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IN THE UNITED STATES DISTRICT COURT
FOR THE CENTRAL DISTRICT OF CALIFORNIA

STATE OF CALIFORNIA, on behalf of the CALIFORNIA DEPARTMENT OF TOXIC SUBSTANCES CONTROL, Plaintiff, vs. UNITED STATES OF AMERICA, DEPARTMENT OF THE ARMY, and DOES 1 - 100, inclusive. Defendants.	No. CV 96-5205MRP(VAPx) No. CV 96-8867MRP(VAPx) (Consolidated) APPENDIX OF EXHIBITS IN SUPPORT OF UNITED STATES MOTION FOR SUMMARY JUDGMENT ON THE FIRST CAUSE OF ACTION AND PART OF THE THIRD CAUSE OF ACTION OF THE CITY'S COMPLAINT VOLUME 1 OF 6
CITY OF SAN BERNARDINO MUNICIPAL WATER DEPARTMENT, Plaintiff, vs. UNITED STATES OF AMERICA, DEPARTMENT OF THE ARMY, and DOES 1 - 100, inclusive. Defendants.	Date: February 21, 2000 Time: 10:00 a.m. Room: Courtroom 12 Judge: Mariana R. Pfaelzer

APPENDIX OF EXHIBITS IN SUPPORT OF MOTION FOR SUMMARY JUDGMENT ON THE FIRST CAUSE OF ACTION AND PART OF THE THIRD CAUSE OF ACTION OF THE CITY'S COMPLAINT

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Exhibit 1

DEPOSITION EXHIBIT 543 6/9/99 KM

SAN BERNARDINO WATER DEPARTMENT PLANT PRODUCTION DATA

APRIL, 1976

LOWER SYSTEM	RESERVOIR STORAGE IN GALLONS	PLANT STORAGE GALLONS	NO. OF WELLS	TUR-BINE PUMPS	BOOS-TER PUMPS	MAX. PROD. M.G.D.
Antil Plant	-	258,000	3	3	4	8.6
Base Line and California	-	-	1	1	-	1.2
Gilbert Street	-	108,000	1	1	1	3.3
Lytle Creek No. 1	3,500,000	-	1	1	-	1.9
Lytle Creek No. 2	7,500,000	-	-	-	-	-
Lytle Creek Gravity	-	-	-	-	-	-
Mill and "D" Street	-	437,200	1	1	1	1.0
Mt. Vernon Gravity	-	-	-	-	-	-
7th Street	-	125,000	1	1	1	4.2
17th and Sierra Way	-	108,500	1	-	1	-
Waterman Avenue	10,000,000	-	2	2	-	6.8
TOTAL	21,000,000	1,036,700	11	10	8	27.0
INTERMEDIATE SYSTEM						
Perris Hill	10,000,000	407,000	1	1	3	1.9
16th Street	-	-	1	1	1	2.4
TOTAL	10,000,000	407,000	2	2	4	4.3
UPPER SYSTEM						
Cajon - Vincent	-	-	2	2	-	5.9
Devil Canyon No. 2	-	-	1	1	-	0.8
Devil Canyon Gravity and Wells		220,000	2	2	-	1.9
Electric	8,000,000	-	-	-	-	-
Lynwood	-	223,000	1	1	1	2.4
Mt. Vernon	-	-	1	1	-	1.3
Newmark	21,800,000	-	4	4	-	7.9
19th Street	-	258,000	2	2	2	3.6
North "E" Street	-	122,000	2	2	2	5.1
30th and Mt. View	-	97,200	2	2	2	4.1
27th and Acacia	-	247,400	1	1	1	2.2
Waterman	-	-	-	-	2	-
TOTAL	29,800,000	1,167,600	18	18	10	35.2
MISCELLANEOUS DISTRICTS						
Daley Canyon	1,250,000	-	-	-	2	-
Devil Canyon No. 1	-	-	-	-	2	-
College Reservoir	2,570,000	-	-	-	-	-
Ridgeview	330,000	-	-	-	1	-
Sycamore No. 1	2,500,000	-	-	-	1	-
Sycamore No. 2	450,000	-	-	-	1	-
Del Rosa No. 1	460,000	-	-	-	1	-
Del Rosa No. 2	190,000	-	-	-	1	-
Mountain No. 2 and 3	2,223,000	-	-	-	3	-
Quail Canyon No. 1	40,000	-	-	-	-	-
Shandin Hills	219,000	-	-	-	1	-
Terrace No. 1	1,160,000	-	-	-	1	-
Terrace No. 2	1,285,000	-	-	-	1	-
Terrace Elevated	100,000	-	-	-	1	-
TOTAL	12,777,000	-	-	-	16	-
SAN BERNARDINO WATER UTILITIES CORPORATION						
Cajon	550,000	-	2	2	2	6.0
Mallory	169,000	-	1	1	2	1.3
Palm Avenue	-	-	-	-	1	-
Wiggins Hill	325,000	-	-	-	-	-

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Exhibit 2

DEFENDANTS' EXHIBIT 576 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-22-99
WITNESS: LOWE, V. II

WATER DEPARTMENT
300 No. "D" Street
San Bernardino, Calif. 92403

PURCHASE REQUISITION

WATER RECLAMATION PLANT

Date NOV 17 19 77 B 6409/500 Wanted by NOV 21 19 77

To Purchasing Department: Please order the items listed below which are required for:

CONSTRUCTION ORDER NO. 2525

NOTE: If required for equipment, please complete the following:

NAME OF EQUIPMENT _____ MFG. _____

MODEL _____ SERIAL NUMBER _____ YEAR _____

MATERIAL USED FOR _____

ITEM NO.	QUANTITY	PART NO.	ARTICLE DESCRIPTION
	4 GAL.		CEILCOTE T-410 SOLVENT
			720 GAL
			94802
			COATING

APPROVED _____ SUPERVISOR [signature]

P. O. NO. 54776 Issued to CEILCOTE Date 11/18

P. O. NO. _____ Issued to _____ Date _____

P. O. NO. _____ Issued to _____ Date _____

576

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B 6409/500

WATER DE. ARTMENT

300 N. "D" STREET • TELEPHONE (714) 383-5192
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PAYMENT VOUCHER

№ 54776

Date November 21, 1977

SHIP TO: ~~195 "D" Street~~
~~San Bernardino~~
~~California 92403~~
Water Reclamation Plant
299 Blood Bank Road
San Bernardino, Calif. 92408

TO Ceilcote Corporation
4917 Lankershim Blvd.
North Hollywood, Calif. 91601

PLEASE FURNISH THE FOLLOWING

H 103900

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
	94802		
4 Gal. - Ceilcote T-410, Solvent.		7.20/ gal.	
			9.20

CONFIRMING ORDER DO NOT DUPLICATE

INVOICES
72573

PURCHASING DEPARTMENT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
94802	9.20		

PREPAYMENT AUDIT

DATE ENTERED

DATE PAID DEC 20 1977

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2

E 6129-500
Don Hunt

WATER DEPARTMENT

300 N. "D" STREET • TELEPHONE (714) 383-5192
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PAYMENT VOUCHER

Nº 54990

Date December 8, 1977

SHIP TO: ~~199 "D" Street~~
~~San Bernardino~~
~~California 92403~~
~~Water Reclamation Plant~~
299 Blood Bank Road
San Bernardino, Calif. 92408

H

TO CEILCOTE
John M. Vossler & Co.
4917 Lankershim Blvd.
North Hollywood, Ca 91601

PLEASE FURNISH THE FOLLOWING

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
	94802		
2 - One gallon units of Ceilcote #348 Adhesive.		23.10	
1 Gal. - #T-420.		6.70	
1 - Week Delivery			
			74.20

CONFIRMING ORDER DO NOT DUPLICATE

INVOICES
13094
13122

PURCHASING DEPARTMENT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
94802	74.20		

PREPAYMENT AUDIT
DATE ENTERED
DATE PAID JAN 17 1978

54990

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3

Ceilcote

THE CEILCOTE COMPANY/A UNIT OF GENERAL SIGNAL
140 SHELDON ROAD/BEREA, OHIO 44017
TELEPHONE: (216) 243-0700 • TELEX: 098-5590 • TWX: (810) 423-2158

Corrosion Control Products
Air Pollution Control Products
Engineering – Materials – Construction

			TERRITORY CODE					TYPE	INVOICE NO		INVOICE DATE
	54990	02462	39					1	130947		122977

				SHIPPED VIA		PREPAID	COLLECT	PREPAID & BILL
7786	925	1700	4	WILLIG	12-12-77		X	

SOLD TO:
SAN BERNARDINO WATER
RECLAMATION PLANT
P O BOX 710
SAN BERNARDINO CAL 92403

SHIP TO: (SAME AS SOLD TO UNLESS NOTED BELOW)

54990

TERMS - NET 30 DAYS U.S. DOLLARS - F.O.B. SHIPPING POINT

QUANTITY	DESCRIPTION		PRODUCT CODE	UNIT PRICE	AMOUNT
1	GALS 348 ADHESIVE 2 GAL UNIT COMP A&B REG	002	101	21.10	21.10
	CALIF STATE TAX		820		1.37
	MATERIAL FRTREGULAR	001	350		.00

REMIT THIS AMOUNT TO P.O. BOX 5618N, CLEVELAND, OHIO 44193

INVOICE TOTAL $ 22.47

WE HEREBY CERTIFY THAT THESE GOODS WERE PRODUCED IN COMPLIANCE WITH ALL APPLICABLE REQUIREMENTS OF SECTION 6, 7, & 12 OF THE FAIR LABOR STANDARDS ACT AS AMENDED
Materials shall not be returned to SELLER without SELLER'S express permission

DUPLICATE INVOICE

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4

Ceilcote

THE CEILCOTE COMPANY/A UNIT OF GENERAL SIGNAL
140 SHELDON ROAD/BEREA, OHIO 44017
TELEPHONE: (216) 243-0700 • TELEX: 098-5590 • TWX: (810) 423-2156

Corrosion Control Products
Air Pollution Control Products
Engineering – Materials – Construction

					TERRITORY	CODE				TYPE	INVOICE NO		INVOICE DATE	
	549901	02463	39							1	131221		12 29	77

				SHIPPED VIA		PREPAID	COLLECT	PREPAID & BILL
7786	925	4940	4	WILLIG	12-14-77		X	

SOLD TO:
SAN BERNARDINO WATER
RECLAMATION PLANT
P O BOX 710
SAN BERNARDINO CAL 92403

SHIP TO: (SAME AS SOLD TO UNLESS NOTED BELOW)

54990

TERMS - NET 30 DAYS U.S. DOLLARS - F.O.B. SHIPPING POINT

QUANTITY	DESCRIPTION		PRODUCT CODE	UNIT PRICE	AMOUNT
2	GALS 348 ADHESIVE 2 GAL UNIT COMP A&B REG	002	101	21.10	42.20
1	GALS SOLVENT T-420 1 GAL CAN	007	121	6.70	6.70
	CALIF STATE TAX		820		3.18
	MATERIAL FRTREGULAR	001	350		.00

REMIT THIS AMOUNT TO P.O. BOX 5618N, CLEVELAND, OHIO 44193

INVOICE TOTAL $ 52.08

WE HEREBY CERTIFY THAT THESE GOODS WERE PRODUCED IN COMPLIANCE WITH ALL APPLICABLE REQUIREMENTS OF SECTION 6, 7 & 12 OF THE FAIR LABOR STANDARDS ACT AS AMENDED
Materials shall not be returned to SELLER without SELLER'S express permission

DUPLICATE INVOICE

United States Summary Judgment Motion, Ex. 2, Page 60

5

B 6440-900P
M. Lowe

WATER DEPARTMENT

300 N. "D" STREET • TELEPHONE (714) 383-5192
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PAYMENT VOUCHER

№ 54936

Date December 5, 1977

SHIP TO: ~~195 "D" Street~~
~~San Bernardino~~
~~California 92403~~
Water Reclamation Plant
299 Blood Bank Road
San Bernardino, Calif. 92408

TO Hunt Process Co., Inc.
12767 E. Imperial Highway
Santa Fe Springs, Ca 90670

PLEASE FURNISH THE FOLLOWING

H 111000

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
	94802		
100 Gal. - (20-5 Gal Buckets) Bitumastic #300-M.		10.20	
10 Gal. - Koppers 2000c Thinner.		5.05	
			119652

CONFIRMING ORDER DO NOT DUPLICATE

INVOICES
21402

PURCHASING DEPARTMENT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
94802	119652		

PREPAYMENT AUDIT
DATE ENTERED
DATE PAID JAN 3 1977

United States Summary Judgment Motion, Ex. 2, Page 61

54936

6

INVOICE

Telephone
(213) 941-0231

HUNT PROCESS CO., INC.

P.O. BOX 2111 12767 EAST IMPERIAL HIGHWAY
SANTA FE SPRINGS, CALIFORNIA 90670

ORIGINAL
No. 21402
JI

SOLD TO
CITY OF SAN BERNARDINO
P.O. Box 710
San Bernardino, Ca. 92403

SHIPPED TO Same
Sewage Treatment Plant

VIA Admiral

☒ TAXABLE ☐ RESALE ☐ PREPAID ☐ COLLECT

DATE OF INVOICE	CUST. ORDER NUMBER	REQUISITION NUMBER	DATE SHIPPED	TERMS:	F.O.B.
12/2/77	54936		12/2/77	Net 30 Days	

QUANTITY	UNIT MEASURE	DESCRIPTION	MCB CODE	UNIT PRICE	TOTAL
100	GALLONS	20/5's Koppers Bitumastic 300M	67	10.20	1,020.00
10	GALLONS	2/5's Koppers 2000C Thinner	67	5.05	50.50
					1,070.50
		6% Sales Tax			64.23
					1,134.73
		Freight Charges	73		61.79
					1,196.52

BACK ORDER

PACKING SLIP
54936

United States Summary Judgment Motion, Ex. 2, Page 62

7

WATER DEPARTMENT

300 N. "D" STREET • TELEPHONE (714) 383-5192
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PAYMENT VOUCHER

X

6400

№ 54712

Date November 15, 1977

SHIP TO: ~~--195 "D" Street--~~
~~--San Bernardino--~~
~~--California 92403--~~
Water Reclamation Plant
299 Blood Bank Road
San Bernardino, Calif. 92408

TO Chevron U.S.A.
P. O. Box 32
San Bernardino, Calif. 92402

PLEASE FURNISH THE FOLLOWING

H 104150

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
	6400		
170556 6 - Chevron Solvent 325.			
			257.33

CONFIRMING ORDER DO NOT DUPLICATE

INVOICES
270
830CR

PURCHASING DEPARTMENT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
6400	297.33		
94202	20.00		

PREPAYMENT AUDIT

DATE ENTERED

DATE PAID DEC 20 1977

United States Summary Judgment Motion, Ex. 2, Page 63

8

Chevron

Chevron U.S.A. Inc.
P.O. Box R, Concord, CA 94524

Invoice
Copy

For Account of CITY OF SAN BERNARDINO WATER DEPT PO BOX 710 SAN BERNARDINO CA 92401	Ship to (BLOOD BANK RL) 11 1129 4743 580187 A11301 Terms Net Cash	Date 11/15/77 Acct No 4743 02090990 Invoice No 270 This invoice includes all federal and state fuel taxes applicable to the sale of products hereunder which have been or will be paid when due.

Customer Order No.	From	FOB
54712	SAN BERNARDINO (PRICE	

Contract No	Item No.	Req No	Via	Frt Prepaid or Collect

No Pkgs	Package Description	Product Description	Quantity	Price	Amount
	HUD DRUM	CHEVRON SOLVENT 325	330	.85	280.50
		RETURNABLE DRUM DEP @ $20.	1	20.00	20.00
		SALES TAX			16.83
			INVOICE TOTAL		317.33

COPY

"Checks may be made payable to Chevron" "Thank you for purchasing Chevron Products."

