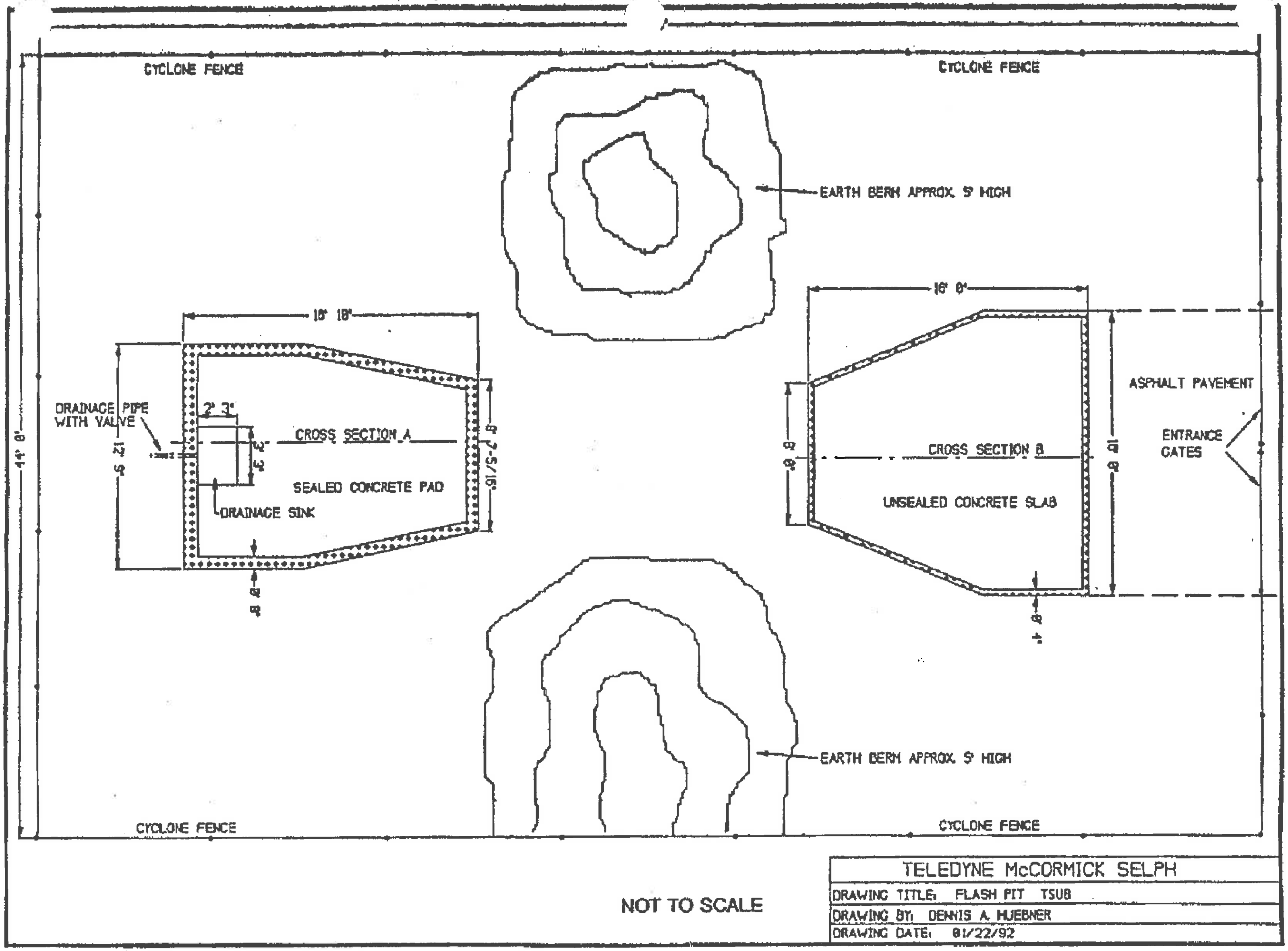
PLATE
2



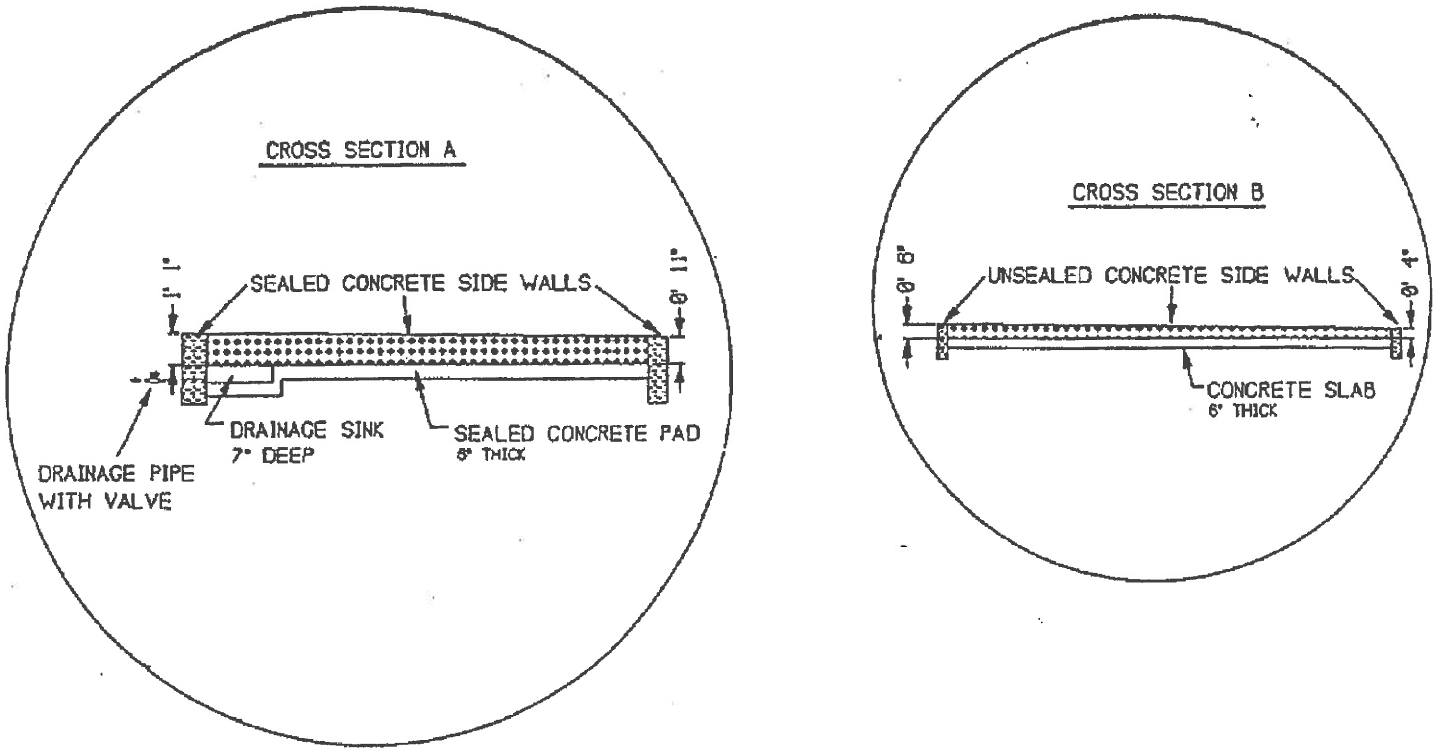
KLEINFELDER	SITE PLAN FOR TSU-5 AND TSU-7 TELEDYNE McCORMICK SELPH 3601 UNION ROAD HOLLISTER, CALIFORNIA	PLATE 3
PROJECT NUMBER 10-2236-03		



KLEINFELDER	ELEVATIONS FOR TSU-5 AND TSU-7	PLATE
PROJECT NUMBER 10-2236-03	TELEDYNE McCORMICK SELPH 3601 UNION ROAD HOLLISTER, CALIFORNIA	4



KLEINFELDER	ELEVATION PLAN FOR FLASH PIT TSU-8 TELEDYNE McCORMICK SELPH 3601 UNION ROAD HOLLISTER, CALIFORNIA	PLATE 5
PROJECT NUMBER 10-2236-03		



NOT TO SCALE

TELEDYNE McCORMICK SELPH
DRAWING TITLE: FLASH PIT TSU8
DRAWING BY: DENNIS A. HUEBNER
DRAWING DATE: 01/22/92

KLEINFELDER	CROSS SECTIONS FOR FLASH PIT TSU-8 TELEDYNE McCORMICK SELPH 3601 UNION ROAD HOLLISTER, CALIFORNIA	PLATE 6
PROJECT NUMBER 10-2236-03		

KLEINFELDER

May 30, 1991
File: 10-2236-01

Mr. Ed Lynam
Teledyne McCormick Selph
3601 Union Road
P.O. Box 6
Hollister, California 95023

SUBJECT: Documentation for the containment volume calculations and the structural stability calculations for the Masonry Walls of the Hazardous Waste Secondary Containment Sump in Area TSU-4 at Teledyne McCormick Selph (TMc/S), 3601 Union Road, Hollister, California

Dear Mr. Lynam:

Kleinfelder is pleased to submit the following documentation of the hazardous waste secondary containment sump for Area TSU-4 of the TMc/S facility located at 3601 Union Road, Hollister, California (Plate 1). This document was prepared at the request of TMc/S to be used as a supplement to TMc/S' "Hazardous Waste Operations Plan". The "Hazardous Waste Operations Plan" will be submitted to the Department of Health Services (DHS) as an application for renewal of TMc/S' Hazardous Waste Operational Permit. The following documentation summarizes the structural stability and volume calculations for the masonry walls of the secondary containment sump at Area TSU-4.

1.0 BACKGROUND

The secondary containment sump at Area TSU-4 consists of a concrete slab supporting four tanks, three of which contain hazardous waste (Plate 2). The materials stored are as described in Chapters III and IV of the aforementioned "Hazardous Waste Operational Plan". The slab area is contained by a reinforced masonry wall. In 1983, Area TSU-4 was certified by IT Enviroscience for hazardous waste storage.

2.0 DOCUMENTATION

The following conditions and clarifications form the basis for documentation.

2.1 Site Observation

A site observation of the secondary containment sump masonry wall at Area TSU-4, was performed on April 12, 1991. The masonry wall did not appear to have visible cracks. The containment area concrete slab and masonry wall is coated with a coal tar elastomeric polyurethane coating. The existing coating has been previously certified and is not a part of this document.

During the site observation, measurements were taken of the masonry wall containment area (Plate 2). The masonry wall is four blocks high. The blocks appear to be a horizontal interlocking, hollow concrete unit with interlocking horizontal joints placed in running bond. The masonry block dimensions are 8"W X 12"H X 16"L. The interior wall height measurement is 31". The combined concrete slab and footing depth under the masonry wall was measured at 15".

2.2 Review of TMc/S As-Built Information

To facilitate preparation of the TSU-4 Secondary Containment Documentation, TMc/S supplied Kleinfelder with the following information: A draft copy of the Facility's "Hazardous Waste Operations Plan", Chapter III and IV, a TSU-4 Storage Area site plan, a photograph of the masonry wall, and four x-rays of the masonry wall.

The purpose of the x-rays was to show size and location of the reinforcement steel in the masonry wall. This was necessary due to the absence of construction as-built drawings of the masonry wall. From the review of the x-rays, it appears that the masonry wall contains two 1/2-inch diameter, vertical reinforcement steel spaced 16 inches on center. It was not apparent from the x-rays whether the wall contains horizontal steel. For the purpose of our review, it was assumed that this configuration of reinforcing steel is consistent throughout the masonry wall and that it is fully grouted. Assumed details are shown in Appendix B.

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The tanks located at Area TSU-4 are listed below. This information was obtained from TMc/S' "Hazardous Waste Operation Plan".

TANK I.D.		VOLUME (gal.)	SUPPORT
1603		6000	raised on legs
5038		7765	on concrete slab
5040		7765	on concrete slab
5042		10,360	raised on legs
	Total	31,890	

2.3 Secondary Containment Volume Calculations

The storage capacity requirements of the containment area are set forth in the "Hazardous Waste Operation Plan", Chapter IV. The storage capacity of the containment area must be adequate to contain the total volume of rainfall from a 25 year storm for a duration of 24 hours, plus 10 percent of the total volume of hazardous waste stored within the containment sump or 100 percent of the volume of the largest container, whichever is greater. The largest container is of greater volume than 10% of the combined container total. Therefore, the TSU-4 Secondary containment volume must be large enough to contain the total 24 hour rainfall volume plus the contents of the largest container. The storage volumes are listed below:.

Available TSU-4 Secondary Containment Volume = 2,709 Cubic Feet (CF)

Total 25 Year Storm, 24 Hour Duration Volume = <503> CF

Tank 5042 Volume = <1,385> CF

Surplus Volume = 821 CF

Details of the calculations are contained in the storage volume calculation work sheets in Appendix A.

The combined rainfall and hazardous waste volume is 1,888 CF or 14,122 gallons. This volume would fill the containment area to a height of 23 inches, leaving an 8-inch freeboard between the water surface and the top of the masonry wall.

2.4 TSU-4 Secondary Containment Sump Structural Stability Calculations

The structural stability of the secondary containment sump masonry wall at Area TSU-4 was calculated using a structural analysis computer program for masonry retaining structures named "Enercalc". The program input and output sheets are included in Appendix B. The calculations are based on a site observation and x-ray review of the masonry wall. The construction of the wall is described above under x-ray review and shown on Plate 3. A summary of the masonry wall loading is listed below:

Soil bearing (assumed) = 2000 pounds per square foot (psf)

Active Fluid Pressure = 62.4 pounds per cubic foot (pcf)

Passive Pressure (assumed) = 250 pcf

Soil Density (assumed) = 120 pcf

Soil Friction (assumed) = 0.35

Based on the information described herein, the calculations indicate that the sump is adequately designed to resist sliding, overturning, and shear against the existing loading conditions listed above. Also, the area of steel to wall ratio is adequate to meet the minimum requirements of the Uniform Building Code (UBC) and the guidelines of the Masonry Institute of America (MIA) for reinforced masonry block walls. The minimum total steel to gross area ratio required by the UBC in the vertical and horizontal direction combined is 0.002, with a minimum steel requirement in either direction of 0.0007. The quantity of vertical steel in the wall described above yields a total steel to gross crossectional area of 0.002. This meets the UBC requirement for the minimum amount of steel required in both directions. It cannot be determined from the x-rays if the minimum steel requirement of 0.0007 times the gross area is met in the horizontal direction. However this does not affect the vertical, structural stability of the masonry wall.

Furthermore, from visual inspection, the possible lack of horizontal steel in the masonry wall does not appear to have promoted horizontal temperature or shrinkage cracking.

3.0 CONCLUSION

This documentation is not a ratification, but rather a supplement to the previous certification performed by IT Enviroscience. The documentation is based on the information received from TMc/S and the data obtained from the site observation of the TMc/S facility. Based on this information the existing volumes and the existing structural stability of the TSU-4 secondary containment sump masonry walls appear to be adequate to contain the volume of rainfall and hazardous waste as reported within this documentation.

4.0 LIMITATIONS

This report was prepared in general accordance with the accepted standard of practice which exists in Northern California at the time the investigation was performed. It should be recognized that definition and evaluation of environmental conditions is a difficult and inexact art. Judgements leading to conclusions and recommendations are generally made with an incomplete knowledge of the conditions present. More extensive studies, including additional environmental investigations, can tend to reduce the inherent uncertainties associated with such studies. If the Client wishes to reduce the uncertainty beyond the level associated with this study, Kleinfelder should be notified for additional consultation.

Our firm has prepared this report for the Client's exclusive use for this particular project and in accordance with generally accepted engineering practices within the area at the time of our investigation. No other representations, expressed or implied, and no warranty or guarantee is included or intended.

This report may be used only by the client and only for the purposes stated, within a reasonable time from its issuance. Land use, site conditions (both onsite and offsite) or other factors may change over time, and additional work may be required with the passage of time. Any party other than the client who wishes to use this report shall notify Kleinfelder of such intended use. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.

Sincerely,

KLEINFELDER

David Behrens, MSCE/PE
Senior Engineer
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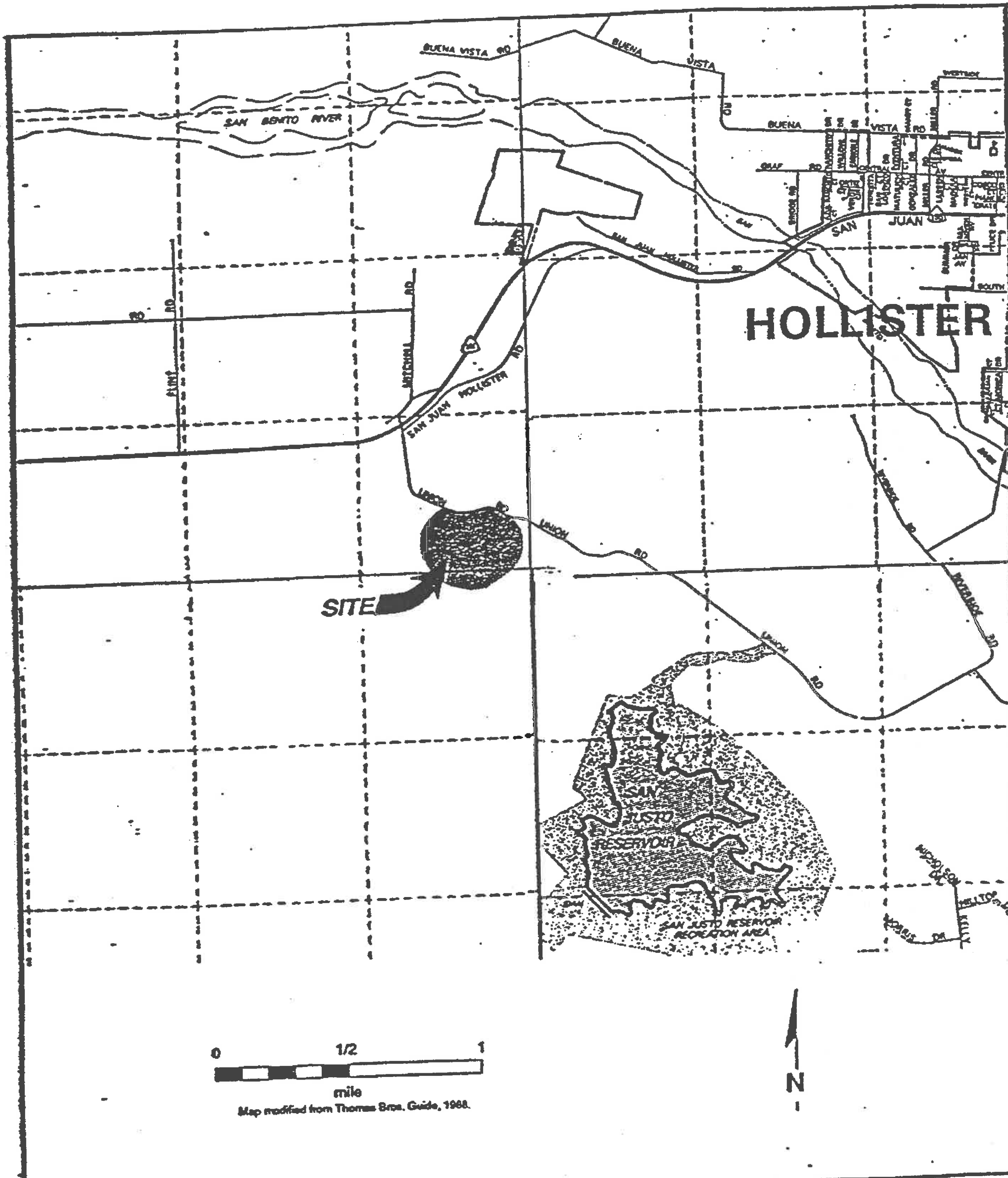
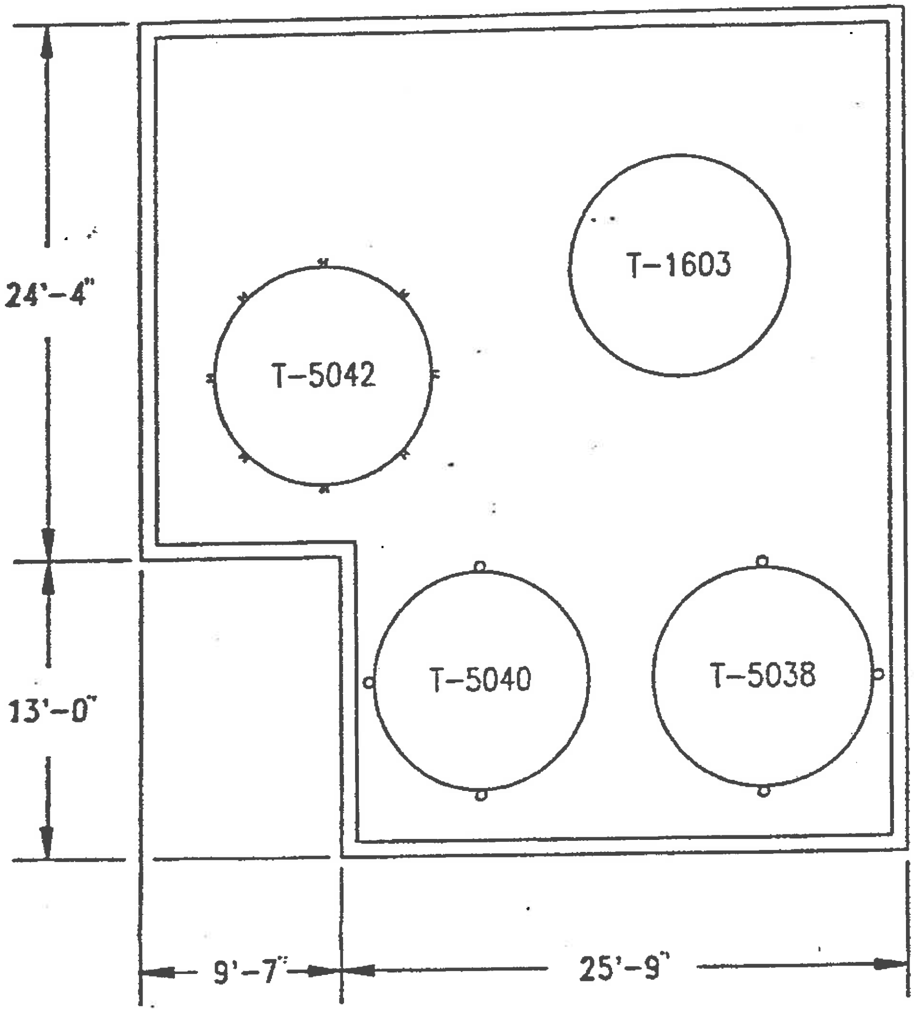
REGISTERED PROFESSIONAL ENGINEER
DAVID K. BEHRENS
No. 32807
Exp. 6-30-94
CIVIL
STATE OF CALIFORNIA

DKB:ko



Map modified from Thomas Bros. Guide, 1988.

KLEINFELDER WALNUT CREEK CALIFORNIA			SITE LOCATION MAP TELEDYNE MCCORMICK SELPH	
DRAFTED KPK	CHECKED BRB	PROJ. ENGR. BRB	DRAWING NO	REV.
SCALE SEE BAR SCALE		PROJ. MGR. DKB	PLATE 1	0
PROJECT NUMBER 10-2236-01		CAD FILE		



T-5038	SULFURIC ACID (30%)
T-5040	SULFURIC ACID (30%)
T-5042	AQUEOUS TRIAMINOGUANIDE NITRATE
T-1603	NON-HAZARDOUS

Base Map Source: TMc/S Drawing No.401061

KLEINFELDER

CALIFORNIA

CHECKED | PROJ. ENGR. | PROJ. MGR. | CAD FILE

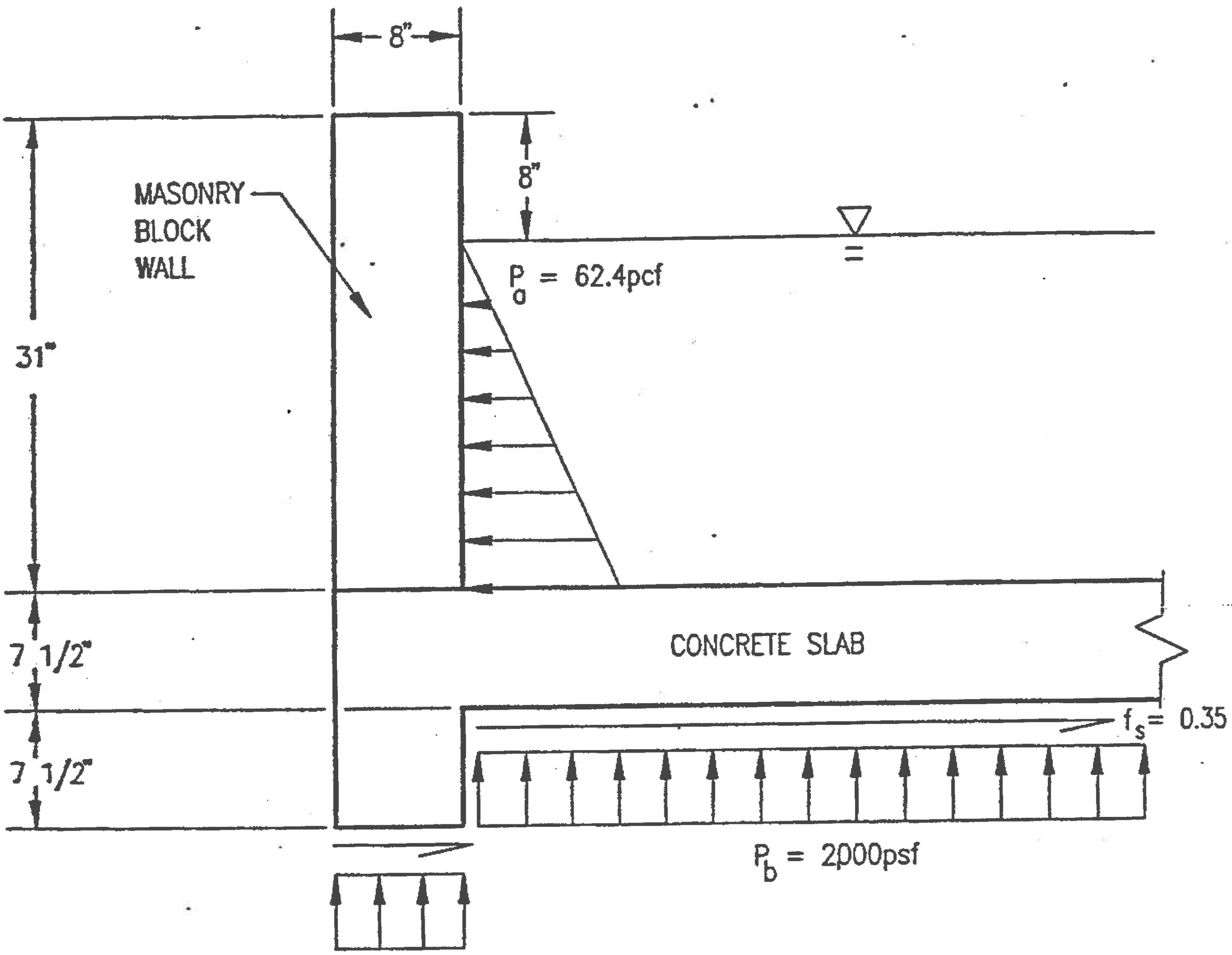
PLAN VIEW OF AREA TSU-4

TELEDYNE MCCORMICK SELPH

DRAWING NO

PLATE 2

REV 0



KLEINFELDER

WALNUT CREEK CALIFORNIA

LOAD DIAGRAM FOR DIKE WALLS AT TSU-4
TELEDYNE MCCORMICK SELPH

DRAFTED	LEL	CHECKED:	BRB	PROJ. ENGR:	BRB
SCALE	N.T.S.			PROJ. MGR:	DKB
PROJECT NUMBER	10-2236-01			CAD FILE:	LOAD4

DRAWING NO. PLATE 3

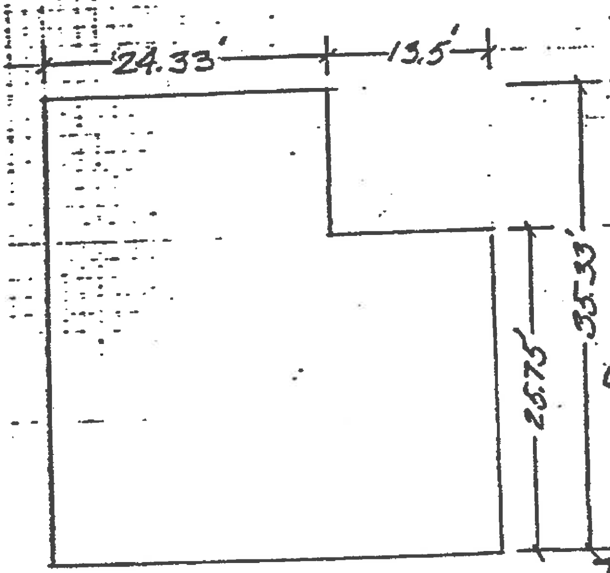
REV. 0

SHEET 1 OF 2

KLEINFELDER

PROJECT Teledyne McC/Selph PROJECT NO. 10-2236-01
SUBJECT TSU-4 required volume BY B BRADLEY DATE 4/30/91
REVIEWED BY DATE

CAPACITY OF SECONDARY CONTAINMENT FOR TSU-4



TSU-4 TANK VOLUMES

TANK	GALLONS	CUBIC FEET
1603	6,000	802
5038	7,765	1,038
5040	7,765	1,038
5042	10,360	1,385

$0.1 \times \Sigma$ VOLUMES = 426 SF

1,385 > 426

∴ CHOOSE 1,385 SF

INTERIOR CONTAINMENT WALL HEIGHT = 31" = 2.58'

INTERIOR CONTAINMENT AREA, SF:

$(24.33 \times 35.33) + (25.75 \times 13.50) = 1,207$ SF

TANKS 5038 AND 5040 REST ON SLAB, D = 10':

$\therefore\ 2(\pi \frac{10^2}{4}) \times 2.58' = 405.3$ CF

CONTAINMENT VOLUME (AVAILABLE) $= (1,207 \times 2.58) - 405.3$
$= 2,709$ CF
$= 20,262$ GAL

25 YEAR STORM CAPACITY FOR 24-HOUR RAINFALL PERIOD

25-YR STORM = 5 IN = 0.42 FT

VOLUME RAIN = (0.42)(1,207) = 503 CF

NET CAPACITY − REQ'D CAPACITY = EXCESS

2,709 − (1,385 + 503) = 821 CF EXCESS CAPACITY
≐ 6,141 GAL

821/1,207 ≐ 0.68 FT ⇒ 8 INCHES FREEBOARD

SHEET 2 OF 2

KLEINFELDER

PROJECT TMc/S — PROJECT NO. 10-2236-01
SUBJECT -TSU-4 REQ'D. VOLUME — BY BE — DATE 5/1/91
REVIEWED BY ____ DATE ____

DATA SOURCES FOR TSU-4. SECONDARY CONTAINMENT

SECONDARY CONTAINMENT WALLS

LENGTHS: SUPPLIED IN CHAP. IV - HW FACILITY DESIGN, TMc/S.

DEPTH: FIELD MEASUREMENT BY KLEINFELDER.

TANK DIMENSIONS: CHAPTER IV - HW FACILITY DESIGN, TMc/S

RAINFALL: "RAIN FREQUENCY ATLAS OF THE UNITED STATES" HERSHFIELD, DAVID M., 1961

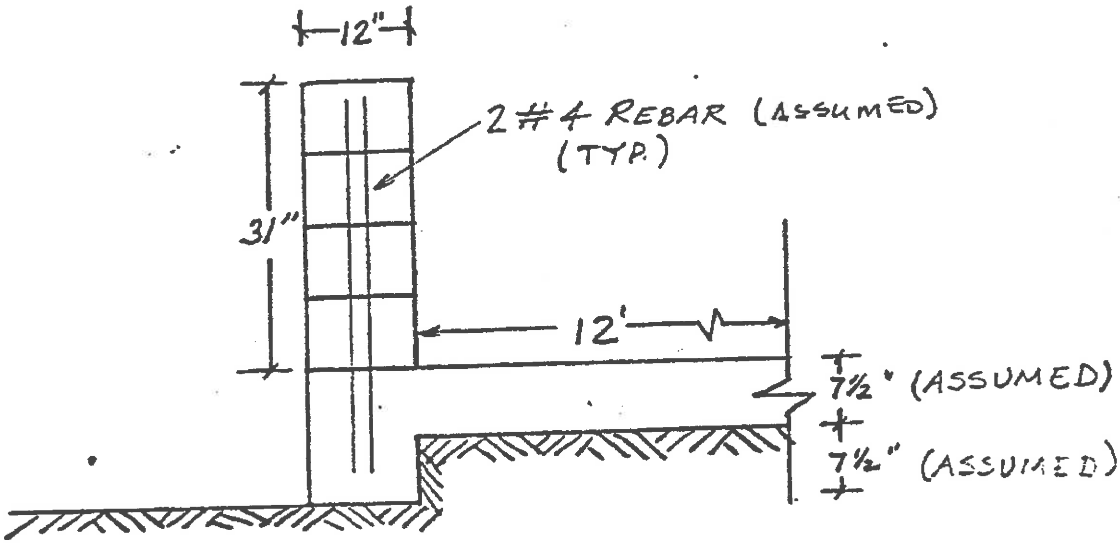
KLEINFELDER

SHEET____ OF____

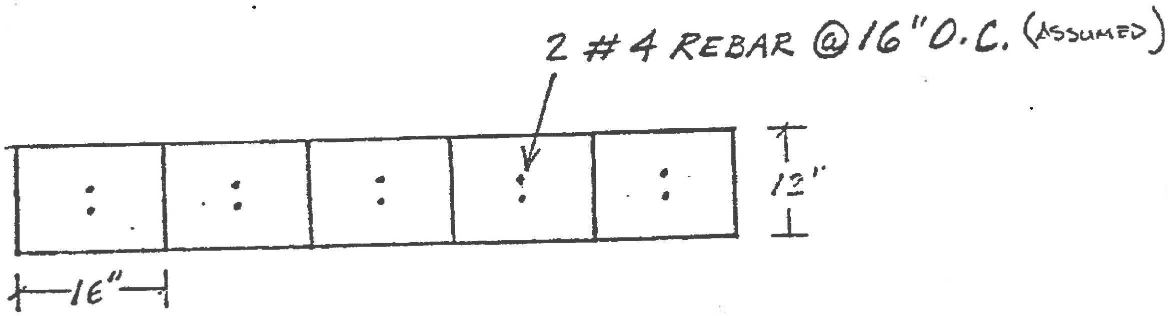
PROJECT Teledyne McCormick Selph PROJECT NO. 10-2236-01

SUBJECT Structural Strength of TSU-4 2° Containment Walls BY B Bradley DATE 5/2/91

REVIEWED BY____ DATE____



ELEVATION OF CONTAINMENT WALL



PLAN VIEW OF CONTAINMENT WALL

DETERMINE REQUIRED STEEL IN WALL

AREA OF STEEL $A_{sv} = .002\,bt$ REQUIRED IN VERTICAL DIRECTION

$b = 16"$

$t = 12"$

$A_{sv} = .002(16)(12) = 0.38\ in^2$

ACTUAL AREA OF 2 #4 BARS:

$A_s = 2(\pi\ 0.5^2/4) = \underline{0.39\ in^2}$ O.K.

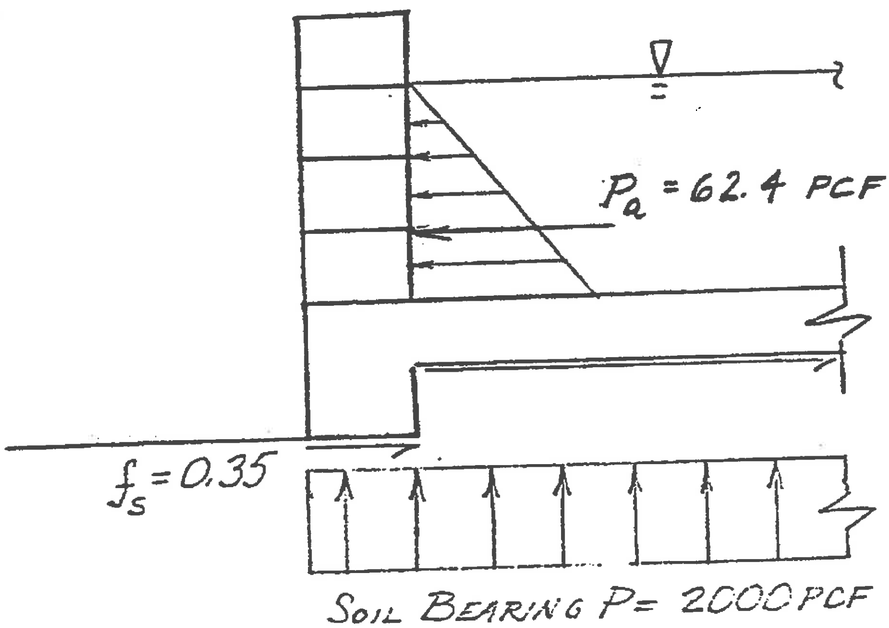
SHEET____ OF____

KLEINFELDER

PROJECT TMc/S
PROJECT NO. 10-2236-01
SUBJECT Structural Strength of TSU-4 2° Containment Walls
BY B Bradley
DATE 5/2/91
REVIEWED BY
DATE

DETERMINE STABILITY OF CONTAINMENT WALLS

WORST CASE:



REFER TO ATTACHED PRINT OUT FOR CALCULATIONS AND STABILITY SUMMARY.

PROJECT:10-2236-01
SUBJECT:TSU-4 SUMP WALL

DATE:5/2/91 BY :BB,DB

RETAINING WALL DESIGN

> DESCRIPTION :

> DESIGN DATA

Soil Bearing Press =	2,000 psf	FOOTING :	
Active Fluid Press =	62.4 pcf	Ftg/Soil Friction	= 0.35
Passive Pressure =	200 pcf	f'c - Concrete	= 3,000 psi
Soil Density =	120 pcf	Fy - Reinforcement	= 40,000 psi

> WALL LOADING CONDITIONS

Slope of Backfill = (horiz:vert,0=Level)	0 :1	Design Fluid Pressure = (Corrected for Slope)	0.0 pcf
Surcharge over Toe =	0 psf	Surcharge over Heel =	0 psf
Shall Surcharge be used in Resisting Moment? Y=1, N=0 -->			0 <--
Soil Ht over Toe =	0 in	Axial Load on Stem =	0 plf
Wall Ht above Soil =	0.67 ft	Load @ Wall Above Soil=	0 psf
ADJACENT FOOTING LOAD :		Width of Footing =	0 ft
Footing Load =	0 plf	Ftg. Dist. from Wall =	0 ft
Spread Footing ? Y=1 , N=0 : -->	0	Depth of Bearing Below Soil @ Rear F.O.W. =	0 ft
UNIFORM LOAD (Added)=	0 plf	Bottom Above T.O.F. =	0.00 ft
		Top Above T.O.F. =	0.00 ft

WALL & FOOTING GEOMETRY

> RETAINED HEIGHT = (above T.O.F.)	2.25 ft	> Footing Thickness =	7.5 in
		> Key Depth =	7.5 in
> Toe Width =	0 ft	> Key Width =	12 in
Stem Width =	1.00 ft	> Toe / Key Dist. =	0 ft
> Heel Width =	12 ft		
FOOTING WIDTH =	13.00 ft		

— STABILITY SUMMARY

SOIL PRESSURE @ TOE =	449 psf	: 2,000 = Allow	
SOIL PRESSURE @ HEEL =	320 psf		
FACTOR OF SAFETY : Overturning =	129.26	> 1.5, -->	OK
FACTOR OF SAFETY : Sliding =	7.27	> 1.5, -->	OK
ONE-WAY SHEAR AT TOE SIDE OF STEM = <	NA >		
ONE-WAY SHEAR AT HEEL SIDE OF STEM = <	1 >		OK

PROJECT:10-2236-01
SUBJECT:TSU-4 SUMP WALL

DATE:5/2/91 BY :BB,DB

STABILITY CHECK

> NOTE: Should 1/3 of Active Pressure be used as Vertical Pressure at rear face of stem? Y=1 , N = 0 --->> 1

OVERTURNING MOMENT = 247 ft-#
RESISTING MOMENT = 31,945 ft-# MAX. LATERAL FORCE = 258 #

FACTOR OF SAFETY : Overturning --> 129.26

SLIDING CHECK

Max. Lateral Force = 258 # > Ht. of Soil to Neglect = 0.00 in
Max. Resis. Force = 1,875 # Passive Pressure = 156 #
F.S. : Sliding = 7.27 Friction Pressure = 1,719 #

SOIL PRESSURE

Eccentricity from CL = 0.36 ft Kern Distance = 2.17 ft

		UN-FACTORED	FACTORED
> SOIL PRESSURE @ TOE	=	449 psf	598 psf
> SOIL PRESSURE @ HEEL	=	320 psf	460 psf

TOE DESIGN

Mu''= Upward = NA ft-# Mu : DESIGN MOMENT = NA ft-#
Mu' = Downward = NA ft-#
Rebar Cover = 3.5 in
> % Steel Minimum = 0.0012 d = Thk-Cover = NA in
As : Required = NA in^2/ft 'm' = = NA
As : Provided = NA in^2/ft R-u = NA psi

One Way Shear: Try: #4 @ NA " #7 @ NA "
Fv = 2*(f'c^.5) = NA psi #5 @ NA " #8 @ NA "
Actual Shear / Phi= NA psi #6 @ NA " #9 @ NA "

HEEL DESIGN

> Neglect Upward Soil Pressure? Y=1,N=0 --> 0

Mu''= Downward = 36666 ft-# Mu : DESIGN MOMENT = 504.81 ft-#

Mu' = Upward = 36161.1 ft-#
Rebar Cover = 2
> % Steel Minimum = 0.0012 d = Thk-Cover = 5.50 in
As : Required = 0.031 in^2/ft 'm' = = 15.69
As : Provided = 0.079 in^2/ft R-u = 18.54 psi

One Way Shear: Try: #4 @ 30.50 " #7 @ 90.50 "
Fv = 2*(f'c^.5) = 109.54 psi #5 @ 46.50 " #8 @119.50 "
Actual Shear / Phi= 34.17 psi #6 @ 66.50 " #9 @151.50 "

PROJECT:10-2236-01
SUBJECT:TSU-4 SUMP WALL

DATE:5/2/91 BY :BB,DB

TOP STEM SECTION DESIGN

> WALL MATERIAL : CONCRETE = 1, MASONRY = 2 : -->> 2 <<--

> f'm Masonry	=	1,350 psi
> Fs : For Masonry	=	20,000 psi
> f'c Concrete	=	3,000 psi
> Fy : For Concrete	=	40,000 psi
> Load Factor	=	1.00
> Grouting? Y=1 N=0 >		1
> Inspected ? Y=1 N=0>		0
> Center=1 , Edge=2 ->		2

Masonry :	Actual	Allow.
f'm =	100	225 psi
fs =	10,697	20,000 psi

Bond Length Req'd = 13.4 in

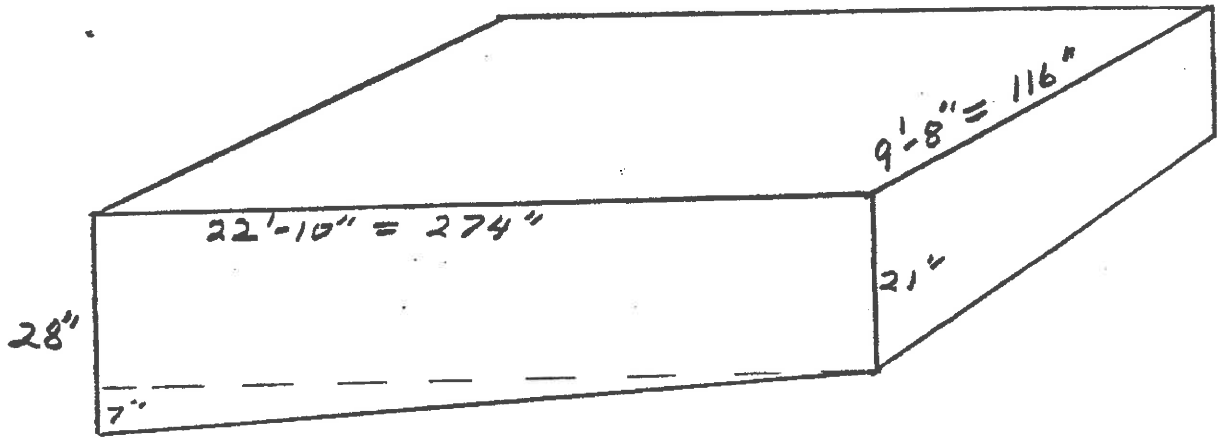
> Bottom Ht. above TOF	=	0 ft
Loaded Section Height	=	2.92 ft
Total Lateral Press.	=	157.95 #
Maximum Ms:Service	=	118.46 ft-#
> WALL THICKNESS	=	12 in
> REBAR SIZE	#	4
REQ'D SPACING	=	48.00 in
Rebar Area Supplied	=	0.05 in^2
'd' for design	=	3.00 in
Allowable Unit Shear	=	25.0 psi
Actual Unit Shear	=	1.1 psi

KLEINFELDER

PROJECT TMc/s - AREAS TSU7 PROJECT NO. 10-2236-03
SUBJECT & TSU-8 VOLUME BY OK Bahena DATE 2/5/92
CALCULATIONS REVIEWED BY ____ DATE ____

I) AREA TSU-7 VOLUME CALC'S

INTERIOR DIMENSIONS



$$\text{TSU-7 TOTAL VOLUME} = \left\{\left[\left(\frac{21''+28''}{2}\right)\left(274''\right)\right]\left(116''\right)\right\} \div 1728\ \text{CI/CF}$$

TSU-7 TOTAL VOLUME = 450.64 CF

25 YEAR STORM VOLUME:
(5" RAINFALL PER 24 HRS)(274" x 116") ÷ 1728

25 YEAR STORM VOLUME = 91.97 CF

55 GAL. DRUM = 7.35 CF

SAND BAGS = 27 CF

SURPLUS VOLUME = 450.64 CF − 126.32 CF = 324.32 CF
INCHES FREEBOARD = (324.32 CF) ÷ [116" x 274" ÷ 144"]

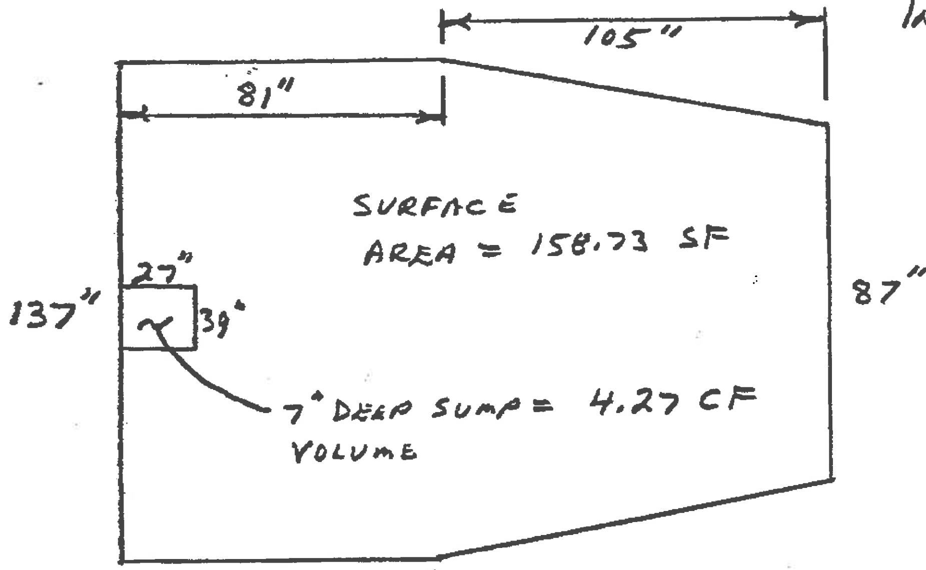
INCHES FREEBOARD = 1.47 FT. = 17.63 IN.

PROJECT TMc/s Continued PROJECT NO. 10-2236-03

SUBJECT BY [initials] DATE 1/5/02

REVIEWED BY DATE

II) Area TSU-8 Volume Calc's

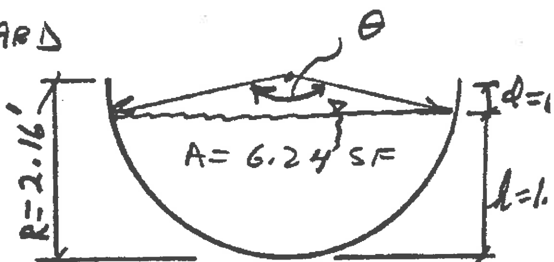


$$\text{Total Volume} = \left\{ \left[(137'' \times 81'') + \left(\frac{87'' + 137''}{2} \right)(105'') \right] \left(\frac{11'' + 13''}{2} \right) \right\} \div 1728$$

Total TSU-8 Volume = 158.73 CF + 4.27 CF = **163.0 CF**

25 Yr. Storm Volume = $\left(\frac{5'' \text{ Rainfall}}{12} \right)$ (158.73 CF) = **66.14 CF**

One - Evap. Trough w/6" Freeboard



$d = R \cos \frac{\theta}{2}$ $\theta = 2.675$ rad.'s

$A = \frac{1}{2} R^2 \theta = 6.24$ SF

Volume = (6.24 SF)(11.275') =

⇒ **70.34 CF**

Surplus Volume = 163.0 CF − 66.14 CF − 70.34 CF = 26.52

Inches Freeboard = 26.52 CF ÷ 158.73 SF = .17' = **2"**

1.09 WARRANTY

A. Provide three year warranty for application. Warranty shall include coverage for bond to substrate. Warranty shall also include degradation of chemical resistance to those chemicals which compound has been tested and approved for usage.

PART 2.0 MATERIALS

2.01 MANUFACTURER

The coatings shall be as supplied by E.A. Wilcox Company of So. San Francisco, CA or approved equal.

2.02 MATERIALS

A. Coating - two component catalyzed elastomeric polyurethane shown below, or equal product:

Coat No.	Product	Thickness
1	Endura-Flex 1947 Precoat	10 Mils
2	Endura-Flex 1947 Topcoat	90 Mils
	Total	100 Mils

B. The materials shall be approved by the Engineer prior to commencing the application. Once the coating formulation is accepted and approved by the Engineer, it shall not be changed except by authority of the Engineer.

C. All coatings, precoat and topcoat, shall be 100% solids tar filled elastomeric aromatic polyurethane in a 1 part resin to 1 part catalyst ration by volume. Neither component shall contain solvents, fillers or extenders.

D. The protective coating materials shall be corrosion, abrasion and impact resistant; with a Shore "A" hardness of 65 to 70 at 78 °F; a tensile strength of 1350 psi at an elongation of 50% as per ASTM D-412a; and shall be resistant to puncture per FTMS 101C at 100 mils equal to 80 lbs.

E. The applied coating shall be capable of repair at any time during its life.

PART 3.0 EXECUTION

3.01 APPLICATION SCHEDULE

A. All sump surfaces shall receive one precoat of Endura-Flex 1947 Precoat and one topcoat of Endura-Flex 1947 Topcoat.

3.02 SURFACE PREPARATION

A. If grease, oils or other contaminants are present, they must be removed with low pressure water blasting or steam cleaned. An emulsifying detergent wash is also acceptable as long as it is promptly rinsed down with plenty of fresh water so as to remove residual detergents.

B. Once the concrete surface has been cleaned and has been allowed to dry, it is grit blasted via "brush blast" techniques. for the purpose of removing any deteriorated concrete, aggregate or laitence and produce a firm grade of sound concrete with an adequate surface profile that will enhance the adhesion of the coating. Unless otherwise specified, any existing coatings must be removed completely, whether by abrasive blasting or by any other method.

C. The entire area to be coated shall be cleaned of any loose matter such as blasting residues, aggregate, or laitence prior to coating. Vertical or inverted surfaces may be blown off with clean, oil-free compressed air but the floors and at least the lower section of the vertical walls must be vacuumed. If blowing off with compressed air creates unacceptable levels of dust in the air, which may later settle on the cleaned surfaces, then the entire surface shall be vacuumed instead.

D. Allow the concrete to dry thoroughly before coating. In order to determine the moisture content of the concrete, a test shall be performed where a one foot square section of clear polyethylene plastic is securely taped around its edges to the concrete surface. The plastic is allowed to remain attached to the surface overnight and if water condensation is evident on the interior surface when inspected the following day, then it shall be considered too humid for coating. Consult the manufacturer for further recommendations if necessary.

3.03 RESURFACING

A. Hand mixing of the urethane coating materials is allowed only for filling small voids, cracks or joints in the concrete surface to be coated.

B. Larger scale resurfacing of the concrete surface, if needed, may be accomplished by the use of quick set cementitious mortars or sand filled solventless epoxy putties.

3.04 MIXING

A. The precoat and topcoat shall be two component systems that are simultaneously proportioned, mixed and sprayed in a 1A : 1B volume ratio by plural component spray equipment specially designed for use with these coating systems. The containers of the resin (Side "A") component shall be thoroughly mixed with an air driven agitator for at least 15 minutes before hooking up to the spray rig. Mixing of the isocyanate component is not required. Once this is done, no further mixing or proportioning is required. Avoid contamination of moisture.

3.05 APPLICATION OF PRECOAT

A. Do not apply precoat in damp or rainy weather.

B. The precoating material is applied at the thickness specified before the application of the topcoat. It is applied with the special equipment that is described in Section 3.04A of this specification.

C. The precoat is allowed to cure for no less than twenty minutes or more than two hours prior to topcoating at an ambient temperature of 72 °F. If more than two (2) hours pass from the time of application of the precoat, it shall be given a very light abrasive brush blast and vacuum prior to application of the topcoat.

3.06 APPLICATION OF TOPCOAT

A. The topcoat is spray applied with the plural component described in Section 3.03B, to all primed surfaces at a pressure of 2500 psi at the desired thickness in one single coat accomplished by various passes of the spray gun at a rate of approximately 10 mils per pass. The total thickness of material shall be applied at one spraying. Multiple coats, so as to build up thickness gradually, may be applied over already applied and untreated topcoating material as long as the undercoat is no older than 2 hours. Longer periods between coats require cleaning and abrading of the undercoat prior to the application of an additional coat.

B. No moisture condensation, precipitation, water vapor or contamination will be acceptable on the primed surface.

C. The acceptable ambient temperature range for application of the topcoat is 40 °F to 120 °F. The maximum acceptable relative humidity range is 95% or 5 °F above the dew point.

D. The acceptable minimum cure time after completion of coating and exposure to splash or immersion is 2 hours. A 48 hour cure period is desirable. Impact, abrasion or high traffic applications should allow at least seven days at 70 °F or four days at 120 °F for full cure.

E. Ladders and items such as hoses, boards, cables, and braces must be placed at least 18" away from the surfaces to be coated so as not to interfere with the space normally required for spray gun operations.

3.07 APPEARANCE OF FINISHED COATING

A. The finished coating shall be generally smooth and free of sags, drips or holidays. All surfaces shall have the required minimum thickness. In general, the surface of the coating shall be no rougher than the concrete substrate. The color must be uniform.

3.08 PINHOLE AND CONTINUITY TESTING

A. The Contractor will test the coating and the Engineer shall witness the testing. The Contractor will use a low voltage electrical resistance meter or similar testing equipment to test for pinholes and check thickness with a magnetic thickness gauge to verify to the Engineer's satisfaction that a pinhole free condition and specified film thickness of the coating system has been achieved over all of the coated surfaces. Repair all deficiencies in film integrity and thickness per manufacturer's recommendations.

3.09 LEAK TESTING

A. Following completion and curing of the coating, the sumps shall be tested for liquid-tightness by filling the sumps to approximately 45 1/2" depth, i.e., to the level just below the angle irons at the top of the sumps. Leak testing shall be performed by the Contractor and witnessed by the Engineer.

B. Leak testing procedures shall be approved by the Engineer prior to testing.

C. Only two non-adjacent sumps shall be measured during one 24-hour period.

D. The sumps shall be filled once at the start of a 24-hour test. The water depth shall be measured using a stilling well. The sumps shall be covered and left undisturbed. After 24 hours the depths shall be remeasured.

E. The Contractor shall supply all materials necessary for the leak test.

F. Any leaks disclosed by the test shall be corrected by the Contractor in accordance with the manufacturer's recommendations.

G. Water required for testing shall be supplied by the Owner.

3.10 INSPECTION

A. The quality and grade of cleanliness of all blasted and prepared surfaces, including removal of the blast grit from these surfaces, shall be inspected by the painting contractor and verified by the Owner's representative prior to the application of the precoat.

B. The quality of all precoated surfaces are to be inspected for uniformity in coverage and color. The proper recoat times are also monitored by the Owner's representative before topcoating.

C. A final inspection of the coated concrete shall be undertaken:

1. Coated surfaces shall be inspected visually for blisters. Blisters, if any, shall be removed and repaired as per manufacturer's recommendations.

2. If the coating thickness cannot be determined by the continuity testing described in 3.08, the Contractor shall furnish as many plugs as are requested by the Owner's representative in order to measure the coating thickness for proper coverage. Areas where the coating has been removed must be repaired as per manufacturer's recommendations.

3. Absolutely no pinholes shall be allowed on the coated surface.

3.11 CLEANING AND COMPLETION

A. At the completion of this portion of the work, remove all debris, remove all coating and stains from work for which coated finish is not intended, touch up all marred surfaces, and leave all structures in a clean condition, ready for use.

B. Refinish all damaged or imperfect coating to the satisfaction of the Engineer prior to final acceptance of the facility.

END OF SECTION

Endura-Flex Systems

EF-1947 COAL TAR URETHANE

(Formerly Black Magic Plus & Rel-Flex)

PRODUCT DESCRIPTION

EF-1947, A 100% SOLIDS COAL TAR POLYURETHANE ELASTOMER, DESIGNED AS AN EXTERIOR SECONDARY CONTAINMENT COATING FOR SPLASH AND SPILL OF VARIOUS CHEMICALS. BY UTILIZING PLURAL COMPONENT SPRAY EQUIPMENT, EF-1947 CAN BE APPLIED, PINHOLE FREE, OVER CONCRETE, ASPHALT, WOOD AND STEEL. WHEN COMBINED WITH A REINFORCEMENT FABRIC, EF-1947 CAN BE APPLIED DIRECT TO THE EARTH..

TYPICAL USE AREAS

- LOADING RACKS (TRUCK/RAIL)
- PLATING AREAS
- FUEL/CHEMICAL TANKS
- CATCH BASINS
- FUEL DISPENSERS
- WASTE STORAGE
- NON-SKID FLOOR COATINGS
- CHEMICAL SUMPS
- PROCESS AREAS
- GUNITE TRENCHES
- EVAPORATION PONDS
- SLUDGE PITS

REPRESENTED BY:
E. A. WILCOX CO.
173 UTAH AVE.
SO. SAN FRANCISCO, CA 94080
(415) 871-5350

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(415) 871-5350

PRODUCT CHARACTERISTICS
EF-1947

COMPONENTS: RESIN
ACTIVATOR

MIX RATIO: 1:1

FLASH POINT: 200 DF

THINNER: NONE

WEIGHT/USG: 9 LBS.

TENSILE: 1350 PSI
ASTM D-412

ELONGATION: 50%
ASTM D-412

TEAR STRENGTH: 141.8 PSI
ASTM D-1004

COLD FLEX: PASS
10-15 DEGREES F/80 MILS

ACTUAL COVERAGE: (PER USG)
12 SQF - 100 MIL
15 SQF - 80 MIL
20 SQF - 60 MIL

CLEAN UP: MEK RECOMMENDED

VOLUME OF SOLIDS: 100%

HARDNESS:	@ 77 DEGREES F.	
SHORE A	30-40	15 MIN.
	45-55	30 MIN.
	60-70	60 MIN.
FULL CURE	96	

DRY TIME:	@ 77 DEGREES F.
TOUCH	15 - 20 MIN.
LT. FOOT	30 - 40 MIN.
HVY. FOOT	2 HRS.
TOTAL CURE	168 HRS.

PUNCTURE RESISTANCE FTMS 101C
100 MILS THICK
MAXIMUM FORCE: 60-80 LBS.

IMPACT RESISTANCE IN LBS.
50 MILS THICK

FORWARD	120
REVERSE	120

CHEMICAL CONTAINMENT DATA
EF-1947

CONTAINMENT TIME FOR 60 MIL FILM

CHEMICAL	24 HRS	48 HRS	72 HRS	168 HRS
ACIDS				
ACETIC ACID, 10%	YES	YES	YES	YES
ACETIC ACID, 50%	YES	YES	YES	YES
ACETIC ACID, GLACIAL	YES	NO	---	---
HYDROCHLORIC ACID, 37%	YES	YES	YES	YES
NITRIC ACID, 70%	NO	---	---	---
PHOSPHORIC ACID, 20%	YES	YES	YES	YES
PHOSPHORIC ACID, 50%	YES	YES	YES	YES
SULFURIC ACID, 20%	YES	YES	YES	YES
SULFURIC ACID, 50%	YES	YES	YES	YES
SULFURIC ACID, 98%	NO	---	---	---
ALKALIES				
AMMONIUM HYDROXIDE, 5%	YES	YES	YES	YES
AMMONIUM HYDROXIDE, 20%	YES	YES	YES	YES
SODIUM HYDROXIDE, 20%	YES	YES	YES	YES
SODIUM HYDROXIDE, 50%	YES	YES	YES	YES
OILS AND FUELS				
HYDRAULIC FLUID	YES	YES	YES	YES
MOTOR OIL	YES	YES	YES	YES
UNLEADED GAS-REG.	YES	YES	YES	YES
UNLEADED GAS-PREM.	YES	YES	YES	YES
JP-4 JET FUEL	YES	YES	YES	YES
SOLVENTS				
ACETONE	NO	---	---	---
CELLOSOLVE	NO	---	---	---
HEXANE	YES	YES	YES	YES
M.E.K.	NO	---	---	---
M.I.B.K.	NO	---	---	---
N-BUTYL ACETATE	NO	---	---	---
TOLUENE	NO	---	---	---
TRICHLORETHYLENE	YES	NO	---	---
XYLOL	NO	---	---	---

Appendix 7

Training Director Qualifications

7/25/2002 2 pages

Charles F. Martin
Training Director

EDUCATION

- Cabrillo College
- Associate in Science, Hazardous Materials Technology – 1997
- Past member of Cabrillo College Hazardous Technology Advisory Committee
  Note: Course studies included a three (3) unit course on hazardous materials storage

CERTIFICATION

- California State Certified Hazardous Materials Specialist (Certification No. 300)
- California State Certified Incident Commander (Certification No. 888)
- California State Registered Environmental Assessor (Certification No. REA-06795)
- California State Certified Drinking Water Operator, Grade II (Certification No. 17445)

CONTINUING EDUCATION (partial list)

- Chemistry of Hazardous Materials – National Fire Academy
- Respiratory Protection – U.C. Berkeley
- Hazardous Materials, Chemicals and Waste Management – Transportation Skills Program, Inc.
- Hazardous Waste Worker Health and Safety Training – U.C. Davis/U.C. Berkeley (40-hour initial training with 8-hour annual refresher.)

SUMMARY OF EXPERIENCE

McCormick Selph, Inc.

2/8/99 to Present **Manager, Support Services**

Manages Safety, Environmental, Resource Protection departments, assigned additional responsibility of Communications and Facilities/Maintenance.

1995 – 2/1999 Additional responsibilities assigned to supervisory position. Designated sole contact for environmental regulatory agencies. Responsible for conducting all negotiations in the environmental arena at the Hollister and Northridge facilities.

Assumed responsibility for all environmental and regulatory programs following resignation of Director of Support Services.

1992 – 1995 **Supervisor, Support Services**

Assist the Director of Support Services/Environmental Manager in administrating all on-sight regulatory duties related to U.S. Environmental Protection Agency (EPA), California branch of the EPA (Department of Toxic Substances Control and the Office of Drinking Water), California Regional Water Quality Control Board, California Regional Air Quality Control Board, Monterey Unified Air Pollution Control District, and San Benito County Department of Health.

Duties for this position include:

- Regulatory report writing, including, but not limited to: Hazardous Materials Inventory, Toxic Emissions Inventory, Annual Hazardous Waste, Biennial Hazardous Waste, Office of Drinking Water, Ground Water Monitoring, Effluent Monitoring, Hazardous Waste Manifest, Waste Minimization
- Industrial health and safety training
- Industrial health and safety audits
- Personnel air monitoring
- Manage $200,000 annual budget
- Generation and/or updates to all associated Company Safety Instructions, Company Procedures and Interdepartmental Procedures.

1989 – 1992 **Foreperson**

Provide guidance and instruction to Environmental Technicians toward optimum utilization of time and materials. Provide health and safety training to technicians and approximately 80 additional employees involved in hazardous waste activities. Provide respirator training to employees as required. Coordinate all hazardous waste shipments. Conduct hazard assessment of chemicals within the workplace.

1987 – 1989 **Environmental Technician**

Conduct health and safety audits in manufacturing areas. On-site treatment of hazardous waste. Package and label hazardous waste for off-site disposal.

1985 – 1987 **Chemical Operator**

Responsible for running chemical reactions and processes in the Chemical Operations Plant.

Appendix 8

2006, DTSC, Hazardous waste Facility Permit (33 Pages)

1999, DTSC, Hazardous Waste Facility Permit & Modification (77 Pages)

2000, DHS, Water Supply Permit (1 Page)

2013, CRWQCB, Cleanup & Abatement Order (Teledyne/Allegheny Technologies) (4 Pages)

1999, CRWQCB, Monitoring & Reporting Program/Waste Discharge Requirement (13 Pages)

2007, MBUAPCD, Air Permit to Operate for TSU-1 and TSU-2 (5 Pages)

<u>Appendix 8</u>

2006, DTSC

Hazardous Waste Facility Permit

(33 pages)

facility file

Department of Toxic Substances Control

Maureen F. Gorsen, Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Linda S. Adams
Secretary for
Environmental Protection

Arnold Schwarzenegger
Governor

July 10, 2007

Mr. Charles F. Martin
Manager, Environment and Security
Pacific Scientific Energetic Materials Company
3601 Union Road
Hollister, California 95023

CLASS 1 PERMIT MODIFICATION FOR COMPANY NAME CHANGE, MCCORMICK SELPH, INC. FACILITY, EPA ID. NO. CAD009220898

Dear Mr. Martin:

The Department of Toxic Substances Control (DTSC) has reviewed your permit modification notification, dated June 11, 2007, requesting a Class 1 modification to the Hazardous Waste Facility Permit for the McCormick Selph, Inc. facility. McCormick Selph, Inc. has decided to proceed with a name change from "McCormick Selph, Inc." to "Pacific Scientific Energetic Materials Company (California) Inc" (PSEMC). DTSC understands that this is a name change only and does not affect the operation of the facility. DTSC concurs that this modification is a Class 1 modification, as defined in California Code of Regulations, title 22, chapter 20, appendix I, paragraph A.1, for administrative and informational changes.

Pursuant to California Code of Regulations, title 22, section 66270.42(a) this Class 1 permit modification becomes effective on July 11, 2007. In accordance with California Code of Regulations, title 22, section 66270.42(a)(1)(B), PSEMC is required to send a public notice of the modification within 90 days after the change is put into effect. Please notify DTSC when the change is put into effect and submit a copy of the public notice to DTSC.

DTSC has determined that this Class 1 permit modification is not a project subject to the provisions of the California Environmental Quality Act (CEQA) as defined in California Code of Regulations, title 14, section 15378.

DTSC has not prepared a modified permit document at this time. DTSC intends to prepare a modified permit after the revised Part A and Part B Applications are received.

Should you have any questions concerning this letter, please contact Mr. Paul Ruffin of my staff at (916) 255-6677 or at pruffin@dtsc.ca.gov.

Sincerely,

Mohinder S. Sandhu, P.E., Chief
Standardized Permitting and Corrective Action Branch

Enclosures

cc: Ms. Charlene Williams, Chief
Northern California Branch
Enforcement and Emergency Response Program
700 Heinz Avenue, Suite 200
Berkeley, California 94710-2721

Mr. Rizgar Ghazi, P.E.
Unit Chief
Standardized Permitting and Corrective Action Branch
Department of Toxic Substances Control
8800 Cal Center Drive, 2nd Floor
Sacramento, California 95826-3200

Mr. Paul Ruffin, P.E.
Standardized Permitting and Corrective Action Branch
Department of Toxic Substances Control
8800 Cal Center Drive, 2nd Floor
Sacramento, California 95826-3200

facility file

PACIFIC SCIENTIFIC
Energetic Materials Company **Hollister Operations**

Charles F. Martin, Manager,
Environment and Security
Voice: 831-637-3731, ext. 389
Fax: 831-637-2151
cmartin@psemc.com

June 11, 2007

Mr. Paul E. Ruffin, P.E.
Hazardous Substances Engineer
California Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, CA 95826-3200

Subject: Class 1 permit Modification-Company Name Change

Dear Mr. Ruffin:

McCormick Selph Inc. has determined that it would like to proceed with a name change from "McCormick Selph Inc." to "Pacific Scientific Energetic Materials Company (California) Inc." This will be a name change only and has no affect on the operation of the Company, it's officers or its shareholders.

CCR Title 22, Division 4.5, Chapter 20, Article 4, Section 66270.13 states, "All applicants for permits shall provide the following information to the Department using the Part A application…"

(b) Name, mailing address, and location, including latitude and longitude of the facility for which the applicant is submitted."

In compliance with this regulation, McCormick Selph Inc. hereby requests a Class 1 Modification as cited in CCR Title 22, Division 4.5, Chapter 20, Article 4, Appendix I, part A.1. "Administrative and informational changes."

Within 30 days after the name change from McCormick Selph Inc. to Pacific Scientific Energetic Materials Company (California) Inc. (PSEMC), PSEMC will submit a modified Part A Application. Within 120 days of the name change PSEMC will submit a change package that will include modifications to applicable documents containing the new Company name.

Until such time as the Part B Application change package task is completed, it is understood that in all parts of the Part B Permit, the Company name McCormick Selph Inc. will be understood to represent the new Company name, Pacific Scientific Energetic Materials Company (California) Inc.

Should you have any questions or require further information, please feel free to contact me by phone at 831 637-3731, ext. 389, or via electronic mail, *cmartin@psemc.com*.

Sincerely,

Charles F. Martin
Manager, Environment and Security

Enclosures as Stated

Sent via Certified Mail: 7007 0220 0000 6777 3538

CM 07-028

California Environmental Protection Agency
Department of Toxic Substances Control

HAZARDOUS WASTE FACILITY PERMIT

Facility Name:

McCormick Selph, Incorporated
3601 Union Road
Hollister, California 95023

Owner and Operator Name:

McCormick Selph, Incorporated
3601 Union Road
Hollister, California 95023

Permit Number:

06-BRK-03

Facility EPA ID Number:

CAD009220898

Effective Date of Permit:

May 12, 2006

Expiration Date of Permit:

May 11, 2016

Pursuant to Section 25200 of the California Health and Safety Code, this RCRA-equivalent Hazardous Waste Facility Permit is hereby issued to: McCormick Selph, Incorporated. The issuance of this Permit is subject to the conditions set forth in Attachment A and the Part "A" and Part "B" Application (Approved Permit Application), dated January 4, 2006. The Permit consists of 33 pages, including this cover page and Attachment A.

// original signed by //

Mohinder S. Sandhu. P.E., Chief
Standardized Permitting and Corrective Action Branch
Department of Toxic Substances Control

Date: May 12, 2006

McCormick Selph, Incorporated
3601 Union Road
Hollister, California 95023

HAZARDOUS WASTE FACILITY PERMIT
ATTACHMENT "A"

TABLE OF CONTENTS

HAZARDOUS WASTE FACILITY PERMIT

McCormick Selph, Incorporated
3601 Union Road
Hollister, California 95023
CAD009220898

PART I. DEFINITIONS

All terms used in this Permit shall have the same meaning as those terms have in the California Health and Safety Code, division 20, chapter 6.5 and California Code of Regulations, title 22, division 4.5, unless expressly provided otherwise by this Permit.

1. **“BATF”** as used in this Permit means the federal Bureau of Alcohol, Tobacco, and Firearms.

2. **“DoD”** as used in this Permit means the Department of Defense.

3. **“DTSC”** as used in this Permit means the California Department of Toxic Substances Control.

4. **“EHW”** as used in this Permit means explosive hazardous waste.

5. **“EHWS”** as used in this Permit means explosive hazardous waste in solvents.

6. **“Facility”** as used in this Permit means the 290-acre property under the control of McCormick Selph, Incorporated, including structures, other appurtenances, and improvements on the land used for the treatment, transfer, and storage of hazardous waste, consistent with the definition of “hazardous waste facility” in California Code of Regulations, title 22, section 66210.10.

7. **“Health and Safety Code”** as used in this Permit means the California Health and Safety Code.

8. **“Permittee”** as used in this Permit means the Owner and Operator, which is McCormick Selph, Incorporated.

9. **“VOCs”** as used in this Permit means volatile organic compounds.

Unless explicitly stated otherwise, all references to items in this Permit shall refer only to items occurring within the same part.

PART II. DESCRIPTION OF THE FACILITY AND OWNERSHIP

1. OWNER

The Facility owner is McCormick Selph, Incorporated (hereafter "Owner").

2. OPERATOR

The Facility operator is McCormick Selph, Incorporated (hereafter "Operator").

3. LOCATION

The Facility address is 3601 Union Road, Hollister, California 95023. The Facility is located at latitude 36^{o} 50' 00" N and longitude 121^{o} 27' 05" W, in San Benito County, approximately 3 miles southwest of the center of Hollister, near the intersection of Union Road and State Highway 156. (See Figure 1.) The following San Benito County Assessor's parcel numbers describe the Facility property: 021-140-001 and 021-140-048. The legal description of the Facility property is provided in Section II.C.1 of the Approved Permit Application.

4. DESCRIPTION

The Facility occupies approximately 290 acres. Twenty (20) acres were added adjacent to and to the south of the original 270-acre facility in 1992 to provide additional buffer area. The Facility has historically been in a sparsely developed area bounded by agricultural and grazing lands. The Operator and its predecessor companies have manufactured explosives and explosive devices for aerospace, military, and commercial applications and produced specialty chemicals on a contract basis at the Facility since 1971. Hazardous wastes generated from these activities include: solvents, toxic chemicals, metal powders, reactive compounds, explosives, flammable liquids, and corrosive solids and liquids. Hazardous wastes generated at the Facility are either treated at the Facility or sent to an approved off-site treatment or disposal site. The Operator does not accept at the Facility any hazardous wastes generated at off-site locations. Hazardous waste management activities at the Facility are: storage of containers of hazardous waste; volume reduction of explosives contaminated water by evaporation in open tanks; open burning of organic liquids (solvents) containing explosives; open burning/open detonation of reactive (explosive) materials; and, mixing two-part epoxy materials in containers.

5. FACILITY HISTORY

The Facility was built at this location in 1971 by Teledyne, Incorporated, which purchased McCormick Selph Associates in 1964. The original Part "A" application was submitted November 19, 1980. An Interim Status Document (ISD) was issued on April 6, 1981. A permit to store hazardous waste in tanks and containers was issued to Teledyne, Inc., on November 7, 1983. Other hazardous waste activities such as treatment in tanks, storage and treatment in surface impoundments, and thermal treatment of explosive wastes continued under the ISD until a new permit was issued on July 28, 1993. As a result of internal reorganization, the corporate name for the July 1993 permit was Teledyne Ryan Aeronautical/McCormick Selph Ordnance (Teledyne Ryan). In July 1999, McCormick Selph was sold and became McCormick Selph, Incorporated (MSI). In July 2003, MSI was acquired by Pacific Scientific Energetic Materials Company. The 1993 permit expired on July 31, 2003, but it continued to be in effect while DTSC processed MSI's permit renewal application pursuant to California Code of Regulations, title 22, section 66270.51.

6. FACILITY SIZE AND TYPE FOR FEES

The Facility is categorized as a Small Treatment and Storage facility for purpose of Health and Safety Code, Section 25205.19.

PART III. GENERAL CONDITIONS

1. PERMIT APPLICATION DOCUMENTS

The “Facilities Hazardous Waste Operations Plan,” dated February 28, 1991, as revised through January 4, 2006, including the Part "A" Application and the Part "B" Application, are hereby approved (collectively, the Approved Permit Application), and made a part of this Permit by reference.

2. EFFECT OF PERMIT

(a) The Permittee shall comply with the provisions of the Health and Safety Code, and division 4.5 of California Code of Regulations, title 22. The issuance of this Permit by DTSC does not release the Permittee from any liability or duty imposed by federal or State statutes or regulations or local ordinances, except the obligation to obtain this Permit. The Permittee shall obtain the permits required by other governmental agencies, including but not limited to, the applicable land use planning, zoning, hazardous waste, air quality, water quality, and solid waste management laws for the construction and/or operation of the Facility.

(b) The Permittee is permitted to treat and store hazardous wastes in accordance with the conditions of this Permit. Any treatment or storage of hazardous wastes not specifically authorized in this Permit is strictly prohibited

(c) Compliance with the terms of this Permit does not constitute a defense to any action brought under any other law governing protection of public health or the environment, including, but not limited to, one brought for any imminent and substantial endangerment to human health or the environment.

(d) DTSC's issuance of this Permit does not prevent DTSC from adopting or amending regulations that impose additional or more stringent requirements than those in existence at the time this Permit is issued and does not prevent the enforcement of these requirements against the Permittee.

(e) Failure to comply with any term or condition set forth in the Permit in the time or manner specified herein will subject the Permittee to possible enforcement action including but not limited to penalties pursuant to Health and Safety Code, section 25187.

(f) In addition, failure to submit any information required in connection with the Permit, or falsification and/or misrepresentation of any submitted information, is grounds for revocation of this Permit (Cal. Code of Regs., tit. 22, §66270.43).

(g) In case of conflicts between the Approved Permit Application and the Permit, the Permit conditions take precedence.

(h) This Permit includes and incorporates by reference any conditions of waste discharge requirements issued by the State Water Resources Control Board or any of the California Regional Water Quality Control Boards and any conditions imposed pursuant to section 13227 of the Water Code.

3. COMPLIANCE WITH CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

A Negative Declaration has been prepared in the accordance with the requirements of Public Resources Code section 21000 et seq. and the CEQA Guidelines, California Code of Regulations, title 14, section 15070 et seq..

4. WASTE MINIMIZATION CERTIFICATION

Pursuant to Health and Safety Code section 25202.9, the Permittee shall certify annually, by March 1 for the previous year ending December 31, that:

(a) The Facility has a program in place to reduce the volume and toxicity of all hazardous wastes outlined in Section III of the Approved Permit Application which are generated by the Facility operations to the degree, determined by the Permittee, to be economically practicable.

(b) The method of storage or treatment is the only practicable method or combination of methods currently available to the Facility which minimizes the present and future threat to human health and the environment.

The Permittee shall make this certification, in accordance with California Code of Regulations, title 22, section 66270.11. The Permittee shall submit the certification to Chief, Standardized Permitting and Corrective Action Branch, Department of Toxic Substances Control, 8800 Cal Center Drive, Sacramento, California 95826-3200, and shall record and maintain onsite such certification in the Facility Operating Record.

5. WASTE MINIMIZATION CONDITIONS

(a) The Permittee shall comply with the Hazardous Waste Source Reduction and Management Review Act (SB 14) requirements that are specified in the Health and Safety Code sections 25244.19, 25244.20 and 25244.21, and any subsequent applicable statutes or regulations promulgated thereunder. This would include submittal of SB 14 documents to DTSC upon request.

(b) DTSC may require the Permittee to submit a more detailed status report explaining any deviation from, or changes to, the approved waste minimization plan.

6. SAMPLING/ACCESS

(a) Sampling

(1) The Permittee shall provide confirmatory samples to DTSC within the time requested by DTSC to determine if there is a threat to human health and/or the environment. The sampling shall be done in accordance with guidance that DTSC supplies to the Permittee.

(2) The Permittee shall notify DTSC in writing at least fourteen (14) days prior to beginning any confirmatory sampling requested by DTSC. If the Permittee believes it must commence emergency confirmatory sampling without delay, the Permittee may seek emergency telephone authorization from DTSC's Standardized Permitting and Corrective Action Branch Chief or, if the Branch Chief is unavailable, his/her designee to commence such activities immediately. At the request of DTSC, the Permittee shall provide or allow DTSC or its authorized representative to take split or duplicate samples of all samples collected by the Permittee pursuant to Part VI of this Permit.

(3) The Permittee shall submit to DTSC upon request the results of all sampling and/or tests or other data generated by its employees, divisions, agents, consultants or contractors pursuant to this Permit.

(4) Notwithstanding any other provisions of this Permit, DTSC retains all information gathering and inspection authority rights including enforcement actions related thereto, under Health and Safety Code and any other applicable State of federal statutes or regulations.

(b) Access

(1) DTSC, its contractors, employees, agents, and/or any United States Environmental Protection Agency representatives are authorized to enter and freely move about the Facility pursuant to the entire Permit for the purposes of interviewing Facility personnel and contractors; inspecting records, operating logs, and contracts relating to the Facility; reviewing progress of the Permittee in carrying out the terms of Part VI of the Permit; conducting such testing, sampling, or monitoring as DTSC deems necessary; using a camera, sound recording, or other documentary-type equipment; verifying the reports and data submitted to DTSC by the Permittee; or confirming any other aspect of compliance with this Permit and Division 20, Chapter 6.5 of the Health and Safety Code. The Permittee shall provide DTSC and its representatives access at all reasonable times to the Permittee's Facility and any other property to which access is required for implementation of any provision of this Permit and any provision of Division 20, Chapter 6.5 of the Health and Safety Code and shall allow such persons to inspect and copy all records, files, photographs, documents, including all sampling and monitoring data, that pertain to work undertaken pursuant to the entire Permit or undertake any other activity necessary to determine compliance with applicable requirements.

(2) To the extent that work being performed pursuant to Part VI of the Permit must be done on property not owned or controlled by the Permittee, the Permittee shall use its best efforts to obtain access agreements necessary to complete work required by this Part of the Permit from the present owner(s) of such property within thirty (30) days of approval of any workplan for which access is required. "Best efforts" as used in this paragraph shall include, at a minimum, a certified letter from the Permittee to the present owner(s) of such property requesting access agreement(s) to allow the Permittee and DTSC and its authorized representatives access to such property and the payment of reasonable sums of money in consideration of granting access. The Permittee shall provide DTSC with a copy of any access agreement(s). In the event that agreements for the access are not obtained within thirty (30) days of approval of any workplan for which access is required, or of the date that the need for access becomes known to the Permitee, the Permittee shall notify DTSC in writing within fourteen (14) days thereafter regarding both efforts undertaken to obtain access and its failure to obtain such agreements. In the event DTSC obtains access, the Permittee shall undertake approved work on such

property.

(3) Nothing in Part VI of the Permit shall be construed to limit or otherwise affect the Permittee's liability and obligation to perform corrective action including corrective action beyond the Facility boundary, notwithstanding the lack of access. DTSC may determine that additional on-site measures must be taken to address releases beyond the Facility boundary if access to off-site areas cannot be obtained.

(4) Nothing in Part VI of the Permit shall limit or otherwise affect DTSC's right to access and entry pursuant to any applicable State or federal laws and regulations.

PART IV. PERMITTED UNITS AND ACTIVITIES

This Permit authorizes operation only of the Facility units and activities listed below. The Permittee shall not treat or store hazardous waste in any unit other than those specified in this Part IV. Any modifications to a unit or activity authorized by this Permit require the written approval of DTSC in accordance with the permit modification procedures set forth in California Code Regulations, title 22, section 66270.42.

The eight (8) units authorized under this Permit are as follows:

1. TSU-1, Open burn/open detonation
2. TSU-2, Open burn
3. TSU-3, Bay A, Container storage
4. TSU-3, Bay B, Container storage
5. TSU-3, Bay C, Container storage
6. TSU-3, Bay D, Container storage
7. TSU-8, Treatment in tanks
8. Solidification of Two-Part Epoxy Materials

UNIT NAME:

TSU-1

LOCATION:

TSU-1 is located in the southern portion of the Facility. (See Figure 2)

ACTIVITY TYPE:

Open burn/open detonation

ACTIVITY DESCRIPTION:

Explosive hazardous waste (EHW) and EHW contaminated waste is burned/detonated. Subsequent secondary and tertiary burning is conducted as needed to ensure complete treatment of the reactive materials. Over 95% of the EHW treated at TSU-1 is contained in explosive devices made of metal. The Explosive Hazardous Waste in Solvents (EHWS) residue from TSU-2 makes up about 5% of the waste treated. Prior to treatment, EHW and EHW contaminated wastes are stored in secure locations in accordance with State, Bureau of Alcohol, Tobacco, and Firearms (BATF), and Department of Defense (DOD) requirements. Ash generation is limited to the cellulose fuel used, to small amounts from EHW contaminated organic material, and to loose EHW in the form of granules, pellets, or billets. Ash from TSU-1 with lead content is collected and managed as hazardous waste through TSU-3. Other ash from TSU-1 is managed as non-hazardous waste, as is scrap metal.

PHYSICAL DESCRIPTION:

TSU-1 contains two 10-foot diameter, reinforced concrete pipes (burn tubes) which are enclosed in a reinforced, expanded metal mesh cage (22’ W x 28’ D x 10’10” H). The mesh cage is surrounded by concrete walls, installed in 2002, and on three sides by an earth bank and earth barricades over 15 feet high. The pipes rest on a six-inch thick concrete slab reinforced with steel bars. The cage is bolted to the concrete slab and structurally supported by cantilever supports attached to external foundation blocks. The dimensions of the concrete slab are 54-foot W x 50-foot D. There is a 66-foot by 62-foot, corrugated metal roof structure over the mesh cage and concrete slab.

MAXIMUM CAPACITY:

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

WASTE TYPES:

The general types of hazardous wastes allowed to be treated at TSU-1 are: ordnance parts, scrap, and explosive/reactive raw materials and residues. The waste types treated in TSU-1 are listed in Table III-1 of the Approved Permit Application.

RCRA HAZARDOUS WASTE CODES:

D001	D003	D007	D008	D011
F003	F005	U002	U003	U154
U160	U234	NA	NA	NA

CALIFORNIA HAZARDOUS WASTE CODES:

172	181	212	213	214
343	352	791	NA	NA

UNIT SPECIFIC SPECIAL CONDITIONS:

1. No construction related activity is allowed within a 90-foot radius of TSU-1 without prior approval from DTSC. The area within a 90-foot radius of TSU-1 currently consists of open space.