GO 10 S C INP (4 77)

United States Summary Judgment Motion, Ex. 2, Page 61

9

B 3230
C. Neumeyer

WATER DEPARTMENT

300 N. "D" STREET • TELEPHONE (714) 383-5192
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PAYMENT VOUCHER

Nº 54452

Date October 25, 1977

SHIP TO: ~~195 "D" Street~~
~~San Bernardino~~
~~California 92403~~
Water Reclamation Plant
899 Blood Bank Road
San Bernardino, Calif. 92408

TO L. M. Schofield Co.
5511 East Slauson
Los Angeles, Calif.

PLEASE FURNISH THE FOLLOWING 118355 H 118357

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
	94802		
20 Gals. (5 - 4 gal cans) COLMA DURA GEL made by Sika - (including Hardener).		35.64/ gal.	
4 Gals. SIKADUR HI-MOD (including Hardener)		31.32/ gal.	
Material required in Worthington Bldg. for new foundation being build for Engine #2.			
CONFIRMING ORDER DO NOT DUPLICATE			888.36

INVOICES
B 45421

PURCHASING DEPARTMENT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
94802	888.36		

PREPAYMENT AUDIT
DATE ENTERED
DATE PAID NOV 1 1977

54452

United States Summary Judgment Motion, Ex. 2, Page 65

10

AGENT

P O NO 54452

CUST NO 208485

SHIP TO

L. M. SCOFIELD COMPANY

MANUFACTURER & DISTRIBUTOR OF BUILDING SPECIALTIES SINCE 1933
5511 EAST SLAUSON AVE LOS ANGELES CA 90040 (213) 723-5285

INVOICE NO. G 45421

CAT.	TERR.	AREA	REP.	TYPE
154	X	AG	001A	06

DATE 10-21-77

JOB DESTINATION

CITY OF SAN BERNARDINO
WATER DEPT
PO BOX 710
SAN BERNARDINO, CA 92403

TO

VIA W/C

FREIGHT

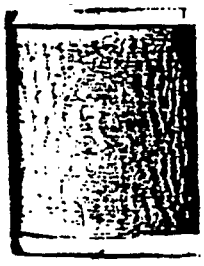
		SIKA PRODUCTS			
5	4 GAL UNITS	343 COLMA DUR GEL	X.90	20@35.64	712.80
1	4 GAL UNIT	370 SIKADUR HI MOD	X.90	4@31.32	125.28
					838.08
			SLS TX		50.28
					888.36
					NET

Returned goods will not be accepted for credit without our special permission and transportation charges prepaid. Excepting cases where we are at fault, credits on authorized returns will be issued on the basis of billing price, less a fifteen percent (15%) charge for handling and less all the freight charges incurred by seller. This is with the understanding that such goods are received undamaged and in good condition.

Shortages or errors in billings must be reported within five (5) days from receipt of shipment and invoice to secure adjustment. Title passes to buyer upon delivery of goods to carrier. Sales, use taxes on interstate shipments are the purchaser's responsibility. These products are warranted to be of uniform quality within manufacturing tolerances. Since no control is exercised over their use, no warranty, expressed or implied, is made as to the effects of such use.

TERMS: NET CASH—10TH PROX.
A SERVICE CHARGE OF 1½% PER MONTH (18% ANNUALLY) WILL BE CHARGED ON ALL DELINQUENT (60 DAY) ITEMS.

INVOICE



54452

United States Summary Judgment Motion, Ex. 2, Page 66

11

WATER DEPARTMENT
300 No. "D" Street
San Bernardino, Calif. 92403

PURCHASE REQUISITION

WASTEWATER TREATMENT PLANT

Date October 20 1977 **B** 3240 Wanted by Required ASAP 19____

To Purchasing Agent: Please order the items listed below which are required for:

CONSTRUCTION ORDER NO. 119-_____ Plant Maint._____ Office_____ Other_____

NOTE: If required for equipment, please complete the following:

NAME OF EQUIPMENT_____ MFG._____

MODEL_____ SERIAL NUMBER_____

REMARKS: 31/502

ITEM NO.	QUANTITY	PART NO.	ARTICLE DESCRIPTION
1	20 gals ~~12 gals~~ 4 gal		(5-4 gal cans) COLMA DURA GEL made by Sika - (including Hardener) $35.00 ea
2	3 gals		SIKADUR Hi-MOD (including Hardener) 31.32 ea
			Order from L. M. Schofield Co
			5511 E. Slauson
			Los Angeles
			213-723-5285
			May be only source —
			Material required in
			Worthington Bldg for new
			Foundation being built for
			Engine #2.
			CONFIRMING

SUPERINTENDENT_____ SUPERVISOR Charles J Hemmayard

P. O. NO. 54452 Issued to_____ Date 10/21/77

P. O. NO._____ Issued to_____ Date_____

P. O. NO._____ Issued to_____ Date_____

United States Summary Judgment Motion, Ex. 2, Page 67

54452

12

Req. #B 6968
M. Lowe

WATER RECLAMATION PLANT

TELEPHONE (714) 383-5380
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PURCHASE ORDER
PAYMENT VOUCHER

WR P 00480

Date August 3, 1978

SHIP TO: 299 Blood Bank Road
San Bernardino,
California 92408

TO Engard Coatings Corporation
15541 Commerce Lane
Huntington Beach, Ca 92649

PLEASE FURNISH THE FOLLOWING

H 107661 H 107670 (NBM)

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
1340-	2595		
50 Gal. 463 Coal Tar Epoxy. 30 Gal. 43 Thinner.			$690.06

CONFIRMING ORDER DO NOT DUPLICATE

DELIVERY SCHEDULE

IMPORTANT: SHOW PURCHASE ORDER NUMBER ON INVOICES

Joe Pieckiel
BUYER TO CONTACT REGARDING THIS PURCHASE

PURCHASING AGENT

12726

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
1340-2595	$690.06		

PREPAYMENT AUDIT

DATE ENTERED

DATE PAID SEP 0 5 1978

United States Summary Judgment Motion, Ex. 2, Page 68

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00480

ENGARD COATINGS CORPORATION
15541 COMMERCE LANE
HUNTINGTON BEACH, CA 92649
(714) 892 8316 • (213) 431-6553

CUSTOMER NO.

INVOICE NO.
I 12726

SOLD TO
City of San Bernardino
Water Dept
P.O. Box 710
San Bernardino, CA 92403

SHIP TO
299 Bloodbank Road

DATE SHIPPED	ORDER & SHIP DOC. NO.	CUSTOMER P.O. NO.	CUSTOMER JOB NAME	ENGARD P.O. #
8-1-78	15168	00480		
	SHIP VIA		TERMS (F.O.B. OUR PLANT)	SALES CODE
	Will Call		Net 30	SD350

Item	Gallons Ordered	Gallons Shipped	C	B/O	Stock Number/Description	Unit Price	Amount
1	50	50	F		ENGARD 463 Coal Tar Epoxy	9.45	472.50
2	30	30	F		ENGARD 43 Epoxy Thinner	5.95	178.50

United States Summary Judgment Motion, Ex. 2, Page 69

CUSTOMER 00480

WARNING – READ THIS NOTICE!

HAZARD WARNING

Many ENGARD products are combustible and may cause skin and eye irritation. AVOID PROLONGED CONTACT WITH SKIN AND BREATHING OF VAPOR OR SPRAY MIST. If swallowed do not induce vomiting. CALL PHYSICIAN IMMEDIATELY. In case of skin or eye contact, flood with water immediately and secure medical attention. Keep away from heat and open flame. Close container after each use. USE WITH ADEQUATE VENTILATION, EXPLOSION PROOF EQUIPMENT, FRESH AIR MASKS, EXHAUST FANS AND BLOWERS SHOULD BE USED IN CONFINED AREAS. Keep out of the reach of children. For industrial use and professional application only. Not intended for sale to the general public.

READ SALES TERMS AND CONDITIONS AND WARRANTY ON REVERSE SIDE.

PLEASE PAY FROM THIS INVOICE AND RETURN REMITTANCE COPY WITH PAYMENT.

SUB TOTAL	651.00
TAX	39.06
FREIGHT	
TOTAL	690.06

Rev. 8 76

C

WATER RECLAMATION PLANT

TELEPHONE (714) 383-5380
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PURCHASE ORDER
PAYMENT VOUCHER

WR P 00271

Date May 25, 1978

SHIP TO: 299 Blood Bank Road
San Bernardino,
California 92408

TO
P.O. Chevron U.S.A., Inc.
P.O. Box 32
Rialto, CA 92376

PLEASE FURNISH THE FOLLOWING

H 104150

DESCRIPTION			ACCOUNT NUMBER	PRICE	EXTENSION
170556	6	Chevron Solvent 325	6400	330/.91	300.30
		2 Drum DEP.			40.00
		TAX			18.02
					358.32
		CREDIT			30.00
					328.32

CONFIRMING ORDER DO NOT DUPLICATE

DELIVERY SCHEDULE

IMPORTANT: SHOW PURCHASE ORDER NUMBER ON INVOICES

Robert C. Clark
BUYER TO CONTACT REGARDING THIS PURCHASE

Robert C. Clark
PURCHASING AGENT

018651
154845 CREDIT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
6400	328.32		

PREPAYMENT AUDIT

DATE ENTERED

DATE PAID JUN 20 1978

United States Summary Judgment Motion, Ex. 2, Page 70

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[illegible] U.S.A. [illegible]
P.O. BOX R
CONCORD, CA 94524
PLNS: 00-914-0559

CITY OF SAN BERNARDINO
WATER DEPT
(DLVRD BANK RD)
CA

CITY OF SAN BERNARDINO
WATER DEPT
PO BOX 710
SAN BERNARDINO, CA 92401

CREDIT MEMO
FULL PROD RETURN
DOCUMENT NO. 154645
DATE 05/26/78
ACCOUNT NO. 1203556

DLVRED FROM SAN BERNARDNO C/A-1001644
FOB DESTINATION FREIGHT PREPAID
AGENT BULK TRANSPORT
VIA COMMISSION AGENT'S EQUIPM

05-1001644-525824-060578-#- -2020909904

[illegible]	Product Description	Tax Rates Included in Price: Federal	State	Local	Sls. Tax Sl To Ac	Quantity	Price	Amount
CH	RETURNABLE DRUM DEP @ $15.					2-	15.00	30.0
	INVOICE TOTAL							30.0

CREDIT MEMO -
PLEASE DO NOT REMIT

United States Summary Judgment Motion, Ex. 2, Page 71

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CHEVRON U.S.A. INC.
P.O. BOX R
CONCORD, CA 94524
DUNS: 00-914-0559

CITY OF SAN BERNARDINO
WATER DEPT
(BLOOD BANK RD)
CA

CITY OF SAN BERNARDINO
WATER DEPT
PO BOX 710
SAN BERNARDINO, CA 92401

COPY INVOICE
CHARGE SALE - NORMAL
INVOICE NO. 018651
DATE 05/26/78
ACCOUNT NO. 1203558

DLVRED FROM SAN BERNARDNO C/A-1001644
FOB DESTINATION FREIGHT PREPAID
AGENT BULK TRANSPORT
VIA COMMISSION AGENT'S EQUIPM
PURCHASE ORDER NO. 00271

05-1001644-525824-060578-*- -20209099047

Product Description	Tax Rates Included in Price Federal	State	Local	Sls. Tax S L T O S C	Quantity	Price	Amount
CHEVRON SOLVENT 325				1	330	.91	300.3
RETURNABLE DRUM DEP @ $20.					2	20.00	40.0
CA SALES TAX						6.000%	18.0
INVOICE TOTAL							358.3

CHEVRON U.S.A. INC.
P.O. BOX R
CONCORD, CA 94524

MAKE CHECK PAYABLE TO:
CHEVRON

United States Summary Judgment Motion, Ex. 2, Page 72

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WATER RECLAI. ATION PLANT

TELEPHONE (714) 383-5380
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PURCHASE ORDER
PAYMENT VOUCHER

WR P 00211

Date June 21, 1978

SHIP TO: 299 Blood Bank Road
San Bernardino,
California 92408

TO Oxford Chemical Co.
2030 East 4th St.
Santa Ana, Calif. 92705

PLEASE FURNISH THE FOLLOWING

H 115450

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
	9480-2		
1 - 20 Gal. 583.		20.65/ Gal.	$413.00
6% S. T.			24.78
			$437.78
D.S.C.			18.68
			$456.46

DELIVERY SCHEDULE

IMPORTANT:
SHOW PURCHASE ORDER NUMBER ON INVOICES

Robert C. Clark, Sr.
BUYER TO CONTACT REGARDING THIS PURCHASE

PURCHASING AGENT

15937221

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
9480-2	456.46		

PREPAYMENT AUDIT

DATE ENTERED

DATE PAID

United States Summary Judgment Motion, Ex. 2, Page 73

18

P.O. BOX 80202 ATLANTA, GEORGIA 30366

7221	05-31-78	06-02-78	11	15937221

014337003	00211	GENE	C HENSON, GARY	STE4C14 C2

CITY OF SAN BERNARDINO
426 W 3RD ST
SAN BERNARDINO
CALIFORNIA 92401

SHIP TO
CITY OF SAN BERNARDINO
WATER TREATMENT PLANT
299 BLOODBANK ROAD
SAN BERNARDINO
CALIFORNIA 92408

SHIPPING DATE 06-02-78 WHSE. 01
SHIP VIA WESTERN CAR
TERMS — 1½% 10 DAYS NET 30

	PRODUCT DESCRIPTION		NO. UNITS SHIPPED	UNIT PRICE	UNIT MEAS.	AMOUNT
1	GAL 583	ISC33	20	20.65	GAL	413.00

WE THANK YOU FOR YOUR PATRONAGE AND
LOOK FORWARD TO SERVING YOU AGAIN.

DSC *	TAXABLE AMOUNT					INVOICE TOTAL
18.63	413.00	.00	5.16	19.62	.00	456.46

* Distribution Sharing Charge

United States Summary Judgment Motion, Ex. 2, Page 74

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PAYMENT VOUCHER

WATER DEPARTMENT

300 N. "D" STREET • TELEPHONE (714) 383-5192
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

№ 56422

Date April 11, 1978

TO Valley Auto Supply
P. O. Box 271
San Bernardino, California

SHIP TO: ~~195 "D" Street~~
~~San Bernardino~~
~~California 92403~~
Water Reclamation Plant,
299 Blood Bank Road,
San Bernardino, Calif. 92408

PLEASE FURNISH THE FOLLOWING

H 122000

DESCRIPTION	ACCOUNT NUMBER		
202112 12- Sure Fire Starting Fluid 11 oz. Can.	6400	1.49	
276150 10- Mechanics Wire WI-18 18 Ga.. (Dorman) 1 lb. Roll	6400	2.84	
			34.00
	DIS.		.68
			33.32

CONFIRMING ORDER DO NOT DUPLICATE

INVOICES
61403

PURCHASING DEPARTMENT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
6400	34.00	PARTIAL SHIPMENT	
DIS	.68		

PREPAYMENT AUDIT
DATE ENTERED
DATE PAID JUN 0 6 1978

56422

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CONTROLLING

WATER DEPARTMENT

300 N. "D" STREET • TELEPHONE (714) 383-5192
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PAYMENT VOUCHER

№ 56127

Date March 8, 1978

SHIP TO: ~~XXXXXXXXXXX~~
~~XXXXXXXXXXX~~
~~San Bernardino~~
~~XXXXXXXXXXX~~
~~California 92403~~

Water Reclamation Plant
299 [redacted]
[redacted]
H [redacted]

TO Chevron U.S.A.
P.O. Box 32
San Bernardino, CA 92402

[redacted]

DESCRIPTION			ACCOUNT NUMBER	PRICE	EXTENSION
170556	6	Chevron Solvent 325	6400		
					431.32

INVOICES
690

PURCHASING DEPARTMENT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
6400	311.32		
9280	120.00		

PREPAYMENT AUDIT [illegible]
DATE ENTERED
DATE PAID 4 APR 78

561 --

United States Summary Judgment Motion, Ex. 2, Page 76

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COPY Invoice

Chevron U.S.A. Inc.
[illegible] CA 91824

Account of CITY OF SAN BERNARDINO
WATER DEPT
PO BOX 710
SAN BERNARDINO CA 92401

Ship to (BLOOD BANK RD)
CA
03 0321 4743 204269 A03221

Date 3/10/78
Acct. 4743 02090990
Invoice No 690

This invoice includes all federal and state taxes applicable to the sale of products hereunder which have been or will be paid when d

Shipment No	From	F.O.B.
56127	SAN BERNARDNO C/A	

Contract No	Item No.	Req No.	Via	Frt. Prepaid or Collect
[redacted]	[redacted]	[redacted]	[redacted]	[redacted]

Pkgs	Package Description	Product Description	Quantity	Price	Amount
	HUD DRUM	CHEVRON SOLVENT 325	330	.89	293.70
		RETURNABLE DRUM DEP @ $20.	6	20.00	120.00
		SALES TAX			17.62
				INVOICE TOTAL	431.32

"Checks may be made payable to Chevron" "Thank you for purchasing Chevron Products."

56127

United States Summary Judgment Motion, Ex. 2, Page 77

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W/C
6460

WATER DEPARTMENT

300 N. "D" STREET • TELEPHONE (714) 383-5192
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PAYMENT VOUCHER

Nº 56120

Date March 7, 1978

SHIP TO: [redacted]

TO Easterday Supply Co.
808 No. "E" Street
[redacted]

	DESCRIPTION	NUMBER		
50-125	12 Qt. Collars 24.	6400		36.63

INVOICES
539536

Robert Pollock
PURCHASING DEPARTMENT

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
6400	36.63		

PREPAYMENT AUDIT [illegible]
DATE ENTERED
DATE PAID 4 APR 78

56120

United States Summary Judgment Motion, Ex. 2, Page 78

23

Equal Opportunity Affirmative Action Employer

UPPLY ... NY

...ED TO

BILL TO: SA... TE ... WATE... MATION PL
...299 ... ANK RD
P O ...
SA... CA ... 92403 ... SAN BE... RDINO CA

...3/13/79

...refer to this ... remittance or ... correspondence con-...

ORDERS LESS THAN $30.00 ... HANDLING CHARGE.

TERMS: PAYABLE ON RECE... A Service Charge of ...% per month (18% ... added to Past Due Invoices.

56120 ... 001...

PRODUC...	...	QUANTITY ORDERED	SHIPPED	BACK ORDERED	UNIT PRICE	...	AMOUNT
11-401-012-7...	... UER 12X QT	1	1		2.880		34.56
	...SERVATION IS A PROB...EM, ... OUR OUTDOOR VAC... AND FLOWERS.						

...34.56 ... 2.0... | ... | OTHER | PLEASE PAY THIS AMOUNT | INVOICE TOTAL 36.63

Title to above merchandise ... the event that ... this bad all invoices purchaser is legally liable for all reasonable attorney's fe... action. Seller ... compliance with the provisions of the Fair Labor Standards Act.

CLAIMS—Please mention invoice date and ... made for shortage or ... We cannot be responsible for errors or shortages not noted on our DELIVERY RECEIPT at time of delivery

PLEASE REMIT WITH COPY OF INVOICE TO
EASTERDAY SUPPLY CO.
801 E. 61ST STREET
LOS ANGELES, CA. 90001

ORIGINAL

56120

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B 7264

WATER RECLAMATION PLANT

TELEPHONE (714) 383-5380
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PURCHASE ORDER

WR P 00580

Date August 25, 1978

SHIP TO: 299 Blood Bank Road
San Bernardino,
California 92408

TO Engard Coatings Corporation
15541 Commerce Lane
Huntington Beach, CA 92649

PLEASE FURNISH THE FOLLOWING

H 107670

DESCRIPTION		ACCOUNT NUMBER	PRICE	EXTENSION
1 gal.	Engard 2 Tie Solvent	1340 2595	19.00	$ 19.00
50 gal.	Engard 463 Epoxy Tar Black Coating 5 gal units		9.45	472.50
10 gal	Engard 463 Epoxy Tar Black Coating 1 gal unit		10.45	104.50
				$ 596.00
	6% S.T.			35.76
				$ 631.76

CONFIRMING ORDER DO NOT DUPLICATE

DELIVERY SCHEDULE 8/30

IMPORTANT: SHOW PURCHASE ORDER NUMBER ON INVOICES

Robert C. Clark, Sr.
BUYER TO CONTACT REGARDING THIS PURCHASE

Robert C. Clark Sr.
PURCHASING AGENT

13021

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
1340-2595	631.76		

PREPAYMENT AUDIT

DATE ENTERED

DATE PAID SEP 19 1978

United States Summary Judgment Motion, Ex. 2, Page 80

00580

25

26

ENGARD COATINGS CORPORATION
15541 COMMERCE LANE
HUNTINGTON BEACH, CA 92649
(714) 892-8316 • (213) 431-6553

CUSTOMER NO. _____

INVOICE NO.
I 13021

SOLD TO
City of San Bernardino
P.O. Box 710
San Bernardino, CA 92408

SHIP TO
SAME
299 Bloodbank Road

DATE SHIPPED	ORDER & SHIP DOC. NO.	CUSTOMER P.O. NO.	CUSTOMER JOB NAME	ENGARD P.O. #
8-31-78	15532	00580		L

FREIGHT	SHIP VIA	TERMS (F.O.B. OUR PLANT)	SALES CODE
P.	GI	Net 30	SD802

Item	Gallons Ordered	Gallons Shipped	C	B/O	Stock Number/Description	Unit Price	Amount
1	50	50	F		ENGARD 463 Coal Tar Epoxy	9.45	472.50
2	10	10	0		ENGARD 463 Coal Tar Epoxy	10.45	104.50
3	1	1	0		ENGARD 2 Tie Solvent	19.00	19.00
					Freight to be added at a later time		

F

WARNING — READ THIS NOTICE!

HAZARD WARNING

Many ENGARD products are combustible and may cause skin and eye irritation. AVOID PROLONGED CONTACT WITH SKIN AND BREATHING OF VAPOR OR SPRAY MIST. If swallowed do not induce vomiting. CALL PHYSICIAN IMMEDIATELY. In case of skin or eye contact, flood with water immediately and secure medical attention. Keep away from heat and open flame. Close container after each use. USE WITH ADEQUATE VENTILATION, EXPLOSION PROOF EQUIPMENT, FRESH AIR MASKS, EXHAUST FANS AND BLOWERS SHOULD BE USED IN CONFINED AREAS. Keep out of the reach of children. For industrial use and professional application only. Not intended for sale to the general public.

READ SALES TERMS AND CONDITIONS AND WARRANTY ON REVERSE SIDE.

PLEASE PAY FROM THIS INVOICE AND RETURN REMITTANCE COPY WITH PAYMENT.

SUB TOTAL	596.00
TAX	35.76
FREIGHT	
TOTAL	631.76

Rev. 8-76

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CUSTOMER 00580

Req. #B6996

WATER RECLAMATION PLANT

TELEPHONE (714) 383-5380
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

PURCHASE ORDER

WR P 00523

Date August 17, 1978

SHIP TO: 299 Blood Bank Road
San Bernardino,
California 92408

TO Crystal Silica Co.
Box 1280
Oceanside, Ca 92054

PLEASE FURNISH THE FOLLOWING

H 105730

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
1340-	2595		
300 Sack (15 ton) 16-20 High quality Crystal Silica Sand for near white blasting.		25.50/ Ton	$ 382.50
6% S. T.			22.95
PALLETS			100.00
Plus Freight			230.00
			735.45

DELIVERY SCHEDULE 1 Week

IMPORTANT: SHOW PURCHASE ORDER NUMBER ON INVOICES

Robert C. Clark, Sr.
BUYER TO CONTACT REGARDING THIS PURCHASE

Robert C. Clark Sr.
PURCHASING AGENT

35495

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
1340-2595	735.45		

PREPAYMENT AUDIT

DATE ENTERED

DATE PAID SEP 19 1978

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00523

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CRYSTAL SILICA COMPANY

PLEASE REMIT TO:
CRYSTAL SILICA COMPANY
c/o World Ways Postal Center
P.O. BOX 80780
LOS ANGELES, CA 90080

BOX 1280 OCEANSIDE, CALIFORNIA 92054
714 757-2630

PLEASE PAY FROM THIS INVOICE.
NO STATEMENT WILL BE SENT.

SANDS OF TIME

CRYSTAL SILICA
#16, #20 & #30
ARE ARB CERTIFIED
FOR DRY UNCONFINED
BLASTING.

INVOICE NO. 35495

29706625
4297073

SOLD TO

SAN BERNARDINO WATER DISTRICT
P. O. BOX 710
SAN BERNARDINO, CA 92403

WARNING: THIS PRODUCT CONTAINS FREE SILICA. SUGGEST POSTING WORK AREAS WHERE PRODUCT IS USED, HANDLED OR STORED. WARNING EMPLOYEES THAT REPEATED INHALATION OF RESPIRABLE SILICA DUST FOR EXTENDED PERIODS OF TIME MAY CAUSE DELAYED LUNG INJURY. FOLLOW PRESENT OSHA SAFETY AND HEALTH STANDARDS or as HEREAFTER AMENDED.

Collection Costs: Buyer agrees to pay the seller all collection costs including attorneys' fees, court costs, and other costs involved in the collection of past due accounts.

F.O.B. OCEANSIDE

TERMS: NET 30 DAYS FROM DATE SHIPPED

DATE	YOUR ORDER NO.	VIA	DATE SHIPPED
8/27/78	P-00523	MC CLINTON	8/22/78

NO. BAGS	POUNDS	DESCRIPTION	CODE	TONS	UNIT PRICE	AMOUNT
300		# BL13766 SAND	5210	15.00	25.50	382.50
		PALLETS	1157			100.00
		SALES TAX	2147			22.95
		FREIGHT	0853			230.00
		TOTAL INVOICE				735.45

PRODUCERS OF WHITE SILICA SAND
ORIGINAL

We hereby certify that these goods were produced in compliance with all applicable requirements of Sections 6, 7, and 12 of the Fair Labor Standards Act, as amended, and of regulations and orders of the United States Department of Labor issued under Section 14, thereof.

00523

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PURCHASE ORDER

WATER RECLAM..TION PLANT

TELEPHONE (714) 383-5380
P. O. BOX 710
SAN BERNARDINO, CALIFORNIA 92403

WR P 00522

Date August 18, 1978

SHIP TO: 299 Blood Bank Road
San Bernardino,
California 92408

TO Oxford Chemical Company
2030 East 4th Street
Suite 231
Santa Ana, Calif. 92705

PLEASE FURNISH THE FOLLOWING

H 115450

DESCRIPTION	ACCOUNT NUMBER	PRICE	EXTENSION
	6400		
170555 2 - Oxford #87 Degreaser (55 gal BBL)		393.25	$ 786.50
INVOICED 6% S.T.			47.20
			$ 833.70
FRT.			30.46
			$ 864.16

DELIVERY SCHEDULE

IMPORTANT: SHOW PURCHASE ORDER NUMBER ON INVOICES

Robert C. Clark, Sr.
BUYER TO CONTACT REGARDING THIS PURCHASE

PURCHASING AGENT

15661331
16351421

ACCOUNT NUMBER	AMOUNT	ACCOUNT NUMBER	AMOUNT
6400	864.16		

PREPAYMENT AUDIT

DATE ENTERED

DATE PAID OCT 0 3 1978

00522

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MAIL CORRESPONDENCE TO
P.O. BOX 80202
ATLANTA, GA. 30366

AFORD CHEMICALS

(404) 451-4311

A CONSOLIDATED FOODS COMPANY

RETURN DUPLICATE COPY WITH REMITTANCE TO
AFORD CHEMICALS
P. O. BOX 101555
ATLANTA GA. 30392

DUNS NO. 04-209-6925

ORDER NO	INVOICE DATE	PER. #	INVOICE NUMBER
1351421	03-24-78	09-01-78	02	16351421

CUSTOMER ACCT NO	CUSTOMER P.O. NUMBER AND/OR BUYERS NAME	Z.	SALES ENGINEER	SALES NO	IT	FC
1433703	00522 BOB CLARK	C	HENSON, GARY STE	4014		02

SAME AS SOLD TO UNLESS SPECIFIED

CITY OF SAN BERNARDINO
426 W 3RD ST
SAN BERNARDINO
CALIFORNIA 92401

SHIP TO
CITY OF SAN BERBARDINO
WATER TREATMENT PLANT
299 BLOODBANK ROAD
SAN BERNARDINO
CALIFORNIA 92408

SHIPPING DATE	WHSE.
08-28-78	01

SHIP VIA: WESTERN CAR

TERMS—1% 10 DAYS NET 30

QUAN	PRODUCT DESCRIPTION		NO. UNITS SHIPPED	UNIT PRICE	UNIT MEAS	AMOUNT
1	55 GAL CE-87 B/O FROM 1566133	DC21	55	7.15	GAL	393.25
	IMPORTANT - OUR NEW TELEPHONE NUMBER IS 434-452-1100					

SEP 12 1978

TO INSURE PROPER CREDIT, PLEASE RETURN DUPLICATE WITH YOUR REMITTANCE

OFFICE USE ONLY	SHIPPING & HANDLING	TAXABLE AMOUNT	MISC TAXABLE	LOCAL SALES TAX	STATE SALES TAX	MISC NON-TAXABLE	INVOICE TOTAL
		393.25	.00	4.92	18.68	.00	416.85

I hereby certify that these goods were produced in compliance with all applicable requirements of sections 6, 7 and 12 of the Fair Labor Standards Act as amended and regulations and orders of the United States Department of Labor issued under Section 14 thereof.