2. Permittee shall not exceed the maximum capacity limits for TSU-1 specified above.

AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS:

The air emission standards in California Code of Regulations, title 22, section 66264.1080 do not apply to operations at TSU-1.

UNIT NAME:

TSU-2

LOCATION:

TSU-2 is located in the central portion of the Facility, south of Lake Teledyne and west of TSU-8. (See Figure 2)

ACTIVITY TYPE:

Open burning

ACTIVITY DESCRIPTION:

Explosive hazardous waste in solvent (EHWS) is burned in open horizontal, split steel troughs supported by steel racks in a double boiler arrangement. Contaminated solvents containing relatively more water or lower volatility are placed in the upper container. The fire is initiated remotely in the lower container. EHWS is not placed into the unit until just before burning is started. Treatment is not done during periods of expected rain. Between treatments, the upper troughs contain less than five gallons of material with free liquid and the lower troughs contain dry ash. If not empty, the troughs are covered. If empty, the troughs and secondary containment pans are removed or inverted during expected periods of rain. Residue from TSU-2 is treated in TSU-1 to ensure complete treatment of its reactivity.

PHYSICAL DESCRIPTION:

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

MAXIMUM CAPACITY:

The treatment capacity is 300 gallons per day. The maximum volume of fluid in each trough is 30 gallons.

WASTE TYPES:

The types of hazardous wastes allowed to be treated at TSU-2 are the explosive hazardous wastes in solvent mixtures listed in Table IV-3 of the Approved Permit Application. Table III-1 of the Approved Permit Application also lists waste streams treated at TSU-2.

RCRA HAZARDOUS WASTE CODES:

D001	D003	D005	D007	D008
F003	F005	U002	U003	U154
U213	NA	NA	NA	NA

CALIFORNIA HAZARDOUS WASTE CODES:

212	213	214	343	NA

UNIT SPECIFIC SPECIAL CONDITIONS:

1. Only the following solvent and solvent/water mixtures containing explosive waste particles shall be burned at TSU-2: acetone, acetonitrile, butyl acetate, ethanol, isopropanol, methanol, pyridine, and tetrahydrofuran.

2. Permittee shall not exceed the maximum fluid capacity of 30 gallons per trough.

AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS:

The air emission standards in California Code of Regulations, title 22, section 66264.1080 do not apply to operations at TSU-2.

UNIT NAME:

TSU-3, Bay A

LOCATION:

TSU-3 is located in the central portion of the Facility, southeast of Lake Teledyne. Bay A is the southernmost discrete secondary containment area at TSU-3. (See Figure 2)

ACTIVITY TYPE:

Storage in containers

ACTIVITY DESCRIPTION:

Storage of containers of hazardous wastes generated at the Facility. Hazardous wastes are segregated into the Bays at TSU-3 based on chemical compatibility. Bay A is used to store caustics, cyanides, sulfides, and aqueous solutions with pH of 5 to 9. A variety of types and sizes of containers may be stored and typical containers used at the Facility are listed in Table IV-1 of the Approved Permit Application.

PHYSICAL DESCRIPTION:

TSU-3 has a 6-inch thick reinforced concrete slab surrounded on three sides by a concrete block berm. TSU-3 is fully covered by a roofed building with open sides. The un-bermed front side of TSU-3 has individual grated sumps for each of the four Bays which prevent run-on and collect spills and any rain which may blow into the Bays. The Bays are separated from each other by reinforced concrete dikes, which are bolted and epoxy bonded to the coated concrete floor of the Bay. The dimensions of Bay A are 17-feet 3-inches wide by 59-feet 3-inches long (inside dimensions). The volume of the sump for Bay A is 1,077 gallons (172.5 cubic feet).

MAXIMUM CAPACITY:

The maximum capacity of Bay A is 192 55-gallon drums, four drums per pallet, stacked two pallets high. The maximum quantity of liquid wastes and wastes containing free liquids is 4,140 gallons, which is equivalent to 75 55-gallon drums.

WASTE TYPES:

The types of hazardous wastes allowed to be stored in Bay A are: caustics, cyanides, sulfides, and aqueous solutions with pH of 5 to 9. The waste types stored in Bay A are listed in Table III-1 of the Approved Permit Application.

RCRA HAZARDOUS WASTE CODES:

D002	D005	D006	D007	D008
D009	D011	D035	NA	NA

CALIFORNIA HAZARDOUS WASTE CODES:

122	132	172	181	343
512	513	722	723	791
792	NA	NA	NA	NA

UNIT SPECIFIC SPECIAL CONDITIONS:

1. The Permittee shall not place containers of hazardous waste, non-hazardous waste, or chemical product in TSU-3, Bay A, in excess of the maximum capacity of TSU-3, Bay A. For the purpose of determining compliance with the maximum capacity, all containers in TSU-3, Bay A, will be considered to be full, regardless of the actual volume of material in each container.

AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS:

Pursuant to California Code of Regulations, title 22, section 66264.1086 (Standards: Containers), the Permittee shall control air pollutant emissions from containers in accordance with the Container Level 1 standards.

UNIT NAME:

TSU-3, Bay B

LOCATION:

TSU-3 is located in the central portion of the Facility, southeast of Lake Teledyne. Bay B is north of Bay A and south of Bay C. (See Figure 2)

ACTIVITY TYPE:

Storage in containers

ACTIVITY DESCRIPTION:

Storage of containers of hazardous wastes generated at the Facility. Hazardous wastes are segregated into the Bays at TSU-3 based on chemical compatibility. Bay B is used to store halogenated hydrocarbons, non-flammable liquids, and aqueous solutions with pH of 5 to 9. A variety of types and sizes of containers may be stored and typical containers used at the Facility are listed in Table IV-1 of the Approved Permit Application.

PHYSICAL DESCRIPTION:

TSU-3 has a 6-inch thick reinforced concrete slab surrounded on three sides by a concrete block berm. TSU-3 is fully covered by a roofed building with open sides. The un-bermed front side of TSU-3 has individual grated sumps for each of the four Bays which prevent run-on and collect spills and any rain which may blow into the Bays. The Bays are separated from each other by reinforced concrete dikes, which are bolted and epoxy bonded to the coated concrete floor of the Bay. The dimensions of Bay B are 16-feet 6-inches wide by 59-feet 3-inches long (inside dimensions). The volume of the sump for Bay B is 1,025 gallons (160 cubic feet).

MAXIMUM CAPACITY:

The maximum capacity of Bay B is 192 55-gallon drums, four drums per pallet, stacked two pallets high. The maximum quantity of liquid wastes and wastes containing free liquids is 3,650 gallons, which is equivalent to 66 55-gallon drums.

WASTE TYPES:

The types of hazardous waste allowed to be stored in Bay B are: halogenated hydrocarbons, non-flammable liquids, and aqueous solutions with pH of 5 to 9. The waste types stored in Bay B are listed in Table III-1 of the Approved Permit Application.

RCRA HAZARDOUS WASTE CODES:

D001	D007	D008	D011	D022
D035	D039	F001	F002	U044

CALIFORNIA HAZARDOUS WASTE CODES:

172	181	211	214	343
352	512	513	741	NA

UNIT SPECIFIC SPECIAL CONDITIONS:

1. The Permittee shall not place containers of hazardous waste, non-hazardous waste, or chemical product in TSU-3, Bay B, in excess of the maximum capacity of TSU-3, Bay B. For the purpose of determining compliance with the maximum capacity, all containers in TSU-3, Bay B, will be considered to be full, regardless of the actual volume of material in each container.

AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS

Pursuant to California Code of Regulations, title 22, section 66264.1086 (Standards: Containers), the Permittee shall control air pollutant emissions from containers in accordance with the Container Level 1 standards.

UNIT NAME:

TSU-3, Bay C

LOCATION:

TSU-3 is located in the central portion of the Facility, southeast of Lake Teledyne. Bay C is north of Bay B and south of Bay D. (See Figure 2)

ACTIVITY TYPE:

Storage in containers

ACTIVITY DESCRIPTION:

Storage of containers of hazardous wastes generated at the Facility. Hazardous wastes are segregated into the Bays at TSU-3 based on chemical compatibility. Bay C is used to store acids. A variety of types and sizes of containers may be stored and typical containers used at the Facility are listed in Table IV-1 of the Approved Permit Application.

PHYSICAL DESCRIPTION:

TSU-3 has a 6-inch thick reinforced concrete slab surrounded on three sides by a concrete block berm. TSU-3 is fully covered by a roofed building with open sides. The un-bermed front side of TSU-3 has individual grated sumps for each of the four Bays which prevent run-on and collect spills and any rain which may blow into the Bays. The Bays are separated from each other by reinforced concrete dikes, which are bolted and epoxy bonded to the coated concrete floor of the Bay. The dimensions of Bay C are 16-feet 6-inches wide by 59-feet 3-inches long (inside dimensions). The volume of the sump for Bay C is 1,025 gallons (160 cubic feet).

MAXIMUM CAPACITY:

The maximum capacity of Bay C is 192 55-gallon drums, four drums per pallet, stacked two pallets high. The maximum quantity of liquid wastes and wastes containing free liquids is 3,330 gallons, which is equivalent to 60 55-gallon drums.

WASTE TYPES:

The type of hazardous wastes allowed to be stored at Bay C is acids. The waste types stored in Bay C are listed in Table III-1 of the Approved Permit Application.

RCRA HAZARDOUS WASTE CODES:

D001	D002	D007	NA	NA

CALIFORNIA HAZARDOUS WASTE CODES:

343	512	513	791	792

UNIT SPECIFIC SPECIAL CONDITIONS:

1. The Permittee shall not place containers of hazardous waste, non-hazardous waste, or chemical product in TSU-3, Bay C, in excess of the maximum capacity of TSU-3, Bay C. For the purpose of determining compliance with the maximum capacity, all containers in TSU-3, Bay C, will be considered to be full, regardless of the actual volume of material in each container.

AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS:

Pursuant to California Code of Regulations, title 22, section 66264.1086 (Standards: Containers), the Permittee shall control air pollutant emissions from containers in accordance with the Container Level 1 standards.

UNIT NAME: TSU-3, Bay D

TSU-3, Bay D

LOCATION:

TSU-3 is located in the central portion of the Facility, southeast of Lake Teledyne. Bay D is north of Bay C and is the northernmost Bay at TSU-3. (See Figure 2)

ACTIVITY TYPE:

Storage in containers

ACTIVITY DESCRIPTION:

Storage of containers of hazardous wastes generated at the Facility. Hazardous wastes are segregated into the Bays at TSU-3 based on chemical compatibility. Bay D is used to store flammable liquids, reducing agents, metal catalysts, carbon, fuels, and combustible liquids. A variety of types and sizes of containers may be stored and typical containers used at the Facility are listed in Table IV-1 of the Approved Permit Application.

PHYSICAL DESCRIPTION:

TSU-3 has a 6-inch thick reinforced concrete slab surrounded on three sides by a concrete block berm. TSU-3 is fully covered by a roofed building with open sides. The un-bermed front side of TSU-3 has individual grated sumps for each of the four Bays which prevent run-on and collect spills and any rain which may blow into the Bays. The Bays are separated from each other by reinforced concrete dikes, which are bolted and epoxy bonded to the coated concrete floor of the Bay. The dimensions of Bay D are 17-feet 3-inches wide by 59-feet 3-inches long (inside dimensions). The volume of the sump for Bay D is 1,077 gallons (172.5 cubic feet).

MAXIMUM CAPACITY:

The maximum capacity of Bay D is 192 55-gallon drums, four drums per pallet, stacked two pallets high. The maximum quantity of liquid wastes and wastes containing free liquids is 3,100 gallons, which is equivalent to 56 55-gallon drums.

WASTE TYPES:

The types of hazardous wastes allowed to be stored in Bay D are: flammable liquids, reducing agents, metal catalysts, carbon, fuels, and combustible liquids. The waste types stored in Bay D are listed in Table III-1 of the Approved Permit Application.

RCRA HAZARDOUS WASTE CODES:

D001	D003	D005	D006	D007
D008	D035	F003	F005	U002
U003	U031	U056	U154	U159
U161	U213	NA	NA	NA

CALIFORNIA HAZARDOUS WASTE CODES:

172	181	212	213	214
221	331	343	352	461
512	513	NA	NA	NA

UNIT SPECIFIC SPECIAL CONDITIONS:

1. The Permittee shall not place containers of hazardous waste, non-hazardous waste, or chemical product in TSU-3, Bay D, in excess of the maximum capacity of TSU-3, Bay D. For the purpose of determining compliance with the maximum capacity, all containers in TSU-3, Bay D, will be considered to be full, regardless of the actual volume of material in each container.

AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS:

Pursuant to California Code of Regulations, title 22, section 66264.1086 (Standards: Containers), the Permittee shall control air pollutant emissions from containers in accordance with the Container Level 1 standards.

UNIT NAME:

TSU-8

LOCATION:

TSU-8 is located in the central portion of the Facility, south of Lake Teledyne and east of TSU-2. (See Figure 2)

ACTIVITY TYPE:

Treatment in tanks

ACTIVITY DESCRIPTION:

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

PHYSICAL DESCRIPTION:

TSU-8 consists of two evaporation troughs within a concrete secondary containment pad filled by a gravity feed pipe from an unloading area. Safety Bucket Water is siphoned or hand-pumped from a container in an environmental support vehicle into the feed pipes in the unloading area which empty into the evaporation troughs. The feed pipes are pipe-in-pipe construction with a 2-inch diameter stainless steel inner pipe and a 4-inch diameter polyvinyl chloride (PVC) outer pipe. The troughs are constructed of three-sixteenths of an inch thick carbon steel with welded heads. The troughs are coated with a 100% solids coal tar polyurethane elastomer (Endura-Flex 1947) coating to a minimum thickness of 100 mils. The troughs are half cylinders with slightly domed ends. Each trough is approximately 4.32 feet in diameter and 11.3 feet long.

MAXIMUM CAPACITY:

The maximum capacity of each treatment trough, with an operational freeboard of six inches, is approximately 505 gallons. The treatment capacity is approximately 1,100 gallons per year, based on an observed average evaporation rate of three gallons per day.

WASTE TYPES:

The type of hazardous wastes allowed to be treated in TSU-8 is Safety Bucket Water. The waste types treated at TSU-8 are listed in Table III-1 of the Approved Permit Application.

RCRA HAZARDOUS WASTE CODES:

D003	NA	NA	NA	NA

CALIFORNIA HAZARDOUS WASTE CODES

343	NA	NA	NA	NA

UNIT SPECIFIC SPECIAL CONDITIONS:

1. The fluid level in the troughs shall not exceed the level of a 6-inch minimum freeboard.

2. Construction of a modified TSU-8 is described in Chapter IV, Section C.4, of the Approved Permit Application. Permittee shall notify DTSC of the date TSU-8 will be removed from service for construction of the modified TSU-8 not later than seven (7) days prior to removing TSU-8 from service.

3. Permittee shall not place hazardous waste into the modified TSU-8 until Permittee has submitted, and DTSC has acknowledged receipt of, the engineering certification for the installation of the modified TSU-8 required by California Code of Regulations, title 22, section 66264.192.

AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS:

The air emission standards in California Code of Regulations, title 22, section 66264.1080 do not apply to operations at TSU-8.

UNIT NAME:

Solidification of Two-Part Epoxy Materials

LOCATION:

Solidification of two-part epoxy materials in containers in conducted at TSU-3, Bay D. (See Figure 2).

ACTIVITY TYPE:

Treatment in containers

ACTIVITY DESCRIPTION:

Two-part epoxy paints, potting compounds, adhesives, and insulating materials are mixed according to the manufacture's specifications in either the original containers or in one-gallon, open steel cans in TSU-3, Bay D. Open quantities of these materials at manufacturing work stations greater than one liter and larger quantities in unopened containers become excess to production needs through expiration of shelf life and when inspection reveals the material to be off-specification. These materials are accumulated and transported to TSU-3, Bay D, for storage and treatment by mixing.

PHYSICAL DESCRIPTION:

The treatment takes place in the original containers or in one-gallon, open steel cans.

MAXIMUM CAPACITY:

The process capacity listed in the Approved Permit Application is 20 gallons per day.

WASTE TYPES:

The types of hazardous wastes allowed for treatment in containers at TSU-3, Bay D are: two-part epoxy paints, potting compounds, adhesives, and insulating materials.
The waste types treated by solidification are listed in Table III-1, line 46, of the Approved Permit Application.

RCRA HAZARDOUS WASTE CODES:

D001	D006	D007	D008	D035
F002	F003	NA	NA	NA

CALIFORNIA HAZARDOUS WASTE CODES:

213	214	331	343	NA

UNIT SPECIFIC SPECIAL CONDITIONS:

1. None.

AIR EMISSION STANDARDS FOR CONTAINERS, TANKS, AND SURFACE IMPOUNDMENTS:

Pursuant to California Code of Regulations, title 22, section 66264.1086 (Standards: Containers), the Permittee shall control air pollutant emissions from containers in accordance with the Container Level 1 standards.

PART V. SPECIAL CONDITIONS WHICH APPLY TO ALL OF THE FACILITY’S STORAGE AND/OR TREATMENT UNITS.

1. The Permittee shall only manage hazardous waste generated at the Facility by the Permittee.

2. The Permittee shall only manage the hazardous waste streams identified in Table III-1 of the Approved Permit Application.

3. Except as specifically authorized by this Permit, Permittee shall not dispose of hazardous waste at the Facility. In accordance with California Code of Regulations, title 22, section 66260.10, “disposal” means: (a) the discharge, deposit, injection, dumping, spilling, leaking or placing of any waste or hazardous waste into or on any land or water so that such waste of hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters; (b) the abandonment of any waste.

4. The Permittee shall not store hazardous wastes in containers at the Facility for more than one year.

5. The Permittee shall maintain aisle space at TSU-3 to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of TSU-3 in an emergency. The minimum allowable aisle space is 30 inches.

PART VI. CORRECTIVE ACTION

1. The Permittee is required to conduct corrective action at the Facility pursuant to Health and Safety Code section 25200.10. Allegheny Technologies, Incorporated (Allegheny) is the parent company of a previous owner, operator and permittee at this Facility. Allegheny is continuing to conduct corrective action for groundwater contaminated with perchlorate and volatile organic compounds (VOCs) at the Facility under the oversight of the Regional Water Quality Control Board (RWQCB), Central Coast Region (CCR), pursuant to a Corrective Action Plan (CAP) approved by the RWQCB-CCR on February 13, 2003. DTSC reserves its right under Health and Safety Code sections 25200.10 and 25187 to require the Permittee to comply with additional corrective action requirements for the protection of human health and the environment.

2. The Permittee shall collect soil samples in the vicinity of TSU-1 annually, by May 1 of each year. Soil Samples shall be collected in accordance with the *Corrective Measures Study Final Report for Lead-Affected Soils RCRA Unit TSU-1, July 7, 1998, Revision 3.0*.

3. Within forty five (45) calendar days of soil collection in the vicinity of TSU-1, the Permittee shall submit to DTSC a report detailing, at a minimum, the following:

   (a) Interpretation of the analytical soil results; and,

   (b) Evaluation of the effects from the burn operations on the soil media.

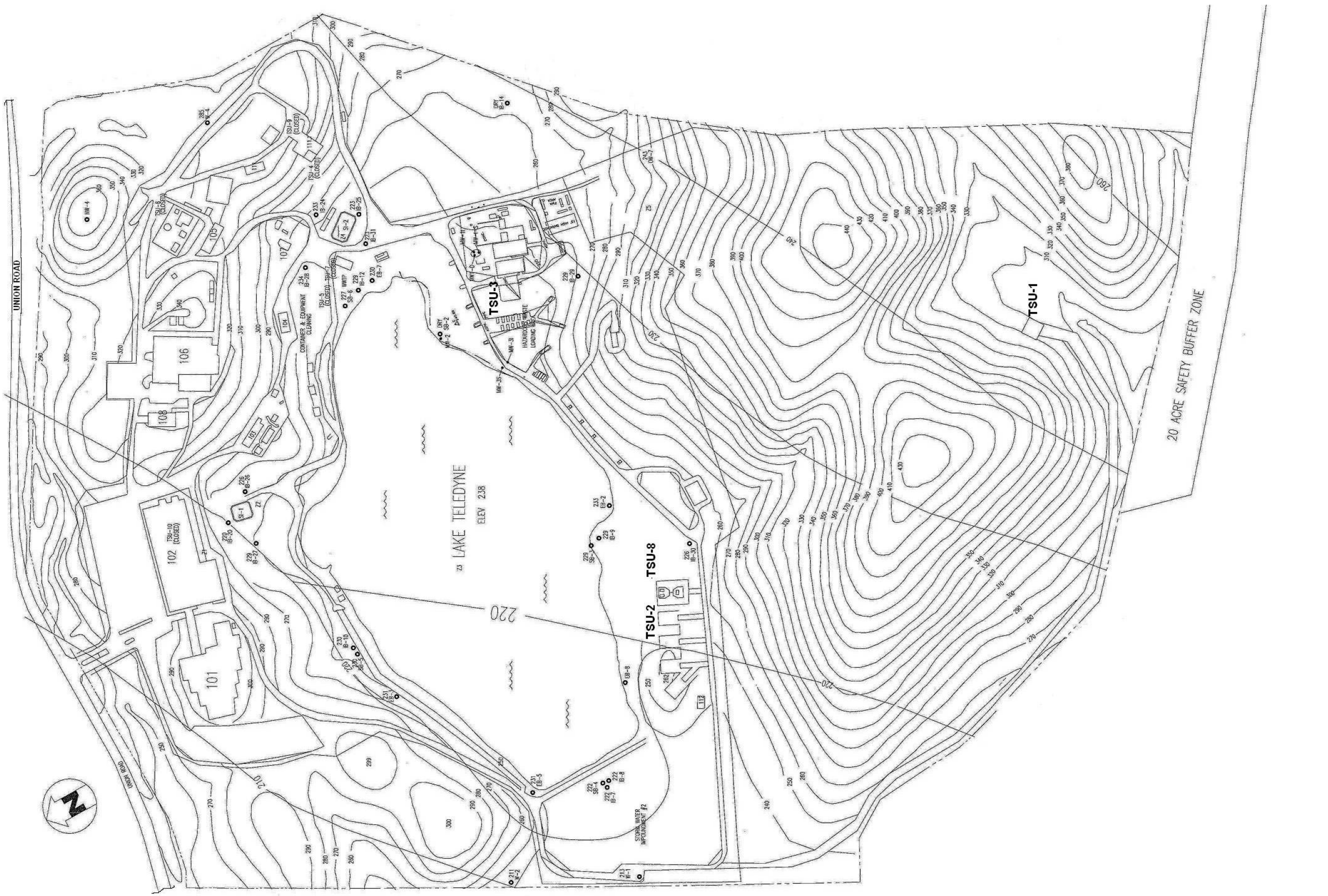
4. The Permittee shall remediate the remaining lead contaminated soil in the vicinity of TSU-1 to meet the closure performance standards of California Code of Regulations, title 22, section 66264.111 when operation of TSU-1 ceases. (During final closure of TSU-1.)

5 In the event the Permittee identifies an immediate or potential threat to human health and/or the environment, discovers new releases of hazardous waste and/or hazardous constituents, or discovers new Solid Waste Management Units (SWMUs) not previously identified, the Permittee shall notify DTSC orally within 24 hours of discovery and notify DTSC in writing within 10 days of such discovery summarizing the findings including the immediacy and magnitude of any potential threat to human health and/or the environment.

6. DTSC may require the Permittee to investigate, mitigate and/or take other applicable action to address any immediate or potential threats to human health and/or the environment and newly identified releases of hazardous waste and/or hazardous constituents. For newly identified SWMUs, the Permittee is required to conduct corrective action. Corrective action will be carried out either under the Corrective Action Consent Agreement or Unilateral Corrective Action Order pursuant to Health and Safety Code, Section 25187.

Figure 1 – Site Location Map

Figure 2 – Hazardous Waste Management Unit Location Map



Appendix 8

1999, DTSC

Hazardous Waste Facility Permit & Modification

(77 pages)

California Environmental Protection Agency
Department of Toxic Substances Control

CLASS 2 PERMIT MODIFICATION
HAZARDOUS WASTE FACILITY PERMIT

Facility: Teledyne Ryan Aeronautical
3601 Union Road
Hollister, California 95024

Owner: Teledyne Industries, Inc.

Operator: McCormick Selph Ordnance

EPA ID Number:	CAD009220898
Expiration Date:	July 31, 2003
Original Issuance Date:	July 28, 1993
Revision Number:	1
Modification Issuance Date:	May 27, 1999
Modification Effective Date:	July 5, 1999

Pursuant to Section 66270.42 of the California Code of Regulations, Title 22, Teledyne McCormick Selph's original Hazardous Waste Facility Permit is hereby modified. The original permit was signed on June 28, 1993 and issued on July 28, 1993. This modified permit, including this cover page, consists of 37 pages, and Appendix I and Appendix II.

Mohinder S. Sandhu, P.E., Chief
Standardized Permits and Corrective Action Branch

Date: May 27, 1999

California Environmental Protection Agency

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

Hazardous Waste Facility Permit

Facility: Teledyne McCormick Selph
3601 Union Road
Hollister, CA 95024

Operator: Teledyne McCormick Selph

EPA ID Number:	CAD009220898
Effective Date:	July 31, 1993
Expiration Date:	July 31, 2003

Pursuant to Section 25200 of the California Health and Safety Code, the Hazardous Waste Facility Permit is hereby issued to Teledyne McCormick Selph.

The issuance of this permit is subject to the conditions set forth in Attachment A which consists of 22 pages (and any other exhibits).

Charlene F. Williams
Acting Chief
Facility Permitting Branch
Region 2

Date: June 28, 1993

TABLE OF CONTENTS

TELEDYNE RYAN AERONAUTICAL

HAZARDOUS WASTE FACILITY PERMIT

ATTACHMENT A
Hazardous Waste Facility Permit

TELEDYNE RYAN AERONAUTICAL
3601 UNION ROAD
HOLLISTER, CALIFORNIA 95023
EPA ID No.: CAD009220898

I. DESCRIPTION OF FACILITY

A. Ownership, Operations, and Location

The Teledyne Ryan Aeronautical (Teledyne) facility is located at 3601 Union Road, at latitude 36°50'00" N and longitude 121°27'05" W, approximately three miles southwest of the City of Hollister. The facility is owned by Teledyne Industries Incorporated and operated by McCormick Selph Ordnance.

Teledyne has produced explosive ordnance materials at this location since 1971 and has produced chemicals for agricultural, pharmaceutical and industrial uses since 1974. Hazardous waste streams generated at the facility include scrap explosives and explosive materials, explosive-contaminated solvents, obsolete chemical products and materials, metal powders and spent corrosive materials.

The hazardous waste facilities consist of a pit for detonation of solid reactive waste, one unit for open burning of solid reactive waste, one unit for burning of solvents contaminated with reactive wastes, two water evaporation units, one silver recovery reactor, a waste photographic silver recovery unit, a treatment reactor, three above-ground hazardous waste storage tanks, and one hazardous waste container storage area with four bays. Teledyne also treats two part epoxy compounds by mixing them in containers. All these units are used to handle only hazardous waste which is generated on-site.

Closure was implemented for TSU-6 in 1998 (Refer to Permit Condition III.B.1.c.i).

Effective January 1, 1999, TSU-10 is no longer regulated under this Permit pursuant to Health and Safety Code, Section 25143.13(c), which excludes onsite waste treatment activities for "silver only" hazardous wastes from regulatory requirements.

Corrective action for the burn unit and detonation pit, collectively known as TSU-1, was initiated as a result of lead contaminated soil found in the vicinity of the unit (see Permit Condition IV.E. for further detail). As part of the remedy selection of corrective action for the burn unit, the structural design of the burn unit will be modified (see Permit Condition III.D. and Permit Condition IV.E.8).

The detonation pit is scheduled to close in 1999.

B. Compliance With California Environmental Quality Act (CEQA)

A Negative Declaration was prepared for the initial permit. A second Negative Declaration has been prepared for the Class 2 Permit Modification.

II. GENERAL CONDITIONS

A. Effect of Permit

1. The issuance of this permit by the California Department of Toxic Substances Control (Department) does not release the Permittee from any liability or duty imposed by federal or state statutes and regulations or local ordinances, except the obligation to obtain this permit. In particular, unless otherwise specifically provided in this permit, the Permittee shall comply with the provisions of the Health and Safety Code (HSC), division 20, chapter 6.5 and the California Code of Regulations, title 22 (Cal. Code Regs.), division 4.5.

2. Issuance of this permit by the Department does not prevent the Department from adopting or amending regulations, issuing administrative orders, or obtaining judicial orders which impose requirements which are in addition to or more stringent than those in existence at the time this permit was issued, and does not prevent the enforcement of these requirements against the Permittee of the facility. The Permittee shall comply with any such additional or more stringent requirements in addition to the requirements and conditions specified in the permit. Where appropriate, this permit is also subject to HSC sections 25159.6 and 25159.7 relating to the incorporation and implementation of federal regulations in the absence of equivalent State regulations.

3. This permit does not convey any property rights of any sort, or any exclusive privilege.

B. Requirement to Submit Information

All information, reports, submittals, or notices required by this permit shall be submitted to the Standardized Permits and Corrective Action Branch in the Berkeley office.

C. Consent to Entry by Department Representatives

The Permittee, by accepting this permit, consents to entry by any authorized representative of the Department or of the local health officer at any reasonable hour of the day in order to carry out the purposes of the Hazardous Waste Control Law, HSC section 25100 et seq., including, but not limited to, the activities listed in HSC section 25185 and title 22, Cal. Code Regs., section 66270.30(i).

D. Specific Conditions

1. The Permittee shall provide financial responsibility, if applicable,

in accordance with title 22, Cal. Code Regs., division 4.5, chapter 14, article 8, and section 66270.40(b). Documentation of financial assurance shall be submitted to:

Department of Toxic Substances Control
Standardized Permits and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

2. The Permittee shall comply with the general facility standards contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 2.

3. The Permittee shall comply with preparedness and prevention requirements contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 3.

4. The Permittee shall comply with the contingency plan and emergency procedure requirements contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 4.

5. The Permittee shall comply with the manifest system, recordkeeping and reporting requirements contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 5, and section 66270.30(l).

6. The Permittee shall comply with the closure and, if applicable, post-closure requirements contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 7.

7. The Permitee shall comply with the air emission standards for process vents contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 27.

8. The Permitee shall comply with the air emission standards for equipment leaks contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 27.

E. <u>Land Disposal Restrictions</u>

1. The Permittee shall comply with applicable provisions of the land disposal restrictions as found in title 22, Cal. Code Regs., division 4.5, chapter 18.

2. The Permittee shall retain on-site, until closure of the facility, a copy of all notices, certifications, demonstrations, waste analysis data, and other documentation related to the management of all wastes (for on-site or off-site treatment, storage or disposal) subject to

land disposal restrictions.

3. The Permittee shall retain on-site, a current waste analysis plan describing how and when wastes or treatment residues will be tested to comply with the land disposal restriction regulations.

F. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination or a notification of anticipated noncompliance or planned changes (except as provided in title 22, Cal. Code Regs., section 66270.42(a)), does not stay any permit condition. Except as provided in title 22, Cal. Code Regs., section 66270.42(a), a new facility permit condition or a modification of an existing facility permit condition shall become effective on the date specified in the Department's written notice of approval of the permit modification, pursuant to title 22, Cal. Code Regs., sections 66270.42 and/or 66271.14.

G. Need to Halt or Reduce Activity

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

H. Severability

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

I. Permit Expiration

In accordance with title 22, Cal. Code Regs., section 66270.51, this permit and all conditions therein will remain in effect beyond the permit expiration or termination date, until the effective date of a new permit, if the Permittee has submitted a timely and complete application (both Part A and Part B) for a new permit and, through no fault of the Permittee, the Department has not issued a new permit. In accordance with title 22, Cal. Code Regs., section 66270.10(h), a timely and complete application for a new permit shall be submitted at least 180 days before this permit expires, unless permission for a later date is granted in writing by the Department.

J. 24-Hour Reporting

The Permittee shall report to the Department any incidents of noncompliance, with the conditions of this permit and any of the provisions of title 22, Cal. Code Regs., division 4.5 or HSC, division 20, chapter 6.5, which may endanger health or the environment, pursuant to the reporting requirements in title 22, Cal. Code Regs., section 66270.30(l)(6).

K. Notice of Planned Physical Changes and Certification of Construction

The Permittee shall give notice to the Department as soon as possible, and, in any event, at least 30 days in advance of, any planned physical alterations or additions to the permitted facility. In addition, prior to commencement of the treatment, storage, or transfer of hazardous wastes at a new facility or modified portion of an existing facility, the Permittee shall comply with the requirements contained in title 22, Cal. Code Regs., section 66270.30(l)(2).

L. Operation at Night

When the facility is operated during hours of darkness, the Permittee shall provide sufficient lighting to ensure safe, effective management of hazardous wastes.

M. Part B Application (Operation Plan) of the Hazardous Waste Facility Permit Application

1. By the issuance of this permit, the Part B Permit Application dated February 28, 1991 and modified on May 31, 1991, July 12, 1991, February 19, 1992, August 20, 1992, November 4, 1992, December 28, 1992, January 15, 1993, March 13, 1993 and June 14, 1993, is hereby approved. This Part B Permit Application and any subsequent revisions thereto, subject to the permit modification requirements contained in title 22, Cal. Code Regs., sections 66270.41 and 66270.42, are by this reference made part of this permit.

2. The following permit modifications were made to Permit Condition II.M.:

   a. On November 29, 1993, the Department approved a Class 1 Permit Modification for administrative changes to the Part B as well as a facility name change.

   b. On October 16, 1995, under the direction of the Department, Teledyne revised the Part A Application to reflect the hazardous wastes stored in containers and tanks listed in Table III-1 and

Table III-2 of the Part B Application.

c. On February 2, 1996, the Department approved a Class 1 Permit Modification for the following: (1) change in the closure schedule, and (2) update the closure cost estimates.

d. On May 27, 1999, the Department approved a Class 2 Permit Modification for the following: (1) a closure plan entitled *Closure Plan Former Detonation Pit*, Revision 1, dated November 5, 1997, and (2) a remedy selection of corrective action for the lead contaminated soil in the vicinity of TSU-1.

e. Effective January 1, 1999, TSU-10 is no longer regulated pursuant to Health and Safety Code, Section 25143.13(c).

3. The Permittee shall operate and maintain the facility in accordance with the Part B Permit Application.

4. In the event of any conflict between this document and the Part B Permit Application, the most stringent provisions shall control.

5. The Part B Permit Application and this document shall be maintained at the facility and place of business at all times until closure is completed.

N. <u>General Responsibilities of Operator</u>

1. Compliance

The Permittee shall comply with all conditions of this permit in accordance with title 22, Cal. Code Regs., section 66270.30. The Permittee shall comply with all laws, regulations, permits, zoning conditions, and all other requirements established by federal, state, and local agencies.

2. Transfer of the Permit

This permit may be transferred to a new Permittee only if it is modified or revoked and reissued pursuant to title 22, Cal Code Regs., section 66270.40. The Permittee shall notify the Standardized Permits and Corrective Action Branch Chief, in writing, of a proposed change in ownership of this facility no later than 90 days prior to the proposed date of transfer. A copy of the notification, required under title 22, Cal. Code Regs., section 66264.12(c), informing the new Permittee of the requirements of this permit and title 22, Cal Code Regs., division 4.5, chapters 14 and 20, shall be submitted to the Department prior to the transfer.

3. Operation and Maintenance

a. The Permittee shall at all times maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned release of hazardous waste or hazardous waste constituents to air, soil, or surface water, which could threaten human health or the environment.

b. The Permittee shall maintain all equipment, pipes, and lines used at the facility to handle, transfer, pump, or store hazardous wastes in a manner that prevents the leaking and spilling of hazardous wastes.

c. The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control in accordance with title 22, Cal. Code Regs., section 66270.30(e).

4. Submittal of Requested Information

The Permittee shall furnish to the Department, within the time specified by the Department in its request, any relevant information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Department, upon request, within the time requested, copies of records required to be kept by this permit.

5. Hazardous Waste List

The Permittee shall maintain a current list of hazardous wastes that are handled by the facility. The Permittee shall, as necessary, update the hazardous waste list presented in the approved Part B Permit Application, in accordance with the permit modification requirements contained in title 22, Cal. Code Regs., section 66270.42 (a), (b) or (c). Any additions to the list must be approved by the Department, in accordance with the requirements of title 22, Cal. Code Regs., sections 66270.41 and/or 66270.42, prior to their inclusion.

6. Anticipated Noncompliance

The Permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements, in accordance with title 22, Cal. Code Regs., section 66270.30(l)(2).

7. Noncompliance

In the event of noncompliance with the permit, the Permittee shall take all reasonable steps to minimize or correct releases to the environment, and shall carry out all measures as are reasonable to prevent and correct adverse impacts on human health or the environment. The Permittee shall report to the Department and to the California Office of Emergency Services (800) 852-7550 any circumstances that may endanger public health or the environment immediately upon becoming aware of the incident.

8. Incomplete and/or Incorrect Information

Where the Permittee becomes aware that any relevant fact was not included in a permit application, or incorrect information was included in a permit application or in any report to the Department, the Permittee shall promptly correct the error or omission by submitting the correct information to the Department.

O. Signatory Requirement

1. The owner shall comply with the signatory requirements in title 22, Cal. Code Regs., section 66270.11, for all applications, reports or information submitted to the Department.

2. The Permittee shall provide documentation of an agreement for operation of the facility between the property owner and the facility owner, if different from the property owner.

P. Waste Minimization Certification

The Permittee shall certify annually, by March 1 for the previous year ending December 31, that:

1. The facility has a program in place to reduce the volume and toxicity of all hazardous wastes listed in Chapter III of the approved Part B Application, dated February 21, 1991 and modified on May 31, 1991, July 12, 1991, February 19, 1992, August 20, 1992, November 4, 1992, December 28, 1992, January 15, 1993, March 31, 1993 and June 14, 1993, which are generated by the facility operations to the degree, determined by the Permittee, to be economically practicable.

2. The method of storage, treatment, or disposal is the only practicable method or combination of methods currently available to the facility which minimizes the present and future threat to human health and the environment.

The Permittee shall make this certification, in accordance with title 22, Cal. Code Regs., section 66270.11. The Permittee shall submit the certification to the Standardized Permits and Corrective Action Branch Chief in the Berkeley office and shall record and maintain on site such certification in the facility Operating Record

Q. Waste Minimization Conditions

1. The Permittee shall comply with the Hazardous Waste Source Reduction and Management Review Act requirements that are specified in the HSC, sections 25244.19, 25244.20 and 25244.21, and any subsequent applicable statutes or regulations promulgated thereunder.

2. The Permittee shall submit a copy of all reviews, plans, plan summaries, reports and report summaries required by Section II.Q.1 above, to the Department's Standardized Permits and Corrective Action Branch Chief in the Berkeley office on or before September 1, 1995, and by September 1 every four years thereafter.

   The Standardized Permits and Corrective Action Branch Chief may require the Permittee to submit a more detailed status report explaining any deviation from, or changes to, the waste minimization plan.

3. The Permittee shall submit to the Standardized Permits and Corrective Action Branch Chief in the Berkeley office annually, by March 1, a report on the status of development, by the Permittee and others, and on the status of preliminary implementation by the Permittee of alternative treatment methods for the hazardous wastes which are treated at the facility by open burning/open detonation.

R. Recycling

The Permittee shall comply with the requirements for recyclable hazardous wastes specified in title 22, Cal. Code Regs., division 4.5, chapter 16.

S. Compliance Schedule

Within 180 days of the effective date of this permit, the Permittee shall submit an updated risk assessment which includes the activities approved in this permit.

III. SPECIAL CONDITIONS

A. Prohibition of Disposal

Hazardous wastes shall not be disposed of at the facility.

B. Identification of Permitted and Prohibited Waste

1. Permitted Wastes

a. Storage in Containers

i. This permit authorizes the Permittee to store in containers at the facility the hazardous wastes listed in Table III-1 of the approved Part B Permit Application as follows:

TABLE III-1

C--tainer . rage Area	Hazardous Wastes Stored	Secondary Containment Capacity	Liquid Waste Capacity	Maximum Number of 55-gallon * Waste Drums
Bay A	caustics, cyanides, sulfides, aqueous solutions	1,077 gallons	4,140 gallons	75
Bay B	halogenated hydrocarbons, non-flammable liquids, oxidizers, aqueous solutions, combustible liquids	1,025 gallons	3,650 gallons	66
Bay C	acids	1,025 gallons	3,330 gallons	60
Bay D	flammable liquids, reducing agents, metal catalysts, carbon, fuels, combustible liquids	1,077 gallons	3,100 gallons	54

* Containers of various sizes are handled by the facility

ii. Containers holding hazardous wastes shall be stored onl. in TSU-3. The Permittee shall not store hazardous wastes exceeding the maximum inventory as specified above. The maximum inventory is based on double stacking of containers.

b. Storage in Tanks

This permit authorizes the Permittee to store hazardous waste in tanks in TSU-4 as follows:

TABLE III-2

Tank #	Maximum Storage Capacity (gallons)	Type of Tank	California Waste Code	EPA Waste Code
5038	5,000	Polyethylene	343, 135, 791	D001, D002
5040	5,000	Polyethylene	343, 135, 791	D001, D002
5042	10,000	Stainless Steel	343, 135, 791	D001, D002

The Permittee will follow the operational procedures set forth in section C.9, Chapter IV, of the approved Part B Permit Application when using tanks for storage of material other than hazardous waste.

c. Treatment in Miscellaneous Units

This permit authorizes the Permittee to treat hazardous waste in the following units:

i. TSU-6 A 300 gallon, glass-lined, reactor will be used for silver recovery with nitric acid and ammonium formate. Silver tubing containing explosives and expended photographic developing fluid will be treated in this unit. Silver will be dissolved into solution, the explosives will be filtered out, and then the silver will be removed from solution as silver flake. The filtered explosives will be stored in drums in the container storage area until they are burned in one of the burn units. This unit will treat up to 700 pounds per batch. This unit is vented through a venturi and a packed bed scrubber in series.

TSU-6 was closed in 1998. A closure report and certification dated September 10, 1998 for TSU-6 was submitted to the Department for review and approval. The Department did not review the closure report and certification prior to the Class 2 Permit Modification approval.

ii. TSU-7 When natural evaporation is not feasible, an electrically heated evaporator will be used to evaporate safety bucket water. The evaporator consists of a stainless steel drum with two thermostatically controlled electric heating belts. The unit is within secondary containment which is lined with polyurethane.

iii. TSU-8 Safety bucket water will be treated by natural evaporation in evaporation troughs. This water is generated when reactives are placed in water buckets for safe handling and to prevent ignition. This evaporator will treat approximately 3 gallons per day. The troughs are located within a polyurethane lined concrete dike. After treatment in this unit, the residue is moved to TSU 2 for burning.

iv. TSU-9 A 2,000 gallon, glass-lined reactor, R-5000, will be used for neutralization of reactivity by chemical oxidation and for neutralization of basic and acidic solutions. This unit will treat an average of 300 gallons per day by chemical oxidation and 3,000 gallons per day by neutralization.

v. TSU-10 A photographic silver recovery unit, consists of a systolic feed pump, two electrolytic silver recovery units, a flow meter, a tailings system feed tank, and two sealed silver recovery cylinders, all connected in series. This unit can remove silver from silver halide liquid at a rate of 34.5 gallons per day. Effective January 1, 1999, TSU-10 is no longer regulated under this Permit. Health and Safety Code, Section 25143.13(c) excludes onsite waste treatment activities for "silver only" hazardous wastes from regulatory requirements.

vi. Partial containers of two-part epoxy paints, potting compounds, adhesives and insulating materials are mixed and solidified according to the manufacturer's specifications. Quantities of one liter or less will be mixed at work stations. Quantities of greater than one liter will be transported to TSU-3 where they will be mixed and solidified.

The Permittee shall treat the following wastes subject to the terms of this permit and as described below:

TABLE III-3

Unit	Maximum Treatment Capacity	Type of waste Treated
TSU-6 (see Permit Condition III.B.1.c.i.)	700 pounds per batch	Silver tubing containing reactives, expended photographic developing fluids.
TSU-7	30 gallons per day	Safety Bucket Water
TSU-8	3 gallons per day*	Safety Bucket Water
TSU-9	3,000 gallons per day	Acidic and Basic Solutions
TSU-9	300 gallons per day	Reactive Solutions
TSU-10 (see Permit Condition III.B.1.c.v.)	34.5 gallons per day	Photographic Solutions Containing Silver
	200 gallons per year	Two-part Epoxy Paints, Potting Compounds, Adhesives and Insulating Materials

* Treatment is continuous. Any amount of waste may be added at anytime provided the unit maintains a freeboard of six inches.

d. Treatment of Energetic Wastes
Solids and liquids contaminated with reactive wastes are burned in two locations (TSU-1 and TSU-2) at the facility as described below. The liquid wastes are either solvent or water. The solid wastes are explosive devices, tubing filled with explosives, rags and wipes contaminated with explosives, and bulk explosives and propellants.

i. TSU-1 Solids, which include contaminated rags and tubing filled with explosives, are stacked in cement sewer pipes inside a wire cage and covered with a straw-like material made of cellulose and ignited by remote control. The solid burns last for approximately one hour. This unit burns a maximum of 500 pounds of solid waste per burn.

TSU-1 Some explosives are detonated in a pit near the solid burn unit. The explosives may be covered with water or dirt to minimize smoke and noise. The detonations take only a few seconds. Up to 500 pounds per day of explosive waste may be detonated in this unit. (Note: the detonation pit is scheduled to close in 1999)

ii. TSU-2 Liquid wastes, generally solvent or water contaminated with explosives, are burned in a double boiler system and are ignited electrically by remote control. The liquid burns last up to four hours. This unit burns a maximum of 300 gallons per burn.

The Permittee shall open burn or open detonate the following wastes subject to the terms of this permit and as described below:

Table III-4

Unit	Description of Waste	Calif. Waste Code	EPA Waste Code	Maximum Daily Capacity	Maximum Annual Quantity
TSU - 1	Solid Reactive Wastes (includes contaminated rags and wipes)	172, 181, 352, 791,	D001, D003, D008	500 pounds	20,000 pounds
TSU - 2	Liquid wastes * contaminated with reactives	213, 212, 214	U234, U105, U106, U160	300 gallons	86,100 pounds

* Only the following solvents and solvent/water mixture containing explosive waste particles shall be burned: Methanol, Isopropanol, Acetone, Tetrahydrofuran, Pyridine, Acetonitrile, Butyl Acetate, and Ethanol.

2. Prohibited Wastes

The facility shall not handle:

a. Any hazardous waste not listed in the Section III.B.1 (above) of this permit.

b. Any hazardous waste generated outside the premises of the facility.

C. Prohibited Activities

No construction related activity is allowed within a 90-foot radius of the burn unit without prior approval from the Department. The burn unit is defined as two concrete cylinders mounted side-by-side on a 54-feet by 50-feet concrete slab foundation and surrounded by a metal framed expanded metal enclosure. The area within a 90-foot radius of the burn unit currently consists of open space.

D. Authority to Construct

1. The Permittee may construct the following in accordance with the *Corrective Measures Study Final Report for Lead-Affected Soils RCRA Unit TSU-1, July 7, 1998, Revision 3.0*:

   a. Move the three sides of the existing soil berms approximately 15 feet out from the current locations.

   b. Extend the concrete slab from the current dimensions of 24 feet by 30 feet to 54 feet by 50 feet.

   c. Install a 15 feet by 25 feet concrete apron in the front of the burn unit with a loading ramp and entry gate.

   d. Install concrete perimeter walls on all four sides of the burn unit. The north and south walls will be 5 feet high. The east wall will be 8 feet high, and the west wall will be 6 feet high.

   e. Install a roof over the burn unit. The roof will cover an area 66 feet by 62 feet and will have a height of approximately 24 feet at the front (south) and 27 feet at the back (north).

2. The Permittee shall notify the Department of any deviations to the plans provided in the *Corrective Measures Study Final Report for Lead-Affected Soils RCRA Unit TSU-1, July 7, 1998, Revision 3.0* before the construction.

3. All structural modifications to the burn unit shall be reviewed and approved by the San Benito County Building Department.

4. Construction activities shall be conducted during normal working

hours, Monday through Friday, between 7 a.m. and 6 p.m.

5. The Permittee shall comply with Title 8, California Code of Regulations, on Lead in Construction Standards during the construction of the structural modifications.

6. No later than thirty (30) calendar days after the approval of the Class 2 Permit Modification, the Permittee shall submit to the Department, a construction schedule for the burn unit.

7. No later than sixty (60) calendar days after the completion of Permit Condition III.D.1., the Permittee shall submit to the Department, as-built drawings that are certified by a civil or structural engineer registered in California.

8. No later than ninety (90) calendar days after the completion of Permit Condition III.D.1, the Permittee shall submit to the Department, a letter signed by the owner and/or operator and an independent civil or structural engineer registered in California that the structural designs of the burn unit have been constructed in accordance with Permit Condition III.D.1.a., b., c., d., and e.

E. Other Conditions

1. The Permittee shall collect soil samples in the vicinity of TSU-1 annually, by May 1 of each year. Soil samples shall be collected in accordance with the *Corrective Measures Study Final Report for Lead-Affected Soils RCRA Unit TSU-1, July 7, 1998, Revision 3.0.*

2. Within forty-five (45) calendar days of soil collection in the vicinity of TSU-1, the Permittee shall submit to the Department a report detailing, at a minimum, the following:

   a. Interpretion of the analytical soil results; and

   b. Evaluation of the effects from the burn operations on the soil media.

3. The Permittee shall remediate the remaining lead contaminated soil in the vicinity of TSU-1 to meet closure performance standards of 22 CCR 662654.111 when operation of the burn unit ceases.

IV. CORRECTIVE ACTION

A. SUMMARY OF RFA FINDINGS/RESULTS

A RCRA Facility Assessment (RFA) was conducted and a report summarizing the findings was prepared by the California Department of Health Services, Toxic Substances Control Program in June 1991. The RFA found no indication of any historical activities that may have resulted in a release of hazardous waste to the environment. The RFA identifies 18 Solid Waste Management Units (SWMUs) as listed below. Section E states that no corrective action is needed at these units at this time. Sections F. through Q. describe the corrective action procedures that will go into affect if additional SWMUs, or contamination at existing SWMUs is identified.

SWMU 1	Lake Teledyne
SWMU 2	Surface Impoundment #1
SWMU 3	Surface Impoundment #2
SWMU 4	Plating Shop Waste Storage Tank
SWMU 5	Industrial Wastewater Screening Tank
SWMU 6	Silver Recovery Vessel
SWMU 7	Upper Drum Storage Area
SWMU 8	Hazardous Waste Storage Area #1
SWMU 9	Hazardous Waste Storage Area #2
SWMU 10	Unsymmetrical Dimethylhydrazine Storage
SWMU 11	Spray Field
SWMU 12	Hazardous Waste Storage Area #3
SWMU 13	Hazardous Waste Storage Area #4
SWMU 14	Thermal Oxidizer
SWMU 15	Surface Impoundment
SWMU 16	Old Burn Area
SWMU 17	Waste Solvent Open Burn Area
SWMU 18	Open Burn of Explosive Solids

A.1 For clarification purposes, SWMU 18 consists of a burn unit and a detonation pit, collectively known as TSU-1. The burn unit consists of two 10-foot diameter reinforced concrete cylinders mounted side-by-side on a 30-foot by 24-foot concrete slab foundation with a metal mesh cage enclosing the unit. The detonation pit is an unlined pit that measures approximately 20-feet in diameter and five feet deep.

B. DEFINITIONS

For purposes of this Corrective Action Schedule of Compliance the following definitions shall apply:

"Facility" means all contiguous property under the control of the

Permittee seeking a permit under title 22, Cal. Code Regs.

"Branch Chief" means the Branch Chief of the California Environmental Protection Agency, Department of Toxic Substances Control, Standardized Permits and Corrective Action Branch or his designee or authorized representative.

"Release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents).

"Solid waste management unit" means any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

"Hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. The term hazardous waste includes hazardous constituent as defined below.

"Hazardous constituent" means any constituent identified in Appendix IV of title 22, Cal. Code Regs., section 66261, or any constituent identified in Appendix IX of title 22, Cal. Code Regs., section 66264.

All references herein to Unit Numbers are found in <u>RCRA Facility Assessment, Teledyne McCormick Selph, 3601 Union Road Hollister, California</u>, California State Department of Health Services, Toxic Substances Control Program, Region 2, June 1991.

C. <u>STANDARD CONDITIONS</u>

1. Title 22, Cal. Code Regs., section 66264.100 requires that permits issued after July 1, 1991, address corrective action of all releases of hazardous wastes including hazardous constituents from any solid waste management unit (SWMU) at the facility, regardless of when the waste was placed in the unit.

2. Failure to submit the information required in this Corrective Action

Schedule of Compliance, or falsification of any submitted information, is grounds for termination of this Permit (title 22, Cal. Code Regs. section 66270.43). The Permittee shall ensure that all plans, reports, notifications, and other submissions to the Branch Chief required in this Corrective Action Schedule of Compliance are signed and certified in accordance with title 22, Cal. Code Regs., section 66270.11. Two (2) copies of these plans, reports, notifications or other submissions shall be submitted to the Branch Chief and sent by certified mail or hand delivered to:

Branch Chief
Standardized Permits and Corrective Action Branch
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710

3. All plans and schedules required by the conditions of this Corrective Action Schedule of Compliance are, upon approval of the Branch Chief, incorporated into this Schedule of Compliance by reference and become an enforceable part of this Permit. Any noncompliance with such approved plans and schedules shall be termed noncompliance with this Permit. Extensions of the due dates for submittals may be granted by the Branch Chief in accordance with the permit modification processes under title 22, Cal. Code Regs., section 66270.41.

4. If the Branch Chief determines that further actions beyond those provided in this Corrective Action Schedule of Compliance, or changes to that which is stated herein, are warranted, the Branch Chief shall modify the Schedule of Compliance either according to procedures in Permit Condition IV.Q. of this Permit, or according to the permit modification processes under title 22, Cal. Code Regs., section 66270.41.

5. All raw data, such as laboratory reports, drilling logs, bench-scale or pilot-scale data, and other supporting information gathered or generated during activities undertaken pursuant to this Corrective Action Schedule of Compliance shall be maintained at the facility during the term of this Permit, including any reissued Permits

D. REPORTING REQUIREMENTS

1. The Permittee shall submit to the Branch Chief signed quarterly progress reports of all activities conducted pursuant to the provisions of this Corrective Action Schedule of Compliance beginning no later than ninety (90) calendar days after the Permittee is first required to begin implementation of any requirement herein. These reports shall contain:

a. A description of the work completed;

b. Summaries of all findings, including summaries of laboratory data;

c. Summaries of all problems or potential problems encountered during the reporting period and actions taken to rectify problems; and

d. Projected work for the next reporting period.

2. Copies of other reports (e.g., daily reports, inspection reports), drilling logs and laboratory data shall be made available to the Branch Chief upon request.

3. As specified under Permit Condition IV.C.4., the Branch Chief may require the Permittee to conduct new or more extensive assessments, investigations, or studies, as needed, based on information provided in these progress reports or other supporting information

E. CORRECTIVE ACTION REQUIREMENTS FOR EXISTING SWMUS

1. No corrective action for the SWMUs identified in Permit Condition IV.A. was required at the time this Permit was issued on July 28, 1993. However, the Department was notified by telephone of a newly-discovered release from SWMU 18 (TSU-1) on July 12, 1995 As a result of the notification, the corrective action requirements in Permit Condition IV of this permit were implemented for SWMU 18.

2. Subsequent RCRA Facility Investigations (RFI)of the soil and groundwater of TSU-1 revealed the following:

   a. Analytical results of surface soil samples indicate the presence of lead at concentrations ranging from 4.4 to 15,000 mg/kg. Soil samples collected at 1.5 feet below ground surface (bgs) indicate concentrations of lead ranging from 4.3 to 27 mg/kg.

   b. Past operations of the detonation pit did not impact groundwater at the Teledyne facility.

3. On May 10, 1996, the Department approved Teledyne's *Final Report, RCRA Facility Investigation (RFI), TSU-1, Teledyne Ryan Aeronautical, McCormick Selph Ordnance*, dated February 6, 1996 The approval of the RFI report was for the soil portion only.

4. On March 19, 1997, the Department terminated the corrective action process for the groundwater. Groundwater investigations of the

detonation pit showed no impacts to groundwater.

5. On November 27, 1997, the Department approved a cleanup goal of 5,295 mg/kg for the lead contaminated soil in a risk assessment dated December 12, 1996. The cleanup goal is for an industrial setting.

6. On October 9, 1998, the Department determined that the *Corrective Measures Study Final Report for Lead-Affected Soils, Revision 3.0*, dated July 7, 1998, is technically complete.

7. Pursuant to Permit Condition IV.P., a remedy is selected for the lead contaminated soil and a Class 2 Permit Modification is initiated.

8. Remedy selection for the lead contaminated soil consists of the following:

   a. Soil containing lead concentrations greater than 5,259 mg/kg will be excavated and removed. Approximately 145 cubic yards of lead contaminated soil will be excavated. The contaminated soil will remain in the bins pending waste profiling results. Confirmation sampling will be performed to document that cleanup goals have been achieved. If the remediation area is found not to meet the cleanup criteria, additional soil removal will be performed as necessary and additional verification samples collected. Confirmation samples will be collected from an estimated removal area of 2,200 square feet. Following removal of the contaminated soil, clean soil as referenced in the *Corrective Measures Study Final Report for Lead-Affected Soils, Revision 3.0*, dated July 7, 1998, Section 6.4, Task 4 - Excavation Backfilling (page 21), will be placed as backfill.

   b. The burn unit will be structually modified to the following:

      i. Move the three sides of the existing soil berms approximately 15 feet out from the current locations.

      ii. Extend the concrete slab from the current dimensions of 24 feet by 30 feet to 54 feet by 50 feet.

      iii Install a 15 feet by 25 feet concrete apron in the front of the burn unit with a loading ramp and entry gate.

      iv. Install concrete perimeter walls on all four sides of the burn unit. The north and south walls will be 5 feet high. The east wall will be 8 feet high, and the west wall will be 6 feet high.

v. Install a roof over the burn unit. The roof will cover an area 66 feet by 62 feet and will have a height of approximately 24 feet at the front (south) and 27 feet at the back (north).

c. Restrict construction activities within a 90-feet radius of the burn unit unless prior Department approval is obtained. The burn unit is defined as two concrete cylinders mounted side-by-side on a 54-feet by 50-feet concrete slab foundation and surrounded by a metal framed expanded metal enclosure.

F. NOTIFICATION REQUIREMENTS FOR AND ASSESSMENT OF NEWLY-IDENTIFIED SOLID WASTE MANAGEMENT UNIT(S)

1. The Permittee shall notify the Branch Chief in writing of any newly-identified SWMU(s), not specifically identified during the RFA and listed in Section A, discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means, no later than fifteen (15) calendar days after discovery.

2. After such notification, the Branch Chief may request, in writing, that the Permittee prepare a Solid Waste Management Unit (SWMU) Assessment Plan and a proposed schedule of implementation and completion of the Plan for any additional SWMU(s) discovered subsequent to the issuance of this Permit.

3. Within fifteen (15) calendar days after receipt of the Branch Chief's request for a SWMU Assessment Plan, the Permittee shall prepare a SWMU Assessment Plan for determining past and present operations at the unit, as well as any sampling and analysis of ground water, land surface and subsurface strata, surface water or air, as necessary to determine whether a release of hazardous waste including hazardous constituents from such unit(s) has occurred, is likely to have occurred, or is likely to occur. The SWMU Assessment Plan must demonstrate that the sampling and analysis program, if applicable, is capable of yielding representative samples and must include parameters sufficient to identify migration of hazardous waste including hazardous constituents from the newly discovered SWMU(s) to the environment.

4. After the Permittee submits the SWMU Assessment Plan, the Branch Chief shall either approve or disapprove the Plan in writing.

   If the Branch Chief approves the Plan, the Permittee shall begin to implement the Plan within fifteen (15) calendar days of receiving such written notification.

If the Branch Chief disapproves the Plan, the Branch Chief shall either (1) notify the Permittee in writing of the Plan's deficiencies and specify a due date for submittal of a revised Plan, or (2) revise the Plan and notify the Permittee of the revisions. This Branch Chief-revised Plan becomes the approved SWMU Assessment Plan. The Permittee shall implement the Plan within fifteen (15) calendar days of receiving written approval.

5. The Permittee shall submit a SWMU Assessment Report to the Branch Chief n6 later than fifteen (15) calendar days from completion of the work specified in the approved SWMU Assessment Plan. The SWMU Assessment Report shall describe all results obtained from the implementation of the approved SWMU Assessment Plan. At a minimum, the Report shall provide the following information for each newly identified SWMU:

   a. The location of the newly-identified SWMU in relation to other SWMUs;

   b. The type and function of the unit;

   c. The general dimensions, capacities, and structural description of the unit (supply any available drawings);

   d. The period during which the unit was operated;

   e. The specifics on all wastes that have been or are being managed at the SWMU, to the extent available; and

   f. The results of any sampling and analysis required for the purpose of determining whether releases of hazardous wastes including hazardous constituents have occurred, are occurring, or are likely to occur from the unit.

6. Based on the results of this Report, the Branch Chief shall determine the need for further investigations at specific unit(s) covered in the SWMU Assessment. If the Branch Chief determines that such investigations are needed, the Branch Chief may require the Permittee to prepare a plan for such investigations. This plan will be reviewed for approval as part of the RCRA Facility Investigation (RFI) Workplan under Permit Condition IV.H.1.

G. <u>NOTIFICATION REQUIREMENTS FOR NEWLY-DISCOVERED RELEASES AT SWMUS</u>

The Permittee shall notify the Branch Chief, in writing, of any release(s) of hazardous waste including hazardous constituents discovered during the course of ground-water monitoring, field investigation, environmental auditing, or other activities undertaken after the commencement of the RFI, no later than fifteen (15) calendar days after discovery. Such newly-discovered releases may be from newly-identified units, from units for which, based on the findings of the RFA, the Branch Chief had previously determined that no further investigation was necessary, or from units investigated as part of the RFI. The Branch Chief may require further investigation of the newly-identified release(s). A plan for such investigation will be reviewed for approval as part of the RFI Workplan under Permit Condition IV.H.1.

H. RCRA FACILITY INVESTIGATION (RFI) WORKPLAN

1. On or before thirty (30) calendar days after a request by the Branch Chief, the Permittee shall submit a Workplan to the Branch Chief to address those units, releases of hazardous waste including hazardous constituents, and media of concern which require further investigation.

   a. The Workplan shall describe the objectives of the investigation and the overall technical and analytical approach to completing all actions necessary to characterize the nature, direction, rate, movement, and concentration of releases of hazardous waste including hazardous constituents from specific units or groups of units, and their actual or potential receptors. The Workplan shall detail all proposed activities and procedures to be conducted at the facility, the schedule for implementing and completing such investigations, the qualifications of personnel performing or directing the investigations, including contractor personnel, and the overall management of the RFI.

   b. In addition, the Workplan shall discuss sampling and data collection quality assurance and data management procedures, including formats for documenting and tracking data and other results of investigations, and health and safety procedures.

2. After the Permittee submits the Workplan, the Branch Chief will either approve or disapprove the Workplan in writing. If the Branch Chief disapproves the Workplan, the Division Branch Chief shall either (1) notify the Permittee in writing of the Workplan's deficiencies and specify a due date for submittal of a revised Plan, or (2) revise the Workplan and notify the Permittee of the revisions. This modified Workplan becomes the approved RFI Workplan.

3. The Branch Chief shall review for approval as part of the RFI Workplan any plans developed pursuant to Permit Condition IV.F.6., addressing further investigations of newly-identified SWMUs, or Section IV.G., addressing new releases from previously-identified

units. The Branch Chief shall modify the Schedule of Compliance either according to procedures in Section IV.Q. of this Permit, or according to the permit modification procedures under 22 CCR 66270.41, to incorporate these units and releases into the RFI Workplan.

I. RCRA FACILITY INVESTIGATION WORKPLAN IMPLEMENTATION

No later than fifteen (15) calendar days after the Permittee has received written approval from the Branch Chief for the RFI Workplan, the Permittee shall begin implementation of the RCRA Facility Investigation according to the schedules specified in the RFI Workplan. Pursuant to Permit Condition IV.C.3., the RFI shall be conducted in accordance with the approved RFI Workplan.

J. RCRA FACILITY INVESTIGATION FINAL REPORT AND SUMMARY REPORT

1. Within sixty (60) calendar days after the completion of the RFI, the Permittee shall submit an RFI Final Report and Summary Report. The RFI Report shall describe the procedures, methods, and results of all facility investigations and their releases, including information on the type and extent of contamination at the facility, sources and migration pathways, and actual or potential receptors. The RFI Final Report shall present all information gathered under the approved RFI Workplan. The Final Report must contain adequate information to support further corrective action decisions at the facility. The Summary Report shall describe more briefly the procedures, methods, and results of the RFI.

2. After the Permittee submits the RFI Final Report and Summary Report, the Branch Chief shall either approve or disapprove the Reports in writing.

   If the Branch Chief approves the RFI Report and Summary Report, the Permittee shall mail the approved Summary Report to all individuals on the facility mailing list established pursuant to title 22, Cal. Code Regs., section 66124.10(c)(1)(viii), within fifteen (15) calendar days of receipt of approval.

   If the Branch Chief determines the RFI Final Report and Summary Report do not fully detail the objectives stated under Permit Condition IV.H.1., the Branch Chief may disapprove the RFI Final Report and Summary Report. If the Branch Chief disapproves the Reports, the Branch Chief shall notify the Permittee in writing of the Reports' deficiencies and specify a due date for submittal of a revised Final and Summary Report. The Summary Report, once approved, shall be mailed to all individuals on the facility mailing list.

K. INTERIM MEASURES

1. If, during the course of any activity initiated under this Corrective Action Schedule of Compliance, the Branch Chief determines that a release or potential release of hazardous waste including hazardous constituents from a SWMU poses a threat to human health and the environment, the Branch Chief may specify interim measures. The Branch Chief shall determine the specific action(s) that must be taken to implement the interim measure, including potential permit modifications and the schedule for implementing the required measures. The Branch Chief shall notify the Permittee in writing of the requirement to perform such interim measures. The Branch Chief shall modify the Corrective Action Schedule of Compliance either according to procedures in Section IV.Q. of this Permit, or according to the permit modification procedures under title 22, Cal. Code Regs., section 66270.41, to incorporate such interim measures into the Permit.

2. The following factors may be considered by the Branch Chief in determining the need for interim measures:

   a. Time required to develop and implement a final remedy;

   b. Actual and potential exposure of human and environmental receptors;

   c. Actual and potential contamination of drinking water supplies and sensitive ecosystems;

   d. The potential for further degradation of the medium absent interim measures;

   e. Presence of hazardous waste in containers that may pose a threat of release;

   f. Presence and concentration of hazardous waste including hazardous constituents in soils that have the potential to migrate to ground water or surface water;

   g. Weather conditions that may affect the current levels of contamination;

   h. Risks of fire, explosion, or accident; and

   i. Other situations that may pose threats to human health and the environment.

L. CORRECTIVE MEASURES STUDY PLAN

1. If the Branch Chief determines that the contaminants pose a threat to human health and the environment given site-specific exposure conditions, the Branch Chief may require a Corrective Measures Study (CMS) and shall notify the Permittee in writing. This notice shall identify the hazardous constituent(s) which have exceeded action levels as well as those which have been determined to threaten human health and the environment given site-specific exposure conditions. The notification may also specify remedial alternatives to be evaluated by the Permittee during the CMS.

2. The Permittee shall submit a CMS Plan to the Branch Chief within forty-five (45) calendar days from notification of the requirement to conduct a CMS.

   The CMS Plan shall provide the following information:

   a. A description of the general approach to investigating and evaluating potential remedies;

   b. A definition of the overall objectives of the study;

   c. The specific plans for evaluating remedies to ensure compliance with remedy standards;

   d. The schedules for conducting the study; and

   e. The proposed format for the presentation of information.

3. If the Branch Chief disapproves the CMS Plan, the Branch Chief shall either (1) notify the Permittee in writing of the Plan's deficiencies and specify a due date for submittal of a revised Plan, or (2) revise the Plan and notify the Permittee of the revisions. This modified Plan becomes the approved CMS Plan.

M. CORRECTIVE MEASURES STUDY IMPLEMENTATION

No later than fifteen (15) calendar days after the Permittee has received written approval from the Branch Chief for the CMS Plan, the Permittee shall begin to implement the Corrective Measures Study according to the schedules specified in the CMS Plan. Pursuant to Permit Condition IV.C.3, the CMS shall be conducted in accordance with the approved Plan.

N. CORRECTIVE MEASURES STUDY FINAL REPORT

1. Within sixty (60) calendar days after the completion of the CMS. the

Permittee shall submit a CMS Final Report. The CMS Final Report shall summarize the results of the investigations for each remedy studied and of any bench-scale or pilot tests conducted. The CMS Report must include an evaluation of each remedial alternative. The CMS Report shall present all information gathered under the approved CMS Plan. The final report must contain adequate information to support the Branch Chief in the remedy selection decision-making process, described under Section IV.O. of the Corrective Action Schedule of Compliance.

2. If the Branch Chief determines that the CMS Final Report does not fully satisfy the information requirements specified under Permit Condition IV.L.2., the Branch Chief may disapprove the CMS Final Report. If the Branch Chief disapproves the Final Report, the Branch Chief shall notify the Permittee in writing of deficiencies in the Report and specify a due date for submittal of a revised Final Report.

3. As specified under Permit Condition IV.C.4., based on preliminary results and the final CMS report, the Branch Chief may require the Permittee to evaluate additional remedies or particular elements of one or more proposed remedies.

O. REMEDY SELECTION

1. Based on the results of the CMS and any further evaluations of additional remedies under this study, the Branch Chief shall select a remedy from the remedial alternatives evaluated in the CMS that will (1) be protective of human health and the environment; (2) meet the concentration levels of hazardous constituents in each medium that the remedy must achieve to be protective of human health and the environment; (3) control the source(s) of release(s) so as to reduce or eliminate, to the maximum extent practicable, further releases that might pose a threat to human health and the environment; and (4) meet all applicable waste management requirements.

2. In selecting the remedy which meets the standards for remedies established under Permit Condition IV.O.1., the Branch Chief shall consider the following evaluation factors, as appropriate:

   a. Long-term reliability and effectiveness. Any potential remedy(s) may be assessed for the long-term reliability and effectiveness it affords, along with the degree of certainty that the remedy will prove successful. Factors that shall be considered in this evaluation include:

      i. Magnitude of residual risks in terms of amounts and concentrations of waste remaining following implementation of a remedy,, considering the persistence, toxicity, mobility and propensity to bioaccumulate of such hazardous wastes including hazardous constituents;

ii. The type and degree of long-term management required, including monitoring and operation and maintenance;

iii, Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, redisposal or containment;

iv. Long-term reliability of the engineering and institutional controls, including uncertainties associated with land disposal of untreated wastes and residuals; and

v. Potential need for replacement of the remedy.

b. Reduction of toxicity, mobility, and volume. A potential remedy(s) may be assessed as to the degree to which it employs treatment that reduces toxicity, mobility or volume of hazardous wastes including hazardous constituents. Factors that shall be considered in such assessments include:

i. The treatment processes the remedy(s) employs and materials it would treat;

ii. The amount of hazardous wastes including hazardous constituents that would be destroyed or treated;

iii The degree to which the treatment is irreversible; and

iv. The residuals that will remain following treatment, considering the persistence, toxicity, mobility and propensity to bioaccumulate of such hazardous wastes including hazardous constituents.

c. The short-term effectiveness of a potential remedy(s) may be assessed considering the following:

i. Magnitude of reduction of existing risks;

ii. Short-term risks that might be posed to the community, workers, or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and redisposal or containment; and

iii Time until full protection is achieved.

d. Implementability. The ease or difficulty of implementing a potential remedy(s) may be assessed by considering the following types of factors:

i. Degree of difficulty associated with constructing the technology;

ii. Expected operational reliability of the technologies;

iii Need to coordinate with and obtain necessary approvals and permits from other agencies;

iv Availability of necessary equipment and specialists; and

v. Available capacity and location of needed treatment, storage and disposal services.

e. Cost. The types of costs that may be assessed include the following:

i. Capital costs;

ii. Operation and maintenance costs;

iii Net present value of capital and operation and maintenance costs; and

iv. Potential future remedial action costs.

P. <u>PERMIT MODIFICATION FOR REMEDY</u>

1. Based on information the Permittee submits in the RFI Final and Summary Reports, the CMS Final Report, and other information, the Branch Chief will select a remedy and initiate a major permit modification to this Permit, pursuant to title 22, Cal. Code Regs., section 66270 Subpart D.

The modification shall specify the selected remedy and include, at a minimum, the following:

a. Description of all technical features of the remedy that are necessary for achieving the standards for remedies established under Permit Condition IV.O.1., including length of time for which compliance must be demonstrated at specified points of compliance;

b. All concentration levels of hazardous constituents in each medium that the remedy must achieve to be protective of human health and the environment;

c. All requirements for achieving compliance with these concentration levels;

d. All requirements for complying with the standards for management of wastes;

e. Requirements for removal, decontamination, closure, or post-closure of units, equipment, devices or structures that will be used to implement the remedy;

f. A schedule for initiating and completing all major technical features and milestones of the remedy; and

g. Requirements for submission of reports and other information.

2. Within one hundred and twenty (120) calendar days after this Permit has been modified, the Permittee shall demonstrate financial assurance for completing the approved remedy.

Q. MODIFICATION OF THE CORRECTIVE ACTION SCHEDULE OF COMPLIANCE

1. If at any time the Branch Chief determines that modification of the Corrective Action Schedule of Compliance is necessary, he or she may initiate a modification to the Schedule of Compliance according to the procedures of this Section. If the Branch Chief initiates a modification, he or she shall:

   a. Notify the Permittee in writing of the proposed modification and the date by which comments on the proposed modification must be received; and

   b. Publish a notice of the proposed modification in a locally distributed newspaper, mail a notice to all persons on the facility mailing list maintained according to title 22, Cal. Code Regs., section 66124.10(c)(1)(viii), and place a notice in the facility's information repository (i.e., a central source of all pertinent documents concerning the remedial action, usually maintained at the facility or some other public place, such as a public library, that is accessible to the public) if one is required.

i. If the Branch Chief receives no written comment on the proposed modification, the modification shall become effective five (5) calendar days after the close of the comment period.

ii. If the Branch Chief receives written comment on the proposed modification, the Branch Chief shall make a final determination concerning the modification after the end of the comment period.

c. Notify the Permittee in writing of the final decision.

i. If no written comment was received, the Branch Chief shall notify individuals on the facility mailing list in writing that the modification has become effective and shall place a copy of the modified Corrective Action Schedule of Compliance in the information repository, if a repository is required for the facility.

ii. If written comment was received, the Branch Chief shall provide notice of the final modification decision in a locally distributed newspaper and place a copy of the modified Corrective Action Schedule of Compliance in the information repository, if a repository is required for the facility.

2. Modifications that are initiated and finalized by the Branch Chief according to this procedure shall not be subject to administrative appeal.

3. Modifications to the Corrective Action Schedule of Compliance do not constitute a reissuance of the Permit.

APPENDIX I

List of Modifications Made to the
Hazardous Waste Facility Permit

APPENDIX I

LIST OF MODIFICATIONS MADE TO
THE HAZARDOUS WASTE FACILITY PERMIT

The following is a summary of changes made to the original permit issued on July 28, 1993. For detail of the changes made to the original permit, please refer to Appendix II.

1. Teledyne McCormick Selph is replaced with Teledyne Ryan Aeronautical throughout the permit.

2. Sections of the permit have been changed to reflect the reorganization within the Permitting Division of the Department of Toxic Substances Control. The Region 2 Facility Permitting Branch is replaced with the Standardized Permits and Corrective Action Branch Berkeley Office and the Facility Permitting Branch Chief is replaced with the Standardized Permits and Corrective Action Branch Chief.

3. Section I.A. has been modified to address the current status of the facility.

4. Section I.B. has been changed to reflect the additional procedures conducted to comply with the provisions of CEQA in approving the modifications.

5. Section II.M.2 has been added to address the modifications made to the permit since the permit was issued.

6. Section III.B.c.i. has been changed to reflect the current status of the unit.

7. Section III.B.c.v. has been changed to reflect the current status of the unit.

8. Section III.B.d.i. has been modified to address the closure of the unit.

9. Section III.C. has been added to address prohibited activities.

10. Section III.D. has been added to address the authority to construct.

11. Section III.E. has been added to address other conditions.

12. Section IV.A.1 has been added to clarify SWMU-18.

13. Section IV.E. has been modified and new text has been added to address the corrective action requirements for existing SWMUs.

APPENDIX II

Modifications Made to the Original
Hazardous Waste Facility Permit Issued on July 28, 1993

For ease of reviewing changes made to the text of the original Hazardous Waste Facility Permit, the following legends are defined:

- The ~~strikeout~~ means the text has been removed or deleted for public comments.
- The double underline means the text has either been replaced or added for public comments.
- The ~~strikeout~~ with the ~~double underline~~ means the text has been deleted as a result of public comments.
- The **shadow** means the text has been added after the public comment period.
- The **shadow** with the **double underline** means the text has been added as a result of public comments.

APPENDIX II

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TELEDYNE RYAN AERONAUTICAL

HAZARDOUS WASTE FACILITY PERMIT

ATTACHMENT A
Hazardous Waste Facility Permit

TELEDYNE RYAN AERONAUTICAL
3601 UNION ROAD
HOLLISTER, CALIFORNIA 95023
EPA ID No.: CAD009220898

I. DESCRIPTION OF FACILITY

A. Ownership, Operations, and Location

The Teledyne Ryan Aeronautical (Teledyne) facility is located at 3601 Union Road, at latitude 36°50'00" N and longitude 121°27'05" W, approximately three miles southwest of the City of Hollister. The facility is owned by Teledyne Industries Incorporated and operated by McCormick Selph Ordnance.

Teledyne has produced explosive ordnance materials at this location since 1971 and has produced chemicals for agricultural, pharmaceutical and industrial uses since 1974. Hazardous waste streams generated at the facility include scrap explosives and explosive materials, explosive-contaminated solvents, obsolete chemical products and materials, metal powders and spent corrosive materials.

The hazardous waste facilities consist of a pit for detonation of solid reactive waste, one unit for open burning of solid reactive waste, one unit for burning of solvents contaminated with reactive wastes, two water evaporation units, one silver recovery reactor, a waste photographic silver recovery unit, a treatment reactor, three above-ground hazardous waste storage tanks, and one hazardous waste container storage area with four bays. Teledyne also treats two part epoxy compounds by mixing them in containers. All these units are used to handle only hazardous waste which is generated on-site.

Closure was implemented for TSU-6 in 1998 (Refer to Permit Condition III.B.1.c.i).

Effective January 1, 1999, TSU-10 is no longer regulated under this Permit pursuant to Health and Safety Code, Section 25143.13(c), which excludes onsite waste treatment activities for "silver only" hazardous wastes from regulatory requirements.

Corrective action for the burn unit and detonation pit, collectively known as TSU-1, was initiated as a result of lead contaminated soil found in the vicinity of the unit (see Permit Condition IV.E. for further detail). As part of the remedy selection of corrective action for the burn unit, the structural design of the burn unit will be modified (see Permit Condition

III.D. and Permit Condition IV.E.8).

The detonation pit is scheduled to close in ~~early~~ 1999.

B. Compliance With California Environmental Quality Act (CEQA)

A Negative Declaration ~~has been~~ was prepared for ~~this project~~ the initial permit. A second Negative Declaration has been prepared for the Class 2 Permit Modification.

II. GENERAL CONDITIONS

A. Effect of Permit

1. The issuance of this permit by the California Department of Toxic Substances Control (Department) does not release the Permittee from any liability or duty imposed by federal or state statutes and regulations or local ordinances, except the obligation to obtain this permit. In particular, unless otherwise specifically provided in this permit, the Permittee shall comply with the provisions of the Health and Safety Code (HSC), division 20, chapter 6.5 and the California Code of Regulations, title 22 (Cal. Code Regs.), division 4.5.

2. Issuance of this permit by the Department does not prevent the Department from adopting or amending regulations, issuing administrative orders, or obtaining judicial orders which impose requirements which are in addition to or more stringent than those in existence at the time this permit was issued, and does not prevent the enforcement of these requirements against the Permittee of the facility. The Permittee shall comply with any such additional or more stringent requirements in addition to the requirements and conditions specified in the permit. Where appropriate, this permit is also subject to HSC sections 25159.6 and 25159.7 relating to the incorporation and implementation of federal regulations in the absence of equivalent State regulations.

3. This permit does not convey any property rights of any sort, or any exclusive privilege.

B. Requirement to Submit Information

All information, reports, submittals, or notices required by this permit shall be submitted to the Standardized Permits and Corrective Action Branch in the Berkeley office.

C. Consent to Entry by Department Representatives

The Permittee, by accepting this permit, consents to entry by any authorized representative of the Department or of the local health officer at any reasonable hour of the day in order to carry out the purposes of the Hazardous Waste Control Law, HSC section 25100 et seq., including, but not limited to, the activities listed in HSC section 25185 and title 22, Cal. Code Regs., section 66270.30(i).

D. Specific Conditions

1. The Permittee shall provide financial responsibility, if applicable,

in accordance with title 22, Cal. Code Regs., division 4.5, chapter 14, article 8, and section 66270.40(b). Documentation of financial assurance shall be submitted to:

Department of Toxic Substances Control
Standardized Permits and Corrective Action Branch
700 Heinz Avenue
Berkeley, California 94710

2. The Permittee shall comply with the general facility standards contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 2.

3. The Permittee shall comply with preparedness and prevention requirements contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 3.

4. The Permittee shall comply with the contingency plan and emergency procedure requirements contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 4.

5. The Permittee shall comply with the manifest system, recordkeeping and reporting requirements contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 5, and section 66270.30(l).

6. The Permittee shall comply with the closure and, if applicable, post-closure requirements contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 7.

7. The Permitee shall comply with the air emission standards for process vents contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 27.

8. The Permitee shall comply with the air emission standards for equipment leaks contained in title 22, Cal. Code Regs., division 4.5, chapter 14, article 27.

E. Land Disposal Restrictions

1. The Permittee shall comply with applicable provisions of the land disposal restrictions as found in title 22, Cal. Code Regs., division 4.5, chapter 18.

2. The Permittee shall retain on-site, until closure of the facility, a copy of all notices, certifications, demonstrations, waste analysis data, and other documentation related to the management of all wastes (for on-site or off-site treatment, storage or disposal) subject to

land disposal restrictions.

3. The Permittee shall retain on-site, a current waste analysis plan describing how and when wastes or treatment residues will be tested to comply with the land disposal restriction regulations.

F. Permit Actions

This permit may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Permittee for a permit modification, revocation and reissuance, or termination or a notification of anticipated noncompliance or planned changes (except as provided in title 22, Cal. Code Regs., section 66270.42(a)), does not stay any permit condition. Except as provided in title 22, Cal. Code Regs., section 66270.42(a), a new facility permit condition or a modification of an existing facility permit condition shall become effective on the date specified in the Department's written notice of approval of the permit modification, pursuant to title 22, Cal. Code Regs., sections 66270.42 and/or 66271.14.

G. Need to Halt or Reduce Activity

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

H. Severability

The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances and the remainder of this permit shall not be affected thereby.

I. Permit Expiration

In accordance with title 22, Cal. Code Regs., section 66270.51, this permit and all conditions therein will remain in effect beyond the permit expiration or termination date, until the effective date of a new permit, if the Permittee has submitted a timely and complete application (both Part A and Part B) for a new permit and, through no fault of the Permittee, the Department has not issued a new permit. In accordance with title 22, Cal. Code Regs., section 66270.10(h), a timely and complete application for a new permit shall be submitted at least 180 days before this permit expires, unless permission for a later date is granted in writing by the Department.

J. 24-Hour Reporting

The Permittee shall report to the Department any incidents of noncompliance, with the conditions of this permit and any of the provisions of title 22, Cal. Code Regs., division 4.5 or HSC, division 20, chapter 6.5, which may endanger health or the environment, pursuant to the reporting requirements in title 22, Cal. Code Regs., section 66270.30(l)(6).

K. Notice of Planned Physical Changes and Certification of Construction

The Permittee shall give notice to the Department as soon as possible, and, in any event, at least 30 days in advance of, any planned physical alterations or additions to the permitted facility. In addition, prior to commencement of the treatment, storage, or transfer of hazardous wastes at a new facility or modified portion of an existing facility, the Permittee shall comply with the requirements contained in title 22, Cal. Code Regs., section 66270.30(l)(2).

L. Operation at Night

When the facility is operated during hours of darkness, the Permittee shall provide sufficient lighting to ensure safe, effective management of hazardous wastes.

M. Part B Application (Operation Plan) of the Hazardous Waste Facility Permit Application

1. By the issuance of this permit, the Part B Permit Application dated February 28, 1991 and modified on May 31, 1991, July 12, 1991, February 19, 1992, August 20, 1992, November 4, 1992, December 28, 1992, January 15, 1993, March 13, 1993 and June 14, 1993, is hereby approved. This Part B Permit Application and any subsequent revisions thereto, subject to the permit modification requirements contained in title 22, Cal. Code Regs., sections 66270.41 and 66270.42, are by this reference made part of this permit.

2. The following permit modifications were made to Permit Condition II.M.:

   a. On November 29, 1993, the Department approved a Class 1 Permit Modification for administrative changes to the Part B as well as a facility name change.

   b. On October 16, 1995, under the direction of the Department, Teledyne revised the Part A Application to reflect the hazardous wastes stored in containers and tanks listed in Table III-1 and

Table III-2 of the Part B Application.

c. On February 2, 1996, the Department approved a Class 1 Permit Modification for the following: (1) change in the closure schedule, and (2) update the closure cost estimates.

d. On May 27, 1999, the Department approved a Class 2 Permit Modification for the following: (1) a closure plan entitled *Closure Plan Former Detonation Pit*, Revision 1, dated November 5, 1997, and (2) a remedy selection of corrective action for the lead contaminated soil in the vicinity of TSU-1.

e. Effective January 1, 1999, TSU-10 is no longer regulated pursuant to Health and Safety Code, Section 25143.13(c).

3. The Permittee shall operate and maintain the facility in accordance with the Part B Permit Application.

4. In the event of any conflict between this document and the Part B Permit Application, the most stringent provisions shall control.