MERCHANDISE RETURNED WITHOUT PRIOR AUTHORITY WILL NOT BE ACCEPTED FOR CREDIT
NOT RESPONSIBLE FOR FURNISHING POD AFTER 90 DAYS
ORIGINAL INVOICE

PLEASE PAY THIS AMOUNT

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00522

MAIL CORRESPONDENCE TO
P.O. BOX 80202
ATLANTA, GA. 30366

XFORD CHEMICALS

(404) 451-4311

A CONSOLIDATED FOODS COMPANY

RETURN DUPLICATE COPY WITH REMITTANCE TO.
XFORD CHEMICALS
P. O. BOX 101555
ATLANTA GA. 30392

DUNS NO. 04-209-6925

ORDER NO		INVOICE DATE	PER #	INVOICE NUMBER
5661331	08-24-78	08-29-78	02	15661331

CUSTOMER ACCT NO.	CUSTOMER P.O. NUMBER AND/OR BUYERS NAME		Z.	SALES ENGINEER	SALES NO	IT	FC
14337003	00522	BOB CLARK	C	HENSON, GARY STE	4014	03	

SAME AS SOLD TO UNLESS SPECIFIED

CITY OF SAN BERNARDINO
426 W 3RD ST
SAN BERNARDINO
CALIFORNIA 92401

SHIP TO
CITY OF SAN BERBARDINO
WATER TREATMENT PLANT
299 BLOODBANK ROAD
SAN BERNARDINO
CALIFORNIA 92408

SHIPPING DATE	WHSE.
08-21-78	14

SHIP VIA
ERISBANE

TERMS—1% 10 DAYS NET 30

QUAN	PRODUCT DESCRIPTION		NO UNITS SHIPPED	UNIT PRICE	UNIT MEAS	AMOUNT
1	55 GAL DE-87	DC21	55	7.15	GAL	393.25
	B/O 1 55GAL DE87 B/O TO 1635142					
	IMPORTANT - OUR NEW TELEPHONE NUMBER IS 404-452-1100					

RECEIVED SEP 5 1978 FINANCE DEPT. CITY OF SAN BERNARDINO

TO INSURE PROPER CREDIT, PLEASE RETURN DUPLICATE WITH YOUR REMITTANCE

OFFICE USE ONLY	SHIPPING & HANDLING	TAXABLE AMOUNT	MISC TAXABLE	LOCAL SALES TAX	STATE SALES TAX	MISC NON-TAXABLE	INVOICE TOTAL
	30.46	393.25	.00	4.92	18.68	.00	447.31

hereby certify that these goods were uced in compliance with all applicable rements of sections 6, 7 and 12 of the Labor Standards Act as amended, and egulations and orders of the United s Department of Labor issued under on 14 thereof

MERCHANDISE RETURNED WITHOUT PRIOR AUTHORITY WILL NOT BE ACCEPTED FOR CREDIT.
NOT RESPONSIBLE FOR FURNISHING POD AFTER 90 DAYS.
ORIGINAL INVOICE

PLEASE PAY THIS AMOUNT

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00522

Van Waters & Rogers
Univar

ORIGINAL
INVOICE

...ING SCIENCE INDUSTRY AND AGRICULTURE • WAREHOUSES IN MAJOR MARKETING AREAS

REMIT TO NEAREST ADDRESS:

LOS ANGELES
...E BEACH PLACE
LOS ANGELES
213 ...-8123

LAS VEGAS
4150 SOUTH VALLEY VIEW
LAS VEGAS
702 736 7066

SAN DIEGO
...HAILEY AVENUE
NATIONAL CITY
714 ...-0711

• P.O. BOX 2062 TA
LOS ANGELES CA 90051
• P.O. BOX 1391
SAN DIEGO CA 92112

SOLD TO
...4208
S BERNARDINO CITY OF
TER DEPT
BOX 710
BERNARDINO CA 92402

SHIP TO
51095219
SAN BERNARDINO CITY OF
WATER RECLAMATION PLANT
299 BLOOD BANK RD
SN BERNARDINO CA 92403

INVOICE DATE: 09/30/77
INVOICE NUMBER: 51-70-38
TERMS: NET 10TH PROX

YOUR ORDER NUMBER	SHIPPING DATE	SHIPPED VIA	F.O.B.	FREIGHT
9200 RED R6050	09/29/77	AUTO FAST FRT	XWHSE LA	

ORDERED	SHIPPED	B/O CODE	ISSUE UNIT	DESCRIPTION	TAX	UNIT PRICE	PER	PRICE EXTEN
1.000	1.000		DR	04761406 660.00 LB TRICHLOROETHYLENE NEUTRAL GRADE-VW	T	.2975	LB	196.

...EXPRESSLY UNDERSTOOD AND AGREED THAT SELLER MAKES NO EXPRESS OR IMPLIED WARRANTIES OF ...ESS OR OF MERCHANTABILITY OR OF ANY OTHER KIND WHATSOEVER EXCEPT THAT THE GOODS SOLD ...UNDER SHALL BE OF THE QUANTITY ABOVE SPECIFIED. BUYER ASSUMES ALL THE RISK OF LIABILITY ...SOEVER RESULTING FROM THE USE OF SUCH GOODS, WHETHER USED SINGULARLY OR IN COM...TION WITH OTHER SUBSTANCES. SELLER'S LIABILITY FOR NONCONFORMING GOODS IS EXCLUSIVELY ...ED AT THE SELLER'S OPTION, TO REPLACEMENT OF THE DEFECTIVE GOODS OR THE PURCHASE PRICE ...CH GOODS AND UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR INCIDENTAL OR CON...ENTIAL DAMAGES. THE AMOUNT BILLED IS JUSTLY DUE AND OWING, NO PART THEREOF HAS BEEN PAID. ...THE AMOUNT DUE FOR THE LAST ITEM ACCRUED WITHIN ONE YEAR OF THE INVOICE DATE.
...E AND LOCAL TAXES HAVE NOT BEEN INCLUDED UNLESS SPECIFICALLY ITEMIZED ON THE INVOICE. ...DUE BALANCES ARE SUBJECT TO A LATE PAYMENT CHARGE OF 1% PER MONTH, OR IF LESS, THE ...MUM AMOUNT PERMITTED BY APPLICABLE LAW.

MERCHANDISE TOTAL	196.
6.00 % TAX	11.
FREIGHT	32.
PLEASE PAY ⇨	241.

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E4200

NVOICE

Telephone
213) 941-0231

HUNT PROCESS® CO., INC.

No. 13008

P.O. BOX 2111 12767 EAST IMPERIAL HIGHWAY

SANTA FE SPRINGS, CALIFORNIA 90670

SOLD TO
M033JI
SAN BERNARDINO WATER DEPT
PO BOX 710
SAN BERNARDINO
CA 92403

SHIPPED TO
SAME
WWTP

VIA ADMIRAL

☒ TAXABLE ☐ RESALE ☐ PREPAID ☐ COLLECT

Date of Invoice	Customer Order	Requisition Number	Date Shipped	Terms	
09/23/77	54056		9/16/77	NET 30 DAYS	

QUANTITY	UNIT MEASURE	DESCRIPTION	CODE	UNIT PRICE	TOTAL
30.00	GALLONS	6/5MS KOPPERS 2000C THINNER	G0178	5.05	151.
		STATE SALES TAX			9.
		TOTAL INVOICE			160.

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54056

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WATER DEPARTMENT
300 No. "D" Street
San Bernardino, Calif. 92403

PURCHASE REQUISITION
WATER RECLAMATION PLANT

Date 9/15 1977 3 3255 Wanted by 9/19 1977

To Purchasing Department: Please order the items listed below which are required for:
CONSTRUCTION ORDER NO. 2540
NOTE: If required for equipment, please complete the following:

NAME OF EQUIPMENT _____ MFG. _____

MODEL _____ SERIAL NUMBER _____ YEAR _____

MATERIAL USED FOR _____

ITEM NO.	QUANTITY	PART NO.	ARTICLE DESCRIPTION
	30 gal		KOPPERS 2000 C THINNER
			505 GAL
			CONFIRMAL

APPROVED Don Curlin SUPERVISOR [signature]

P. O. NO. 54056 Issued to [illegible] PROCESS Date 9/16

P. O. NO. _____ Issued to _____ Date _____

P. O. NO. _____ Issued to _____ Date _____

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54056

Exhibit 3

KOPPERS

Protective Coatings

TECHNICAL DATA SHEET

ATTACHMENT #1

TYPE OF COATING

COAL TAR

Product: BITUMASTIC SUPER TANK SOLUTION

DESCRIPTION: Bitumastic Super Tank Solution is a heavy duty, high build cold applied highly water resistant coal tar base coating. After normal agitation it is ready to apply. It is normally self priming and will produce a dried film thickness of 8 to 10 mils per coat with good film thickness retention on edges. The coating dries by solvent evaporation and is easy to recoat or repair. The dried film will not sag or flow at maximum temperatures encountered in normal atmospheric exposure and it will not crack at -20°F. Bitumastic Super Tank Solution has an unlimited shelf life with a minimum of settling. It is made from pitch derived from suitable tars, selected solvents and mineral fillers affording a highly water-resistant coating.

USE: FOR INDUSTRIAL USE ONLY. NOT INTENDED FOR USE IN THE HOME.

It is designed primarily for the long-term protection of the interior of large steel water storage tanks and the interior of steel water transmission pipelines used for either potable or irrigation water service.

DO NOT USE FOR DEAD ENDS, STAGNANT OR VERY LOW FLOW LINES.

Its required thick coat application deposits 4 to 5 times the thickness of conventional paint.

TECHNICAL DATA:

Number of coats:	2 minimum
Volume solids:	63% 61%
Theoretical coverage:	1010 mil sq. ft./gal. 978
Coverage to achieve minimum dry film thickness:	80 to 100 sq. ft./gal. (allows for approximately 20% application loss).
Film build ratio:	
Minimum dry film required per coat:	8 to 10 mils
Wet film required per coat:	12.7 to 15.9 mils
Drying time at 70°F. and 50% relative humidity:	
To touch:	2 hours

DEFENDANTS' EXHIBIT 505 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

Koppers Company, Inc., Pittsburgh, Pennsylvania 15219

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TECHNICAL DATA (Continued):

Between coats: A minimum of 24 hours, or until first coat dries firm.

Before submerging: The normal dry time is 10 days after the topcoat is applied. Thorough drying must be obtained between coats and after application of the final coat prior to submerging. It is essential that the solvent vapors released during application and from the deposited film be removed from the vessel or tank by means of exhaust blowers or suction fans. Ventilation blowers or fans should be ducted to or from the bottom of the tank.

During coating application, the volume of fresh air introduced must provide good air movement. The volume of fresh air should be not less than 300 cu. ft. air/minute for each one gallon of coating applied/hour. It is customary in large tanks (0.5-2MM gallons) to use a ducted 10,000 c.f.m. blower.

After application to completely remove all traces of solvent from the coating or tank, forced ventilation at the rate of at least one change of air/hour should be continued for a period of ten days. Temperature and humidity readings above or below 70°F. and 50% R.H. may extend or shorten the time required to some degree.

Before placing in service, the entire coated surfaces shall be washed down with water, disinfectant and flushed according to AWWA D102-64, Section 5.3.

Color: Flat Black

Thinner: Koppers Thinner 2000C. Do not use ordinary paint thinners, mineral spirits, gasoline or turpentine as they will destroy the material. Do not thin except in cold weather, when ½ pint of Koppers Thinner 2000C per gallon is the maximum amount allowable.

Cleaner: Koppers Thinner 2000C, to clean brushes, rollers or spray equipment.

Surface preparation: Apply only to clean dry surfaces. Remove weld spatter by chipping or grinding. Grind off all sharp edges or high points on weld seams. Remove oil and grease deposits with Koppers Thinner 2000C. Sandblast metal clean to NACE-3 or SSPC-SP-6-63.

The maximum height of sandblast profile must not exceed 3 mils.

Sandblasted surfaces must be coated the same day.

Primer:

Metal: Normally, self-priming. If a shop primer is required, apply one thinned coat of Bitumastic Super Tank Solution or Bitumastic Tank Solution for a minimum dry film thickness of 2.0 mils. The shop primed steel surfaces should not be stored for prolonged periods with exposure to full, direct sunlight.

Note: On non-ferrous metals, pretreat with Koppers 40 Passivator.

Mixing instructions: Mix thoroughly until a smooth, uniform texture is obtained. A slow speed power mixer should be used.

TECHNICAL DATA
(Continued):

Methods of application: Brush, roller, conventional or airless spray. Best method of application is spray with airless spray being preferred. Use a technique which will result in a film free of fog or splatter. This will provide a theoretical dry film thickness of 8 to 10 mils when applied at a wet film thickness of 13.1 to 16.4 mils.

To insure complete coverage of the welds and in conjunction with the first coat application, the material should be brushed in. Spray over the wet brush coat on the welds.

Airless Spray:

Pump:	Graco 30:1 Bulldog or equivalent.
Hose:	3/8" i.d. to 50 Ft.; 1/2" i.d. over 50 Ft. Use of 1/4" whip end at gun to facilitate handling is recommended.
Gun:	Hand gun only; use 30 mesh filter.
Tip sizes:	.025" to .035"; 12" fan width is suggested.
Pressure:	50 to 90 psi at pump.

Conventional Spray:

Material pump:	Minimum 8:1 ratio.
Hoses:	From material pump: 3/8" i.d. to 100 Ft.; 3/4" i.d. over 100 Ft.; use hoses with solvent resistant linings. From air line: 1/2" i.d.
Gun:	Hand gun; 1/8" tip and 3/16" cap or 1/4" tip and 1/4" cap.
Pressures:	Material: 20 to 50 psi. Atomization: 50 to 80 psi Individual pressure regulators are required for both material pump and atomizing air.

In cold weather, an in-line heater, such as a Speed-Flo, will facilitate application. Use of an in-line heater is highly recommended whenever airless spray is used.

Do not apply at temperatures below 40°F. or if rain threatens before the coating is dry.

Temperature limitations: Dry: −20°F. to 400°F. Wet: 120°F.

Storage life: 1 year minimum

Packaging: 55-gallon drums, 5-gallon pails and 1-gallon cans

PRECAUTIONS: Take these precautions before the coating dries and during application.

DANGER!

Harmful or fatal if swallowed. Vapor harmful.
Eye irritant.
Combustible.

CONTAINS PERCHLOROETHYLENE, TOLUOL AND XYLOL.

If swallowed, do not induce vomiting. CALL PHYSICIAN IMMEDIATELY. Keep away from heat, sparks and open flame. Perchloroethylene or its vapors may form corrosive fumes in contact with flames or hot glowing surfaces. Avoid prolonged contact with skin and breathing of vapor or spray mist. In case of contact with eyes, flood repeatedly with water and CONTACT PHYSICIAN. Close container after each use. Do not take internally.

KEEP OUT OF REACH OF CHILDREN.

In confined areas, circulate adequate fresh air continuously during application and drying. Use fresh air masks and explosion-proof equipment. Prevent flames, sparks, welding and smoking.

without gas is
is not harmed.

WARRANTY

All technical advice, recommendations and services are rendered by the Seller gratis. They are based on technical data which the Seller believes to be reliable and are intended for use by persons having skill and knowhow, at their discretion and risk. Seller assumes no responsibility for results obtained or damages incurred from their use by Buyer whether as recommended herein or otherwise. Such recommendations, technical advice or services are not to be taken as a license to operate under or intended to suggest infringement of any existing patent.

July 1976 Supersedes all previous data sheets printed on this product.

Exhibit 4

Received from Joe Bocanegra of SB City

TNEMEC (OLD)

46-465 HI-BUILD TANK COATING

Coal Tar Pitch Solution

CONTAINS PCE

COATING PROFILE

DESCRIPTION	Water-resistant coating with excellent high film build and long-term protection. Meets the performance requirements of AWWA D102-78 Inside System No. 6.
TYPICAL USE	Interior coating for large steel potable water storage tanks. **DO NOT USE FOR DEAD ENDS, STAGNANT OR VERY LOW FLOW LINES.**
PRIMER	Self-priming
SURFACE PREPARATION	STEEL: Commercial Blast Cleaning (SSPC-SP6) ALL SURFACES must be dry and clean.
COLOR	Black
FINISH	Semi-gloss
SOLIDS BY VOLUME	60.0 ± 1.0%
THEORETICAL COVERAGE	960 mil sq. ft. per gallon
DRY FILM THICKNESS	8 to 12 mils per coat (Minimum 2 coats)
CURING TIME – AT 75 F.	To recoat: 24 hours minimum or until the first coat dries firm. Immersion Service: 14 days minimum. Thorough drying must be allowed between coats and after application of the final coat prior to immersion. It is essential that the solvent vapors released during application and from the deposited film be removed from the tank by exhaust blowers or suction fans. After application, completely remove all traces of solvent from the coating or tank by force ventilation at the rate of at least one change of air per hour for a period of 14 days. Temperature and humidity reading above or below 75 F. and 50% R. H. may extend or reduce the time required. Before placing in service, the coated surfaces shall be washed down with water, disinfected and flushed according to AWWA D102-64, Section 5.3.