5. The Part B Permit Application and this document shall be maintained at the facility and place of business at all times until closure is completed.

N. General Responsibilities of Operator

1. Compliance

The Permittee shall comply with all conditions of this permit in accordance with title 22, Cal. Code Regs., section 66270.30. The Permittee shall comply with all laws, regulations, permits, zoning conditions, and all other requirements established by federal, state, and local agencies.

2. Transfer of the Permit

This permit may be transferred to a new Permittee only if it is modified or revoked and reissued pursuant to title 22, Cal. Code Regs., section 66270.40. The Permittee shall notify the Standardized Permits and Corrective Action Branch Chief, in writing, of a proposed change in ownership of this facility no later than 90 days prior to the proposed date of transfer. A copy of the notification, required under title 22, Cal. Code Regs., section 66264.12(c), informing the new Permittee of the requirements of this permit and title 22, Cal. Code Regs., division 4.5, chapters 14 and 20, shall be submitted to the Department prior to the transfer.

3. Operation and Maintenance

   a. The Permittee shall at all times maintain and operate the facility to minimize the possibility of a fire, explosion, or any unplanned release of hazardous waste or hazardous waste constituents to air, soil, or surface water, which could threaten human health or the environment.

   b. The Permittee shall maintain all equipment, pipes, and lines used at the facility to handle, transfer, pump, or store hazardous wastes in a manner that prevents the leaking and spilling of hazardous wastes.

   c. The Permittee shall at all times properly operate and maintain all facilities and systems of treatment and control in accordance with title 22, Cal. Code Regs., section 66270.30(e).

4. Submittal of Requested Information

   The Permittee shall furnish to the Department, within the time specified by the Department in its request, any relevant information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The Permittee shall also furnish to the Department, upon request, within the time requested, copies of records required to be kept by this permit.

5. Hazardous Waste List

   The Permittee shall maintain a current list of hazardous wastes that are handled by the facility. The Permittee shall, as necessary, update the hazardous waste list presented in the approved Part B Permit Application, in accordance with the permit modification requirements contained in title 22, Cal. Code Regs., section 66270.42 (a), (b) or (c). Any additions to the list must be approved by the Department, in accordance with the requirements of title 22, Cal. Code Regs., sections 66270.41 and/or 66270.42, prior to their inclusion.

6. Anticipated Noncompliance

   The Permittee shall give advance notice to the Department of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements, in accordance with title 22, Cal. Code Regs., section 66270.30(l)(2).

7. Noncompliance

In the event of noncompliance with the permit, the Permittee shall take all reasonable steps to minimize or correct releases to the environment, and shall carry out all measures as are reasonable to prevent and correct adverse impacts on human health or the environment. The Permittee shall report to the Department and to the California Office of Emergency Services (800) 852-7550 any circumstances that may endanger public health or the environment immediately upon becoming aware of the incident.

8. Incomplete and/or Incorrect Information

Where the Permittee becomes aware that any relevant fact was not included in a permit application, or incorrect information was included in a permit application or in any report to the Department, the Permittee shall promptly correct the error or omission by submitting the correct information to the Department.

O. Signatory Requirement

1. The owner shall comply with the signatory requirements in title 22, Cal. Code Regs., section 66270.11, for all applications, reports or information submitted to the Department.

2. The Permittee shall provide documentation of an agreement for operation of the facility between the property owner and the facility owner, if different from the property owner.

P. Waste Minimization Certification

The Permittee shall certify annually, by March 1 for the previous year ending December 31, that:

1. The facility has a program in place to reduce the volume and toxicity of all hazardous wastes listed in Chapter III of the approved Part B Application, dated February 21, 1991 and modified on May 31, 1991, July 12, 1991, February 19, 1992, August 20, 1992, November 4, 1992, December 28, 1992, January 15, 1993, March 31, 1993 and June 14, 1993, which are generated by the facility operations to the degree, determined by the Permittee, to be economically practicable.

2. The method of storage, treatment, or disposal is the only practicable method or combination of methods currently available to the facility which minimizes the present and future threat to human health and the environment.

The Permittee shall make this certification, in accordance with title 22, Cal. Code Regs., section 66270.11. The Permittee shall submit the certification to the Standardized Permits and Corrective Action Branch Chief in the Berkeley office and shall record and maintain on-site such certification in the facility Operating Record.

Q. Waste Minimization Conditions

1. The Permittee shall comply with the Hazardous Waste Source Reduction and Management Review Act requirements that are specified in the HSC, sections 25244.19, 25244.20 and 25244.21, and any subsequent applicable statutes or regulations promulgated thereunder.

2. The Permittee shall submit a copy of all reviews, plans, plan summaries, reports and report summaries required by Section II.Q.1 above, to the Department's Standardized Permits and Corrective Action Branch Chief in the Berkeley office on or before September 1, 1995, and by September 1 every four years thereafter.

   The Standardized Permits and Corrective Action Branch Chief may require the Permittee to submit a more detailed status report explaining any deviation from, or changes to, the waste minimization plan.

3. The Permittee shall submit to the Standardized Permits and Corrective Action Branch Chief in the Berkeley office annually, by March 1, a report on the status of development, by the Permittee and others, and on the status of preliminary implementation by the Permittee of alternative treatment methods for the hazardous wastes which are treated at the facility by open burning/open detonation.

R. Recycling

The Permittee shall comply with the requirements for recyclable hazardous wastes specified in title 22, Cal. Code Regs., division 4.5, chapter 16.

S. Compliance Schedule

Within 180 days of the effective date of this permit, the Permittee shall submit an updated risk assessment which includes the activities approved in this permit.

III. SPECIAL CONDITIONS

A. Prohibition of Disposal

Hazardous wastes shall not be disposed of at the facility.

B. Identification of Permitted and Prohibited Waste

1. Permitted Wastes

a. Storage in Containers

i. This permit authorizes the Permittee to store in containers at the facility the hazardous wastes listed in Table III-1 of the approved Part B Permit Application as follows:

TABLE III-1

Container rage Area	Hazardous Wastes Stored	Secondary Containment Capacity	Liquid Waste Capacity	Maximum Number of 55-gallon * Waste Drums
Bay A	caustics, cyanides, sulfides, aqueous solutions	1,077 gallons	4,140 gallons	75
Bay B	halogenated hydrocarbons, non-flammable liquids, oxidizers, aqueous solutions, combustible liquids	1,025 gallons	3,650 gallons	66
Bay C	acids	1,025 gallons	3,330 gallons	60
Bay D	flammable liquids, reducing agents, metal catalysts, carbon, fuels, combustible liquids	1,077 gallons	3,100 gallons	54

* Containers of various sizes are handled by the facility.

ii. Containers holding hazardous wastes shall be stored only in TSU-3. The Permittee shall not store hazardous wastes exceeding the maximum inventory as specified above. The maximum inventory is based on double stacking of containers.

b. Storage in Tanks

This permit authorizes the Permittee to store hazardous waste in tanks in TSU-4 as follows:

TABLE III-2

Tank #	Maximum Storage Capacity (gallons)	Type of Tank	California Waste Code	EPA Waste Code
5038	5,000	Polyethylene	343, 135, 791	D001, D002
5040	5,000	Polyethylene	343, 135, 791	D001, D002
5042	10,000	Stainless Steel	343, 135, 791	D001, D002

The Permittee will follow the operational procedures set forth in section C.9, Chapter IV, of the approved Part B Permit Application when using tanks for storage of material other than hazardous waste.

c. Treatment in Miscellaneous Units

This permit authorizes the Permittee to treat hazardous waste in the following units:

i. TSU-6 A 300 gallon, glass-lined, reactor will be used for silver recovery with nitric acid and ammonium formate. Silver tubing containing explosives and expended photographic developing fluid will be treated in this unit. Silver will be dissolved into solution, the explosives will be filtered out, and then the silver will be removed from solution as silver flake. The filtered explosives will be stored in drums in the container storage area until they are burned in one of the burn units. This unit will treat up to 700 pounds per batch. This unit is vented through a venturi and a packed bed scrubber in series.

TSU-6 was closed in 1998. A closure report and certification dated September 10, 1998 for TSU-6 was submitted to the Department for review and approval. The Department did not review the closure report and certification prior to the Class 2 Permit Modification approval.

ii. TSU-7 When natural evaporation is not feasible, an electrically heated evaporator will be used to evaporate safety bucket water. The evaporator consists of a stainless steel drum with two thermostatically controlled electric heating belts. The unit is within secondary containment which is lined with polyurethane.

iii. TSU-8 Safety bucket water will be treated by natural evaporation in evaporation troughs. This water is generated when reactives are placed in water buckets for safe handling and to prevent ignition. This evaporator will treat approximately 3 gallons per day. The troughs are located within a polyurethane lined concrete dike. After treatment in this unit, the residue is moved to TSU-2 for burning.

iv. TSU-9 A 2,000 gallon, glass-lined reactor, R-5000, will be used for neutralization of reactivity by chemical oxidation and for neutralization of basic and acidic solutions. This unit will treat an average of 300 gallons per day by chemical oxidation and 3,000 gallons per day by neutralization.

v. TSU-10 A photographic silver recovery unit, consists of a systolic feed pump, two electrolytic silver recovery units, a flow meter, a tailings system feed tank, and two sealed silver recovery cylinders, all connected in series. This unit can remove silver from silver halide liquid at a rate of 34.5 gallons per day. Effective January 1, 1999, TSU-10 is no longer regulated under this Permit. Health and Safety Code, Section 25143.13(c) excludes onsite waste treatment activities for "silver only" hazardous wastes from regulatory requirements.

vi. Partial containers of two-part epoxy paints, potting compounds, adhesives and insulating materials are mixed and solidified according to the manufacturer's specifications. Quantities of one liter or less will be mixed at work stations. Quantities of greater than one liter will be transported to TSU-3 where they will be mixed and solidified.

The Permittee shall treat the following wastes subject to the terms of this permit and as described below:

TABLE III-3

Unit	Maximum Treatment Capacity	Type of waste Treated
TSU-6 (see Permit Condition III.B.1.c.i.)	700 pounds per batch	Silver tubing containing reactives, expended photographic developing fluids.
TSU-7	30 gallons per day	Safety Bucket Water
TSU-8	3 gallons per day*	Safety Bucket Water
TSU-9	3,000 gallons per day	Acidic and Basic Solutions
TSU-9	300 gallons per day	Reactive Solutions
TSU-10 (see Permit Condition III.B.1.c.v.)	34.5 gallons per day	Photographic Solutions Containing Silver
	200 gallons per year	Two-part Epoxy Paints, Potting Compounds, Adhesives and Insulating Materials

* Treatment is continuous. Any amount of waste may be added at anytime provided the unit maintains a freeboard of six inches.

d. Treatment of Energetic Wastes
Solids and liquids contaminated with reactive wastes are burned in two locations (TSU-1 and TSU-2) at the facility as described below. The liquid wastes are either solvent or water. The solid wastes are explosive devices, tubing filled with explosives, rags and wipes contaminated with explosives, and bulk explosives and propellants.

i. TSU-1 Solids, which include contaminated rags and tubing filled with explosives, are stacked in cement sewer pipes inside a wire cage and covered with a straw-like material made of cellulose and ignited by remote control. The solid burns last for approximately one hour. This unit burns a maximum of 500 pounds of solid waste per burn.

TSU-1 Some explosives are detonated in a pit near the solid burn unit. The explosives may be covered with water or dirt to minimize smoke and noise. The detonations take only a few seconds. Up to 500 pounds per day of explosive waste may be detonated in this unit. (Note: the detonation pit is scheduled to close in 1999)

ii. TSU-2 Liquid wastes, generally solvent or water contaminated with explosives, are burned in a double boiler system and are ignited electrically by remote control. The liquid burns last up to four hours. This unit burns a maximum of 300 gallons per burn.

The Permittee shall open burn or open detonate the following wastes subject to the terms of this permit and as described below:

Table III-4

Unit	Description of Waste	Calif. Waste Code	EPA Waste Code	Maximum Daily Capacity	Maximum Annual Quantity
TSU - 1	Solid Reactive Wastes (includes contaminated rags and wipes)	172, 181, 352, 791,	D001, D003, D008	500 pounds	20,000 pounds
TSU - 2	Liquid wastes * contaminated with reactives	213, 212, 214	U234, U105, U106, U160	300 gallons	86,100 pounds

* Only the following solvents and solvent/water mixture containing explosive waste particles shall be burned: Methanol, Isopropanol, Acetone, Tetrahydrofuran, Pyridine, Acetonitrile, Butyl Acetate, and Ethanol.

2. Prohibited Wastes

The facility shall not handle:

a. Any hazardous waste not listed in the Section III.B.1 (above) of this permit.

b. Any hazardous waste generated outside the premises of the facility.

C. Prohibited Activities

No construction related activity is allowed within a 90-foot radius of the burn unit without prior approval from the Department. **The burn unit is defined as two concrete cylinders mounted side-by-side on a 54-feet by 50-feet concrete slab foundation and surrounded by a metal framed expanded metal enclosure.** The area within a 90-foot radius of the burn unit currently consists of open space.

D. Authority to Construct

1. The Permittee may construct the following in accordance with the *Corrective Measures Study Final Report for Lead-Affected Soils RCRA Unit TSU-1, July 7, 1998, Revision 3.0*:

   a. Move the three sides of the existing soil berms **approximately** 15 feet out from the current locations.

   b. Extend the concrete slab from the current dimensions of 24 feet by 30 feet to 54 feet by 50 feet.

   c. Install a 15 feet by 25 feet concrete apron in the front of the burn unit with a loading ramp and entry gate.

   d. Install concrete perimeter walls on all four sides of the burn unit. The north and south walls will be 5 feet high. The east wall will be 8 feet high, and the west wall will be 6 feet high.

   ~~f~~e. Install a roof over the burn unit. The roof will cover an area 66 feet by 62 feet and will have a height of approximately 24 feet at the front (south) and 27 feet at the back (north).

2. The Permittee shall notify the Department of any deviations to the plans provided in the *Corrective Measures Study Final Report for Lead-Affected Soils RCRA Unit TSU-1, July 7, 1998, Revision 3.0* before the construction.

3. All structural modifications to the burn unit shall be reviewed and approved by the San Benito County Building Department.

4. Construction activities shall be conducted during normal working

hours, Monday through Friday, between 7 a.m. and 6 p.m.

5. The Permittee shall comply with Title 8, California Code of Regulations, on Lead in Construction Standards during the construction of the structural modifications. ~~The Permittee shall also monitor and sample the air for lead during the construction.~~

6. No later than thirty (30) calendar days after the approval of the Class 2 Permit Modification, the Permittee shall submit to the Department, a construction schedule for the burn unit.

7. No later than sixty (60) calendar days after the completion of Permit Condition III.D.1., the Permittee shall submit to the Department, as-built drawings that are certified by a civil or structural engineer registered in California.

8. No later than ninety (90) calendar days after the completion of Permit Condition III.D.1, the Permittee shall submit to the Department, a letter signed by the owner and/or operator and an independent civil or structural engineer registered in California that the structural designs of the burn unit have been constructed in accordance with Permit Condition III.D.1.a., b., c., d., **and** e.~~, and f.~~

E. Other Conditions

1. The Permittee shall collect soil samples in the vicinity of TSU-1 annually, by May 1 of each year. **Soil samples shall be collected in accordance with the *Corrective Measures Study Final Report for Lead-Affected Soils RCRA Unit TSU-1, July 7, 1998, Revision 3.0.***

2. Within forty-five (45) calendar days of soil collection in the vicinity of TSU-1, the Permittee shall submit to the Department a report detailing, at a minimum, the following:

   a. Interpretion of the analytical soil results; and

   b. Evaluation of the effects from the burn operations on the soil media.

3. The Permittee shall remediate the remaining lead contaminated soil in the vicinity of TSU-1 to meet closure performance standards of 22 CCR 662654.111 when operation of the burn unit ceases.

IV. CORRECTIVE ACTION

A. SUMMARY OF RFA FINDINGS/RESULTS

A RCRA Facility Assessment (RFA) was conducted and a report summarizing the findings was prepared by the California Department of Health Services, Toxic Substances Control Program in June 1991. The RFA found no indication of any historical activities that may have resulted in a release of hazardous waste to the environment. The RFA identifies 18 Solid Waste Management Units (SWMUs) as listed below. Section E states that no corrective action is needed at these units at this time. Sections F. through Q. describe the corrective action procedures that will go into affect if additional SWMUs, or contamination at existing SWMUs is identified.

SWMU 1	Lake Teledyne
SWMU 2	Surface Impoundment #1
SWMU 3	Surface Impoundment #2
SWMU 4	Plating Shop Waste Storage Tank
SWMU 5	Industrial Wastewater Screening Tank
SWMU 6	Silver Recovery Vessel
SWMU 7	Upper Drum Storage Area
SWMU 8	Hazardous Waste Storage Area #1
SWMU 9	Hazardous Waste Storage Area #2
SWMU 10	Unsymmetrical Dimethylhydrazine Storage
SWMU 11	Spray Field
SWMU 12	Hazardous Waste Storage Area #3
SWMU 13	Hazardous Waste Storage Area #4
SWMU 14	Thermal Oxidizer
SWMU 15	Surface Impoundment
SWMU 16	Old Burn Area
SWMU 17	Waste Solvent Open Burn Area
SWMU 18	Open Burn of Explosive Solids

A.1 For clarification purposes, SWMU 18 consists of a burn unit and a detonation pit, collectively known as TSU-1. The burn unit consists of two 10-foot diameter reinforced concrete cylinders mounted side-by-side on a 30-foot by 24-foot concrete slab foundation with a metal mesh cage enclosing the unit. The detonation pit is an unlined pit that measures approximately 20-feet in diameter and five feet deep.

B. DEFINITIONS

For purposes of this Corrective Action Schedule of Compliance the following definitions shall apply:

"Facility" means all contiguous property under the control of the

Permittee seeking a permit under title 22, Cal. Code Regs.

"Branch Chief" means the Branch Chief of the California Environmental Protection Agency, Department of Toxic Substances Control, Standardized Permits and Corrective Action Branch or his designee or authorized representative.

"Release" means any spilling, leaking, pouring, emitting, emptying, discharging, injecting, pumping, escaping, leaching, dumping, or disposing of hazardous wastes (including hazardous constituents) into the environment (including the abandonment or discarding of barrels, containers, and other closed receptacles containing hazardous wastes or hazardous constituents).

"Solid waste management unit" means any discernible unit at which solid wastes have been placed at any time, irrespective of whether the unit was intended for the management of solid or hazardous waste. Such units include any area at a facility at which solid wastes have been routinely and systematically released.

"Hazardous waste" means a solid waste, or combination of solid wastes, which because of its quantity, concentration, or physical, chemical, or infectious characteristics may cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, or disposed of, or otherwise managed. The term hazardous waste includes hazardous constituent as defined below.

"Hazardous constituent" means any constituent identified in Appendix IV of title 22, Cal. Code Regs., section 66261, or any constituent identified in Appendix IX of title 22, Cal. Code Regs., section 66264.

All references herein to Unit Numbers are found in RCRA Facility Assessment, Teledyne McCormick Selph, 3601 Union Road Hollister, California, California State Department of Health Services, Toxic Substances Control Program, Region 2, June 1991.

C. STANDARD CONDITIONS

1. Title 22, Cal. Code Regs., section 66264.100 requires that permits issued after July 1, 1991, address corrective action of all releases of hazardous wastes including hazardous constituents from any solid waste management unit (SWMU) at the facility, regardless of when the waste was placed in the unit.

2. Failure to submit the information required in this Corrective Action

Schedule of Compliance, or falsification of any submitted information, is grounds for termination of this Permit (title 22, Cal. Code Regs. section 66270.43). The Permittee shall ensure that all plans, reports, notifications, and other submissions to the Branch Chief required in this Corrective Action Schedule of Compliance are signed and certified in accordance with title 22, Cal. Code Regs., section 66270.11. Two (2) copies of these plans, reports, notifications or other submissions shall be submitted to the Branch Chief and sent by certified mail or hand delivered to:

Branch Chief
Standardized Permits and Corrective Action Branch
Department of Toxic Substances Control
700 Heinz Avenue, Suite 200
Berkeley, CA 94710

3. All plans and schedules required by the conditions of this Corrective Action Schedule of Compliance are, upon approval of the Branch Chief, incorporated into this Schedule of Compliance by reference and become an enforceable part of this Permit. Any noncompliance with such approved plans and schedules shall be termed noncompliance with this Permit. Extensions of the due dates for submittals may be granted by the Branch Chief in accordance with the permit modification processes under title 22, Cal. Code Regs., section 66270.41.

4. If the Branch Chief determines that further actions beyond those provided in this Corrective Action Schedule of Compliance, or changes to that which is stated herein, are warranted, the Branch Chief shall modify the Schedule of Compliance either according to procedures in Permit Condition IV.Q. of this Permit, or according to the permit modification processes under title 22, Cal. Code Regs., section 66270.41.

5. All raw data, such as laboratory reports, drilling logs, bench-scale or pilot-scale data, and other supporting information gathered or generated during activities undertaken pursuant to this Corrective Action Schedule of Compliance shall be maintained at the facility during the term of this Permit, including any reissued Permits.

D. REPORTING REQUIREMENTS

1. The Permittee shall submit to the Branch Chief signed quarterly progress reports of all activities conducted pursuant to the provisions of this Corrective Action Schedule of Compliance beginning no later than ninety (90) calendar days after the Permittee is first required to begin implementation of any requirement herein. These reports shall contain:

a. A description of the work completed;

b. Summaries of all findings, including summaries of laboratory data;

c. Summaries of all problems or potential problems encountered during the reporting period and actions taken to rectify problems; and

d. Projected work for the next reporting period.

2. Copies of other reports (e.g., daily reports, inspection reports), drilling logs and laboratory data shall be made available to the Branch Chief upon request.

3. As specified under Permit Condition IV.C.4., the Branch Chief may require the Permittee to conduct new or more extensive assessments, investigations, or studies, as needed, based on information provided in these progress reports or other supporting information.

E. CORRECTIVE ACTION REQUIREMENTS FOR EXISTING SWMUS

1. No corrective action for the SWMUs identified in Permit Condition IV.A. was required at the time this Permit was issued on July 28, 1993. However, the Department was notified by telephone of a newly-discovered release from SWMU 18 (TSU-1) on July 12, 1995. As a result of the notification, the corrective action requirements in Permit Condition IV of this permit were implemented for SWMU 18.

2. Subsequent RCRA Facility Investigations (RFI)of the soil and groundwater of TSU-1 revealed the following:

a. Analytical results of surface soil samples indicate the presence of lead at concentrations ranging from 4.4 to 15,000 mg/kg. Soil samples collected at 1.5 feet below ground surface (bgs) indicate concentrations of lead ranging from 4.3 to 27 mg/kg.

b. Past operations of the detonation pit did not impact groundwater at the Teledyne facility.

3. On May 10, 1996, the Department approved Teledyne's *Final Report, RCRA Facility Investigation (RFI), TSU-1, Teledyne Ryan Aeronautical, McCormick Selph Ordnance*, dated February 6, 1996. The approval of the RFI report was for the soil portion only.

4. On March 19, 1997, the Department terminated the corrective action process for the groundwater. Groundwater investigations of the detonation pit showed no impacts to groundwater.

5. On November 27, 1997, the Department approved a cleanup goal of 5,295 mg/kg for the lead contaminated soil in a risk assessment dated December 12, 1996. The cleanup goal is for an industrial setting.

6. On October 9, 1998, the Department determined that the *Corrective Measures Study Final Report for Lead-Affected Soils, Revision 3.0*, dated July 7, 1998, is technically complete.

7. Pursuant to Permit Condition IV.P., a remedy is selected for the lead contaminated soil and a Class 2 Permit Modification is initiated.

8. Remedy selection for the lead contaminated soil consists of the following:

   a. Soil containing lead concentrations greater than 5,259 mg/kg will be excavated and removed. Approximately 145 cubic yards of lead contaminated soil will be excavated. The contaminated soil will remain in the bins pending waste profiling results. Confirmation sampling will be performed to document that cleanup goals have been achieved. If the remediation area is found not to meet the cleanup criteria, additional soil removal will be performed as necessary and additional verification samples collected. Confirmation samples will be collected from an estimated removal area of 2,200 square feet. Following removal of the contaminated soil, clean soil as referenced in the *Corrective Measures Study Final Report for Lead-Affected Soils, Revision 3.0*, dated July 7, 1998, Section 6.4, Task 4 - Excavation Backfilling (page 21), will be placed as backfill.

   b. The burn unit will be structually modified to the following:

      i. Move the three sides of the existing soil berms approximately 15 feet out from the current locations.

      ii. Extend the concrete slab from the current dimensions of 24 feet by 30 feet to 54 feet by 50 feet.

      iii Install a 15 feet by 25 feet concrete apron in the front of the burn unit with a loading ramp and entry gate.

iv. Install concrete perimeter walls on all four sides of the burn unit. The north and south walls will be 5 feet high. The east wall will be 8 feet high, and the west wall will be 6 feet high.

v. Install a roof over the burn unit. The roof will cover an area 66 feet by 62 feet and will have a height of approximately 24 feet at the front (south) and 27 feet at the back (north).

c. Restrict construction activities within a 90-feet radius of the burn unit unless prior Department approval is obtained. **The burn unit is defined as two concrete cylinders mounted side-by-side on a 54-feet by 50-feet concrete slab foundation and surrounded by a metal framed expanded metal enclosure.**

F. NOTIFICATION REQUIREMENTS FOR AND ASSESSMENT OF NEWLY-IDENTIFIED SOLID WASTE MANAGEMENT UNIT(S)

1. The Permittee shall notify the Branch Chief in writing of any newly-identified SWMU(s), not specifically identified during the RFA and listed in Section A, discovered during the course of groundwater monitoring, field investigations, environmental audits, or other means, no later than fifteen (15) calendar days after discovery.

2. After such notification, the Branch Chief may request, in writing, that the Permittee prepare a Solid Waste Management Unit (SWMU) Assessment Plan and a proposed schedule of implementation and completion of the Plan for any additional SWMU(s) discovered subsequent to the issuance of this Permit.

3. Within fifteen (15) calendar days after receipt of the Branch Chief's request for a SWMU Assessment Plan, the Permittee shall prepare a SWMU Assessment Plan for determining past and present operations at the unit, as well as any sampling and analysis of ground water, land surface and subsurface strata, surface water or air, as necessary to determine whether a release of hazardous waste including hazardous constituents from such unit(s) has occurred, is likely to have occurred, or is likely to occur. The SWMU Assessment Plan must demonstrate that the sampling and analysis program, if applicable, is capable of yielding representative samples and must include parameters sufficient to identify migration of hazardous waste including hazardous constituents from the newly discovered SWMU(s) to the environment.

4. After the Permittee submits the SWMU Assessment Plan, the Branch Chief shall either approve or disapprove the Plan in writing.

   If the Branch Chief approves the Plan, the Permittee shall begin to implement the Plan within fifteen (15) calendar days of receiving such written notification.

   If the Branch Chief disapproves the Plan, the Branch Chief shall either (1) notify the Permittee in writing of the Plan's deficiencies and specify a due date for submittal of a revised Plan, or (2) revise the Plan and notify the Permittee of the revisions. This Branch Chief-revised Plan becomes the approved SWMU Assessment Plan. The Permittee shall implement the Plan within fifteen (15) calendar days of receiving written approval.

5. The Permittee shall submit a SWMU Assessment Report to the Branch Chief no later than fifteen (15) calendar days from completion of the work specified in the approved SWMU Assessment Plan. The SWMU Assessment Report shall describe all results obtained from the implementation of the approved SWMU Assessment Plan. At a minimum, the Report shall provide the following information for each newly identified SWMU:

   a. The location of the newly-identified SWMU in relation to other SWMUs;

   b. The type and function of the unit;

   c. The general dimensions, capacities, and structural description of the unit (supply any available drawings);

   d. The period during which the unit was operated;

   e. The specifics on all wastes that have been or are being managed at the SWMU, to the extent available; and

   f. The results of any sampling and analysis required for the purpose of determining whether releases of hazardous wastes including hazardous constituents have occurred, are occurring, or are likely to occur from the unit.

6. Based on the results of this Report, the Branch Chief shall determine the need for further investigations at specific unit(s) covered in the SWMU Assessment. If the Branch Chief determines that such investigations are needed, the Branch Chief may require the Permittee to prepare a plan for such investigations. This plan will be reviewed for approval as part of the RCRA Facility Investigation

(RFI) Workplan under Permit Condition IV.H.1.

G. NOTIFICATION REQUIREMENTS FOR NEWLY-DISCOVERED RELEASES AT SWMUS

The Permittee shall notify the Branch Chief, in writing, of any release(s) of hazardous waste including hazardous constituents discovered during the course of ground-water monitoring, field investigation, environmental auditing, or other activities undertaken after the commencement of the RFI, no later than fifteen (15) calendar days after discovery. Such newly-discovered releases may be from newly-identified units, from units for which, based on the findings of the RFA, the Branch Chief had previously determined that no further investigation was necessary, or from units investigated as part of the RFI. The Branch Chief may require further investigation of the newly-identified release(s). A plan for such investigation will be reviewed for approval as part of the RFI Workplan under Permit Condition IV.H.1.

H RCRA FACILITY INVESTIGATION (RFI) WORKPLAN

1. On or before thirty (30) calendar days after a request by the Branch Chief, the Permittee shall submit a Workplan to the Branch Chief to address those units, releases of hazardous waste including hazardous constituents, and media of concern which require further investigation.

   a. The Workplan shall describe the objectives of the investigation and the overall technical and analytical approach to completing all actions necessary to characterize the nature, direction, rate, movement, and concentration of releases of hazardous waste including hazardous constituents from specific units or groups of units, and their actual or potential receptors. The Workplan shall detail all proposed activities and procedures to be conducted at the facility, the schedule for implementing and completing such investigations, the qualifications of personnel performing or directing the investigations, including contractor personnel, and the overall management of the RFI.

   b. In addition, the Workplan shall discuss sampling and data collection quality assurance and data management procedures, including formats for documenting and tracking data and other results of investigations, and health and safety procedures.

2. After the Permittee submits the Workplan, the Branch Chief will either approve or disapprove the Workplan in writing. If the Branch Chief disapproves the Workplan, the Division Branch Chief shall either (1) notify the Permittee in writing of the Workplan's deficiencies and specify a due date for submittal of a revised Plan,

or (2) revise the Workplan and notify the Permittee of the revisions. This modified Workplan becomes the approved RFI Workplan.

3. The Branch Chief shall review for approval as part of the RFI Workplan any plans developed pursuant to Permit Condition IV.F.6., addressing further investigations of newly-identified SWMUs, or Section IV.G., addressing new releases from previously-identified units. The Branch Chief shall modify the Schedule of Compliance either according to procedures in Section IV.Q. of this Permit, or according to the permit modification procedures under 22 CCR 66270.41, to incorporate these units and releases into the RFI Workplan.

I. RCRA FACILITY INVESTIGATION WORKPLAN IMPLEMENTATION

No later than fifteen (15) calendar days after the Permittee has received written approval from the Branch Chief for the RFI Workplan, the Permittee shall begin implementation of the RCRA Facility Investigation according to the schedules specified in the RFI Workplan. Pursuant to Permit Condition IV.C.3., the RFI shall be conducted in accordance with the approved RFI Workplan.

J. RCRA FACILITY INVESTIGATION FINAL REPORT AND SUMMARY REPORT

1. Within sixty (60) calendar days after the completion of the RFI, the Permittee shall submit an RFI Final Report and Summary Report. The RFI Report shall describe the procedures, methods, and results of all facility investigations and their releases, including information on the type and extent of contamination at the facility, sources and migration pathways, and actual or potential receptors. The RFI Final Report shall present all information gathered under the approved RFI Workplan. The Final Report must contain adequate information to support further corrective action decisions at the facility. The Summary Report shall describe more briefly the procedures, methods, and results of the RFI.

2. After the Permittee submits the RFI Final Report and Summary Report, the Branch Chief shall either approve or disapprove the Reports in writing.

If the Branch Chief approves the RFI Report and Summary Report, the Permittee shall mail the approved Summary Report to all individuals on the facility mailing list established pursuant to title 22, Cal. Code Regs., section 66124.10(c)(1)(viii), within fifteen (15) calendar days of receipt of approval.

If the Branch Chief determines the RFI Final Report and Summary

Report do not fully detail the objectives stated under Permit Condition IV.H.1., the Branch Chief may disapprove the RFI Final Report and Summary Report. If the Branch Chief disapproves the Reports, the Branch Chief shall notify the Permittee in writing of the Reports' deficiencies and specify a due date for submittal of a revised Final and Summary Report. The Summary Report, once approved, shall be mailed to all individuals on the facility mailing list.

K. INTERIM MEASURES

1. If, during the course of any activity initiated under this Corrective Action Schedule of Compliance, the Branch Chief determines that a release or potential release of hazardous waste including hazardous constituents from a SWMU poses a threat to human health and the environment, the Branch Chief may specify interim measures. The Branch Chief shall determine the specific action(s) that must be taken to implement the interim measure, including potential permit modifications and the schedule for implementing the required measures. The Branch Chief shall notify the Permittee in writing of the requirement to perform such interim measures. The Branch Chief shall modify the Corrective Action Schedule of Compliance either according to procedures in Section IV.Q. of this Permit, or according to the permit modification procedures under title 22, Cal. Code Regs., section 66270.41, to incorporate such interim measures into the Permit.

2. The following factors may be considered by the Branch Chief in determining the need for interim measures:

   a. Time required to develop and implement a final remedy;

   b. Actual and potential exposure of human and environmental receptors;

   c. Actual and potential contamination of drinking water supplies and sensitive ecosystems;

   d. The potential for further degradation of the medium absent interim measures;

   e. Presence of hazardous waste in containers that may pose a threat of release;

   f. Presence and concentration of hazardous waste including hazardous constituents in soils that have the potential to migrate to ground water or surface water;

g. Weather conditions that may affect the current levels of contamination;

h. Risks of fire, explosion, or accident; and

i. Other situations that may pose threats to human health and the environment.

L. CORRECTIVE MEASURES STUDY PLAN

1. If the Branch Chief determines that the contaminants pose a threat to human health and the environment given site-specific exposure conditions, the Branch Chief may require a Corrective Measures Study (CMS) and shall notify the Permittee in writing. This notice shall identify the hazardous constituent(s) which have exceeded action levels as well as those which have been determined to threaten human health and the environment given site-specific exposure conditions. The notification may also specify remedial alternatives to be evaluated by the Permittee during the CMS.

2. The Permittee shall submit a CMS Plan to the Branch Chief within forty-five (45) calendar days from notification of the requirement to conduct a CMS.

   The CMS Plan shall provide the following information:

   a. A description of the general approach to investigating and evaluating potential remedies;

   b. A definition of the overall objectives of the study;

   c. The specific plans for evaluating remedies to ensure compliance with remedy standards;

   d. The schedules for conducting the study; and

   e. The proposed format for the presentation of information.

3. If the Branch Chief disapproves the CMS Plan, the Branch Chief shall either (1) notify the Permittee in writing of the Plan's deficiencies and specify a due date for submittal of a revised Plan, or (2) revise the Plan and notify the Permittee of the revisions. This modified Plan becomes the approved CMS Plan.

M. CORRECTIVE MEASURES STUDY IMPLEMENTATION

No later than fifteen (15) calendar days after the Permittee has received written approval from the Branch Chief for the CMS Plan, the Permittee shall begin to implement the ~~C~~orrective Measures Study according to the schedules specified in the CMS Plan. Pursuant to Permit Condition IV.C.3, the CMS shall be conducted in accordance with the approved Plan.

N. CORRECTIVE MEASURES STUDY FINAL REPORT

1. Within sixty (60) calendar days after the completion of the CMS, the Permittee shall submit a CMS Final Report. The CMS Final Report shall summarize the results of the investigations for each remedy studied and of any bench-scale or pilot tests conducted. The CMS Report must include an evaluation of each remedial alternative. The CMS Report shall present all information gathered under the approved CMS Plan. The final report must contain adequate information to support the Branch Chief in the remedy selection decision-making process, described under Section IV.O. of the Corrective Action Schedule of Compliance.

2. If the Branch Chief determines that the CMS Final Report does not fully satisfy the information requirements specified under Permit Condition IV.L.2., the Branch Chief may disapprove the CMS Final Report. If the Branch Chief disapproves the Final Report, the Branch Chief shall notify the Permittee in writing of deficiencies in the Report and specify a due date for submittal of a revised Final Report.

3. As specified under Permit Condition IV.C.4., based on preliminary results and the final CMS report, the Branch Chief may require the Permittee to evaluate additional remedies or particular elements of one or more proposed remedies.

O. REMEDY SELECTION

1. Based on the results of the CMS and any further evaluations of additional remedies under this study, the Branch Chief shall select a remedy from the remedial alternatives evaluated in the CMS that will (1) be protective of human health and the environment; (2) meet the concentration levels of hazardous constituents in each medium that the remedy must achieve to be protective of human health and the environment; (3) control the source(s) of release(s) so as to reduce or eliminate, to the maximum extent practicable, further releases that might pose a threat to human health and the environment; and (4) meet all applicable waste management requirements.

2. In selecting the remedy which meets the standards for remedies established under Permit Condition IV.O.1., the Branch Chief shall consider the following evaluation factors, as appropriate:

a. Long-term reliability and effectiveness. Any potential remedy(s) may be assessed for the long-term reliability and effectiveness it affords, along with the degree of certainty that the remedy will prove successful. Factors that shall be considered in this evaluation include:

i. Magnitude of residual risks in terms of amounts and concentrations of waste remaining following implementation of a remedy, considering the persistence, toxicity, mobility and propensity to bioaccumulate of such hazardous wastes including hazardous constituents;

ii. The type and degree of long-term management required, including monitoring and operation and maintenance;

iii Potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, redisposal or containment;

iv. Long-term reliability of the engineering and institutional controls, including uncertainties associated with land disposal of untreated wastes and residuals; and

v. Potential need for replacement of the remedy.

b. Reduction of toxicity, mobility, and volume. A potential remedy(s) may be assessed as to the degree to which it employs treatment that reduces toxicity, mobility or volume of hazardous wastes including hazardous constituents. Factors that shall be considered in such assessments include:

i. The treatment processes the remedy(s) employs and materials it would treat;

ii. The amount of hazardous wastes including hazardous constituents that would be destroyed or treated;

iii The degree to which the treatment is irreversible; and

iv The residuals that will remain following treatment, considering the persistence, toxicity, mobility and propensity to bioaccumulate of such hazardous wastes including hazardous constituents.

c. The short-term effectiveness of a potential remedy(s) may be assessed considering the following:

i. Magnitude of reduction of existing risks;

ii. Short-term risks that might be posed to the community, workers, or the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and redisposal or containment; and

iii Time until full protection is achieved.

d. Implementability. The ease or difficulty of implementing a potential remedy(s) may be assessed by considering the following types of factors:

i. Degree of difficulty associated with constructing the technology;

ii. Expected operational reliability of the technologies;

iii Need to coordinate with and obtain necessary approvals and permits from other agencies;

iv. Availability of necessary equipment and specialists; and

v. Available capacity and location of needed treatment, storage and disposal services.

e. Cost. The types of costs that may be assessed include the following:

i. Capital costs;

ii. Operation and maintenance costs;

iii Net present value of capital and operation and maintenance costs; and

iv. Potential future remedial action costs.

P. PERMIT MODIFICATION FOR REMEDY

1. Based on information the Permittee submits in the RFI Final and Summary Reports, the CMS Final Report, and other information, the Branch Chief will select a remedy and initiate a major permit modification to this Permit, pursuant to title 22, Cal. Code Regs., section 66270 Subpart D.

The modification shall specify the selected remedy and include, at a minimum, the following:

a. Description of all technical features of the remedy that are necessary for achieving the standards for remedies established under Permit Condition IV.O.1., including length of time for which compliance must be demonstrated at specified points of compliance;

b. All concentration levels of hazardous constituents in each medium that the remedy must achieve to be protective of human health and the environment;

c. All requirements for achieving compliance with these concentration levels;

d. All requirements for complying with the standards for management of wastes;

e. Requirements for removal, decontamination, closure, or post-closure of units, equipment, devices or structures that will be used to implement the remedy;

f. A schedule for initiating and completing all major technical features and milestones of the remedy; and

g. Requirements for submission of reports and other information.

2. Within one hundred and twenty (120) calendar days after this Permit has been modified, the Permittee shall demonstrate financial assurance for completing the approved remedy.

Q. MODIFICATION OF THE CORRECTIVE ACTION SCHEDULE OF COMPLIANCE

1. If at any time the Branch Chief determines that modification of the Corrective Action Schedule of Compliance is necessary, he or she may initiate a modification to the Schedule of Compliance according to the procedures of this Section. If the Branch Chief initiates a modification, he or she shall:

a. Notify the Permittee in writing of the proposed modification and the date by which comments on the proposed modification must be received; and

b. Publish a notice of the proposed modification in a locally distributed newspaper, mail a notice to all persons on the facility mailing list maintained according to title 22, Cal.

Code Regs., section 66124.10(c)(1)(viii), and place a notice in the facility's information repository (i.e., a central source of all pertinent documents concerning the remedial action, usually maintained at the facility or some other public place, such as a public library, that is accessible to the public) if one is required.

i. If the Branch Chief receives no written comment on the proposed modification, the modification shall become effective five (5) calendar days after the close of the comment period.

ii. If the Branch Chief receives written comment on the proposed modification, the Branch Chief shall make a final determination concerning the modification after the end of the comment period.

c. Notify the Permittee in writing of the final decision.

i. If no written comment was received, the Branch Chief shall notify individuals on the facility mailing list in writing that the modification has become effective and shall place a copy of the modified Corrective Action Schedule of Compliance in the information repository, if a repository is required for the facility.

ii. If written comment was received, the Branch Chief shall provide notice of the final modification decision in a locally distributed newspaper and place a copy of the modified Corrective Action Schedule of Compliance in the information repository, if a repository is required for the facility.

2. Modifications that are initiated and finalized by the Branch Chief according to this procedure shall not be subject to administrative appeal.

3. Modifications to the Corrective Action Schedule of Compliance do not constitute a reissuance of the Permit.

<u>Appendix 8</u>

2000, DHS

Water Supply Permit

(1 page)

STATE OF CALIFORNIA

DEPARTMENT OF HEALTH SERVICES

Water Supply Permit

The State Department of Health Services Hereby Grants Permission To

MCCORMICK SELPH, INC.

To Furnish or Supply Water for Domestic Purposes To

MCCORMICK SELPH, INC.

This Permit Becomes Effective **February 18, 2000**

and is granted subject to the provisions of the California Safe Drinking Water Act of the Health and Safety Code of the State of California and the Department of Health Services letter of **February 18, 2000**.