DEFENDANTS' EXHIBIT 50 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

SHIPPING & STORAGE

NUMBER OF COMPONENTS	One	
PACKAGED IN	55 gallon drums, 5 gallon pails and 1 gallon cans	
NET WEIGHT PER GALLON	12.76 ± 0.25 lbs.	
STORAGE TEMPERATURE	Minimum 20 F.	Maximum 120 F.
SHELF LIFE	12 months at recommended storage temperature.	
FLASH POINT – SETA	175 F.	

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APPLICATION INFORMATION & SAFETY DATA

MIXING

Stir thoroughly, making sure no pigment remains on the bottom of the can.

SPREADING RATE

	Dry Mils	Wet Mils	Sq. Ft./Gal.
Suggested	10.0	17.0	96
Minimum	8.0	13.0	120
Maximum	12.0	20.0	80

Allow for overspray and surface irregularities. Film thickness is based on closest 0.5 mil.

THINNING

Use No. 21 Thinner. For air spray thin up to 1 pt./gal., brush or roller up to 1 pt./gal. No thinning is required for airless spray.

SURFACE TEMPERATURE

Minimum 40 F. Maximum 120 F.

The surface should be dry and at least 5 F. above the dew point. Coating will not cure below minimum surface temperature.

APPLICATION EQUIPMENT

Air or airless spray, brush or roller

Air Spray

Suggested equipment, or equal:

Gun	Fluid Tip	Air Cap	Air Hose ID	Mat'l Hose ID	Atomizing Pressure	Pot Pressure
DeVilbiss MBC-516 MBC-510	E	704	3/8" to 1/2"	1/2" to 3/4"	50 psi	20

Low temperatures or longer hoses require higher pot pressure.

Airless Spray

Tip Orifice	Operating Air Pressure	Air Hose ID	Mat'l Hose ID	Pump Ratio
0.017" to 0.031"	2,400 to 2,700 psi	1/2"	3/8" to 1/2"	30:1

Use appropriate tip orifice and operating air pressure for equipment, applicator technique and weather conditions.

Brush or Roller

For touch-up only.

CLEAN UP INSTRUCTIONS

Clean all equipment immediately after use with No. 21 Thinner. Flush and clean spray equipment before material sets up.

SAFETY INFORMATION

CONTAINS PERCHLOROETHYLENE AND TOLUOL

WARNING! COMBUSTIBLE, VAPOR HARMFUL, MAY CAUSE SKIN SENSITIZATION OR OTHER ALLERGIC RESPONSES

Avoid breathing of vapor or spray mist. Use only with adequate ventilation. Do not take internally. Do not get in eyes, on skin or on clothing. Keep closures tight and upright to prevent leakage. Keep container closed when not in use. In case of spillage, absorb and dispose of in accordance with local applicable regulations. FIRST AID: In case of skin contact, wash thoroughly with soap and water; for eyes, flush immediately with plenty of water for 15 minutes and call a physician. Remove and wash contaminated clothing before reuse. (Discard contaminated shoes.) If affected by inhalation of vapor, remove to fresh air. CALL A PHYSICIAN IMMEDIATELY. If swallowed, CALL A PHYSICIAN IMMEDIATELY; induce vomiting promptly by putting finger down throat or by giving two tablespoons of salt in glass of warm water.

FOR INDUSTRIAL USE ONLY.

TNEMEC COMPANY, INC
Post Office Box 1749
Kansas City, Mo. 64141
(816) 474-3400
(KC) Telex 42-6183

TNEMEC

MANUFACTURING PLANTS:
Kansas City, Missouri
Baltimore, Maryland
Compton, California
(Tnemec Co. of Ca., Inc.)

The technical data contained in this data sheet is accurate to the best of our knowledge. No warranty is expressed or implied since the method of application and its intended use is beyond our control.

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Exhibit 5

ENGARD® COATINGS CORPORATION

15541 COMMERCE LANE • HUNTINGTON BEACH, CALIFORNIA 92649 • TELEPHONE 714/891-4402 CABLE: ENGARI

DESCRIPTION

ENGARD 463 is a special modified coal tar epoxy coating catalyzed by a unique polyamide type activator which conforms to Steel Tank Institute Specification STI-P_3. It is designed to provide a dry film thickness of up to 10 mils per applied coat. ENGARD 463 features superior edge covering without sagging, pinholing or mudcracking. It is formulated to have outstanding adhesion and excellent curing under adverse conditions of low temperature and high humidity. This coating is extremely resistant to fresh and salt water. It is self-priming on most surfaces or it may be used in combination with a primer such as ENGARD 422.

USAGE

ENGARD 463 may be considered as a protective lining for concrete and steel storage tanks, piping and processing equipment handling fresh and salt water, and water solutions containing sour crude, greases, lubrication, vegetable oils, salts, detergents, alkalies and many other chemicals. ENGARD 463 is suggested for buried pipe, sewage plants, refineries, off-shore drilling platforms, marine service, pulp and paper industry, dam gates, mining and chemical plants. The principal use for ENGARD 463 is in water-chemical problem areas which require greater film thickness for protection.

SERVICE LIMITATIONS

Temperature resistance up to 250°F dry and 140°F wet. For immersion service and exposure to corrosive chemicals or use with cathodic protection systems, contact ENGARD for specific recommendations and instructions before proceeding. Not recommended as a lining continuously in contact with strong solvents, acids or bases.

463-SQ81-1

ENGARD 463

COAL TAR EPOXY COATING

DATA SUMMARY

COLORS	Black
FINISH	Low Gloss
VOLUME SOLIDS	75%
WEIGHT SOLIDS	82%
APPLICATION METHODS	Airless or Conventional Spray, Brush (small areas)
DRY TIME @ 70°F & 50% R.H.	Recoat - 4-24 Hours Final Cure - 7 Days
COVERAGE	Dry film spreading rate per gallon:
Theoretical (No loss)	1200 sq. ft. @ 1 mil 120 sq. ft. @ 10 mils
Practical (20% loss)	960 sq. ft. @ 1 mil 96 sq. ft. @ 10 mils
CONFORMS TO	Federal and State Regulations for Air Pollution
COMPONENTS	Two
MIXING RATIO	Mix complete premeasured packaged kits
POT LIFE @ 70°F	4 Hours
THINNER	ENGARD 43
THINNER RATIO	Thin only if required for proper application
SHELF LIFE @ 70°F	Six months from shipment date
DOT/FLASH POINT CLASSIFICATION	Flammable liquid, 20°F to 100°F

DEFENDANTS' EXHIBIT 577 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-22-99
WITNESS: LOWE, V.H.

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CITY 10-1238
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COVERAGE RATES AND STORAGE

Solids content and application properties of this product may vary according to color selected. When ordering or computing working coverage, allow for application loss and surface irregularities. Multiple coats may be necessary to achieve the desired film thickness due to variations in design configuration, application equipment, temperature and other factors. Store in a protected area between 40°F and 100°F. Material should not be used if storage conditions or minimum shelf life have been exceeded unless found to be satisfactory after reinspection by ENGARD.

SUGGESTED SURFACE PREPARATION

No more surface preparation than can be coated in the same working day should be performed. Round off all sharp edges and rough welds. All burrs, weld spatter, loose concrete, masonry and wood should be completely removed. Concrete and masonry should cure at least thirty (30) days and have a moisture content prior to coating below 8% as measured by an instrument such as a Delmhorst Model DP. Wood and composition materials should have a moisture content prior to coating below 15% as measured by an instrument such as a Delmhorst Model BD-7. Oil, grease and heavy deposits of surface contaminants should be removed by solvent or detergent cleaning. All surfaces must be clean, dry and free of any dirt, dust, chalk, grease, oils, salts, curing compounds, release agents, preservatives and other deleterious materials before application is performed. **NOTE:** Vacuuming the topside of all horizontal and sloped surfaces is recommended.

CARBON STEEL: It is recommended for immersion or severe exposures that metal surfaces be prepared in accordance with SSPC-SP-10 (Near-White Blast Cleaning). For atmospheric or mild exposures metal surfaces may be prepared in accordance with SSPC-SP-6 (Commercial Blast Cleaning). Prepared metal surfaces should have an anchor profile of not less than two mils (.002) as measured by use of a non-destructive instrument such as a Keane-Tator Surface Profile Comparator.

ALLOY STEELS AND NON-FERROUS METALS: Chemically clean surfaces in accordance with SSPC-SP-1 (Solvent Cleaning). Abrasive "brush" blast to provide a lightly profiled and etched surface. Apply ENGARD 135 Pretreatment Primer to dry film thickness of not more than one-half mil (.0005). **NOTE:** Coatings applied to these surfaces may not achieve the same degree of adhesion and toughness.

WELDING: Welding should precede coating. . In the event welding or flame cutting is performed on metal already coated with this product, do so in accordance with the latest instructions in U.S.A. Standard Z49:1 "Safety in Welding and Cutting". All welded, burned or otherwise damaged areas should be cleaned to base metal, prepared and recoated as specified.

CONCRETE AND MASONRY: Clean surface by abrasive "brush-off" blast or etch with 10% hydrochloric acid. If etching is employed, the acid solution should be applied at a spreading rate of 1½ pints per square yard to obtain total wetting of the substrate, and thoroughly worked into the surface by stiff bristled brushes until the bubbling reaction has subsided. **PROTECTIVE CLOTHING AND EQUIPMENT SHOULD BE USED WHENEVER WORKING WITH ACIDS .** The etched surface should then be thoroughly washed and scrubbed with clean water and stiff bristled brushes and/or high pressure water hosing to remove all salts and loose particles. Surface and substrate must be thoroughly dry before proceeding with any coating application. Repair and trowel smooth all cavities and voids with ENGARD 490 Epoxy Putty. Clean silica may be added to ENGARD 490 to fill large cavities and voids. Apply the first application coat "thinned" in accordance to ENGARD'S instructions or ENGARD 424 Epoxy Vinyl Primer Sealer to completely wet and thoroughly pentrate the surface.

WOOD AND COMPOSITION MATERIALS: Uniformly abrade the surface and feather any irregular edges by hand or power sanding or abrasive "brush" blasting under low pressure. The surface must be roughened sufficiently to provide a profile adequate to insure a bond. Apply ENGARD 424 Epoxy Vinyl Primer Sealer to completely wet the surface.

ZINC PRIMED AI[illegible]REVIOUSLY COATED SURFACES, [illegible]ROUS SUBSTRATES, PLASTICS AND MISCELLANEOU[illegible]MATERIALS: Contact ENGARD fo[illegible] specific recommendations and instructions before proceeding. **NOTE:** Coatings applied to these surfaces may require a special tie or barrier primer. Always check compatibility before application over a previously coated area.

NOTE: Different ENGARD coatings and/or surface preparation procedures may also be completely satisfactory for use with this product. If for any reason additional information, instructions or explanations are needed, refer to the appropriate supplemental technical bulletins and manuals or contact ENGARD before proceeding.

SUGGESTED APPLICATION PROCEDURE

1. Flush all equipment clean with ENGARD 43 Thinner.

2. Add the total contents of Component A (Activator) into Component B (Base). Do not vary these proportions. Power stir thoroughly until completely mixed and continue agitation during application. **EMPTIED CONTAINERS ARE HAZARDOUS BECAUSE THEY RETAIN PRODUCT VAPOR AND RESIDUE.** Properly destroy and dispose of containers after use.

3. Thin only if required for proper application with ENGARD 43 Thinner.

4. Apply in an even wet coat. Give particular attention to all welds, seams, rivets, bolts and other irregularities to insure that they are completely covered.

5. Pot life of a mixed one gallon kit is approximately 4 hours @ 70°F. Pot life is proportionately shorter at higher temperatures or in larger quantities and longer at lower temperatures or in smaller quantities. **CAUTION!** Do not allow catalyzed material to stand in equipment after use. Clean immediately with ENGARD 43 Thinner.

6. Application at air and surface temperatures lower than 125°F and above 40°F and more than 5°F above the dew point is suggested. If it is necessary to apply this product at temperatures or humidities beyond these preferred limits contact ENGARD for additional information, instructions and explanations before proceeding.

7. **CAUTION!** Recoat when material is relatively dry and firm, but before coating reaches complete cure and hardness. Curing times are proportionately shorter at higher temperatures or lower film thickness and longer at lower temperatures or higher film thickness. Suggested recoat guide @ 50% Relative Humidity:

Temperature	Thickness	Minimum	Maximum
40°F	10 mils	12 hrs	72 hrs
70°F	10 mils	4 hrs	24 hrs
100°F	10 mils	2 hrs	8 hrs

There are additional factors which can influence the drying rate such as: the method of application; the quantity of thinner added, if any; the amount of air circulation and ventilation; humidity, etc. Allow final dry time of at least 7 days at 70°F, before placing in operating service. Heat curing may be used to increase drying speed and resistance properties. If desired, after the final coat has been applied, allow the minimum recoat time before gradually raising the temperature until the substrate reaches 150°F for a period of 2 hours. **NOTE:** Contact ENGARD for different heat cure time cycles.

8. If it is necessary to spot repair or topcoat with the same product after this material has cured beyond the recommended minimum recoat period, the following preparation is suggested: Properly clean the areas. The use of ENGARD 7 Surface Cleaner may be desired. Spot prepare any damaged coating or substrate and feather all rough edges by hand or power sanding or abrasive "brush" blasting under low pressure to remove all deleterious materials before application is performed.

   If it is necessary to spot repair or topcoat with the same product after this material has cured beyond the recommended maximum recoat period, the following preparation is suggested: Properly clean the areas, then uniformly abrade the surface and feather the edges by hand or power sanding or abrasive "brush" blasting under low pressure. The surface must be roughened sufficiently to provide a profile adequate to insure a mechanical bond. Also, the use of ENGARD 2 Tie Solvent may be desired. **NOTE:** Coating applied to these surfaces may not achieve the same degree of adhesion and toughness.

9. If it is necessary to apply this product directly on a porous type primer or substrate, the use of a thin or "mist" coat prior to the regular application may be needed to reduce the possibility of pinholing and/or blistering.

10. Check for desired dry film thickness. Use a non-destructive instrument such as a Mikrotest on ferro-magnetic substrates and an Elcometer "Eddy-Current" Tester on non-ferrous metallic substrates. Use an instrument such as a Tooke Gage on non-metallic substrates when a destructive tester is necessary.

11. On surfaces subject to immersion or severe environments, check for pinholes, holidays and bare areas. Use a non-destructive detector such as a Tinker & Rasor M-1 on conductive substrates.

12. If the coating is to be subjected to contact with either food or potable water or to protect the purity of stored products, disinfect or decontaminate the fully-cured-coated surface by thoroughly flushing clean with 50 ppm chlorine water solution. All solvent vapors must be completely removed before placing in operating service.

13. All coatings to be applied in accordance with the latest revisions of Steel Structures Painting Council, American Concrete Institute and the Forest Products Research Society surface preparation and application specifications. If for any reason additional information, instructions or explanations are needed, refer to the appropriate supplemental technical bulletins and manuals or contact ENGARD before proceeding.

SUGGESTED APPLICATION EQUIPMENT

AIRLESS SPRAY*: Standard equipment such as Graco or equal using a 30:1 or higher pump ratio. Graco 206-718 gun having a fluid tip of .021" or larger orifice size with Reverse-A-Clean tip, 3/8" I.D. or larger high pressure and solvent resistant fluid line, 1/2" I.D. or larger air supply line. Operating air source capable of providing 80 to 100 psi inbound pressure at the pump.

CONVENTIONAL SPRAY*: Standard equipment such as Binks or equal using a pressure material pot with mechanical agitator, equipped with dual regulators and air gages. Oil and moisture separators are necessary. Binks No. 18 gun (external mix), 67 fluid nozzle, 65 fluid needle, 67 PB air cap, heavy duty fluid spring and Teflon fluid packing, 1/2" I.D. or larger high solvent resistant fluid line and 3/8" I.D. or larger air supply line. Operating air source capable of providing a minimum of 20 cfm at 80 psi to each nozzle and 60 psi to the pot is required.