THE GREAT SEAL OF THE STATE OF CALIFORNIA
EUREKA

Water Permit No. 02-05-00P-3500563

Supervising Sanitary Engineer
North Coastal Region
Drinking Water Field Operations Branch

Appendix 8

2013, CRWQCB

Cleanup & Abatement Order (Teledyne/Allegheny Technologies)

(4 pages)

December 18, 2013

Mr. Mark Thomasen
Environmental Manager
Allegheny Technologies Incorporated
48 Prestbury Square Building, Suite 18
Newark, DE 19713
Mark.Thomasen@ATImetals.com

Dear Mr. Thomasen:

SITE CLEANUP PROGRAM: FORMER McCORMICK SELPH FACILITY, 3601 UNION ROAD, HOLLISTER, SAN BENITO COUNTY – CLEANUP AND ABATEMENT ORDER NO. RB3-2013-0019 AMENDMENT, AND REVIEW OF WATER SUPPLY WELL INVESTIGATION REPORT AND INTERIM CONCEPTUAL SITE MODEL

Central Coast Regional Water Quality Control Board (Water Board) staff reviewed the October 23, 2013 *Water Supply Well Investigation Report and Interim Conceptual Site Model* (Report) prepared by Arcadis on behalf of TDY Industries, Inc. (TDY). TDY prepared this Report in accordance with the following:

- May 29, 2013 *Water Supply Well Investigation Work Plan* (Work Plan);
- Cleanup and Abatement Order (CAO) No. R3-2013-0019;
- July 23, 2013 email from Diane Kukol of my staff to Erica Kalve of Arcadis, in which Ms. Kukol agreed to TDY's/Arcadis' July 16, 2013 email extension request to submit the Supply Well Investigation Report by September 15, 2013[1]; and
- September 10, 2013 conference call between Water Board staff and personnel from Arcadis and TDY, during which Water Board staff agreed to TDY's second extension request to submit the Supply Well Investigation Report by October 23, 2013[2].

Please note that any future approvals for extension of, or relief from, requirement due dates (including, but not limited to CAO requirements) will only be in the form of letters signed by the Assistant Executive Officer or those delegated with this authority. This practice will provide all

[1] Task 2.a in CAO No. R3-2013-0019 indicated TDY was required to implement the *Water Supply Investigation Work Plan* (including submitting the Supply Well Investigation Report) by August 15, 2013. Based on field conditions and the extended length of time the investigation took to complete, TDY initially requested extending the Supply Well Investigation Report due date from August 15 to September 15, 2013.

[2] TDY requested a second extension of the Supply Well Investigation Report to October 23, 2013 to incorporate a significant amount of information learned from both the supply well investigation and the concurrent interim cleanup action downgradient of the Former Thermal Destruct Facility. Water Board staff concurred with TDY/Arcadis that both extensions were based on conditions that neither TDY nor Water Board staff anticipated at the time the Water Supply Investigation Work Plan and CAO No. R3-2013-0019 were prepared. Therefore, Water Board staff did not pursue enforcement actions for either change to the August 15, 2013 due date included in CAO No. R3-2013-0019.

parties with clear and appropriate documentation of the changes to requirements and/or due dates.

In the Work Plan, TDY identified the following objectives of the Water Supply Well Investigation:

- Vertical delineation of perchlorate in groundwater in the vicinity of onsite supply well W-1;
- Evaluation of the lateral extent of perchlorate in the vicinity of W-1;
- Evaluation of whether W-1's operation enhanced the transport of perchlorate in the subsurface; and
- Evaluation of natural attenuation processes in the W-1 vicinity.

The Report states that, "*. . . these objectives were generally achieved but additional information is necessary to (1) evaluate perchlorate concentrations in groundwater upgradient from well W-1, and (2) verify the source area associated with perchlorate observed in the vicinity of well W-1*." Water Board staff concurs with this statement and supports TDY's recommendation to conduct a supplemental investigation to address these data gaps. Water Board staff understands the supplemental investigation will also assess the extent of the 1,000 micrograms per liter (µg/L) contour in the Phase 1 Interim Action groundwater treatment area between the Former Thermal Destruct Treatment Area and Lake Teledyne.

Cleanup and Abatement Order Amendment

CAO No. R3-2013-0019 directs TDY to investigate and remediate perchlorate in the W-1 vicinity in a step-wise approach. This approach requires TDY to submit a Water Supply Well Investigation Work Plan, a Supply Well Investigation Report, a Supply Well Feasibility Study (FS) 60 days after Assistant Executive Officer (AEO) approval of the Supply Well Investigation Report, and a Supply Well Remedial Action Plan (RAP) 60 days after AEO approval of the FS. Pursuant to CAO No. R3-2013-0019, TDY submitted the Work Plan and Report; however, data gaps identified during the supply well investigation dictate the need for a second phase of investigation in the W-1 vicinity. Therefore, Water Board staff must modify CAO No. R3-2013-0019 to incorporate TDY's recommended supplemental investigation work plan, the supplemental investigation itself, and the corresponding change to FS and RAP requirements. Therefore, CAO No. R3-2013-0019 Ordering Section C.2 is modified with the following text:

2. ONSITE WATER SUPPLY WELL

b. Supplemental Water Supply Well Investigation Work Plan (SWP)
Due Date: December 20, 2013

TDY must obtain Water Board staff concurrence with the SWP and implementation schedule before initiating the scope of work included in the SWP. TDY must request proposed changes to specific elements of the SWP (including the schedule) in writing to Water Board staff at least 30 days prior to initiating the desired change; the Assistant Executive Officer must approve the requested modification prior to implementation.

c. Supplemental Supply Well Investigation Report (SSWIR)
***Due Date:* 60 days after completion of the SWP activities**.

TDY must submit a SSWIR documenting implementation of tasks included in the SWP. At a minimum, the SSWIR must include the following:

- *Soil boring/lithologic logs for new borings and grab groundwater samples (if appropriate), and well construction information for new and existing monitoring wells pertinent to the W-1 vicinity investigation.*
- *Historic and new analytical results for soil, groundwater, and Lake Teledyne sampling (if appropriate), as well as water elevation data. TDY must present all information in a tabular format.*
- *Perchlorate concentration contour maps for soil and groundwater in all water-bearing zones (i.e., upper and lower alluvial deposits and the Purisima Formation).*
- *Geologic cross-sections of the areas addressed in the SWP, including stratigraphy and perchlorate concentrations.*
- *Determination/confirmation of groundwater flow directions and gradients on the western side of the McCormick Selph Facility (Facility) property in the upper and lower alluvial deposits, as well as the Purisima Formation[3].*
- *Determination of the perchlorate plume extent in the lateral and vertical directions (including the leading edge) in the W-1 vicinity.*
- *Identification of all potential sources of perchlorate in the W-1 vicinity including a short-lived former burn area south of TSU-2 and evaluation of those potential sources as contributors to perchlorate detected in W-1 and the AUS-5, AUS-6, AUS-7, and AUS-8 monitoring well clusters.*
- *An updated conceptual site model as supported by new and existing data.*

It is acceptable for TDY to include the Supply Well Feasibility Study (see Task 2.d, below) with this SSWIR.

d. ***Supply Well Feasibility Study (SWFS)***
Due Date: 60 days after Assistant Executive Officer approval of the Supplemental Supply Well Investigation Report.

TDY must submit a SWFS that includes a recommendation for a cleanup scenario(s) that addresses soil and groundwater containing perchlorate identified and/or confirmed in implementation of the SWP. It is acceptable for TDY to use the results of the onsite enhanced in situ bioremediation actions to conduct a focused FS with limited cleanup alternatives, if appropriate. At a minimum, the FS shall include the elements listed in Attachment 8.

(Attachment 8 in CAO No. R3-2013-0019 is unchanged.)

e. ***Supply Well Remedial Action Plan (SWRAP)***
Due Date: 60 days after Assistant Executive Officer approval of the SWFS

(Remaining text for this section is consistent with Section C.2.c text in CAO No. R3-2013-0019.)

f. ***Implementation of the SWRAP***

[3] *TDY states in the October 23, 2013 Report that "Downgradient from the lake . . . the leading edge of the perchlorate plume is in the Purisima Formation." However, until the first phase of the Water Supply Well Investigation, TDY had not collected data to support conclusions about groundwater flow directions and gradients in all strata of concern west of Lake Teledyne.*

Due Date: In accordance with the schedule in Task 2.e (in the SWRAP), as approved by the Assistant Executive Officer

(Remaining text for this section is consistent with Section C.2.d text in CAO No. R3-2013-0019.)

Legal Requirements

Pursuant to Sections 13267 and 13304 of the California Water Code, TDY and its agents must complete cleanup and abatement of degraded soil and groundwater at and near the Facility as described in CAO No. R3-2013-0019, and as amended in this letter.

Pursuant to Section 13350 of the Water Code, a violation of a cleanup order pursuant to Water Code Section 13304 may subject you to civil liability of up to $5,000 per day for each day in which the violation occurs.

Any person affected by this action of the Water Board may petition the State Water Resources Control Board (State Board) to review the action in accordance with Section 13320 of the California Water Code and Title 23, California Code of Regulations, Section 2050. The petition must be received by the State Board, Office of Chief Counsel, P. O. Box 100 Sacramento, 95812 within 30 days of the date of this order. Copies of the law and regulations applicable to filing petitions will be provided upon request.

If you have questions, please contact **Diane Kukol at (805) 542-4637** or **dkukol@waterboards.ca.gov,** or Thea Tryon at (805) 542-4776 or ttryon@waterboards.ca.gov.

Sincerely,

Digitally signed by John M. Robertson
DN: cn=John M. Robertson, o=Central Coast Regional Water Quality Control Board, ou, email=jrobertson@waterboards.ca.gov, c=US
Date: 2013.12.18 09:39:17 -08'00'

for Michael J. Thomas
Assistant Executive Officer

\\Seadog\vol1\Mgmt\Seniors\Shared\SCP\SITES\San Benito Co\3601 Union Rd. (Former McCormick Selph)\Supply Wells\SWInvestRpt_Comm_120313.docx

cc:

Mr. Edgard Bertaut
Edgard.Bertaut@ATImetals.com

Ms. Lauren McAndrews
Lauren.McAndrews@ATImetals.com

Ms. Erica Kalve, Arcadis U.S., Inc.
Erica.Kalve@arcadis-us.com

Mr. Charles F. Martin
Pacific Scientific Energetic Materials Company, Inc.
cmartin@psemc.com

Ms. Diane Kukol
Central Coast Water Board
Diane.Kukol@waterboards.ca.gov

Ms. Kendall Stahl
Central Coast Water Board – GeoTracker - File
Kendall.stahl@waterboards.ca.gov

<u>Appendix 8</u>

1999, CRWQCB

Monitoring & Reporting Program/Waste Discharge Requirements

(13 pages)

California Regional Water Quality Control Board
Central Coast Region

inston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www swrcb ca.gov/~rwqcb3
81 Higuera Street, Suite 200, San Luis Obispo, California 93401-5427
Phone (805) 549-3147 • FAX (805) 543-0397

Gray Davis
Governor

November 4, 1999

Charlie Martin
McCormick Selph, Inc.
P.O. Box 6
Hollister, CA 95023-0006

REVISED MONITORING AND REPORTING PROGRAM; MCCORMICK SELPH, INC., SAN BENITO COUNTY (ORDER NO. 99-78)

Dear Mr. Martin:

Review of the recently adopted Waste Discharge Requirements Order No. 99-78 for the above named facility revealed discrepancies in the due date for the annual report. The second to last paragraph on Page 3 of the Monitoring and Reporting Program states, in part, "The discharger shall submit an annual report to this Regional Board by January 15 of each year." However, the table on Page 2, which details report due dates, indicates the annual report should be submitted in February. **The correct submittal date for the annual report is February 1 of each year.** A revised copy of the Monitoring and Reporting Program is included with this letter.

In addition, for further clarification, quarterly report due dates are the first day of the second month following the end of the quarter. For example, for the quarter of January-March, the report is due May 1st, allowing one month beyond the end of the quarter to compile and submit the report. Based on conversations with you, this was unclear in the Monitoring and Reporting Program, and we apologize for the confusion.

Questions regarding this matter may be directed to **Matthew Fabry at (805) 549-3458** or Vern Jones at (805) 542-4629.

Sincerely,

Vernon L Jones
for Roger W. Briggs
Executive Officer

S:\northern\matt\teledyne\MRP Revision Letter doc
ncl: Revised Monitoring and Reporting Program 99-78
File: Discharger. McCormick Selph, Inc (formerly Teledyne)
Task: 121-01

Winston H. Hickox
Secretary for Environmental Protection

California Regional Water Quality Control Board
Central Coast Region

Internet Address: http://www swrcb ca.gov/~rwqcb3
81 Higuera Street, Suite 200, San Luis Obispo, California 93401-5427
Phone (805) 549-3147 • FAX (805) 543-0397

Gray Davis
Governor

September 17, 1999

CERTIFIED: P 031 350 014

Charles F. Martin
Teledyne Ryan Aeronautical
Environmental Affiars
P. O. Box 6
Hollister, CA 95023-0006

Dear Mr. Martin:

REVISED WASTE DISCHARGE REQUIREMENTS, ORDER NO. 99-78, McCORMICK SELPH INC., SAN BENITO COUNTY

Enclosed is a copy of updated Waste Discharge Requirements, Order No. 99-78, McCormick Selph Inc., San Benito County.

If you need further assistance, please call **Howard Kolb at 805/549-3332**.

Sincerely,

for Paul Jagger
Roger W. Briggs
Executive Officer

Enclosure

RWQCB-9 (10/97)

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
CUSTOMER SERVICE SURVEY

Our goal is to provide you with the best possible service and your input is vital to our success. Please help us serve you and others better by taking a few minutes to answer the questions below. Thank you for responding.

PETER M. ROONEY, Secretary for Environmental Protection

SERVICE PROVIDER: **Regional Water Quality Control Board (San Luis Obispo)**

What was the nature of your contact with us? (Please check only one box)

☐ General Information ☐ Problem Resolution ☐ Technical Assistance

☐ Permitting/Licensing Assistance ☐ Registration Assistance ☐ Other: ____________

STATEMENTS	*Check (✓) As Appropriate*			
	Strongly Agree	*Agree*	*Disagree*	*Strongly Disagree*
Staff was courteous and helpful.				
Staff provided complete, accurate information to you.				
A timely response was provided.				
My overall experience was positive.				
Please complete the section below if your contact with us involved permitting/licensing/registration assistance.				
The regulations were understandable.				
The application instructions were understandable.				
The permit/license/registration terms and conditions were understandable.				

♦ Please indicate any staff person you would like to commend: ______________________
Name(s)

♦ Comments:

♦ If you feel we fell short in meeting your service expectations, please describe the situation, including name of the staff person involved and the date the incident occurred.

♦ As a result of your experience with us, what service-related improvements can you recommend?

☞ Please fold this survey in thirds, staple/tape, and mail. Postage will be paid by Cal/EPA.

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

81 Higuera Street, Suite 200
San Luis Obispo, California 93401-5427

WASTE DISCHARGE REQUIREMENTS ORDER NO. 99-78

Waste Discharger Identification No. 3 352006001

For

MCCORMICK SELPH, INCORPORATED
San Benito County

The Californa Regional Water Quality Control Board, Central Coast Region (hereafter Board), finds:

1. On August 3, 1998, Teledyne Industries, Inc. filed a Report of Waste Discharge for the Teledyne Ryan Aeronautical, McCormick Selph Ordnance Unit (hereafter "TRA/MSO) in accordance with Section 13260 of the California Water Code. However, as of July 16, 1999, ownership of the TRA/MSO facility was transferred from Teledyne Industries, Inc. to McCormick Selph, Inc. The facility is now referred to as McCormick Selph, Inc. (hereafter "Facility"). McCormick Selph, Inc. (hereafter "Discharger") is the sole party responsible for compliance with this Order.

2. The Report of Waste Discharge updates Regional Board files regarding operation of the Facility and requests authorization to continue discharging treated domestic sewage and non-hazardous industrial wastes within the San Benito River Watershed. The information reaffirms the elimination of hazardous waste streams from the discharge.

3. The Facility is located at 3601 Union Road, Hollister, California, one-half mile West of Hollister in portions of section 5 and 6, T31S, R5E, MDB&M, as shown on Attachment A of the proposed Order (7.5 minute Hollister Quadrangle.)

4. The Discharger operates an advanced research, engineering, and manufacturing facility that produces explosive ordnance items and materials for the aerospace and automotive industry.

5. Waste discharges, treatment, and disposal are described as follows:

   a. Domestic sewage: A maximum of 500 employees will contribute up to 0.015 mgd of domestic wastewater. An extended aeration package plant provides treatment. Undisinfected plant effluent is discharged to a "polishing pond," Surface Impoundment 2 (SI-2), before being sprayed on 3.7 acres of designated disposal area, as shown on attachment B. Runoff from this area occurs during the wet weather season and enters Lake Teledyne.

   b. Research and Development (R&D) Laboratory: All hazardous wastes produced in the R&D Lab are recovered and either recycled or managed at a RCRA permitted facility. No hazardous materials are intentionally discharged to floor drains or sinks; however, the potential for inadvertent discharges exists. Because of this potential, this water is collected in a catchment tank for analysis prior to discharging to SI-2.

   c. Two reverse osmosis units are utilized at the Facility, One serves chemical manufacturing and one provides drinking water for employee consumption and humidifiers in manufacturing areas. Reverse osmosis units produce an effluent consisting of concentrated solids (TDS

1000 to 4000 mg/l) with an average flow of 2008 gpd and 1691 gpd, respectively. For system maintenance the pH is controlled in the range 5.5 to 6.0. Effluent is currently discharged to Lake Teledyne.

d. Processing and storage area spills, and overruns are collected in a catchment tank and analyzed for hazardous substances prior to being discharged to SI-2. All collected water including stormwater undergoes TDS, pH analysis and visual observations as an additional safety precaution.

e. There are currently five cooling towers in operation as follows: Two at building 102, one at building 106, one at the chemical manufacturing plant and one at the R&D laboratory. The "Manufacturing" cooling tower at building 102 and the cooling tower at building 106 require periodic blowdown. Cooling tower blowdown, characteristically high in TDS, is discharged from these cooling towers at an average rate of 2193 gallons per day to Lake Teledyne via SI-1 and 3593 gallons per day to SI-2 respectively.

f. Photographic X-ray effluent is treated prior to discharge. The silver reclamation unit typically reduces the silver concentration to <0.1 PPM. This effluent is discharged to the wastewater treatment plant at a rate of 106 gallons per day.

g. The Discharger has three vehicles it washes on site. The wash water drains directly into Lake Teledyne. No detergents are used in this operation which generates approximately 700 gallons annually.

6. Hazardous materials will continue to be utilized at the facility; however, hazardous waste discharges have been eliminated.

7. The facility is located in a U-shaped valley on gently rolling topography. The alluvial deposits, which occupy the valley-floor, are composed of clay, silt and sand varying in depth from 2-3 feet on the slopes and 40-50 feet near the lake shore and below the lake itself. The Discharger's consultant, I.T. Corporation, conducted a Geologic, Hydrologic and Chemical Site Characterization in 1985 and established that the hydraulic conductivity of the eastern portion of the facility (waste water irrigation field) is 1×10^{-3} to 1×10^{-4} ft/day. Depth to ground water on the valley floor typically varies from 10-30 feet depending on seasonal precipitation. Ground water gradient at the site is toward the northwest. Ground water quality is considered poor for domestic and agricultural purposes. The site is located within the San Juan Valley ground water basin which is separated from the Hollister Valley/San Benito River ground water basin by an unnamed fault passing through the northeast corner of the Discharger's facility.

8. Lake Teledyne is a man-made unlined surface impoundment with no controlled outlet. It is contained entirely on land owned and controlled by the Discharger. In addition to the discharges identified in Finding No. 5, above, it receives stormwater runoff from the surrounding 350-acre watershed. Lake Teledyne is hydraulically continuous with, and recharges the underlying ground water aquifer.

9. Up to 4,000 gallons per day of discharges from Chemical Manufacturing and the R&D Department will be collected in two catchment tanks having a total capacity of 6,800 gallons, within a 10,000 gallon secondary containment. Processing and storage area spills are analyzed for hazardous substances prior to being discharged to SI-2 and subsequently discharged to the sprayfield. All collected water including stormwater undergoes TDS and pH analysis as an additional safety precaution.

10. The Board adopted the Water Quality Control Plan, Central Coast Basin (Basin Plan) on September 8, 1994. The Basin Plan incorporates statewide plans and policies by reference and contains water quality objectives and strategies for protecting beneficial uses of State waters

11. The San Benito River, a surface water tributary to the Pajaro River, is located 1.5

miles northeast of the facility and flows in a northwesterly direction.

12. Present and anticipated beneficial uses of San Benito River that could be affected by the discharge include:
    h. Municipal and Domestic supply
    i. Agricultural supply
    j. Industrial supply
    k. Ground water recharge
    l. Water contact recreation
    m. Non-water contact recreation
    n. Wildlife habitat
    o. Warm fresh water habitat
    p. Fish spawning
    q. Fresh water replenishment
    r. Commercial and sport fishing

13. Present and anticipated beneficial uses of ground water in the vicinity of the discharge include:
    a. Municipal and Domestic supply
    b. Agricultural supply
    c. Industrial supply

14. These waste discharge requirements are being updated to reflect current facility operations and current Board plans and policies. The discharge has been regulated by Waste Discharge Requirements Order No. 86-121, adopted by the Board on June 13, 1986. Earliest available records indicate that this discharge has been regulated by the Board since February 13, 1970.

15. These waste discharge requirements are for an existing facility and are exempt from provisions of the California Environmental Quality Act (Public Resources Code, Section 21100, et seq. in accordance with Section 15301, Chapter 3, Title 14, of the California Administrative Code.

16. Discharge of waste is a privilege, not a right, and authorization to discharge is conditional upon the discharge complying with provisions of Division 7 of the California Water Code and any more stringent effluent limitations necessary to implement water quality control plans, to protect beneficial uses, and to prevent nuisance. Compliance with this Order should assure this and mitigate any potential adverse changes in water quality due to the discharge.

17. On May 6, 1999, the Board notified the Discharger and interested agencies and persons of its intent to update waste discharge requirements for the discharge and has provided them with a copy of the proposed order and an opportunity to submit written views and comments.

IT IS HEREBY ORDERED, pursuant to authority in Section 13263 of the California Water Code, McCormick Selph, Inc., its agents, successors or assigns, may discharge wastewater from the aforedescribed facility providing compliance is maintained with the following:

A. PROHIBITIONS

1. Discharge of waste classified as "hazardous" or "designated", as defined in CCR, Title 23, Chapter 15, Section 2521(a) and CWC Section 13173, respectively, to any part of the wastewater disposal system is prohibited. [BP]

2. The treatment and disposal of wastes at the facility shall not cause pollution, contamination, or nuisance as defined in CWC Section 13050.[BP]

3. Discharge to areas other than disposal areas shown in Attachment "A" is prohibited. [ROWD]

4. Discharge of any wastes, including overflow, bypass, seepage, and overspray from transport, treatment, or disposal systems to the San Benito River, adjacent drainageways or adjacent properties is prohibited. [ROWD]

5. Bypass of the treatment facility and discharge of untreated or partially treated domestic sanitary wastes directly to Lake Teledyne are prohibited. [ROWD]

B. DISCHARGE SPECIFICATIONS

1. Odors of sewage origin shall not be perceivable beyond the limits of the Discharger's property boundry. CWC
2. Average monthly flow of domestic sewage shall not exceed 15, 000 gallons per day. ROWD
3. Effluent discharged to the catchment tank shall not exceed the capacity of the tank and the retaining facility. BPJ
4. Effluent discharged to Lake Teledyne shall not exceed the limits of *Table 1-Effluent Limits*.
5. Effluent discharged to Lake Teledyne shall not have a pH less than 6.5 or greater than 8.4. BP
6. Uncontaminated surface drainage shall be excluded from the wastewater treatment process.
7. Lake Teledyne, SI-1, and SI-2 shall have freeboard of not less than 2 feet (measured vertically) at all times.BPJ

Table 1 – Effluent Limits

Parameter	Units	7 Day Median	30 Day Mean	Daily Maximum
Biochemical Oxygen Demand	mg/l	--	40	100
Suspended Solids	mg/l	--	30	75
Settleable Solids	ml/l	--	--	0.3
Total Coliform	MPN/100 ml	2.2	--	23

C. GROUND WATER LIMITATIONS

1. The discharge shall not cause nitrate concentrations in the ground water downgradient of the disposal area to significantly exceed background levels or 10 mg/l (as N), whichever is more stringent (lower).
2. The discharge shall not cause a significant increase of mineral constituent concentrations in underlying ground waters.
3. The discharge shall not cause concentrations of metals, chemicals, and radionuclides in ground water to exceed limits set forth in Title 22, Chapter 15, Articles 43 and 5 of the California Administrative Code.
4. The discharge shall not cause concentrations of hazardous materials, including those listed in Title 22, Division 4, Chapter 30, in ground water which are toxic to or cause detrimental physiological responses in humans, other animals, plants, or aquatic life.

D. PROVISIONS

1. Order No. 86-121, "Waste Discharge Requirements for Teledyne McCormick Selph, Inc., Hollister, San Benito County," adopted by the Board on June 13, 1986, is hereby rescinded.
2. Discharger shall comply with "Monitoring and Reporting Program No. 99-78," as specified by the Executive Officer.
3. Discharger shall comply with all items of the attached "Standard Provisions and Reporting Requirements for Waste Discharge Requirements" dated January 1984, except A.4, .6, .8, .17, and C.18.

Sources of Requirements:
BP Basin Plan
ROWD Report of Waste Discharge
CWC California Water Code
BPJ Best Professional Judgement

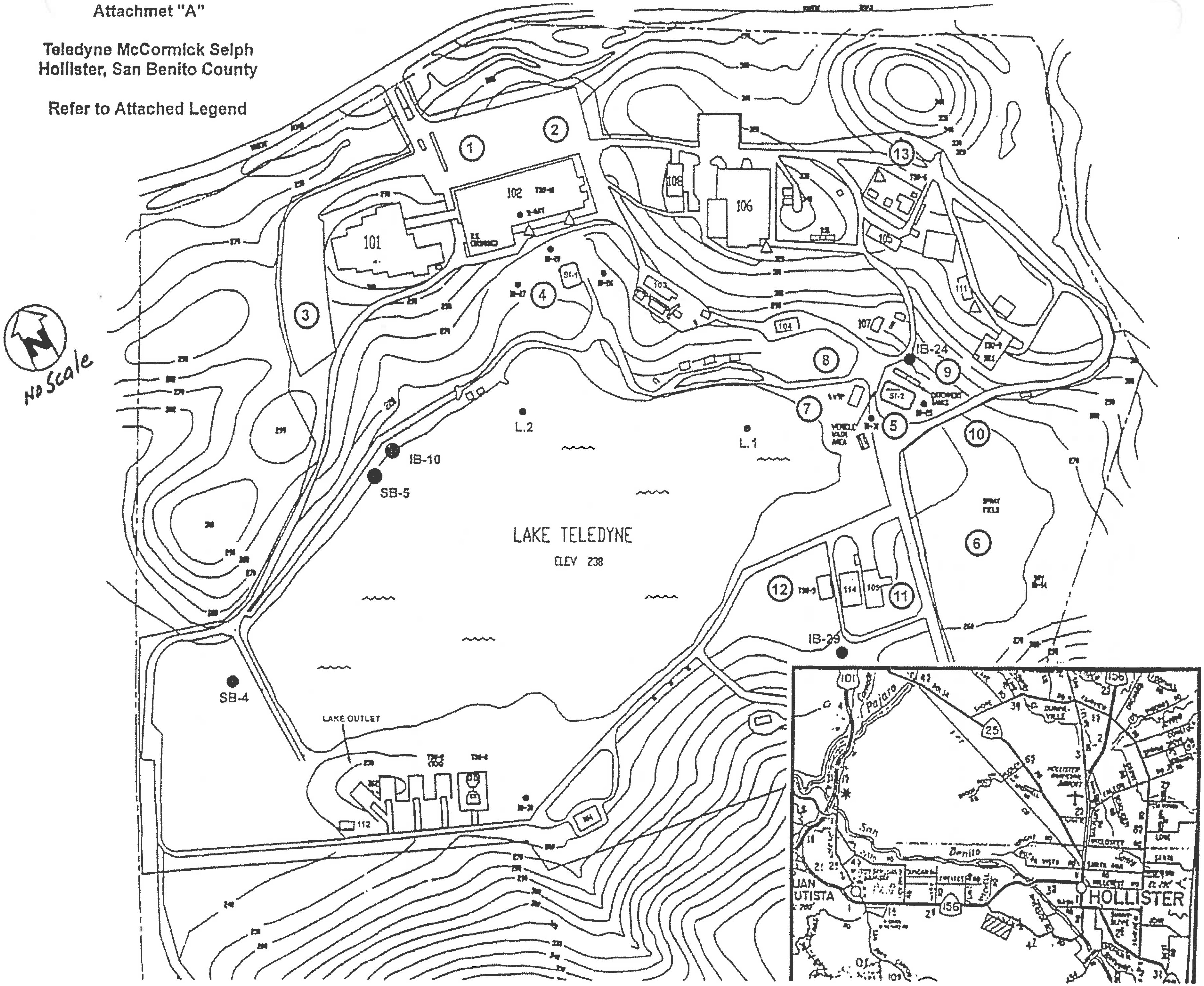
I, Roger W. Briggs Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Coast Region, on September 8, 1999.

Executive Officer

Attachmet "A"

Teledyne McCormick Selph
Hollister, San Benito County

Refer to Attached Legend



STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION
81 Higuera Street, Suite 200
San Luis Obispo, California 93401-5427

MONITORING AND REPORTING PROGRAM NO. 99-78 (Revised November 4, 1999)

Waste Discharger Identification #3 352006001

FOR

McCORMICK SELPH, INCORPORATED
San Benito County

WATER SUPPLY MONITORING

Representative samples of all water supply sources which are ultimately discharged to Lake Teledyne (including water used to maintain levels in Lake Teledyne) shall be collected and analyzed as follows:

Parameter	Units	Type of Sample	Sampling Frequency
Total Dissolved Solids (TDS)	mg/l	Grab	Annually (April)
Sodium	mg/l	Grab	Annually (April)
Chloride	mg/l	Grab	Annually (April)

TREATMENT MONITORING

Influent Monitoring

Monitoring of influent shall consist of the following:

Parameter	Units	Type of Sample	Sampling Frequency
Daily Flow	Gals/day	Measured/Estimated	Daily
20°C BOD_5	mg/l	Grab	Monthly
Total Suspended Solids	mg/l	Grab	Monthly

Effluent Monitoring

Monitoring of SI-2 effluent shall consist of the following:

Parameter	Units	Type of Sample	Sampling Frequency
20°C BOD_5	mg/l	Grab	Weekly
Settleable Solids	ml/l	Grab	Weekly
Total Suspended Solids	mg/l	Grab	Weekly
Total Dissolved Solids	mg/l	Grab	Weekly
Nitrate as $N0_3$	mg/l	Grab	Weekly
Total Nitrogen	mg/l	Grab	Weekly
Total Coliform	MPN/100 ml	Grab	Weekly

Effluent sampling shall be conducted concurrently with influent monitoring. The total average daily flow shall be calculated on a monthly basis. Time of collection of grab samples shall be recorded.

Samples shall be collected from locations within the waste stream where the effluent is representative of the treatment process. For SI-2, this will be at the opposite end of the pond/basin from the inlet at a depth of one foot from the surface of the pond/basin.

If the discharge is intermittent rather than continuous, then on the first day of each such intermittent discharge, the discharger shall monitor and record data for all of the parameters listed above, after which the frequencies of analysis given in the schedules shall apply for the duration of each such intermittent discharge. In no event shall the discharger be required to monitor and record data more often than twice the frequencies listed in the schedules.

DISPOSAL MONITORING

Sprayfield Monitoring

The Discharger shall inspect the Wastewater Irrigation Area at least weekly to assure pumps and irrigation equipment are operating properly. Runoff volumes from the sprayfield shall be estimated and routinely reported.

Lake Teledyne Monitoring

The Discharger shall inspect Lake Teledyne at least monthly. Lake Teledyne freeboard shall be measured and routinely reported.

REPORTING

Monitoring reports presenting all data collected since the previous report shall be submitted to the Regional Water Quality Control Board as follows:

Report Type	Due
Quarterly	May 1st, August 1st, November 1st, February 1st
Annual	February 1

In reporting the monitoring data, the discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in such a manner to illustrate clearly whether the discharge complies with WDRs. The highest daily maximum for the month,

monthly and weekly averages, and removal efficiencies (%) for Biochemical Oxygen Demand (BOD) and Total Suspended Solids should be determined and recorded.
Records of monitoring information shall include:

a. The dates, exact place, and time of sampling or measurement(s);
b. The individual(s) who performed the sampling or measurement(s);
c. The date(s) analyses were performed;
d. The individual(s) who performed the analysis;
e. The analytical techniques or method used; and
f. The results of such analysis

If the discharger monitors any pollutant at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form.

The discharger shall submit an annual report to this Regional Board by February 1 of each year. The report shall contain both tabular and graphical summaries of the monitoring data obtained during the previous year. In addition, the Discharger shall discuss the compliance record and the corrective actions taken or planned that may be needed to bring the discharge into full compliance with the WDRs.

The discharger shall implement the above monitoring program on the first day of the month following the effective date of coverage under these WDRs.

ORDERED BY Vernon L Jones for
Roger W. Briggs, Executive Officer

DATE ____________________

Winston H. Hickox
Secretary for Environmental Protection

State Water Resources Control Board

Division of Water Quality
1001 I Street • Sacramento, California 95814 • (916) 341-5538
Mailing Address: P.O. Box 1977 • Sacramento, California • 95812-1977
FAX (916) 341-5543 • Internet Address: http://www.swrcb.ca.gov

Gray Davis
Governor

November 21, 2000

CHARLES F MARTIN
MCCORMICK SELPH INC
PO BOX 6
HOLLISTER, CA 95024-0006

RECEIPT OF YOUR NOTICE OF INTENT

The State Water Resources Control Board (State Water Board) has received and processed your NOTICE OF INTENT TO COMPLY WITH THE TERMS OF THE GENERAL PERMIT TO DISCHARGE STORM WATER ASSOCIATED WITH INDUSTRIAL ACTIVITY. Accordingly, you are required to comply with the permit requirements.

Your WDID identification number is: 3 35S016249. Please use this number in any future communications regarding this permit.

FACILITY DESCRIPTION

OPERATOR:	MCCORMICK SELPH INC
FACILITY:	MCCORMICK SELPH INC
COUNTY:	SAN BENITO
FACILITY LOCATION:	3601 UNION RD HOLLISTER, CA 95024-0006

When the operator changes (i. e. the business was bought or transferred), a new Notice of Intent (NOI), site map, and fee must be submitted by the new operator. As the previous operator, you are required to submit a Notice of Termination (NOT) to the Regional Water Board stating that your facility is not being operated by you and that you no longer need to be covered by the General Permit. Unless notified, you will continue to be invoiced for the annual fee each October

If you have any questions regarding permit requirements, please contact your Regional Water Board at (805) 549-3458. Please visit the storm water web page at www.swrcb.ca.gov/stormwtr/index.html to obtain storm water related information and forms.

Sincerely,

A. Shimizu

Audrey Shimizu
Storm Water Unit
Division of Water Quality

Enclosure

<u>Appendix 8</u>

2007, MBUAPCD

Air Permit to Operate for TSU-1 and TSU-2

(5 pages)

MONTEREY BAY UNIFIED AIR POLLUTION CONTROL DISTRICT

PERMIT TO OPERATE

13509

24580 SILVER CLOUD CT., MONTEREY, CA 93940 TELEPHONE (831) 647-9411 • FAX (831) 647-8501

OPERATION UNDER THIS PERMIT MUST BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS INCLUDED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED. THE EQUIPMENT MUST BE PROPERLY MAINTAINED AND KEPT IN GOOD CONDITION AT ALL TIMES. THIS PERMIT TO OPERATE MUST BE POSTED OR ACCESSIBLE.

LEGAL OWNER OR OPERATOR:	PACIFIC SCIENTIFIC ENERGETIC MATERIALS COMPANY (CALIFORNIA) INC.
EQUIPMENT LOCATED AT:	3601 Union Road Hollister, California
EQUIPMENT DESCRIPTION AND CONDITIONS:	THIS PERMIT TO OPERATE IS ISSUED AND IS VALID FOR THIS EQUIPMENT ONLY WHILE IT IS IN THE CONFIGURATION SET FORTH IN THE FOLLOWING DESCRIPTION:

ORDNANCE TREATMENT UNIT, TSU-1:

1. Two (2) 10½' Diameter x 8½' Long Concrete Tubes Enclosed By A Steel-Framed Wire Mesh Cage Inside Of Walled Area.
2. Walled Area, 54' Wide x 50' Deep x 5'- 8' High, And Covered By A Steel Roof With Two Sections Which Are 24' & 20' High.
3. Earthen Berm, 14' High, Enclosing Walled Area On Three (3) Sides.

THE EQUIPMENT FOR WHICH THIS PERMIT TO OPERATE IS ISSUED MAY BE OPERATED ONLY WHEN IN COMPLIANCE WITH THE FOLLOWING CONDITIONS:

Conditions:

1. The annual net explosive weight of materials treated must be reported to the District, upon request, at the time of permit renewal.
2. The total annual net explosive weight of materials treated shall not exceed 7,000 pounds without obtaining prior written approval from the District.
3. No chlorinated plastics may be burned.

THIS PERMIT BECOMES VOID UPON ANY CHANGE OF OWNERSHIP OR ADDRESS, OR ANY ALTERATION.

THIS PERMIT DOES NOT AUTHORIZE THE EMISSIONS OF AIR CONTAMINANTS IN EXCESS OF THOSE ALLOWED BY ARTICLE 1, CHAPTER 3, PART 4, DIVISION 26 OF THE HEALTH & SAFETY CODE OF THE STATE OF CALIFORNIA OR THE RULES AND REGULATIONS OF THE AIR POLLUTION CONTROL DISTRICT. THIS PERMIT CANNOT BE CONSIDERED AS PERMISSION TO VIOLATE EXISTING LAWS, ORDINANCES, REGULATION OR STATUTES OF OTHER GOVERNMENTAL AGENCIES.

AIR POLLUTION CONTROL OFFICER

DATE OCT - 9 2007

APCD 3

4. Only the following solvents or mixtures containing these solvents, explosive waste particles and water/solvent solutions may be burned:

   Methanol, Isopropanol, Acetone, THF, and Pyradine.

5. No more than 20 gallons of solvent or solvent mixtures may be ignited per day.

6. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three (3) minutes in any one (1) hour which is as dark or darker than Ringelmann 1, or equivalent 20% opacity.

7. No emissions shall constitute a public nuisance.

NOTE: This permit replaces Permit to Operate 11732 issued to McCormick Selph, Inc. on September 29, 2003. The annual renewal date remains November 16.

****

MONTEREY BAY UNIFIED AIR POLLUTION CONTROL DISTRICT

PERMIT TO OPERATE

13506

24580 SILVER CLOUD CT., MONTEREY, CA 93940 TELEPHONE (831) 647-9411 • FAX (831) 647-8501

OPERATION UNDER THIS PERMIT MUST BE CONDUCTED IN COMPLIANCE WITH ALL DATA AND SPECIFICATIONS INCLUDED WITH THE APPLICATION UNDER WHICH THIS PERMIT IS ISSUED. THE EQUIPMENT MUST BE PROPERLY MAINTAINED AND KEPT IN GOOD CONDITION AT ALL TIMES THIS PERMIT TO OPERATE MUST BE POSTED OR ACCESSIBLE.

LEGAL OWNER OR OPERATOR: PACIFIC SCIENTIFIC ENERGETIC MATERIALS COMPANY (CALIFORNIA), INC.

EQUIPMENT LOCATED AT: 3601 Union Road
Hollister, California

EQUIPMENT DESCRIPTION AND CONDITIONS: THIS PERMIT TO OPERATE IS ISSUED AND IS VALID FOR THIS EQUIPMENT ONLY WHILE IT IS IN THE CONFIGURATION SET FORTH IN THE FOLLOWING DESCRIPTION:

OPEN-AIR WASTE SOLVENT BURNING EQUIPMENT: (TSU-2)

Eight (8) Solvent Incineration Basins, Arranged Four On Top Of Four. Each Basin Consisting Of A 55 Gallon Drum Cut In Half Length-Wise. Basins Filled With Solvent And Ignited For Open Air Burning.

THE EQUIPMENT FOR WHICH THIS PERMIT TO OPERATE IS ISSUED MAY BE OPERATED ONLY WHEN IN COMPLIANCE WITH THE FOLLOWING CONDITIONS:

Conditions:

1. The type and amount of solvents burned in this equipment shall be reported to the District on an annual basis, upon request, at the time of permit renewal.

2. No more than 300 gallons per day of waste solvent may be burned as described above.

3. Only the following explosive-contaminated solvents or mixtures thereof shall be burned in this equipment:

Methanol	Isopropanol
Acetone	Tetrahydrofuran(THF)
Pyradine	Acetonitrile
Ethanol	Butyl Acetate
Dimethylformamide(DMF)	

THIS PERMIT BECOMES VOID UPON ANY CHANGE OF OWNERSHIP OR ADDRESS, OR ANY ALTERATION.

THIS PERMIT DOES NOT AUTHORIZE THE EMISSIONS OF AIR CONTAMINANTS IN EXCESS OF THOSE ALLOWED BY ARTICLE 1, CHAPTER 3, PART 4, DIVISION 26 OF THE HEALTH & SAFETY CODE OF THE STATE OF CALIFORNIA OR THE RULES AND REGULATIONS OF THE AIR POLLUTION CONTROL DISTRICT THIS PERMIT CANNOT BE CONSIDERED AS PERMISSION TO VIOLATE EXISTING LAWS, ORDINANCES, REGULATION OR STATUTES OF OTHER GOVERNMENTAL AGENCIES.

AIR POLLUTION CONTROL OFFICER

DATE OCT - 9 2007

APCD 3

4. No air contaminant shall be discharged into the atmosphere for a period or periods aggregating more than three (3) minutes in any one (1) hour which is as dark or darker than Ringelmann 1, or equivalent 20% opacity.

5. For each batch of waste solvent to be burned in this equipment Pacific Scientific Energetic Materials Company (California) Inc. shall conduct a small scale test burn prior to the large scale open burning of the solvent batch, to ensure that the burning of any solvent batch will comply with Condition 4.

   For purposes of this condition, a solvent batch shall be defined as a volume of solvent which can reasonably be expected to have the same composition and/or burning characteristics due to a common source of origin, common contaminant, or common time of production.

   Upon the finding that any portion of a solvent batch, during either small or large scale open burning, does not comply with the appropriate visible emissions standards, the District shall be notified immediately and burning of the solvent batch in question shall be terminated as soon as practicable.

   Any remaining portions of the solvent batch shall not be burned without prior District approval.

6. Pacific Scientific Energetic Materials Company (California) Inc. shall provide for the training of one or more employees as a Certified Emission Evaluator by the California Air Resources Board. The certified person(s) shall be identified and present their certification card to District personnel upon request.

   A certified person shall be present at all open burnings of solvent in this equipment. Such a person shall be present at the fire site observing smoke opacities for at least the first 30 minutes of the burn. For the remainder of the burn a certified person shall be made available at the facility to make readings if a determination is needed.

   Pacific Scientific Energetic Materials Company (California) Inc. shall provide instruction regarding the District's requirements and standards for visible emissions from fires to all employees involved in burning operations. It shall be made part of the normal duties of such personnel to notify the appropriate company officials of actual or potential violations of such standards.

7. Pacific Scientific Energetic Materials Company (California) Inc. shall maintain a log book on-site for this operation which contains at a minimum, the following information for each solvent batch to be burned:

   a) Description of type of material to be burned, including a description of the source of solvent and composition and an estimate of the total quantity of solvent to be burned,

   b) Date and time of test burn, size of test burn, and compliance status with regard to opacity standards,

   c) Date and time of large-scale burns, and

   d) Date and time of any violations of opacity standards.