*Regulate pressure as required for proper application. Adjust pressure proportionally higher for the smaller hose diameter and/or longer hose length and proportionally lower for the larger hose diameter and/or the shorter hose length. Tip angles and orifice diameters should be selected according to application conditions.

BRUSH: Short hair or natural bristle brushes only.

CLOTHING: Wear protective garments, goggles, and filter masks. Barrier creams should be used on any exposed areas of skin.

IN CONFINED AREAS AND TANKS - READ THIS NOTICE! Use explosion proof lighting and electrical equipment, non-sparking tools, clothes and shoes. Ground all structures and equipment. Use procedures which prevent static electrical sparks. Wear TC-19C NIOSH/MSHA fresh air masks such as MSA or equal with 1/4" I.D. or larger air supply line connected directly to proper air source. Use suction type exhaust fans and blowers with sufficient cfm capacity to keep solvent vapors below 20% of the explosive limit. **NOTE:** Air circulation and exhausting of solvent vapors must be continued until the coatings have fully cured.

NOTE: All equipment and procedures are to conform to the latest safety requirements of applicable regulatory agencies. Different equipment combinations and equivalent equipment from other manufacturers may be completely satisfactory for use with this product. If for any reason additional information, instructions or explanations are needed, refer to the appropriate supplemental technical bulletins and manuals or contact ENGARD before proceeding.

HAZARD WARNING - READ THIS NOTICE!

THIS PRODUCT CONTAINS KETONES, PETROLEUM DISTILLATES, PERCHLORETHYLENE, COAL TAR, EPOXY RESINS AND AMINE COMPOUNDS.

WARNING! FLAMMBALE, VAPOR HARMFUL. CAUSES SEVERE EYE AND SKIN BURNS. MAY CAUSE **SKIN** SENSITIZATION OR OTHER ALLERGIC RESPONSES. HARMFUL OR FATAL IF **SWALLOWED.**

Keep away from heat, sparks and open flame. Use only with adequate ventilation. Prevent breathing of vapor or spray mist. Prevent contact with eyes and skin. Do not take internally. Keep closures tight and upright to prevent leakage. Keep container closed when not in use. In case of spillage, absorb and dispose of in accordance with local applicable regulations. **FIRST AID:** In case of skin contact, wash thoroughly with soap and water; for eyes, flush immediately with plenty of water for 15 minutes and call a physician. Remove and wash contaminated clothing before reuse. (Discard contaminated shoes). If inhaled, remove to fresh air. If swallowed, **CALL A PHYSICIAN IMMEDIATELY. DO NOT** induce vomiting.

IN CONFINED AREAS AND TANKS OBEY SPECIAL SAFETY AND EQUIPMENT INSTRUCTIONS!

FOR INDUSTRIAL USE BY PROFESSIONAL APPLICATORS ONLY. NOT INTENDED FOR SALE TO THE GENERAL PUBLIC. Not to be sold or delivered to any person under 18 years of age. KEEP OUT OF REACH OF CHILDREN. If for any reason additional product and safety information, instructions or explanations are needed, CONTACT ENGARD IMMEDIATELY!

WARRANTY - READ THIS NOTICE!

ENGARD'S technical advice, recommendations and services are provided without charge and are carefully based on the most accurate and reliable information we have obtained. All technical information, test results, instructions and suggested recommendations are predicated on storage, application and service performance conditions at an ambient temperature of 70°F and 50% relative humidity unless designated specifically otherwise in writing. We fully warrant and guarantee the uniformity of our products within manufacturing tolerance. However, since the use of ENGARD'S products, their application and the regulation of the service environment is beyond our direct control, they are furnished only upon the condition that each party shall make his own tests to determine the suitability for their particular purpose, and ENGARD disclaims all responsibility for results obtained or damages incurred from their use. **OUR LIABILITY FOR DAMAGES ARISING OUT OF NEGLIGENCE OR BREACH OF WARRANTY IS HEREBY EXPRESSLY LIMITED TO EITHER SUPPLYING FREE OF CHARGE SUFFICIENT MATERIAL TO REPLACE DEFECTIVE PRODUCTS OR REFUND OF THEIR PURCHASE PRICE.** Failure to give written notice of claim within one year from date of delivery shall constitute a waiver of all claims in respect to such products. There are no other warranties either expressed or implied which are not stated herein!

Exhibit 6

KOPPERS

Protective Coatings

TECHNICAL DATA SHEET

TYPE OF COATING

RUBBER

Product: BITUMASTIC JET-SET PRIMER

DESCRIPTION: A synthetic, black-colored primer formulated from chlorinated rubber, synthetic plasticizers and selected solvents to produce a low viscosity, easily-applied coating that gives a suitable and effective bond between the metal and the subsequent coal tar enamel coating.

USE: FOR INDUSTRIAL USE ONLY.

NOT INTENDED FOR USE IN THE HOME.

Bitumastic Jet-Set Primer is a rapid-drying, long life primer for steel surfaces that will be topcoated with hot applied coal tar enamels. It is a significant improvement over conventional coal tar primers. It has demonstrated foolproof qualities which virtually eliminate all primer problems exhibited with conventional primers; it also aids in simplifying coating operations.

There are numerous advantages to be gained with the use of Bitumastic Jet-Set. Some of the more important ones are:

1. Very Fast Drying: Bitumastic Jet-Set Primer dries much more rapidly than conventional coal tar primers. (See drying schedule elsewhere on this data sheet). The rapid drying of Jet-Set Primer permits the application of enamel before dust or moisture can accumulate on the primer. If such accumulations do occur, they can be removed from Jet-Set Primer more rapidly than from conventional primers.

2. Excellent Bonding Properties: Tests by independent users of Bitumastic Jet-Set Primer and more than 20 years of field experience have shown this primer to bond coal tar enamel to steel surfaces considerably better than conventional coal tar primers.

3. Multi-Enamel Primer: Bitumastic Jet-Set performs equally well under Bitumastic 70-B Standard and 70-B AWWA – truly a multi-enamel primer since these are the most commonly used grades of enamel. Bitumastic Jet-Set Primer is not recommended for high temperature service with Bitumastic Hi-Melt Enamel when operating line temperature will exceed 160°F.

4. Long-Life: Bitumastic Jet-Set Primer will not deteriorate from age while stored in closed containers nor does it "go dead" in a few days after application. Under some exposure conditions it may be advisable or necessary to reprime over a first coat which has dried more than 14 days.

DEFENDANTS' EXHIBIT 566 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-16-99
WITNESS: HARPER, V.I

USE (Continued):

5. Faster Operations:

   Over the ditch pipe-coating: Bitumastic Jet-Set permits cleaning, priming, wrapping and lowering-in of the pipe in one operation.

   Yard pipe-coating and lining: Bitumastic Jet-Set permits operating under adverse conditions which results in more efficient operations and greater productivity.

   Tank coating and lining: Bitumastic Jet-Set results in fewer equipment moves, reduces dust removal costs and eliminates waiting time for drying of primer. Vapors are less objectionable.

6. Ideal for Joints and Field repairs: Quick drying characteristics of Jet-Set mean that primer and enamel can be applied on joints and field repair work without delay, permitting immediate back filling; the complete coating system takes only a few moments. Jet-Set also provides an outstanding bond for coal tar tapes.

7. No Taste or Odor: Bitumastic Jet-Set imparts no taste or odor to potable water systems.

8. Settling: There are no settling problems with Bitumastic Jet-Set Primer, however, it does contain a black pigment which should be uniformly incorporated by stirring before primer is used from the original container.

Bitumastic Jet-Set Primer meets the requirements of AWWA C-203-78, Primer, Type B, fast-drying, synthetic.

TECHNICAL DATA:

Number of coats: One (two or more may be needed for use as a protective weather coat).

Volume solids: 22%

Theoretical coverage: 350 mil sq.ft./gal.

Recommended dry film thickness and typical coverage rates: (Actual coverage rate will vary depending on surface preparation, method of application and amount of material loss).

Type of Application	Coverage sq./ft./gal. (No loss factor)	Dry Film Thickness in Mils (wet film in mils)
Pipe – over the ditch by line traveling machine	440 to 700	0.8 to 0.5 (3.6 to 2.2)
Pipe – yard coating by spray or rug	390 to 700	0.9 to 0.5 (4.0 to 2.2)
AWWA – pipes or tanks by spray, brush	350	1.0 (4.5)
Weathercoat – by spray or brush (where application of enamel will be delayed)	235	1.5 (6.8)

Note: Some additional thickness of primer may be required on very heavy plate which is cold when the enamel is applied.

TECHNICAL DATA (Continued):

	Type of Application	Coverage sq./ft./gal. (No loss factor)	Dry Film Thickness in Mils (wet film in mils)
Drying time: temperature:	100°F+	75°F	40°F
relative humidity:	Below 50%	50%	over 50%
To handle:	5 minutes	5 minutes	15 minutes minimum
To enamel:	Less than 1 hour	1 to 8 hours	8 to 24 hours

Thinner: Do not thin

Cleaner: Koppers Thinner 2000 (Use Koppers Thinner 2000C where air pollution regulations apply).

Surface preparation: Steel surfaces must be thoroughly clean and dry. All oil or grease must be removed using Koppers Thinner 2000 or Koppers Thinner 2000C if necessary. For shop application, best preparation is shot, grit or sandblasting by air-powered or centrifugal casting equipment to remove all millscale, mill lacquer, rust and dirt. Over the ditch, best preparation is by line traveling machine. Wirebrushing and scraping are acceptable but should be limited to small areas where other methods of cleaning are not warranted. In tanks, preparation should be by sand or grit blasting.

Preparation of material: Stir Bitumastic Jet-Set thoroughly to incorporate the black pigment before using. One and five-gallon pails can be stirred or shaken. Drums should be rolled before opening. If applied by spray equipment, using a dip leg suction feed, material should be stirred before use, occasionally during use and before resuming application after standing unused any interval of time.

Methods of application: Brush, rug, conventional or airless spray. Specially formulated material that can be electrostatiscally sprayed is available.

Application: No thinning is required for proper atomization by spray application. Do not apply to surfaces that will be exposed to rain before the coating is dry or to surfaces with temperatures below 40°F.

Temperature limitations: For Bitumastic Jet Set Primer used as a weathercoat or before enameling:

Dry: max. 160°F Wet: max. 100°F

Storage life: Minimum 18 months

Packaging: 55 gallon drums, 5 gallon pails, 1 gallon cans.

PRECAUTIONS: Take these precautions during application and before the coating dries.

(See Material Safety Data Sheet for this product)

Air Pollution Regulatory Control Version	Regular & Electrostatic Version
Combustible.	Flammable.
Contains Perchloroethylene and Aromatic Hydrocarbons	Contains 1,1,1 Trichloroethane, Xylene, and Ethylene Glycol Monoethyl Ether Acetate.

PRECAUTIONS (Continued):

The following precautions are applicable to all versions.

DANGER!

Harmful or fatal if swallowed. Vapor harmful.

Skin and eye irritant.

Keep away from heat, sparks and flame. Perchloroethylene or 1,1,1 Trichloroethane or their vapors may form corrosive fumes in contact with flames or hot glowing surfaces. Avoid breathing of vapor or spray mist. Avoid contact with eyes and skin. Keep closures tight and upright to prevent leakage. Keep container closed when not in use. In case of spillage, absorb and dispose of in accordance with local applicable regulations. Do not take internally.

FIRST AID: In case of skin contact wash thoroughly with soap and water; for eyes, flush immediately with plenty of water for 15 minutes and call a physician. If affected by breathing of vapor move to fresh air. If swallowed, CALL A PHYSICIAN IMMEDIATELY. DO NOT induce vomiting.

KEEP OUT OF REACH OF CHILDREN.

Use with adequate ventilation during application and drying. In tanks and other confined areas, use only with adequate forced air ventilation to prevent dangerous concentrations of vapors which could cause death from explosion or from breathing. Use fresh air masks, clean protective clothing and explosion-proof equipment. Prevent flames, sparks, welding and smoking. Follow OSHA regulations regarding ventilation and respiratory equipment.

IN CASE OF FIRE: Use dry chemical, foam, water fog or CO_2. Cool closed containers with water.

WARRANTY

All technical advice, recommendations and services are rendered by the Seller gratis. They are based on technical data which the Seller believes to be reliable and are intended for use by persons having skill and knowhow, at their discretion and risk. Seller assumes no responsibility for results obtained or damages incurred from their use by Buyer whether as recommended herein or otherwise. Such recommendations, technical advice or services are not to be taken as a license to operate under or intended to suggest infringement of any existing patent.

Reprinted March 1982 Supersedes all previous data sheets printed on this product.

Exhibit 7

TECHNICAL DATA SHE

KOPPERS

Protective Coatings

TYPE OF COATING

COAL TAR EPOXY

Product: BITUMASTIC NO. 300-M

DESCRIPTION: Bitumastic No. 300-M is a two-component, self-priming, chemically-cured, catalyzed coal tar epoxy protective coating.

USE: FOR INDUSTRIAL USE ONLY. NOT INTENDED FOR USE IN THE HOME.

Bitumastic No. 300-M is designed for interior or exterior exposure and combines the outstanding corrosion resistance characteristics of selected coal tar pitch with those of epoxy resin.

Bitumastic No. 300-M is designed to be applied in moderately heavy films for the economical protection of metal, masonry or wood structures exposed to chemical plant environments, water flood gates and dam faces, sewage plants, storage tank linings, bridges, pipeline interiors and exteriors, immersion and atmospheric exposures where a tough, abrasion and chemical resistance film is necessary to insure long-term substrate integrity and strength. The 300-M can be utilized in every industry including chemical processing, pulp and paper, marine, food processing, water and sewage, offshore drilling, nuclear energy, textile, petroleum, plating, steel, public utilities, fertilizer, and space facilities.

Although 300-M exhibits self-priming characteristics, it functions well over compatible primers such as epoxy based inhibitive products and zinc rich primers.

When applied in two coats at a minimum of 16 dry mils, it exhibits excellent resistance when immersed in, or is subjected to the following environments at ambient temperatures:

1. Chemical Solutions — fresh water, sea water, calcium chloride, magnesium sulfate, potassium alum, sodium carbonate, 20% sodium hydroxide, sodium nitrate, sodium sulfite, etc.
2. Aliphatic hydrocarbons — Although some discoloration of the liquid may take place, the coating film will resist immersion in petroleum products, such as gasoline, naphtha, sour crude, jet fuel and lubricating oils.
3. Acid solutions — Immersion resistance is excellent in 10% phosphoric acid, oxalic acid and citric acid. Exhibits excellent resistance of intermittent or splash exposures to alkalies and mineral acids.
4. Alcohols — Immersion resistance is also excellent in methyl alcohol, ethyl alcohol and isopropyl alcohol.

Although the above are a few of the chemicals and solutions that Bitumastic No. 300-M can withstand in immersion service, continuous immersion service requirements in other chemicals and solutions should be panel-tested because of the unpredictable nature of the multitude and combination of environments possible.

The cured coating will withstand considerable physical damage, such as direct impact, abrasion, flexing and will not sag or flow at dry heat temperatures up to 250°F.

Koppers Company, Inc. Pittsburgh, Pennsylvania 15219

DEFENDANTS' EXHIBIT 564 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-16-99
WITNESS: HARPER, U.I

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USE (Continued): [redacted] meets or exceeds all the requirement[redacted] the Corps of Engineers Specification C-200, Government Specification MIL-P-23236 and Steel Structures Painting Council paint system SSPC-Paint 16-68T.

TECHNICAL DATA:

Number of coats:	Two or more
Volume solids:	74%
Theoretical coverage:	1184 mil sq. ft./gal.
Coverage to achieve minimum dry film thickness:	90 to 115 sq. ft. (allows for approx. 20% application loss) on smooth surfaces. Actual coverage will depend on surface porosity and profile.
Film build ratio:	
Minimum dry film required per coat:	8 to 10 mils
Wet film required:	10 to 14 mils
Drying time at 70°F and 50% R.H.:	
To touch:	3-4 hours
Between coats:	Overnight to 24 hours. If longer dry times are expected or needed, refer to the Bitumastic 2CB data sheet for "treatment" before recoating. Do not add Bitumastic 2CB to Bitumastic No. 300-M. Faster between-coat applications are possible at higher temperatures; for example, if the first coat is applied at 100° to 120°F by use of an in-line heater, a second coat can then usually be applied within 3 hours after the first coat.
Before submerging:	All chemically-cured coatings require a long curing time to reach maximum chemical resistance. For best results, a minimum curing time of five days at temperatures between 70°F and 100°F is essential before placing in service.
Colors:	Black or red
Thinners:	Koppers Thinner 2000. For air regulatory type use Thinner 2000C.
Cleaner:	Use Koppers Cleaner 2300 for cleaner equipment. Clean equipment if it is expected to remain idle for longer than 30 minutes at 70°F or approximately 10 minutes at 100°F. (Black hoses laying in the sunlight can reach temperatures of 130 to 140°F very quickly.)
	After equipment is washed thoroughly with the Cleaner, follow with a final flushing with Koppers Thinner 2000.
Surface preparation:	All primed, previously painted or bare surfaces must be dry and free of dirt, oil, loose particles or other foreign matter. On previously painted surfaces, spot testing is recommended to insure adhesion and compatibility.
	Experience of results over a period of several years confirms that the fundamental factor for a quality job is proper surface preparation. Unless the surface is properly prepared, there is no point in using the better coatings.
	Steel surfaces must be blasted to a minimum of SSPC-SP-6-63. For immersion or very severe chemical exposures blast to SSPC-SP-10-64.
	For application to concrete, all curing oils, form oils, laitance, soluble salts and loose concrete must be removed. Concrete must be clean and thoroughly dry before coating. Unpainted concrete floors or concrete that will be submerged must be etched with a 15 to 20% muriatic acid solution or brush blasted to achieve a profile similar to medium grade sandpaper.
Primer:	
Metal:	Shop or Field Primers: Although normally self-priming at the field location, Bitumastic No. 300-M works well over the following primers: Koppers 654 Primer, Koppers PUG Primer, Koppers Organic Zinc, or Koppers P-1500/Inorganic Zinc No. 3. 300-M forms an excellent bond directly to cleaned steel.

(Continued):

Aluminum:	Degrease and pretreat with Koppers 40 Passivator or use a very light brush-off sandblasting or sanding of the surface.
Galvanized metal:	Degrease and apply Koppers 40 Passivator; or sandblast to provide a profile or tooth; or treat with Koppers 30 Metal Conditioner.
Concrete and masonry:	None required, however, the first coat must be thinned (Add one part Thinner 2000 to two parts Bitumastic No. 300-M and apply at the rate of 200-300 sq. ft. per gallon). Allow not more than 24 hours before applying additional coats of Bitumastic No. 300-M at the normal unthinned rate. Note: In areas where high water tables exist, internally coated concrete pipe that is to be buried, may also require external coating if the pipe cannot withstand hydrostatic pressure testing.
Wood:	Rough sand, remove dust and apply as for concrete and masonry above.
Asbestos pipe:	Roughen the surface, remove all dust and dirt and apply first coat thinned 10%; then topcoat with 1 to 2 coats at the normal unthinned rate. See note under concrete.
Mixing instructions:	Mechanically agitate Component A thoroughly. Continue mixing Component A and slowly add Component B to Component A. Mechanically agitate vigorously for two minutes. Pour some of the mixed material back into the Component B can and stir to insure that all of Component B is in solution and return material to Component A can. Mechanically agitate vigorously for at least two minutes. If proportioning equipment is used, agitate Component A as above. (Note: Both Components A & B will thicken in viscosity when cold. The material should be warmed to room temperature before mixing for best results.)
Mixing ratio by volume:	Component A — 3.5 parts Component B — 1 part
Pot life after mixing:	50°F — 10 hours 60°F — 6 hours 85°F — 2 hours 100°F — 1 hour Do not mix more of Component A and B than can be applied in the number of hours listed above, using the highest temperature anticipated.
Methods of application:	Brush, roller, conventional air spray, or airless spray. Avoid the use of nylon or palstic equipment. Do not apply to surfaces that will be exposed to rain before the coating is dry or on surfaces with temperatures below 50°F. (Note: Do not continually use the same can for spray equipment pump sump as the material will cure on the side of the can.) All quality coatings require top grade workmanship and a good knowledge of the materials and systems of application. Special equipment, other than application equipment, should be utilized for top quality results such as a wet film thickness gauge or dry film gauge, low voltage holiday detector, and moisture meter (for concrete, masonry, and wood substrates).

Air type spray data:		
	Pump	Graco Mogul (8:1 ratio)
	Pressure: Material	30 to 55 psi
	Atomization	50 to 90 psi
	Fluid tip	1/8 in. to 1/4 in.
	Atomizing tip	3/16 in. Wing External
	Hose	1/2 in. to 50 ft., over 50 ft. 3/4 in.
	Max. Working Pressure	750 lb.
	Min. Burst Pressure	3,000 lb.

TECHNICAL DATA

Air type spray data: (Continued): The equipment data given may be improved by using a heater with a material hose 1/2 in. in diameter, about 50 ft. long between the pump and the heater to minimize pulsation. The temperature of the product leaving the gun should range between 90°F and 120°F. Heater thermostat should be set to a maximum of 120°F. A heater is recommended if application is made at temperatures between 50 and 70°F. When using a heater, the use of a circulating line is recommended so that the material will not set up in the heater.

Airless type spray data:

Pump	Graco (30:1 ratio)
Line Pressure	70 to 90 psi
Tip	23 – 31 mil
Filter	None
Hose	3/8" high pressure for 50' or less 1/2" high pressure over 50' with a 3/8" H.P. whip end hose

Holiday detection: Holiday detection of the cured coating on metal surfaces is recommended, but should be performed with due consideration for its normal recommended thickness (20-24 mils). The typical high voltage jeep detector used for hot applied coal-tar enamels 100 mils thick, which normally operates at 10-12,000 volts should not be used. A wet sponge detector such as a Tinker and Rasor or K-D Bird Dog which operate at 75 volts maximum is suitable and adequate.

Cathodic protection: Bitumastic No. 300-M is compatible with controlled cathodic protection.

Topcoating: Bitumastic No. 300-M can be topcoated with colored coatings such as Bitugloss Aluminum Paint and acrylic emulsions.

Temperature limitations: dry: 250°F. wet: 120°F. maximum continuous

Storage life: One year minimum – some moderate bodying of Component A will occur after 6 months of storage at 70°F. High shear or high speed agitation will normally return Component A viscosity to its original viscosity. Up to 1 pint Koppers Thinner 2000 per five gallons of coating may be added if necessary.

PRECAUTIONS: Take these precautions before coating dries and during application.

(Applies to Components A and B)

DANGER!

Harmful or fatal if swallowed.
Flammable. Vapor harmful.
Skin and eye irritant.

Regular Type	Air Regulatory Type
Contains xylol and tri (dimethylaminomethyl) phenol	Contains cyclohexanone tri (dimethylaminomethyl) phenol, 2-nitropropane and toluol

If swallowed do not induce vomiting. CALL PHYSICIAN IMMEDIATELY. Keep away from heat, sparks and open flame. Avoid prolonged contact with skin and breathing of vapor or spray mist. For eyes, wash with plenty of water. CONTACT PHYSICIAN. Close container after each use. Do not take internally.

Use with adequate ventilation.

Keep out of the Reach of Children.

In confined areas, use adequate forced ventilation during application and drying. Use fresh air masks, clean clothing and explosion-proof equipment. Prohibit flames, sparks.

WARRANTY

All technical advice, recommendations and services are rendered by the Seller gratis. They are based on technical data which the Seller believes to be reliable and are intended for use by persons having skill and knowhow, at their discretion and risk. Seller assumes no responsibility for results obtained or damages incurred from their use by Buyer whether as recommended herein or otherwise. Such recommendations, technical advice or services are not to be taken as a license to operate under or intended to suggest infringement of any existing patent.

REPRINTED - DECEMBER 1979

Exhibit 8

FIELD FORM FOR WATER WORKS REVIEW

Place: San Bernardino
Surveyor: City of San Bernardino
Person Contacted: Larry Cox
Position: Foreman

Date: 9/4/80
Reviewing Engineer: W.C. Godney

5367

- PERMIT STATUS

Permit issued 10/7/64.

- PREVIOUSLY NOTED SANITARY HAZARDS AND DEFECTS IN OPERATION

Hazards and Defects (Note Date) — Corrections Found

See System Deficiency Record.
Existing defects previously noted.

CHANGES IN SYSTEM

~~1. New Myers Canyon Tank~~
~~2. New chlorination system for Devil Canyon.~~
① Plans to build 2.5 MG Tank to serve Del Rosa Zone.
② continuing to expand in College Zone

Are adequate maps maintained and kept up to date? Yes
Planned Future Changes: Expansion in College Zone

Attach schematic diagram if revised. In map room.
~~(See file rack)~~

CONSUMER AND PRODUCTION DATA

No. of service connections: 39,860 No. with Meters: ~~29,459~~ 31,861 7472
Approx. population served: 105,000
Water produced during recent 12 mo. period (1/79 to 12/79): _____ m.g.
Maximum month (Jul/79): 1279.3 m.g.
Max. Day): 46.0 m.g. production data.

SOURCES

Main: 32 wells.
~~2 surface sources~~.
1 surface source (Devil Canyon)
1 infiltration gallery (Cajon pass).
Standby: Some of the wells are on standby. 2 wells (Ferris Hill #4 and 17th St are capped off).
Auxiliary: None.
Changes in sewage works in vicinity since last review: None.

Sampling taps: Provided.
Meters: Provided.
Well static and pumping levels: In Files.

TREATMENT
Type: Three sites:
Devil Canyon Treatment Plant (post filtration)
Lytle Creek Well
Cajon Transmission line.

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Reliability:
Lytle Creek Well [illegible]orination is not reliable, oth[illegible] Okay.

7. STORAGE (List)

31 tanks and reservoirs with a total capacity of 77 MG.

8. DISTRIBUTION SYSTEM

Pressure Zones	Ave. Pressure Range Maintained	Min. Pressure Maintained During Max. Normal [illegible]
12	45-130 psi	30 psi

Mains:	Size	Material	Class or Gage
	4" - 30"	Steel and cast iron	---

Depth of cover: 36" minimum
Protection against corrosion: Cathodic Protection and DD & W
Compliance with Min. Standards Sec. 64628
Okay

Program to replace inadequate mains:
Replacement is done after evaluating fire flows.
Practice in separation (ver. & horiz.) between water and sewer lines.
3' vertical, 10' horizontal.

Dead Ends: Yes. Approx. No. ____, exact number unknown.
Flushing Program: Continuous flushing with an average of once per month for each location.
Program for Removal: None.

Valve location satisfactory: OK
For past year approx. no. of breaks 11 Outages 18
Duration of water outages: Aver. 2-4 Max. -
Compliance with Min. Standards Sec. 64562
Required Flow: Approx. 32,000 gpm (wwos suggests 46,000 gpm)
Available Flow: Approx.

9. MAIN DISINFECTION PROGRAM

Line pre-flushed: Yes X No ____ Type chemical used: HTH Tablets and gas.
Method of application:
According to AWWA specifications.

Contact time: 24 hrs. Final chlorine residual level maintained: 25 ppm
Practice with repaired mains:
Depressurized mains are treated like new mains.
Bacteriological tests made after main disinfection: Yes X No ____

10. CROSS-CONNECTION CONTROL PROGRAM

Does system have any services to:
Sewage treatment plants or sewage pumping stations? Yes X No ____
Industrial plants having internal hazards which might result in pumping of or siphoning of toxic materials into community water supply? Yes X No ____
Premises having secondary (and unapproved) sources of water supply?
Yes X No ____

Are new services reviewed to establish need for backflow protection?
Yes X No___

Are existing services reviewed to establish need for backflow protection?
Yes X No___

On what type of services is backflow protection being required?

What types of protective devices are required for various conditions and hazards? One service for irrigation - not protected.
See c/c control by City of San Bernardino Water Dept. (1973).

Does the water purveyor have a list of backflow protection devices installed at the service connections in his system? Yes X No ___
What is frequency of testing of devices? Annually
Discuss any unsatisfactory performance records found.
One connection to irrigation is not protected.

BACTERIOLOGICAL QUALITY CONTROL PROGRAM

Location of sample points: As per plan to cover all zones.

Min. no. of samples required: 27/week Min. no. collected: 30/week
Practice when 3 or more portions positive: Investigate and take daily recheck samples until two consecutive samples are negative.

Attach summary of bacteriological analysis. Attached.

CHEMICAL QUALITY CONTROL PROGRAM

Adequacy of chemical analyses available: Analyses from some wells are needed.
Problems in chemical quality: None

Measures taken to correct problems: N/A

Attach latest analyses. Attached

COMPLAINTS

Type: 7 taste & odor; 9 color; 18 outages; 152 pressure; 19 others.

Number: 216
Location: Different locations

ADDITIONAL COMMENTS

Plans to improve the system are not carried out according to the proposed schedule.

EXISTING SANITARY HAZARDS AND DEFECTS IN OPERATION

See System Deficiency Record.

ol

Exhibit 9

MAY - 6 1981
Southern California Laboratory

Purgeable Organics in Four Groundwater Basins

Stephen Nelson, A.M. ASCE, Safi Kalifa, and Frank Baumann*

Abstract

Analyses of public water supply wells in four groundwater basins showed volatile organic contamination in only two of the basins. Trichlorethylene and/or tetrachlorethylene were present in all but one sample with volatile organic contamination. Organic contamination was found in two basins and occurred in discrete areas. The physical properties of volatile halocarbons help explain why they are frequent groundwater contaminants and good contamination markers.

Background

Since 1979 volatile halocarbon contamination of groundwater has been found in several California groundwater basins. Similar contamination has been frequently reported in other states and countries. Much of the available data on these contamination problems reflect analyses for only a few selected compounds. While this information is useful, it does not provide information on other contaminants that may be present, nor does it establish the use of certain compounds as organic contamination markers.

Description of Study

To provide more systematic data on groundwater contamination, the California Department of Health Services (CDHS) studied volatile organic contamination of public water supply wells and the use of trichloethylene (TCE) and tetrachlorethylene (perchlorethylene, or PCE) as organic contamination markers in the four groundwater basins described below.

In the eastern part of the Main San Gabriel Basin, an area of known volatile organic contamination, TCE had already been used as a contamination indicator. This portion of the basin has about 90 wells supplying "large" (i.e., greater than 200 service connections) water systems. A major industrial area is situated on highly permeable soils near a major groundwater recharge area for the basin.

* Associate Sanitary Engineer and Public Health Chemist III, Calif. Dept. of Health Services, Berkeley, and Chief, Southern California Laboratory, Calif. Dept. of Health Services, Los Angeles

DEFENDANTS' EXHIBIT 507 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

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The Bunker Hill Basin in the San Bernardino Valley, about 60 km east of the San Gabriel Valley, is another urbanized valley in Southern California. (Some areas are still being urbanized.) The basin has little industry. Approximately 150 wells in this basin supply "large" water systems.