   This log book shall be made available for District inspection upon request.

8. No emissions shall constitute a public nuisance.

NOTE: This permit replaces Permit to Operate 11727 issued to McCormick Selph, Inc. on September 29, 2003. The annual renewal date remains November 16.

****

Appendix 9

TSU-2 Engineering Cerification

12/3/2002, 4 pages

ATI
ARCHITECTS and ENGINEERS

6 Hangar Way
Watsonville, CA 95076
T: 831.761.6222
F: 831.761.1121

3860 Blackhawk Road
Danville, CA 94506
T: 925.648.8800
F: 925.648.8811

5901 Christie Avenue, #301
Emeryville, CA 94608
T: 510.420.1693
F: 510.420.1691

4200 East Avenue
Livermore, CA 94550
T: 925.447.4017
F: 925.447.9360

2510 Douglas Boulevard
Roseville, CA 95661
T: 916.772.1800
F: 916.772.1820

December 17, 2002

Charles Martin
Manager, Support Services
McCormick Selph, Inc.
3601 Union Road
Hollister, CA 95024-0006

Subject: Certification of TSU-2
McCormick Selph, Inc. Hollister facility
Inspection Date - December 3, 2002
ATI Project M7102

Dear Mr. Martin:

McCormick Selph, Inc. Hazardous Waste Treatment Unit TSU-2 was inspected on December 3, 2002. Although no hazardous liquid wastes are stored in tanks in this unit, McCormick Selph, Inc. requested ATI Architects and Engineers to evaluate unit TSU-2 with respect to the requirements of California Code of Regulations (CCR) Section 66264.

Inspection and Review

The treatment unit inspected was TSU-2 – Hazardous Waste Treatment Unit for combustion of hazardous waste solvent contaminated with reactives.

No information regarding a previous certification was available for review at the time of the inspection.

The following items were reviewed for the certification of TSU-2:

1. Structural Strength – as the hazardous waste is combusted in TSU-2, there are no liquid hazardous wastes stored at TSU-2, and therefore no structural strength calculations of the combustion vessels are provided or required.
2. Design Standards – as the hazardous waste is combusted in TSU-2, there are no liquid hazardous wastes stored at TSU-2, and therefore no design standards of the combustion vessels are provided or required.
3. Characteristics of wastes – the wastes treated in TSU-2 are flammable, non-corrosive, non-chlorinated, organic solvents and water with reactive compounds typically in the range of 1-10% These solvents are listed in Table IV-3 of the Part B application dated June 28, 2002. The actual open burn portion of the TSU-2 treatment operations typically lasts less than three hours. Given the short contact time involving the solvents and reactives, and the carbon steel drums, there is no compatibility issues related to this operation as long as the contact time is limited to less than five (5) hours. If there are residues from the combustion, the solids may be removed and treated more effectively in TSU-1 or containerized and stored for future treatment.
4. Existing corrosion protection measures – inspected with no leaks observed.
5. Results of prior tanks tests – none were documented; no tanks present.

6. Integrity of secondary containment – the containment pans were inspected with no cracks or defects observed.
7. Secondary containment structural calculations – no certified calculations were provided. As the hazardous waste and solvents are typically combusted, so there typically is not any hazardous liquid remaining in the burn vessels. As the capacity of the treatment vessels are limited to approximately twenty-five (25) gallons each secondary containment volume is adequate.
8. Ancillary equipment – consists of plastic gravity pumps and hand scoops.
9. Rainwater infiltration – McCormick Selph, Inc. cleans any residue from the combustion of explosive hazardous wastes as soon after the treatment as possible. The pans are inverted during inclement weather to prevent rain water falling into them
10. Secondary containment leak detection –the treatment unit is monitored once every 24 hours and is inspected once every week.

Certification

Unit TSU-2 located at the McCormick Selph, Inc. facility in Hollister, California, is certified per the applicable requirements of California Code of Regulations (CCR) Section 66264 for the treatment of solid hazardous wastes and solvents listed in Tables IV-3 of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.

It is understood that it is not technically or economically feasible to provide total assurance of the suitability of designed or installed, existing equipment and facilities for the service. ATI and David E. Powell, P.E., have used not less than customary care and skill ordinarily employed by engineers engaged in the type of services provided, namely, evaluation and assessment certification. However, ATI and David E. Powell, P.E., make no warranty of any kind, either expressed or implied, as to its estimates, findings, recommendations, advice, specifications or other professional services.

I certify that under the penalty of law that this document and all attachments were prepared under my direction or supervision with a system designed to assure that qualified personnel gather and evaluate the information submitted. Based on my inquiry of Mr. Charles Martin, of McCormick Selph, Inc., the information provided/reviewed is, to the best of knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of imprisonment for knowing violations.

CERTIFICATION

David E. Powell
Director, Process Engineering

LICENSED PROFESSIONAL ENGINEER
David E. Powell
No. CH005122
Exp. 06/30/04
CHEMICAL
STATE OF CALIFORNIA

California Registered
Chemical Engineer No. 5122

F:\PF\M7102\CERTIFICATIONS\Letter 3 report and certification.f.doc

Reference Documents

1. Table IV-3 from Chapter IV of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.
2. Chapter IV of the Part B Application from McCormick Selph, Inc., dated June 28, 2002.

Appendix 10

1991 Risk Assessment

2015 HHRA Workplan (draft)

Screening Risk Assessment (1991)

(Open Burn/Open Detonation Operations)

Ebasco Environmental

EBASCO

TELEDYNE McCORMICK SELPH
Hollister, California

Screening Risk Assessment

Open Burn/Open Detonation Operations

Submitted to

California Department of Health Services

January 1991

Ebasco Environmental

An ENSERCH Engineering & Construction Company

TELEDYNE McCORMICK SELPH

Hollister, California

Screening Risk Assessment

Open Burn/Open Detonation Operations

Submitted to

California Department of Health Services

January 1991

REGISTERED PROFESSIONAL ENGINEER
DAVID ALAN STEIN
NO. 4285
CHEMICAL
STATE OF CALIFORNIA

Ebasco Environmental

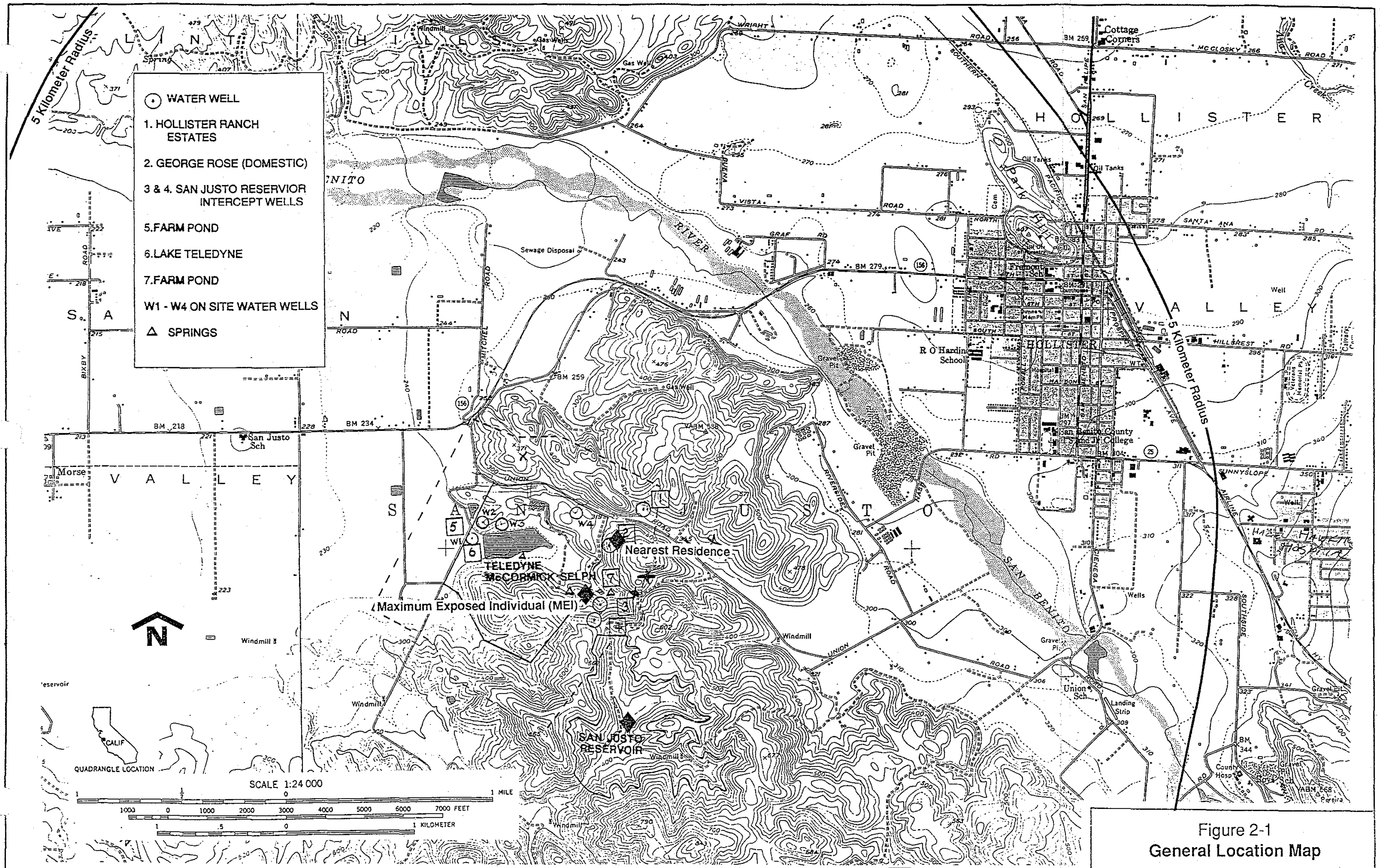


Figure 2-1
General Location Map

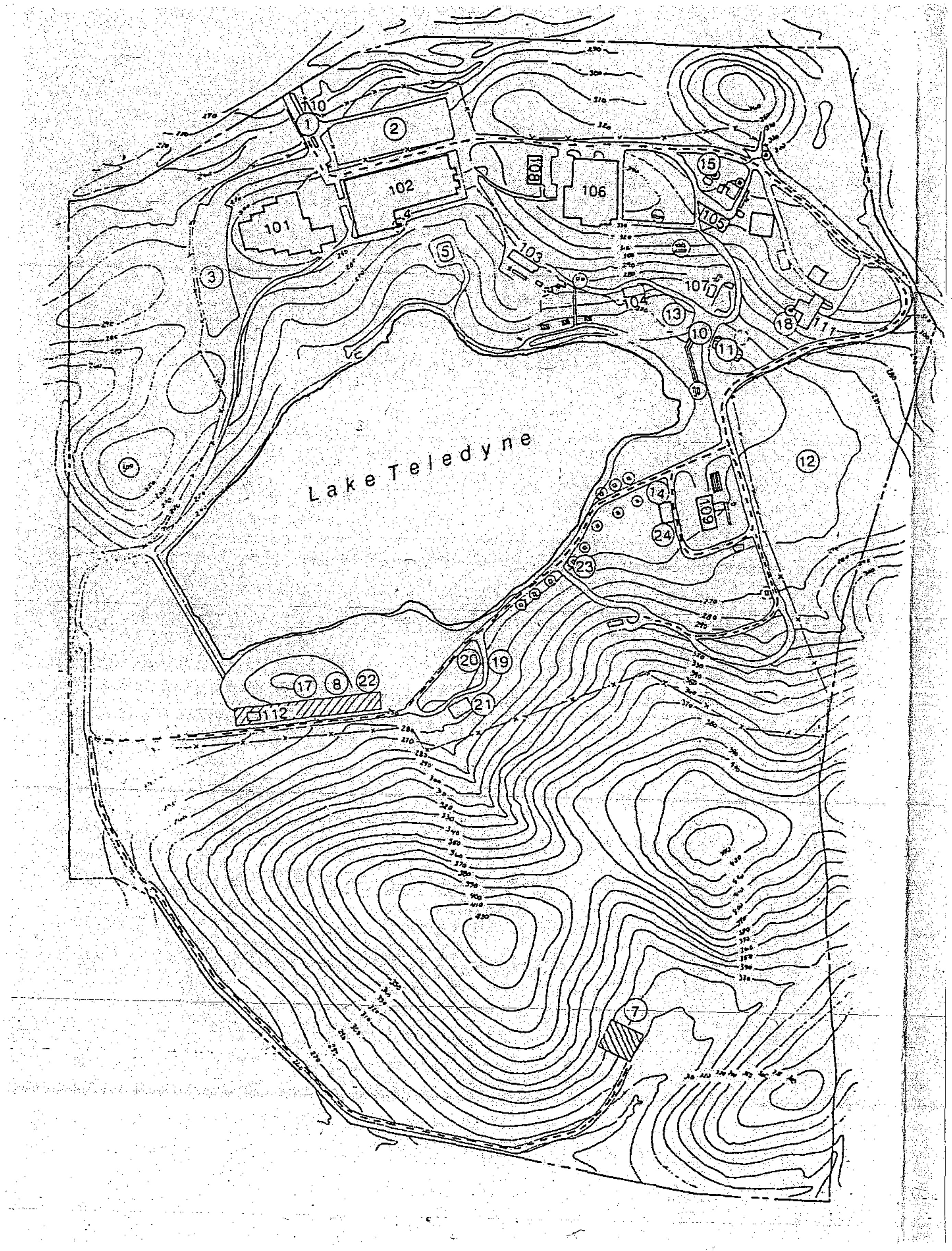


Figure 2-2 Facility Location and Description

LEGEND

MAJOR BUILDINGS

101-Admistrative/Manufacturing
102-Admistrative/Manufacturing
103-Powder Blending
104-Propellent Machining
105-Research and Development
106-Linear Flexible Explosives and Assembly.
107-Not Currently in Use
108-Environmental Testing Facility
109-Maintenance Facility
110-Security Central
111-Chemical Manufacturing Facility
112-Site Control

FEATURES

1.	Security Central-24 Hour Security
2. & 3.	Main Parking lots
4.	Plating Waste Water Treatment (Closed)
5.	Surface Impoundment SI-1-Plating Waste Pond (Closed)
6.	Not in use
7.	TSU-1 Open Burning
8.	TSU-2 Open Burning
9.	Not in use
10.	Domestic Sewage Treatment Facility
11.	Sewage Treatment Tertiary Treatment Pond
12.	Spray Field for Effluent from 11# Above
13.	TSU-5 and TSU-7 (Closed Apr. 1992 and Dec. 2001 Respectively
14.	TSU-3 Container Storage
15.	TSU-6 (Closed Oct. 2002)
16.	Not used
17.	Ordnance Test Facility
18.	TSU-4 (Closure Pending)
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EXECUTIVE SUMMARY

o INTRODUCTION

Teledyne McCormick Selph (TMS) is a subsidiary of Teledyne, Inc. specializing in the production of explosive ordinance items and, small volume specialty chemicals and specialty electronics.

In the course of operation, the facility generates small quantities of hazardous waste comprising various solvents and ordinance items which are safely open burned (OB) or open detonated (OD) on site. TMS currently has interim status for these operations from the EPA and Department of Health Services (DHS).

DHS has recently requested that a screening level health risk assessment of the OB/OD operations be completed. TMS retained Ebasco Environmental to complete the study in November 1990. Shortly thereafter, a protocol (Ebasco Environmental, 1990) for completing the study was submitted to and approved by DHS staff. This report is being submitted in accordance with the protocol to document the results of the assessment.

o FACILITY LOCATION

TMS is located approximately one half mile south of State Highway 156 at 3601 Union Road. The plant is located within San Benito County in the southeast part of the San Juan Valley, four miles west of Hollister, California. The general location of the facility is shown in Figure 2-1. A detailed facility layout is included as Figure 2-2.

o SURROUNDING LAND USE

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 is raised at an average distance of approximately 1.3 kilometers from the site. The only major water body close to the facility is the San Justo Reservoir, approximately 700 meters southeast of the site. The reservoir is a source of local drinking water and recreational fishing.

There are no schools, day care centers, hospitals, or convalescent homes within 2 kilometers of the site. The San Justo school shown on the location map westnorthwest of the site is no longer in use.

o FACILITY DESCRIPTION

Emissions from treatment of hazardous waste at TMS arise primarily from the open burning (OB) or open detonation (OD) of hazardous materials. Negligible emissions also occur as a result of the handling, storage, treatment and containerizing of hazardous materials at the facility. These systems are either totally enclosed or involve low throughput of low vapor pressure materials. Accordingly, and consistent with the DHS-approved protocol (Appendix A), these sources are not quantitively considered in this assessment. Most of the reactive hazardous waste generated at TMS is treated by open burning in a specially designed facility, TSU-1, at a remote location on the property (shown on Figure 2-2). The quantities and specific types of ordinance opened burned at TSU-1 have fluctuated over the years. Detail regarding the representative composition of materials open burned can be found in Appendix B. For purposes of this assessment, a burn rate equal to 110 percent of the 1989 burn rate is considered indicative of long term operation (Lynam, 1990).

A small fraction of the reactive hazardous waste generated at the facility is more conducive to efficient and safe destruction by detonation. Material to be disposed is placed in earthen pits adjacent to the open burning cage. The material is typically covered in several feet of water or earth and remotely detonated.

The manufacturing, conditioning, and blending of reactive materials utilizes a variety of ignitable solvents as a working medium. During the separation portion of the process, small amounts of reactive materials (one to two percent by weight) remain suspended in solution. Current reclamation technology is not compatible with recycling the solvent, because concentration of the reactive material in the high temperature environment of the recycling unit could result in an explosion. Therefore, the contaminated solvents are burned in TSU-2 (Teledyne McCormick Selph, 1990a). A maximum of 300 gallons of solvent is open burned in any given day (Lynam, 1990).

o EMISSIONS CHARACTERIZATION

A paucity of data exists for purposes of developing reliable emissions estimates. TMS literature and other documents available in the open literature were reviewed to determine an appropriate basis for emissions estimates.

Emissions calculations for OB/OD operations were based on the following:

- OB of Solvents, TSU-2: Korcsmaros study for all pollutants (Appendix C).

- OB/OD of reactive hazardous waste, TSU-1: Korcsmaros study for all particulate and criteria pollutants; Rasmussen study for volatile organic compounds (EPA, 1990a).

o AIR QUALITY MODELING

The model selected for use in modeling Teledyne McCormick Selph OB scenarios was EPA's Industrial Source Complex Term (ISCST) model (EPA, 1986a). This is a standard Gaussian dispersion model in wide use as an EPA guideline model for projecting short term (1-hour, in this case) concentrations from releases from industrial sources of many types (EPA, 1986b). This model is appropriate for situations where the plume travel time to the nearest receptor is less than the pollutant release time as is the case in open burning (which lasts from 4-6 hours).

For the much shorter duration open detonation, INPUFF (a puff-type model) was utilized. The INPUFF (INtegrated PUFF) computer code is designed to simulate dispersion from semi-instantaneous or continuous point sources over a spatially and temporally variable wind field. The algorithm is based upon Gaussian puff assumptions including a vertically uniform wind direction field and no chemical reactions (EPA, 1986c).

Both models provided 1-hour average concentrations based upon an emission rate of 1 gram/sec. All output concentrations were then scaled to desired pollutant specific emission rates as input and output are directly proportional. Short term concentrations were determined from X/Q values using multipliers commonly accepted by EPA and ARB, with linear proration to account for duration of release (which is not continuous).

Meteorological data input to both models consisted of a subset of the standard wind-speed/stability combinations used in the EPA model PTPLU. E and F stability combinations (which reflect night time atmospheric conditions) were not modeled as OB/OD does not occur at night (Lynam, 1990). Stability-dependent ambient temperatures and mixing heights were derived as indicated in the ISC User's Guide from data collected at Oakland, California.

Plume rise was calculated for each wind speed in each modeling scenario based upon the procedures indicated in equations 4-8 of the document "Technical Description of the Proposed Open Burn/Open Detonation Dispersion Model" (Dugway Proving Ground, 1990).

Maximum X/Q values are applicable at the nearest facility boundary and are used in determining exposure for the maximally exposed individual (MEI). The MEI was used for estimation of risk by inhalation, soil ingestion, crop ingestion and dermal exposure. An average grazing distance was used for estimation of meat ingestion exposure. San Justo Reservoir was used for estimation of exposure water and fish ingestion.

o EXPOSURE QUANTITATION

To assess the extent of human exposure to facility-emitted contaminants, the environmental fate of those pollutants and the potential pathways of human exposure was evaluated. In addition to the direct inhalation pathway, several other noninhalation pathways are: soil ingestion, fish ingestion, crop ingestion, meat ingestion, surface water ingestion, and dermal absorption. Health risk associated with exposure via the mother's milk pathway is attributable primary to polychlorinated dibenzo dioxins and dibenzo furans (PCDD/PCDFs) and polychlorinated biphenyls (PCBs). Since these substances are not expected to be emitted from the facility, no significant helath risk is expected from mother's milk exposure. Accordingly, inclusion of exposure via mother's milk was not a part in the DHS-approved risk assessment protocol (Appendix A) or this assessment. To monitor the environmental fate of pollutants emitted from the Teledyne McCormick Selph facility, it was necessary to evaluate the rate at which chemicals enter a given medium and the pathway processes that affect chemical concentrations in that medium. Exposure pathway calculations, pathway variables and chemical specific parameters used in the environmental fate evaluation are taken from Health Risk Assessment Guidelines for nonhazardous waste incinerators (ARB, 1990) and CAPCO, 1987 (see Appendix G).

o RISK ASSESSMENT RESULTS

Cancer Risk

Cancer risk assessment involves calculating upper-bound estimates of individual cancer risk as well as the population risk (excess number of cases within a defined population). The individual cancer risk estimate of the most exposed individual (MEI) is most frequently used as a basis for risk management. Individual cancer risk is calculated as the product of exposure dose (mg/kg/day) and the potency slope factor (mg/kg/day). The total theoretical upper-bound incremental cancer risk for benzene at the point of highest exposure to an individual from the seven exposure pathways is summarized in Tables 5-1 to 5-3 for the three district treatment activities. Detailed calculations for each pathway are contained in

Appendix G. The total upper bound incremental risk at the point of the maximally exposed individual is 8.66×10^{-14}. The risk is due principally to benzene exposure via inhalation.

The most exposed individual is assumed to be exposed 24 hours/day, 365 days/yr for 70 years at a distance of 160 meters from TSU-1 and 320 meters from TSU-2. Because workers in the area are located further from TSU-1 and TSU-2 than the MEI, and are exposed for shorter duration (8 hours/day), MEI risk can be viewed as an overstated estimate of worker risk.

Cancer Burden

An estimation of cancer burden that might result from emissions of the TMS facility requires population projections in the zone of impact at the midpoint of the next 70 years (or the year 2025). The 1990 population for San Benito County is 36,850 (San Benito County Planning Department, 1991.) To calculate an upper bound of the cancer burden, it is assumed that the adopted growth forecast of approximately 21% every five years occurs through 2025. The entire population of San Benito County in 2025 can then be calculated:

$$36,850 \times (1.21)^7 = 139,940 \text{ persons}$$

An upper bound for the cancer burden that might result over the next 70 years for this population is calculated from the maximum unit risk for an individual. This assumes that the entire population of San Benito County is exposed to the maximum individual risk. The upper bound is $139,940 \times 8.66 \times 10^{-14}$. Thus, to result in an estimated cancer burden of 1.21×10^{-8}. From this value, the Poisson distribution can be used to calculate a lower bound of the probability that no cancers will result during the next 70 years from emissions of the TMS facility. This probability is $2.713^{-1.21 \times 10\text{-}8} = 99.999999\%$. Therefore, no excess cancer cases are expected from the emissions of the TMS facility during the next 70 years.

Noncancer Effects

Potential effects of chronic exposure to the noncarcinogenic compounds present in the TMS facility emissions are assessed by comparing exposure levels with references doses (R_fDs) or acceptable daily intakes (EPA, 1990c). R_fDs are defined as estimates of lifetime daily exposures of the a noncarcinogenic substance for the general human population which appears to be within an appreciable risk of deleterious effects. Estimates of average daily intake of noncarcinogens, as measured by the hazard index, are shown in Tables 5-4 to 5-6. As can be seen, the estimated intake of these compounds are a small fraction of the R_fD. Consequently, no noncancer health effects are expected from operation of the TMS facility.

o CONCLUSIONS

A health risk assessment is a quantitative evaluation of the relationship between exposure to toxic substances and the potential occurrence of adverse health effects. Health risks to human populations from toxic substances are a function of two factors: toxicity and exposure. To create a health risk, a chemical must be toxic (presenting an intrinsic hazard) and must be present in significant levels in the human environment, presenting an opportunity for exposure. Health risk assessment is a process by which these two factors are interpreted, judging the potential for adverse effects to occur, and calculating the possible magnitude of those effects.

One consideration in judging estimated cancer risks is to compare the risks with risk levels historically considered acceptable by regulatory agencies.

A recent analysis of 132 regulatory decisions found that regulatory action was not taken to control risks below 1 x 10^{-6}, which are called <u>de minimus</u> risks. <u>De minimus</u> risks are historically considered risks of no regulatory concern. Chemical exposure with risks above 4 x 10^{-3}, called <u>de manifestis</u> risks, were consistently regulated. <u>De manifestis</u> risks are typically risks of regulatory concern. The risks falling in between these two extremes were regulated in some cases, but not in others (Travis et al, 1987).

The decision to regulate cancer risk is historically a function of population size, as follows:

- o Small population risks: as population risk approaches 250 cancer deaths per the population of the United States, the de manifestis risk level drops to 3×10^{-4}. Below this level, no action was taken to regulate risks.

- o For effects resulting from exposure to the entire population of the United States, the level of acceptable risk drops to 1×10^{-6}.

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:

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

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

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

1.0 INTRODUCTION

Teledyne McCormick Selph (TMS) is a subsidiary of Teledyne, Inc. specializing in the production of explosive ordinance items and, small volume specialty chemicals and specialty electronics.

The ordinance facility specializes in the production of high reliability pyrotechnic and explosive devices and systems, aircraft and helicopter crew escape systems, weapons delivery systems, missile applications, and spacecraft applications. More recently, TMS technology has been used to develop a safe and reliable pyrotechnic initiator system for inflation of automobile air bags.

The chemical manufacturing facility is a job lot production of 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, ranging from days to months.

In the course of operation, the facility generates small quantities of hazardous waste comprising various solvents and ordinance items which are safely open burned (OB) or open detonated (OD) on site. TMS currently has interim status for these operations from the EPA and Department of Health Services (DHS).

DHS has recently requested that a screening level health risk assessment of the OB/OD operations be completed. TMS retained Ebasco Environmental to complete the study in November 1990. Shortly thereafter, a protocol (Ebasco Environmental, 1990) for completing the study was submitted to and approved by DHS staff. A copy of the protocol is included in Appendix A. This report is being submitted in accordance with the protocol to document the results of the assessment.

The remainder of the report describes facility characteristics pertinent to assessment of OB/OD activities, location and surrounding land uses, expected emissions estimates, risk assessment calculation methodology and assessment results. Supporting documentation for emissions calculations, air dispersion modeling, and risk calculations can be found in the appendices accompanying this report.

2.0 PROJECT DESCRIPTION

2.1 Facility Location

TMS is located approximately one half mile south of State Highway 156 at 3601 Union Road. The plant is located within San Benito County in the southeast part of the San Juan Valley, four miles west of Hollister, California. The general location of the facility is shown in Figure 2-1. A detailed facility layout is included as Figure 2-2.

2.2 Surrounding Land Use

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 grazes at an average distance of approximately 1.3 kilometers from the site.

The only major water body close to the facility is the San Justo Reservoir, approximately 700 meters southeast of the site. The reservoir is a source of local drinking water and recreational fishing. The reservoir supplied primarily by pumping from the State Water Project and is administered by the San Benito County Water District, with guidance from the United States Bureau of Reclamation (San Benito County Water District, 1991). The reservoir began operation in 1988. It has a total storage volume of approximately 12,700,000 m^3, with a 33-acre surface area (U.S. Bureau of Reclamation, 1991). Annual average rainfall in the area is 12.9 inches. Because of the low rainfall and minimal watershed area (approximately 10% or 3.3 acres) surface water runoff is an insignificant contributor to the total water supply in the reservoir. The reservoir is expected to turnover approximately 80 percent of its capacity each year (San Benito County Water District, 1991).

There are no schools, day care centers, hospitals, or convalescent homes within 2 kilometers of the site. The San Justo school shown on the location map westnorthwest of the site is no longer in use. There are several schools in the Hollister area: R.O. Hardin School, Fremont School, Union School, and San Benito County High School and Junior College. The closest of these is approximately 4 kilometers from the site. Of the three day care centers identified in the area, the closest is over 6 kilometers from the site. The closest hospital is also approximately 6 kilometers from the site.

2.3 Facility Description

Emissions from treatment of hazardous waste at TMS arise primarily from the open burning (OB) or open detonation (OD) of hazardous materials. Negligible emissions also occur as a result of the handling, storage, treatment and containerizing of hazardous materials at the facility. These systems are either totally enclosed or involve low throughput of low vapor pressure materials. Accordingly, and consistent with the DHS-approved protocol (Appendix A), these sources are not quantitively considered in this assessment. The OB/OD facilities are discussed below.

2.3.1 Open Burning of Reactive Hazardous Waste (TSU-1)

Most of the reactive hazardous waste generated at TMS is treated by open burning in a specially designed facility, TSU-1, at a remote location on the property (shown on Figure 2-2). The facility comprises two, 10 foot diameter concrete sewer pipe mounted on a concrete foundation. The entire foundation is enclosed in a metal mesh cage with a number of rigid support rods.

Typically, several hundred pounds of material (containing an average of two to four percent net explosive weight) is stacked in each tube. A wood fiber fuel, Excelsior, is added to each pile to initiate and sustain combustion at temperatures sufficient to render the hazardous material nonreactive.

The operator ignites the piles from a remote location. A typical burn lasts from four to six hours. Residue remaining after the initial burn is burned a second, and sometimes a third time ensure destruction of all reactive material. Any residual waste is disposed as hazardous or nonhazardous waste, depending on the known lead content of the metal (Teledyne McCormick Selph, 1990a.).

The quantities and specific types of ordinance opened burned at TSU-1 have fluctuated over the years. Detail regarding the representative composition of materials open burned can be found in Appendix B. Open burning in 1988 was unusually high as a result of an intensive program to reduce "good surplus" inventory. The burn rates for 1987 to 1989 were:

TABLE 2-1

OPEN BURNING RATES OF REACTIVE HAZARDOUS MATERIALS

Year	Gross Weight Open Burned (Pounds)	Number of Burn Days
1987	10,000	37
1988	25,411	67
1989	11,636	55

Reference: Teledyne McCormick Selph, 1990b (Appendix B).

Burn rates in 1987 and 1989 are considered more representative of normal operation. For purposes of this assessment, a burn rate equal to 110 percent of the 1989 burn rate is considered indicative of long term operation (Lynam, 1990).

2.3.2 Open Detonation of Reactive Hazardous Waste

A small fraction of the reactive hazardous waste generated at the facility is more conducive to efficient and safe destruction by detonation. Material to be disposed is placed in earthen pits adjacent to the open burning cage. The material is typically covered in several feet of water or earth and remotely detonated. No lead sheathed material is treated in this manner. All of the reactive hazardous materials are consumed in the detonation. Scrap metal fragments from the detonations are periodically removed from the pit and salvaged or transported to a Class III landfill (Teledyne McCormick Selph, 1990a).

Detail regarding the representative composition of materials open detonated can be found in Appendix B. The quantities of ordinance detonated in 1988 were also high as a result of the inventory reduction campaign. Burn rates for 1987 to 1989 were:

TABLE 2-2

OPEN DETONATION RATES OF REACTIVE HAZARDOUS MATERIALS

Year	Gross Weight Open Detonated (Pounds)	Number of Burn Days
1987	219	6
1988	4,189	28
1989	1,220	11

Reference: Teledyne McCormick Selph, 1990b (Appendix B).

For purposes of the risk assessment, a burn rate equal to 110 percent of 1989 levels is considered indicative of long term operation (Lynam, 1990).

2.3.3 Open Burning of Solvents Contaminated With Reactive Hazardous Waste (TSU-2)

The manufacturing, conditioning, and blending of reactive materials utilizes a variety of ignitable solvents as a working medium. During the separation portion of the process, small amounts of reactive materials (one to two percent by weight) remain suspended in solution. Current reclamation technology is not compatible with recycling the solvent, because concentration of the reactive material in the high temperature environment of the recycling unit could result in an explosion. Therefore, the contaminated solvents are burned in TSU-2 (Teledyne McCormick Selph, 1990a).

TSU-2 comprises a grouping of eight halves of 55 gallon drums (cut in half along the long axis). Four halves are laid side by side in two levels in a double boiler arrangement. Volatile solvents are placed in the lower level trays and solvents with relatively more water are placed in the upper level. Pieces of wood fiber fuel (Excelsior) are laid across the edges of adjacent trays to serve as a fire bridge. Combustion is initiated remotely in the lower level and allowed to proceed to completion. Normally, four to six hours is required to complete a burn (Lynam, 1990).

Details regarding the composition of materials open burned can be found in Appendix B. A maximum of 300 gallons of material is open burned in any given day (Lynam, 1990). The following solvent open burning rates occurred during the 1987 to 1989 period:

TABLE 2-3

OPEN BURNING RATES OF SOLVENTS

Year	Gross Weight Open Burned (Pounds)	Number of Burn Days
1987	28,800	24
1988	108,500	74
1989	35,667	32

Reference: Teledyne McCormick Selph, 1990b (Appendix B).

Again, for purposes of the assessment a burn rate equal to 110 percent of the 1989 rate was assumed (Lynam, 1990).

3.0 EMISSIONS CHARACTERIZATION

3.1 Sources of Emissions Data

A paucity of data exists for purposes of developing reliable emissions estimates. TMS literature and other documents available in the open literature were reviewed to determine an appropriate basis for emissions estimates. The major sources of potential emissions data are discussed below.

- Teledyne McCormick Selph Internal Memoranda

In early 1990, A Robert Korcsmaros, a propellant chemist at TMS initiated an evaluation of emissions from OB/OD practices. The analysis was based on a modification to the computerized Propellant Evaluation Program (PEP), developed on the foundation of a number of technical articles presented in symposia of the International Pyrotechnics Society. The PEP model requires information on the composition of material (number and type of atoms present in substance), density, certain thermodynamic properties, and the air to reactive mixture ratio. The original PEP model was developed by the Naval Weapons Center, China Lake and has been used extensively by the military as a screening tool for identifying substances which cannot be effectively destroyed by OB/OD.

Korcsmaros completed a technical evaluation of the broad range of reactive hazardous waste which was treated in the 1989 period. Computer runs were completed for each ordinance type for multiple air/reactive mixture ratios. After evaluating each of the runs, Korcsmaros summarized his findings in a detailed memorandum to E. Lynam of TMS (Korcsmaros, 1990). The memo, which serves as a fundamental basis for many of the emissions calculations, can be found in Appendix C.

o POLU10 Model

The POLU10 Model is a Fortran IV program developed by Edward Baroody of the U.S. Naval Surface Weapons Center and Ivan Tominack of the U.S. Naval Ordinance Station - Indian Head. The program incorporates heat capacity equations and entropy/enthalpy constants for over 1400 species. It has been used extensively to evaluate potential byproducts of open burning or open detonation of selected propellants, explosives and pyrotechnics. Access to the POLU10 program is currently restricted by the military.

Summaries of these studies have been published to cover a number of specific munitions types. However, these summaries contained no information directly applicable to the reactive materials treated at the TMS facility (Baroody, E. and Tominack, I., 1987).

o Seminar - Incineration and Alternative Treatment of Energetic Compounds to Minimize Effects to Air, Soil, and Water Supplies.

In May 1990, the U.S. Environmental Protection Agency sponsored a technical seminar covering many of the potential environmental issues related to OB/OD operations (EPA, 1990a). The seminar reports selected preliminary findings of a multi-year study of OB/OD emissions. A large body of data compiled by the study will be made available in draft form for peer review in late 1991 (Johnson, 1991). The seminar summary contains ten separate documents covering the general technology as well as environmental assessments for air, water, and soil.

While much of the material in the seminar proceedings is of value from a general understanding viewpoint, almost no data is presented with enough supporting background to allow engineering calculations of emission factors to be completed. The only useable data in the proceedings is a collection of volatile organic compound measurements completed by R. A. Rasmussen for two types of treatment: Open detonation of a small charge of TNT and open burning of a double based propellant. These data compare 6 liter grab samples of ambient air before and during OB/OD events. This data served as a basis for the determination of benzene and other volatile organic emissions from OB of reactive hazardous materials. No data are available at this time for completing defensible estimates of semivolatile organic emissions from OB/OD operations (Johnson, 1991).

- EPA Air Toxics Emission Factor Database

EPA has recently updated its compilation of Air Toxics Emission Factors for a variety of emission sources (EPA, 1990b). The database is organized to allow computerized retrieval of emission factors by type of facility, Standard Industrial Classification (SIC) Code, or pollutant species. A search of the EPA database did not produce any emission factors which could be applied to the TMS OB/OD operations.

3.2 Emission Calculation Methodology

Emissions calculations for OB/OD operations were based on the following:

- OB of Solvents, TSU-2: Korcsmaros study for all pollutants (Appendix C).

- OB/OD of reactive hazardous waste, TSU-1: Korcsmaros study for all particulate and criteria pollutants; Rasmussen study for volatile organic compounds (EPA, 1990a).

3.2.1 Emissions from OB/OD of Reactive Materials, TSU-1

The Korcsmaros study was also used to derive the emission rates for all criteria and solid phase pollutants as follows:

Emission Factor, lb/lb solvent OB/OD

$$= \frac{\text{Total Korcsmaros emission estimate, lb/yr}}{\text{1989 OB/OD rate x 1.1, lb/yr}}$$

For noncriteria volatile organics, the Rasmussen data was transformed as follows:

Pollutant emission factor, lb/lb OB/OD

$$= \frac{\mu g/m^3 \times 10^{-3}\ m^3/l \times 6\ l}{10^6\ \mu g/g \times 454\ g/lb \times 0.5\ lb}$$

Pollutant emission factor, lb/yr

= lb/lb OB/OD x 1989 OB/OD rate, lb/yr

For benzene emissions, the emission factor derived for propellant OB in Section 3.2.2 was used since it resulted in a more conservative estimate of benzene emissions.

Short term emissions were determined by dividing annual emissions by the projected annual hours for combined OB/OD (which based on 110 percent of 1989 levels are 72.6 days, 5 hr/day or 363 hr/yr).

Emissions from OB and OD were assumed to be equivalent in the absence of data to distinguish among the two modes of release. The calculations are summarized in Table 2-4.

3.2.2 Emissions From OB of Solvents, TSU-2

The Korcsmaros study outlines the use of the PEP program for the determination of emissions from OB of solvents. The percentage distribution of solvents evaluated by Korcsmaros was reasonably close to expected future solvent distribution. Thus, Korcsmaros results, which were based on a combustion rate of 8000 lb/yr were scaled to 110 percent of 1989 disposal level as follows:

TABLE 2-4

Summary of TSU-1 Emissions

Reactive Open Burning/Open Detonation Emissions (TSU-1)

Total OB weight=	3022.69 lb net (10% above 1989)					
Days per year=	72.6 days					
Average Burn Period=	5 hr					
Total hours per year=	363 hr					
	Korcemaros lb/yr	lb/lb	lb/yr	lb/day	lb/hr	g/sec
KBO2	17.6	6.40E-03	1.94E+01	2.67E-01	5.33E-02	6.73E-03
ZrO2	6.8	2.47E-03	7.48E+00	1.03E-01	2.06E-02	2.60E-03
K2O	6.3	2.29E-03	6.93E+00	9.55E-02	1.91E-02	2.41E-03
Pb	4.6	1.67E-03	5.06E+00	6.97E-02	1.39E-02	1.76E-03
B2O3	4.6	1.67E-03	5.06E+00	6.97E-02	1.39E-02	1.76E-03
MgF2	4.3	1.56E-03	4.73E+00	6.52E-02	1.30E-02	1.64E-03
BaO	3.8	1.38E-03	4.18E+00	5.76E-02	1.15E-02	1.45E-03
Mg	3.7	1.35E-03	4.07E+00	5.61E-02	1.12E-02	1.41E-03
PbO	2.7	9.83E-04	2.97E+00	4.09E-02	8.18E-03	1.03E-03
Cs2O	2.5	9.10E-04	2.75E+00	3.79E-02	7.58E-03	9.55E-04
KOH	2.1	7.64E-04	2.31E+00	3.18E-02	6.36E-03	8.03E-04
Cr2O3	1.9	6.91E-04	2.09E+00	2.88E-02	5.76E-03	7.26E-04
ZnCl2	0.3	1.09E-04	3.30E-01	4.55E-03	9.09E-04	1.15E-04
BN	0.1	3.64E-05	1.10E-01	1.52E-03	3.03E-04	3.82E-05
Benzene	--	2.43E-10	7.35E-07	1.01E-08	2.02E-09	2.55E-10
CO	--	4.01E-01	1.21E+03	1.67E+01	3.34E+00	4.21E-01
NOx	--	3.45E-04	1.04E+00	1.44E-02	2.88E-03	3.63E-04
HC	--	4.32E-03	1.30E+01	1.80E-01	3.59E-02	4.53E-03
SO2	--	3.45E-04	1.04E+00	1.44E-02	2.88E-03	3.63E-04
HCL	--	1.35E-02	4.08E+01	5.62E-01	1.12E-01	1.42E-02
Ethane	--	2.06E-10	6.22E-07	8.57E-09	1.71E-09	2.16E-10
Ethylene	--	2.57E-11	7.78E-08	1.07E-09	2.14E-10	2.70E-11
Acetylene	--	3.86E-11	1.17E-07	1.61E-09	3.21E-10	4.05E-11
Propane	--	1.54E-10	4.67E-07	6.43E-09	1.29E-09	1.62E-10
Butane	--	2.06E-10	6.22E-07	8.57E-09	1.71E-09	2.16E-10
Pentane	--	1.54E-10	4.67E-07	6.43E-09	1.29E-09	1.62E-10
2-Methylpentane	--	1.29E-11	3.89E-08	5.36E-10	1.07E-10	1.35E-11
3-Methylpentane	--	2.57E-11	7.78E-08	1.07E-09	2.14E-10	2.70E-11
n-Heptane	--	1.29E-11	3.89E-08	5.36E-10	1.07E-10	1.35E-11
Toluene	--	6.43E-11	1.94E-07	2.68E-09	5.36E-10	6.76E-11
Ethylbenzene	--	3.86E-11	1.17E-07	1.61E-09	3.21E-10	4.05E-11
Xylene	--	1.29E-10	3.89E-07	5.36E-09	1.07E-09	1.35E-10
Nonane	--	2.57E-11	7.78E-08	1.07E-09	2.14E-10	2.70E-11

Emission Factor, lb/lb solvent OB/OD

$$= \frac{\text{Total Korcsmaros emission estimate, lb/yr}}{\text{8000 lb/hr}}$$

Future Emission Rate, lb/hr =

Emission Factor, lb/lb solvent OB x Solvent OB rate
Where,
Solvent OB rate = 1.1 x 1989 level, lb/yr

Benzene emissions from OB of solvents were calculated from an emission factor developed from Rasmussen data as follows:

Benzene emission factor:

$$\frac{\mu g}{kg\ OB} = \frac{3.68 \times 10^{-9}\ \text{Benzene ug/m}^3 \times 10^{-3}\ m^3/l \times 6\ l}{1\ lb \times 0.454\ kg/lb}$$

$$= 3.93\ \mu g/kg\ OB$$

$$\frac{lb}{kg\ OB} = \frac{3.93\ \mu g/kg \times 2.21\ lb/kg \times 10^{-6}\ \mu g/kg}{454\ g/lb}$$

$$= 2.43 \times 10^{-10}$$

Then, the emission rate follows from lb/yr = lb/lb OB x lb OB/yr.

Short term emission rates reflective of annual average conditions were determined by dividing the annual emission rate by the projected annual hours (which based on 110 percent of 1989 levels are 35.2 days, 5 hours/day or 176 hours/yr).

Detailed calculations are summarized in Table 2-5.

TABLE 2-5

Summary of TSU-2 Emissions

Solvent Open Burning Emissions (TSU-2)

Total OB weight=	39233.7	lb (10% above 1989)
Days per year=	35.2	days
Average Burn Period=	5	hr/day
Hours per year=	176	hrs

	Emission Factor lb/lb OB	lb/yr	lb/day	lb/hr	g/sec
NOx	8.91E-03	3.50E+02	9.93E+00	1.99E+00	2.51E-01
CO	2.91E-02	1.14E+03	3.25E+01	6.49E+00	8.19E-01
THC	8.91E-03	3.50E+02	9.93E+00	1.99E+00	2.51E-01
Solvents (as below)	2.50E-02	9.81E+02	2.79E+01	5.57E+00	7.03E-01
Methanol	1.35E-02	5.30E+02	1.50E+01	3.01E+00	3.80E-01
Isopropyl Alcohol	3.50E-03	1.37E+02	3.90E+00	7.80E-01	9.84E-02
Acetone	4.75E-03	1.86E+02	5.29E+00	1.06E+00	1.34E-01
Pyradine	1.63E-03	6.38E+01	1.81E+00	3.62E-01	4.57E-02
Tetrahydrofuran	1.63E-03	6.38E+01	1.81E+00	3.62E-01	4.57E-02
Benzene	2.43E-10	9.54E-06	2.71E-07	5.42E-08	6.84E-09

1) Reference: R. Korcsmaros memo to E. Lynam, 3/7/90 for emission factors except benzene.

2) Benzene emission factor assumed equivalent to double base propellant OB

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4.0 RISK ASSESSMENT METHODOLOGY

4.1 Air Quality Modeling

4.1.2 Model Selection

The model selected for use in modeling Teledyne McCormick Selph OB scenarios was EPA's Industrial Source Complex Term (ISCST) model (EPA, 1986a). This is a standard Gaussian dispersion model in wide use as an EPA guideline model for projecting short term (1-hour, in this case) concentrations from releases from industrial sources of many types (EPA, 1986b). This model is appropriate for situations where the plume travel time to the nearest receptor is less than the pollutant release time as is the case in open burning (which lasts from 4-6 hours).

For the much shorter duration open detonation, INPUFF (a puff-type model) was utilized. The INPUFF (INtegrated PUFF) computer code is designed to simulate dispersion from semi-instantaneous or continuous point sources over a spatially and temporally variable wind field. The algorithm is based upon Gaussian puff assumptions including a vertically uniform wind direction field and no chemical reactions (EPA, 1986c).

Both models provided 1-hour average concentrations based upon an emission rate of 1 gram/sec. All output concentrations were then scaled to desired pollutant specific emission rates as input and output are directly proportional. Short term concentrations were determined from X/Q values using multipliers commonly accepted by EPA and ARB, with linear proration to account for duration of release (which is not continuous). For the OD modeling with INPUFF the release time was 36 seconds which is the minimum 'step' time the model will accept (i.e., 100 step maximum) in providing a 1-hour average. The total emission is then 36 grams (1g/sec x 36 sec) and this value was used in 'scaling' all INPUFF modeling results.

4.1.2 Model Input

The models require a wide range of input data. For modeling purposes, the plumes generated by OB/OD activities at this source were assumed to be "area sources."

As the name implies an area source is an emission source that emanates from an area (rather than a stack). The area must by input to the model as a square and also has an effective emission height (plume rise) of release. The emission rate for an area source is supplied to the model in grams per sec per m^2. Therefore, for the solvent open burn area which was calculated to have an area of 4.41 m^2 (2.1 m x 2.1 m) an emission rate of .227 grams per sec per m^2 will provide a 1 g/sec emission rate. For reactive OB, the area was assumed to be 33.8 m^2 (5.8 m x 5.8 m) - with an emission rate of .029 grams per sec m^2 providing 1 g/sec of emissions. For INPUFF modeling of OD, a "stack" diameter of .67 m (the approximate diameter of the detonation pile) was supplied to the model.

Meteorological data input to both models consisted of a subset of the standard wind-speed/stability combinations used in the EPA model PTPLU. E and F stability combinations (which reflect night time atmospheric conditions) were not modeled as OB/OD does not occur at night (Lynam, 1990). Stability-dependent ambient temperatures and mixing heights were derived as indicated in the ISC User's Guide from data collected at Oakland, California.

Plume rise was calculated for each wind speed in each modeling scenario based upon the procedures indicated in equations 4-8 of the document "Technical Description of the Proposed Open Burn/Open Detonation Dispersion Model" (Dugway Proving Ground, 1990). A computer program was developed to calculate final plume rise as a function of wind speed using these equations. The models requires information regarding pile dimension, burn rate, and heating valve. Appropriate input valves were selected on hexanitrostilbene (HNS) as a surrogate for reactive OB/OD and methanol as a surrogate for solvent OB (Lynam, 1990). The outputs of this program as well as the input variable assumptions used for the solvent and reactive material OB scenarios are contained in Appendix E. For each wind speed scenario modeled the final plume rise for that scenario at that wind speed was used in ISCST modeling.

For OD modeling, which generally occurs under a water blanket, a 2 m plume height was assumed. This is the minimum value the model will accept and is a conservative estimate which should provide worst-case downwind concentrations. Plume rise in this situation would be minimal due to loss of plume momentum and buoyance (temperature) when passing through the water cover.

The receptor grid for both models extended out to 2.0 km from the source at 100 meter intervals with the initial receptor at a distance equivalent to the nearest plant boundary. For OB, two receptor grids were supplied to the ISCST model. The first had an initial receptor at 320 meters and was for the solvent open burn site. The second, beginning at 160 meters, was for the reactive OB/OD site. Both receptor grids were supplied elevations which were derived from the maximum elevation (in any direction) at that distance from the respective burn site. Only the latter grid was used in INPUFF, OD modeling. The receptor at 1000 meters would be most appropriate for determining concentrations from the solvent OB site at the San Justo Reservoir while the 700 meter receptor should be used for reactive OB/OD impacts.

Dispersion model computer printouts are contained in Appendix F. In reviewing the ISCST model output one should be aware that both the solvent and reactive OB scenarios were modeled for each meteorological data set (stability/wind speed combinations) in the same computer run using two separate "source groups." The first source group is the solvent OB receptors and the second is the reactive OB receptors. While the concentrations for the two source groups are printed out on separate pages there is no procedure to only print part of the receptors in each group. Therefore, in the first source group the second twenty receptors are extraneous while in the second source group the first eighteen are.

4.1.3 Model Results

X/Q values were projected for all wind speed/stability combinations for the three modeling scenarios of interest. Maximum 1-hour average X/Q values for OB activities (both solvent and reactive material) are summarized in Figure 4-1. It is evident from Figure 4-1 that neutral atmospheric stability and moderate to high windspeed (Class D, 3 m/sec and 15 m/sec) produce the highest ambient concentrations. For other atmospheric stability and wind speed combinations, ambient concentrations are significantly lower. Maximum 1-hr average X/Q values for OD activities are summarized in Figure 4-2. Similarly, mild winds and neutral stability Class D, (0.5 m/s) produce the highest concentrations.

In order to convert 1-hr maximum concentrations to long term annual average X/Q values reflective of discontinuous operation the following equation was used:

Annual Average X/Q

$$= \frac{\text{1-hr X/Q x 0.1 x hours operation/yr}}{\text{8,760 hours/yr}}$$

The 0.1 multiplier is recommended for screening level analysis by the CAPCOA Air Toxic Assessment Manual (CAPCOA, 1987).

Table 4-1 summarizes the location of sensitive receptors considered in the risk assessment. Maximum X/Q values are applicable at the nearest facility boundary and are used in determining exposure for the maximally exposed individual (MEI). The MEI was used for estimation of risk by inhalation, soil ingestion, crop ingestion and dermal exposure. Hollister ranch was used for estimation of meat ingestion exposure. San Justo Reservoir was used for estimation of exposure water and fish ingestion.

Table 4-2 summarizes the maximum 1-hr X/Q concentrations observed at each receptor and applicable days per year assumed in converting the 1-hr maximums to annual averages.

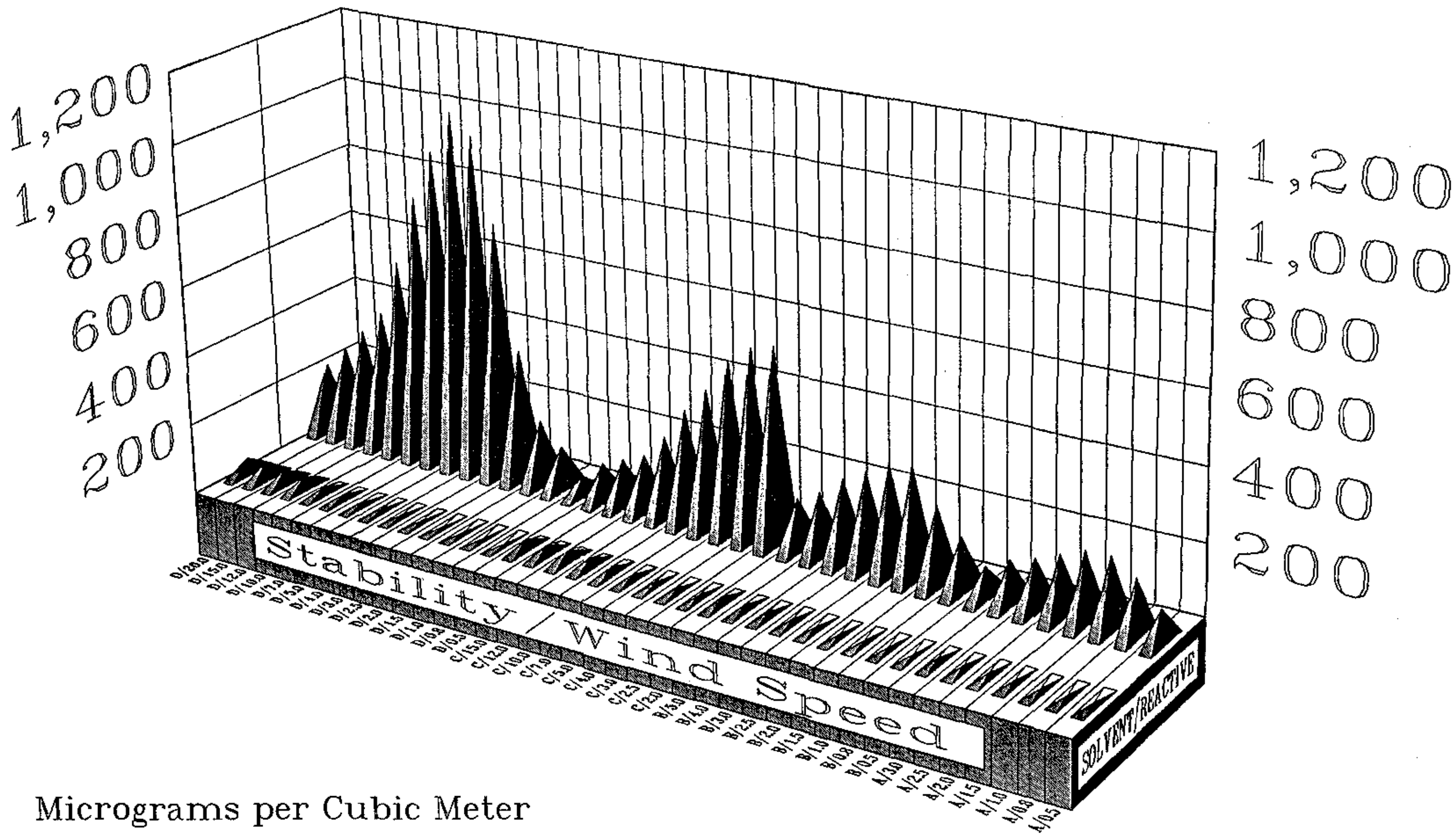

Figure 4-1
MAXIMUM 1 - HR X/Q VALUES FOR OPEN BURNING

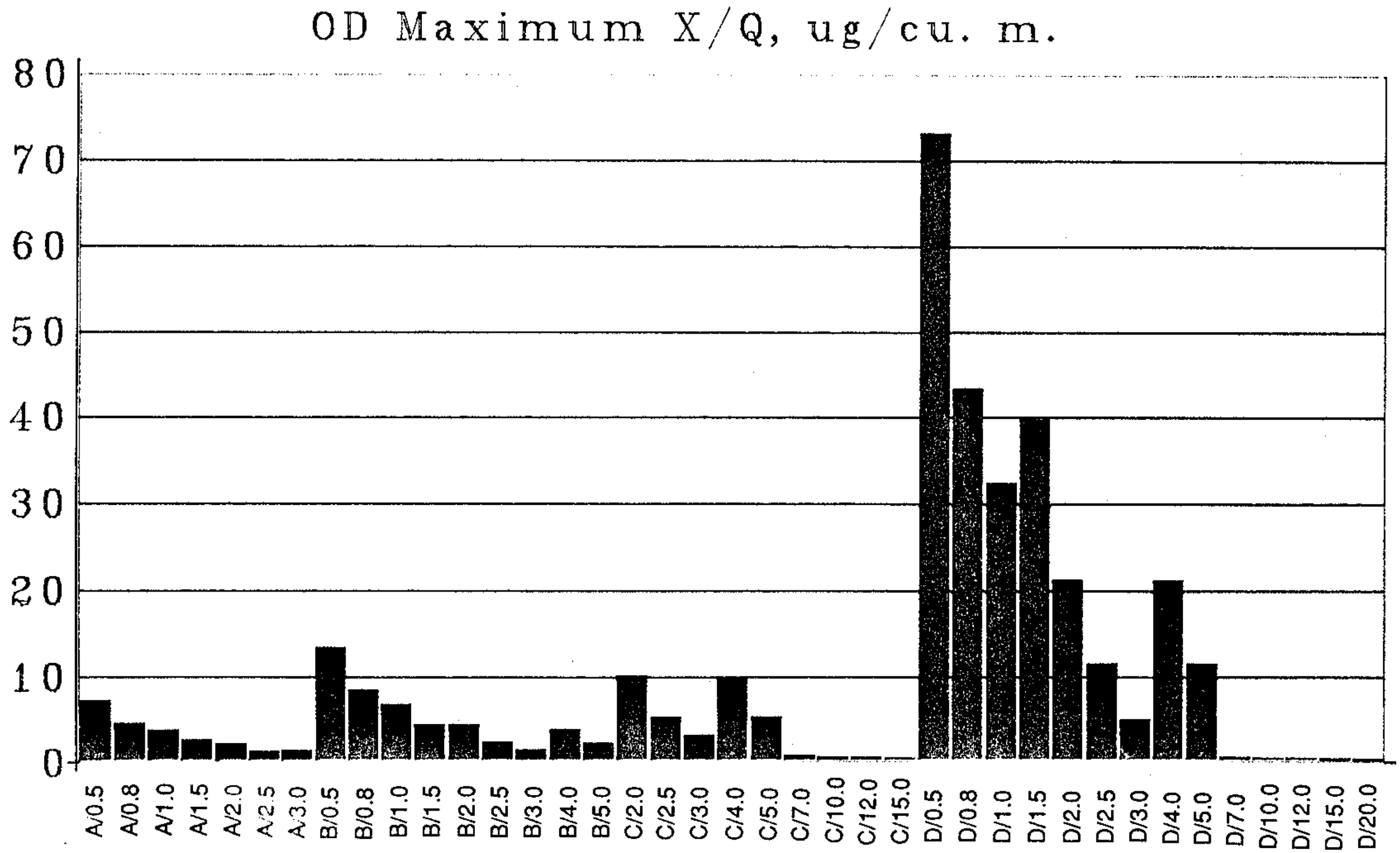

Figure 4-1
MAXIMUM 1 - HR X/Q VALUES FOR OPEN BURNING

TABLE 4-1

LOCATION OF SENSITIVE RECEPTORS

Receptor	Separation Distance, Meters TSU-1	TSU-2
MEI	160	320
Nearest Resident	1000	800
Average Cattle Grazing Distance	1400	1300
San Justo Reservoir	1000	1300

TABLE 4-2

SUMMARY OF MAXIMUM 1-HR X/Q CONCENTRATIONS [(1)]
($\mu g/m^3$)

Receptor	TSU-1 OB [(2)]	TSU-1 OD [(3)]	TSU-2 [(4)]
MEI	1021 (D/3)	73 (D/0.5)	49 (D/15)
Nearest Resident	103 (D/1)	.07 (</2)	17 (D/7)
Average Cattle Grazing Distance	71 (D/.8)	.10 (</2)	17 (D/7)
San Justo Reservoir	103 (D/1)	.07 (</2)	10 (D/5)

(1) Note: Values in parenthesis denote the atmospheric conditions under which the maximum concentration occurred. For example, (D/3) denotes atmospheric stability Class D and 3.0 m/sec wind speed.

(2) TSU-1 OB @ 35 days per year (10% above 1989).

(3) TSU-1 OD @ 60 days per year (10% above 1989).

(4) TSU-2 OB @ 12 days per year (10% above 1989).

Table 4-3 summarizes the annual average X/Q concentrations used in the risk assessment.

4.2 Exposure Quantitation

To assess the extent of human exposure to facility-emitted contaminants, the environmental fate of those pollutants and the potential pathways of human exposure was evaluated. In addition to the direct inhalation pathway, several other noninhalation pathways are: soil ingestion, fish ingestion, crop ingestion, meat ingestion, surface water ingestion, and dermal absorption. Health risk associated with exposure via the mother's milk pathway is attributable primary to polychlorinated dibenzo dioxins and dibenzo furans (PCDD/PCDFs) and polychlorinated biphenyls (PCBs). Since these substances are not expected to be emitted from the facility, no significant helath risk is expected from mother's milk exposure. Accordingly, inclusion of exposure via mother's milk was not a part in the DHS-approved risk assessment protocol (Appendix A) or this assessment. To monitor the environmental fate of pollutants emitted from the Teledyne McCormick Selph facility, it was necessary to evaluate the rate at which chemicals enter a given medium and the pathway processes that affect chemical concentrations in that medium. Exposure pathway calculations, pathway variables and chemical specific parameters used in the environmental fate evaluation are taken from Health Risk Assessment Guidelines for nonhazardous waste incinerators (ARB, 1990) and CAPCO, 1987 (see Appendix G).

4.2.1 Assessing Inhalation Exposures

The risk associated with inhalating ambient concentrations of pollutants was determined using the modeled ground level air concentrations (GLC). Assuming that pollutants adsorbed to inhaled particles are completely absorbed into the body through the lung, inhalation exposure was calculated as a function of the concentration of pollutants in air, respiration rate (20 m^3/day), and body weight (70 kg).

TABLE 4-3

SUMMARY OF ANNUAL AVERAGE X/Q CONCENTRATIONS
$\mu g/m^3$

Receptor	TSU-1 OB	TSU-1 OD	TSU-2
MEI	3.5	0.05	0.098
Nearest Resident	0.35	5×10^{-5}	0.034
Average Cattle Grazing Distance	0.24	7×10^{-5}	0.020
San Justo Reservoir	0.35	5×10^{-5}	0.020

Note: Annual average X/Q = 1-hr X/Q x 0.1 x hours operation/yr ÷ 8,760 hrs/yr.

4.2.2 Ingestion Exposures

4.2.2.1 Soil Ingestion

Pollutants in the soil can be accumulated into food crops or ingested directly. The average concentration in the soil is a function of the deposition, accumulation period, chemical specific half-life, mixing depth, and soil bulk density. The half-lives of all inorganic compounds is assumed to be 10^6 years. The half-lives of all organic compounds were taken from Appendix G, Table 1 or assumed to be 1000 days which is the half-life for DDT, a persistent organic substance (EPA, 1986d). All remaining soil pathway values follow Appendix G default values.

4.2.2.2 Crop Ingestion

Exposure through ingestion of contaminated plants may result if the local population consumes crops which are grown in the vicinity of the facility. The average concentration in and on vegetables is a function of direct deposition, root translocation or uptake from exposed soil and uptake through foliage. The concentration of contaminant due to root translocation has been shown to be a function of the K_{ow} (octanol:water partition factor) and K_{oc} (organic carbon partition coefficient).

For organic compounds, the K_{oc} and K_{ow} of benzene, 83 ml/g and 132 respectively, were assumed. For inorganic compounds K_{ow} is assumed to be 1, since the ratio of contaminant in the octanol layer to the water layer should be less than one. The K_{oc} may be calculated from the K_{ow} by the equation (Dragun, 1988):

$$K_{oc} = 0.524 \log K_{ow} + 0.855$$

For inorganic compounds, K_{oc} is 0.855 since $\log K_{ow}$ is zero. All remaining parameters for the crop pathway follow Appendix G default values.

4.2.2.3 Meat Ingestion

The average consumption of beef was assumed to be 0.1 kg/d for a 70 kg person. The diet transfer coefficient for all organics were assumed to be 5.0×10^{-2}, which si the value listed in Appendix G, Table 1 for PCBs. All other parmeters follow Appendix G recommended default values.

4.2.2.4 Fish Ingestion

Human exposure from consumption of contaminated fish can be calculated based on the concentration of contaminant in the water and the bioconcentration factor. The default bioconcentration value was assumed to be 200 for inorganics and 500 for organics, except where a specific value is reported in Appendix G, Table 1.

4.2.2.5 Water Ingestion

For water ingestion, the average concentration in water is a function of direct deposition and material carried in by surface run-off. The number of water volume changes per year (VC), watershed impact area (WSIA), and fraction by runoff (R_{of}) were calculated from values received from the San Benito County Water District. The water contributed from run off would be:

$$3.3 \text{ acre} \times 4{,}046 \text{ m}^2/\text{acre} \times 0.325 \text{ m/yr} = 4{,}380 \text{ m}^3/\text{yr}$$

This calculation assumes a watershed impact area (WSIA) of 10% of the total reservoir area which is 33 acres.

The volume of water contributed from surface recharge is 8,000 acre-ft[6] or:

$$8{,}000 \text{ acre-ft/yr} \times 4{,}046 \text{ m}^2/\text{acre} \times 0.03048 \text{ m/ft} = 9.86 \times 10^6 \text{ m}^3/\text{yr}$$

The R_{of} would therefore be:

$$(4{,}380 \text{ m}^3/\text{yr})/9.86 \times 10^6 \text{ m}^3/\text{yr}) = 4.44 \times 10^{04}$$

The number of VC may be calculated as:

$$(8,000 \text{ acre-ft/yr})/(10,000 \text{ acre-ft}) = 0.8$$

All remaining variables and parameters used in this calculation are shown in Appendix D.

4.2.3 Dermal Exposures

Dermal exposures can result from direct deposition of pollutants onto skin or contact with surface dust. Pollutant exposure through dermal absorption is a function of the soil or dust loading of the exposed skin surface, skin surface area exposed, and the concentration and availability of the pollutant. See Appendix D for parameters and variables.

5.0 RISK ASSESSMENT RESULTS

5.1 Cancer Risk

Cancer risk assessment involves calculating upper-bound estimates of individual cancer risk as well as the population risk (excess number of cases within a defined population). The individual cancer risk estimate of the most exposed individual (MEI) is most frequently used as a basis for risk management. Individual cancer risk is calculated as the product of exposure dose (mg/kg/day) and the potency slope factor (mg/kg/day). The total theoretical upper-bound incremental cancer risk for benzene at the point of highest exposure to an individual from the seven exposure pathways is summarized in Tables 5-1 to 5-3 for the three distinct treatment activities. Detailed calculations for each pathway are contained in Appendix G. Cancer risks from exposure to multiple carcinogens and multiple pathways of exposure are assumed to be additive based on EPA carcinogenic risk assessment guidelines (EPA, 1986e). The total upper bound incremental risk at the point of the maximally exposed individual is 8.66×10^{-14}. The risk is due principally to benzene exposure via inhalation.

The most exposed individual is assumed to be exposed 24 hours/day, 365 days/yr for 70 years at a distance of 160 meters from TSU-1 and 320 meters from TSU-2. Because workers in the area are located further from TSU-1 and TSU-2 than the MEI, and are exposed for shorter duration (8 hours/day), MEI risk can be viewed as an overstated estimate of worker risk.

5.2 Cancer Burden

An estimation of cancer burden that might result from emissions of the TMS facility requires population projections in the zone of impact at the midpoint of the next 70 years (or the year 2025). The 1990 population for San Benito County is 36,850 (San Benito County Planning Department, 1991.) To calculate an upper bound of the cancer burden, it is assumed that the adopted growth forecast of approximately 21% every five years occurs through 2025. The entire population of San Benito County in 2025 can then be calculated:

$$36{,}850 \times (1.21)^7 = 139{,}940 \text{ persons}$$

TS-1
REACTIVE-OB

TABLE 5-1

Total Risk TSU-1, Reactive OB

TOTAL RISK

COMPOUND	INHALATION	SOIL	WATER	CROP	MEAT	FISH	DERMAL	TOTAL
KBO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZRO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
K2O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pb	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2O3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MgF2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BaO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PbO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs2O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KOH	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cr2O3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZnCl2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BENZENE	4.73E-14	1.19E-18	5.37E-17	5.84E-16	3.47E-16	8.13E-18	1.85E-18	4.83E-14
CO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NOX	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HC	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETHANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETHYLENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETYLENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PROPANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BUTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-METHYLPENTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3-METHYLPENTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-HEPTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOLUENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETHYLBENZENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XYLENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NONANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL	4.73E-14	1.19E-18	5.37E-17	5.84E-16	3.47E-16	8.13E-18	1.85E-18	4.83E-14

TSU-1
REACTIVE-OD

TABLE 5-2

Total Risk TSU-1, Reactive OD

TOTAL RISK

COMPOUND	INHALATION	SOIL	WATER	CROP	MEAT	FISH	DERMAL	TOTAL
KBO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZRO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
K2O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Pb	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2O3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MgF2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BaO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PbO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cs2O	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
KOH	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Cr2O3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ZnCl2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BENZENE	6.76E-16	1.70E-20	5.65E-17	8.34E-18	3.78E-17	3.39E-16	2.64E-20	1.12E-15
CO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NOX	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HC	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HCl	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETHANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETHYLENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETYLENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PROPANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BUTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
2-METHYLPENTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
3-METHYLPENTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-HEPTANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOLUENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ETHYLBENZENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
XYLENE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NONANE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TOTAL	6.7575E-16	1.7E-20	5.6525E-17	8.343872E-18	3.778E-17	3.39E-16	2.64E-20	1.12E-15

TSU-2
SOLVENT-OB

TABLE 5-3

Total Risk TSU-2, Solvent OB

TOTAL RISK

COMPOUND	INHALATION	SOIL	WATER	CROP	MEAT	FISH	DERMAL	TOTAL
NOX	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CO	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
THC	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SOLVENTS	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
METHANOL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ISOPROPYL ALCOHOL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
ACETONE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PYRIDINE	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
TETRAHYDROFURAN	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BENZENE	3.55E-14	8.96E-19	6.70E-16	4.39E-16	4.18E-16	1.01E-16	1.39E-18	3.72E-14

An upper bound for the cancer burden that might result over the next 70 years for this population is calculated from the maximum unit risk for an individual. This assumes that the entire population of San Benito County is exposed to the maximum individual risk. The upper bound is $139,940 \times 8.66 \times 10^{-14}$. Thus, to result in an estimated cancer burden of 1.21×10^{-8}. From this value, the Poisson distribution can be used to calculate a lower bound of the probability that no cancers will result during the next 70 years from emissions of the TMS facility. This probability is $2.713^{-1.21 \times 10-8} = 99.999999\%$. Therefore, no excess cancer cases are expected from the emissions of the TMS facility during the next 70 years.

5.3 Noncancer Effects

Potential effects of chronic exposure to the noncarcinogenic compounds present in the TMS facility emissions are assessed by comparing exposure levels with references doses (R_fDs) or acceptable daily intakes (EPA, 1990c). R_fDs are defined as estimates of lifetime daily exposures of the a noncarcinogenic substance for the general human population which appears to be within an appreciable risk of deleterious effects. Estimates of average daily intake of noncarcinogens, as measured by the hazard index, are shown in Tables 5-4 to 5-6. As can be seen, the estimated intake of these compounds are a small fraction of the R_fD. Consequently, no noncancer health effects are expected from operation of the TMS facility.

TABLE 5-4

TS-1
REACTIVE-OB

Lifetime Dose TSU-1, Reactive OB

LIFETIME DOSE (MG/KG/D)

COMPOUND	INHALATION	SOIL	WATER	CROP	MEAT	FISH	DERMAL	TOTAL	Rf KG/KG/DA	HAZARD INDEX
KBO2	6.73E-06	5.57E-06	2.68E-05	5.74E-02	5.95E-01	6.42E-05	8.65E-05	6.53E-01		
ZRO2	2.60E-06	2.15E-06	1.03E-05	2.22E-02	2.30E-01	2.48E-05	3.34E-05	2.52E-01		
K2O	2.41E-06	2.13E-07	9.58E-06	2.23E-03	2.32E-02	5.75E-05	3.30E-06	2.55E-02		
Pb	1.76E-06	1.46E-06	7.00E-06	4.28E-05	5.02E-07	1.30E-05	2.26E-08	6.66E-05	4.5E-03	1.48E-02
B2O3	1.76E-06	1.55E-07	7.00E-06	1.63E-03	1.70E-02	4.20E-05	2.41E-06	1.86E-02		
MgF2	1.64E-06	1.45E-07	6.52E-06	1.52E-03	1.58E-02	3.91E-05	2.25E-06	1.74E-02		
BaO	1.45E-06	1.28E-07	5.77E-06	1.34E-03	1.40E-02	3.46E-05	1.99E-06	1.54E-02	5.0E-02	3.07E-01
Mg	1.41E-06	1.24E-07	5.61E-06	1.31E-03	1.36E-02	3.36E-05	1.93E-06	1.49E-02		
PbO	1.03E-06	8.53E-07	4.10E-06	2.51E-05	2.94E-07	7.62E-06	1.32E-08	3.90E-05	4.5E-03	8.66E-03
Cs2O	9.55E-07	8.43E-08	3.80E-06	8.85E-04	9.20E-03	2.28E-05	1.31E-06	1.01E-02		
KOH	8.03E-07	6.65E-07	3.19E-06	6.85E-03	7.10E-02	1.92E-05	1.03E-05	7.79E-02		
Cr2O3	7.26E-07	6.01E-07	2.89E-06	6.19E-03	6.42E-02	1.73E-05	9.33E-06	7.05E-02	1.0E+00	7.05E-02
ZnCl2	1.15E-07	9.52E-08	4.57E-07	9.81E-04	1.02E-02	2.74E-06	1.48E-06	1.12E-02		
BN	3.82E-08	3.16E-08	1.52E-07	3.26E-04	3.38E-03	9.11E-07	4.91E-07	3.71E-03		
BENZENE	2.55E-13	2.25E-14	1.01E-12	1.10E-11	6.54E-12	1.53E-13	3.49E-14	1.90E-11		
CO	4.21E-04	3.49E-04	1.67E-03	3.59E+00	3.72E+01	1.00E-02	5.41E-03	4.09E+01		
NOX	3.63E-07	3.01E-07	1.44E-06	3.09E-03	3.21E-02	8.66E-06	4.66E-06	3.52E-02	1.0E+00	3.52E-02
HC	4.53E-06	4.00E-07	1.80E-05	1.96E-04	1.16E-04	1.08E-04	6.20E-06	4.49E-04		
SO2	3.63E-07	3.01E-07	1.44E-06	3.09E-03	3.21E-02	8.66E-06	4.66E-06	3.52E-02		
HCl	1.42E-05	1.18E-05	5.65E-05	1.21E-01	1.26E+00	3.39E-04	1.82E-04	1.38E+00		
ETHANE	2.16E-13	1.91E-14	8.59E-13	9.33E-12	5.54E-12	5.15E-12	2.96E-13	2.14E-11		
ETHYLENE	2.70E-14	2.38E-15	1.07E-13	1.17E-12	6.93E-13	6.44E-13	3.70E-14	2.68E-12		
ACETYLENE	4.05E-14	3.57E-15	1.61E-13	1.75E-12	1.04E-12	9.66E-13	5.55E-14	4.02E-12		
PROPANE	1.62E-13	1.43E-14	6.44E-13	7.00E-12	4.16E-12	3.87E-12	2.22E-13	1.61E-11		
BUTANE	2.16E-13	1.91E-14	8.59E-13	9.33E-12	5.54E-12	5.15E-12	2.96E-13	2.14E-11		
PENTANE	1.62E-13	1.43E-14	6.44E-13	7.00E-12	4.16E-12	3.87E-12	2.22E-13	1.61E-11		
2-METHYLPENTANE	1.35E-14	1.19E-15	5.37E-14	5.83E-13	3.46E-13	3.22E-13	1.85E-14	1.34E-12		
3-METHYLPENTANE	2.70E-14	2.38E-15	1.07E-13	1.17E-12	6.93E-13	6.44E-13	3.70E-14	2.68E-12		
N-HEPTANE	1.35E-14	1.19E-15	5.37E-14	5.83E-13	3.46E-13	3.22E-13	1.85E-14	1.34E-12		
TOLUENE	6.76E-14	5.97E-15	2.69E-13	2.92E-12	1.73E-12	1.61E-12	9.26E-14	6.70E-12	3.0E-01	2.23E-11
ETHYLBENZENE	4.05E-14	3.57E-15	1.61E-13	1.75E-12	1.04E-12	9.66E-13	5.55E-14	4.02E-12	1.0E-01	4.02E-11
XYLENE	1.35E-13	1.19E-14	5.37E-13	5.83E-12	3.46E-12	3.22E-12	1.85E-13	1.34E-11	2.0E+00	6.69E-12
NONANE	2.70E-14	2.38E-15	1.07E-13	1.17E-12	6.93E-13	6.44E-13	3.70E-14	2.68E-12		

TABLE 5-5

TSU-1
REACTIVE-OD

Lifetime Dose TSU-1, Reactive OD

LIFETIME DOSE (MG/KG/D)

COMPOUND	INHALATION	SOIL	WATER	CROP	MEAT	FISH	DERMAL	TOTAL	Rf	HAZARD INDEX
KBO2	9.61E-08	7.96E-08	2.81E-05	7.01E-04	7.42E-03	6.76E-05	1.24E-06	8.22E-03		
ZRO2	3.71E-08	3.08E-08	1.09E-05	2.71E-04	2.87E-03	2.61E-05	4.77E-07	3.18E-03		
K2O	3.44E-08	3.04E-09	1.01E-05	2.74E-05	3.35E-04	6.05E-05	4.72E-08	4.33E-04		
Pb	2.51E-08	2.08E-08	7.36E-06	6.12E-07	2.17E-08	1.37E-05	3.23E-10	2.17E-05	4.5E-03	4.83E-03
B2O3	2.51E-08	2.22E-09	7.36E-06	2.00E-05	2.44E-04	4.42E-05	3.44E-08	3.16E-04		
MgF2	2.34E-08	2.07E-09	6.86E-06	1.86E-05	2.28E-04	4.12E-05	3.21E-08	2.94E-04		
BaO	2.07E-08	1.83E-09	6.06E-06	1.65E-05	2.01E-04	3.64E-05	2.84E-08	2.60E-04	5.0E-02	5.21E-03
Mg	2.01E-08	1.78E-09	5.90E-06	1.60E-05	1.96E-04	3.54E-05	2.76E-08	2.53E-04		
PbO	1.47E-08	1.22E-08	4.31E-06	3.58E-07	1.27E-08	8.01E-06	1.89E-10	1.27E-05	4.5E-03	2.83E-03
Cs2O	1.36E-08	1.20E-09	3.99E-06	1.08E-05	1.33E-04	2.40E-05	1.87E-08	1.71E-04		
KOH	1.15E-08	9.50E-09	3.36E-06	8.37E-05	8.85E-04	2.02E-05	1.47E-07	9.93E-04		
Cr2O3	1.04E-08	8.59E-09	3.04E-06	7.56E-05	8.01E-04	1.82E-05	1.33E-07	8.98E-04	1.0E+00	8.98E-04
ZnCl2	1.64E-09	1.36E-09	4.81E-07	1.20E-05	1.27E-04	2.89E-06	2.11E-08	1.42E-04		
BN	5.46E-10	4.52E-10	1.60E-07	3.98E-06	4.21E-05	9.59E-07	7.01E-09	4.72E-05		
BENZENE	3.64E-15	3.21E-16	1.07E-12	1.57E-13	3.56E-13	6.40E-12	4.99E-16	7.98E-12		
CO	6.01E-06	4.98E-06	1.76E-03	4.39E-02	4.64E-01	1.06E-02	7.73E-05	5.20E-01		
NOX	5.19E-09	4.29E-09	1.52E-06	3.78E-05	4.00E-04	9.11E-06	6.66E-08	4.49E-04	1.0E+00	4.49E-04
HC	6.47E-08	5.71E-09	1.89E-05	5.15E-05	3.14E-05	1.14E-04	8.86E-08	2.16E-04		
SO2	5.19E-09	4.29E-09	1.52E-06	3.78E-05	4.00E-04	9.11E-06	6.66E-08	4.49E-04		
HCl	2.03E-07	1.68E-07	5.94E-05	1.48E-03	1.57E-02	3.56E-04	2.61E-06	1.76E-02		
ETHANE	3.09E-15	2.72E-16	9.03E-13	2.45E-12	1.50E-12	5.42E-12	4.23E-15	1.03E-11		
ETHYLENE	3.86E-16	3.40E-17	1.13E-13	3.07E-13	1.87E-13	6.78E-13	5.28E-16	1.29E-12		
ACETYLENE	5.79E-16	5.11E-17	1.69E-13	4.60E-13	2.81E-13	1.02E-12	7.92E-16	1.93E-12		
PROPANE	2.31E-15	2.04E-16	6.78E-13	1.84E-12	1.12E-12	4.07E-12	3.17E-15	7.71E-12		
BUTANE	3.09E-15	2.72E-16	9.03E-13	2.45E-12	1.50E-12	5.42E-12	4.23E-15	1.03E-11		
PENTANE	2.31E-15	2.04E-16	6.78E-13	1.84E-12	1.12E-12	4.07E-12	3.17E-15	7.71E-12		
2-METHYLPENTANE	1.93E-16	1.70E-17	5.65E-14	1.53E-13	9.37E-14	3.39E-13	2.64E-16	6.43E-13		
3-METHYLPENTANE	3.86E-16	3.40E-17	1.13E-13	3.07E-13	1.87E-13	6.78E-13	5.28E-16	1.29E-12		
N-HEPTANE	1.93E-16	1.70E-17	5.65E-14	1.53E-13	9.37E-14	3.39E-13	2.64E-16	6.43E-13		
TOLUENE	9.66E-16	8.52E-17	2.83E-13	7.68E-13	4.69E-13	1.70E-12	1.32E-15	3.22E-12	3.0E-01	1.07E-11
ETHYLBENZENE	5.79E-16	5.11E-17	1.69E-13	4.60E-13	2.81E-13	1.02E-12	7.92E-16	1.93E-12	1.0E-01	1.93E-11
XYLENE	1.93E-15	1.70E-16	5.65E-13	1.53E-12	9.37E-13	3.39E-12	2.64E-15	6.43E-12	2.0E+00	3.21E-12
NONANE	3.86E-16	3.40E-17	1.13E-13	3.07E-13	1.87E-13	6.78E-13	5.28E-16	1.29E-12		

TABLE 5-6

Lifetime Dose TSU-2, Solvent OB

TSU-2
SOLVENT-OB

LIFETIME DOSE (MG/KG/D)

COMPOUND	INHALATION	SOIL	WATER	CROP	MEAT	FISH	DERMAL	TOTAL	Rf MG/KG/D	HAZARD INDEX
NOX	7.03E-06	5.82E-06	4.64E-04	5.99E-02	6.24E-01	1.11E-03	9.03E-05	6.86E-01	1.0E+00	6.86E-01
CO	2.29E-05	1.90E-05	1.51E-03	1.96E-01	2.04E+00	3.63E-03	2.95E-04	2.24E+00		
THC	7.03E-06	6.20E-07	4.64E-04	3.04E-04	2.89E-04	2.78E-03	9.63E-06	3.86E-03		
SOLVENTS	1.97E-05	1.74E-06	1.30E-03	8.51E-04	8.10E-04	7.80E-03	2.70E-05	1.08E-02		
METHANOL	1.06E-05	9.39E-07	7.02E-04	4.60E-04	4.38E-04	4.21E-03	1.46E-05	5.84E-03	5.0E-01	1.17E-02
ISOPROPYL ALCOHOL	2.76E-06	2.43E-07	1.82E-04	1.19E-04	1.13E-04	1.09E-03	3.77E-06	1.51E-03		
ACETONE	3.75E-06	3.31E-07	2.48E-04	1.62E-04	1.54E-04	1.49E-03	5.14E-06	2.06E-03	1.0E-01	2.06E-02
PYRIDINE	1.28E-06	1.13E-07	8.45E-05	5.53E-05	5.27E-05	5.07E-04	1.75E-06	7.02E-04	1.0E-03	7.02E-01
TETRAHYDROFURAN	1.28E-06	1.13E-07	8.45E-05	5.53E-05	5.27E-05	5.07E-04	1.75E-06	7.02E-04		
BENZENE	1.92E-13	1.69E-14	1.26E-11	8.28E-12	7.88E-12	1.91E-12	2.62E-14	3.09E-11		

6.0 CONCLUSIONS

A health risk assessment is a quantitative evaluation of the relationship between exposure to toxic substances and the potential occurrence of adverse health effects. Health risks to human populations from toxic substances are a function of two factors: toxicity and exposure. To create a health risk, a chemical must be toxic (presenting an intrinsic hazard) and must be present in significant levels in the human environment, presenting an opportunity for exposure. Health risk assessment is a process by which these two factors are interpreted, judging the potential for adverse effects to occur, and calculating the possible magnitude of those effects.

One consideration in judging estimated cancer risks is to compare the risks with risk levels historically considered acceptable by regulatory agencies. A recent analysis of 132 regulatory decisions found that regulatory action was not taken to control risks below 1×10^{-6}, which are called _de minimus_ risks. _De minimus_ risks are historically considered risks of no regulatory concern. Chemical exposure with risks above 4×10^{-3}, called _de manifestis_ risks, were consistently regulated. _De manifestis_ risks are typically risks of regulatory concern. The risks falling in between these two extremes were regulated in some cases, but not in others (Travis et al, 1987).

The decision to regulate cancer risk is historically a function of population size, as follows:

- o Small population risks: as population risk approaches 250 cancer deaths per the population of the United States, the _de manifestis_ risk level drops to 3×10^{-4}. Below this level, no action was taken to regulate risks.

- o For effects resulting from exposure to the entire population of the United States, the level of acceptable risk drops to 1×10^{-6}.