The northern Santa Clara Valley at the south end of San Francisco Bay urbanized extensively from 1960 to the present. Also known as "Silicon Valley", this area is a major center of the semiconductor industry, formerly a large TCE user in California.

The Owens Valley, lying immediately east of the Sierra Nevada Mountains, is only sparsely populated. About 110 wells supply water to the six "large" water suppliers and supplement surface water diversions to Los Angeles from the Owens River. The Owens Valley should be generally free of synthetic organics. (Due to operational constraints of the water suppliers only 27 wells were available for sampling.)

These areas are all alluvial basins recharged through permeable soils along the valley margins. In parts of the Owens Valley highly fractured volcanics also provide large amounts of water. Confined (i.e. artesian) aquifers exist in the southwest parts of the east San Gabriel and Bunker Hill Basins, all but the southern and western peripheries of the Santa Clara Valley, and all but the margins and the northeast corner of the Owens Valley.[1,2,3,4]

Each basin was studied in two phases. Initially all available wells supplying "large" public water systems were sampled for TCE and PCE. At least 13% of the wells were then resampled for purgeable halocarbons and aromatics[5]. To the extent feasible, resampling reflected the variance in TCE and PCE levels and included all parts of the basins.

Sampling Procedures and Analytical Techniques

Samples were collected in amber bottles with minimum headspace. Purgeable organics samples were collected headspace-free in 40 ml screw top vials with PTFE coated septa. All sample bottles were detergent washed and solvent rinsed. Samples were cooled immediately after collection and delivered to the laboratory within three days. Wells were pumped for at least ten minutes prior to sample collection.

Samples from the Santa Clara Valley and all purgeable organics samples were analyzed by the CDHS Sanitation and Radiation Laboratory in Berkeley. Samples from the other three basins were analyzed by the CDHS Southern California Laboratory in Los Angeles.

The Berkeley laboratory extracted one liter of sample with 10 ml of pentane with constant stirring at room temperature

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for 20 minutes. After drying with anhydrous sodium sulfate, 5 microliters of extract was injected into a gas-liquid chromatograph equipped with a ^{63}Ni electron capture detector and a 6 ft by 2 mm chromatographic column packed with 1% SP-1000 on Carbopack 60/80. Nitrogen, at 33 psig, was the carrier gas. Column, injector and detector temperatures were 140, 200 and 330 C, respectively.

At the Los Angeles laboratory one liter portions were extracted twice for two minutes each in separatory funnels with 25 ml of hexane. Five microliters of extract was injected into a gas-liquid chromatograph equipped with a ^{63}Ni electron capture detector and a 6 ft by 2mm column packed with 1% SP-1000 on Carbopack B. Column, injector and detector temperatures were 160, 220 and 280 C, respectively. Nitrogen at 40 ml/min was the carrier gas.

Purgeable organics were analyzed using the purge-and-trap techniques of Bellar and Lichtenberg[6] with a Finnigan Model 4000 mass spectrometer interfaced with an Incos data system containing a library of reference spectra.

All quantitation was by comparison with standards.

Results and Discussion

Results of the TCE and PCE testing are shown in Figures 1 through 4. (Where wells of similar TCE/PCE levels are nearby, only one symbol has been used to indicate the wells.) The larger circles indicate locations of wells sampled for purgeable organics. The results of purgeable organics tests showing contamination are listed in Table 1.

In the San Gabriel Valley, 82 wells were tested for TCE and PCE, and 36 for purgeable organics. The predominant constituents identified, TCE and PCE, mark the areas of organic contamination. Only one well free of TCE and/or PCE contained other organics (7 ppb of benzene). The contaminated areas are generally near and downgradient of major industrial areas.

One hundred thirty-eight wells were sampled for TCE and PCE in the Bunker Hill Basin, with 24 wells sampled for purgeable organics. The only contaminants found were TCE and PCE. TCE and PCE occurred in discrete areas. Overall contaminant levels were lower in this basin than in the San Gabriel Valley.

No serious volatile organic contamination was found in the Santa Clara Valley wells sampled (183 and 24 wells sampled for TCE/PCE and purgeable organics, respectively). The extent of contamination in this basin differs little from that in the Owens Valley. (See below.)

In the Owens Valley one out of 27 wells showed a trace of

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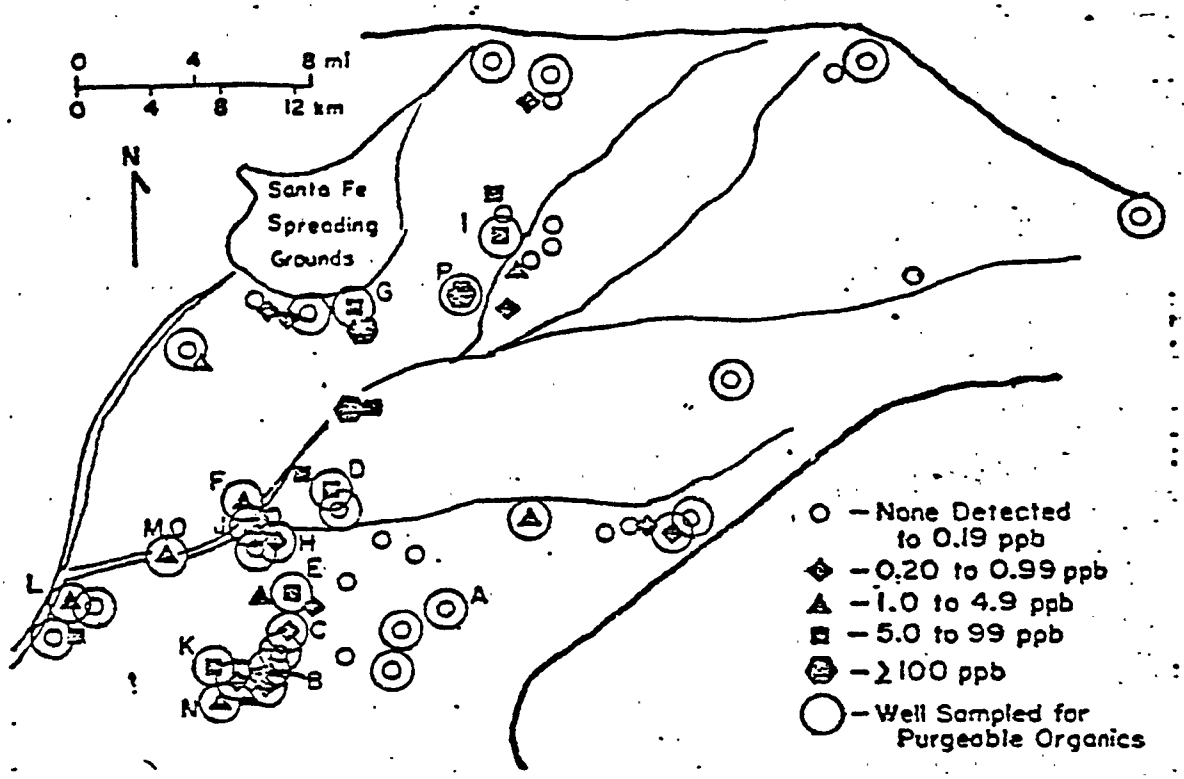

Figure 1. Results of San Gabriel Basin TCE/PCE Samples

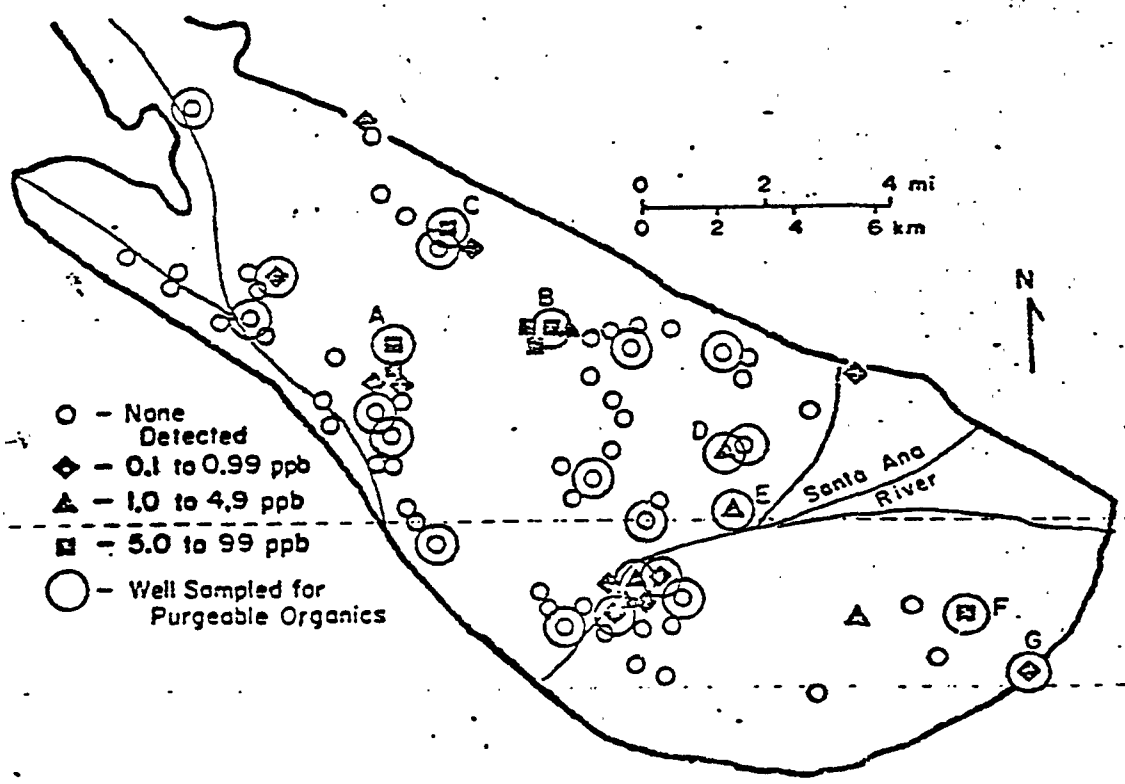

Figure 2. Results of Bunker Hill Basin TCE/PCE Samples

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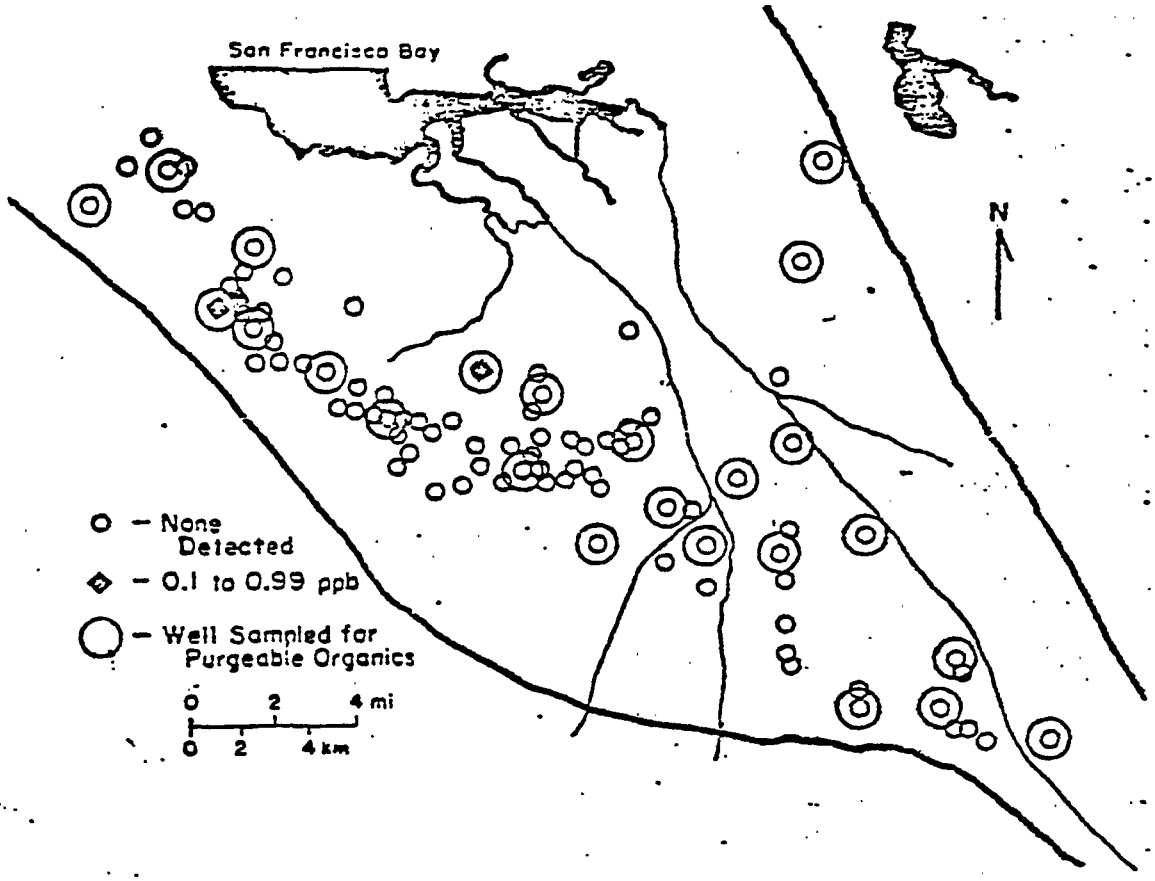

Figure 3. Results of Santa Clara Valley TCE/PCE Samples

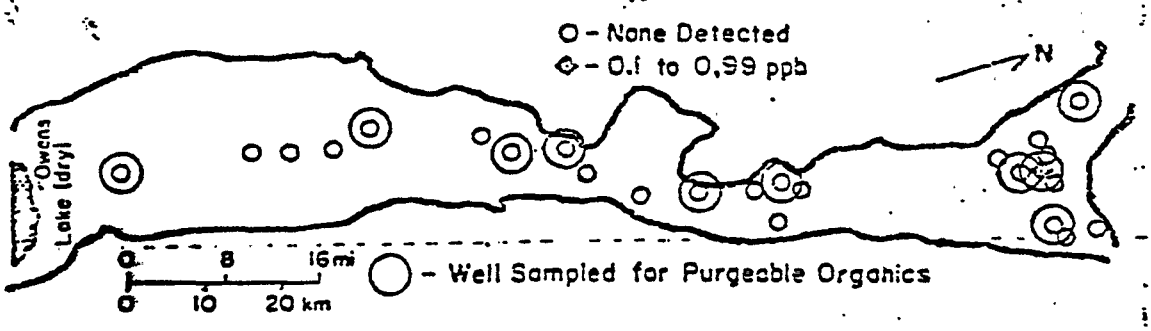

Figure 4. Results of Owens Valley TCE/PCE Samples

PCE in initial sampling. The purgeable organics retest of the well did not indicate contamination. Ten wells were resampled for purgeable organics. Although this sampling may have missed some organic contamination, particularly because many fewer wells located farther apart were sampled, in view of the extremely limited development and the extensive confinement of aquifers in this basin, these results probably provide a good organic contamination baseline.

These findings indicate that TCE and PCE served well as volatile organic contamination markers in these basins. Furthermore the TCE/PCE analytical procedures will detect some other purgeable halocarbons such as dichlorobromomethane. Thus, the suitability of this analysis as a contamination marker may be greater than indicated by the above discussion. The number of detectable halocarbons can also be extended yet further by temperature programming the chromatographic column.

A second finding of this study is that volatile organic contamination was not ubiquitous. Purgeable organic contamination generally appeared in discrete areas. It is probably significant that the most extensively confined aquifer systems had the least contamination.

A study of organic contamination of water in Delaware also found that TCE and PCE were generally present in those groundwaters containing volatile organics. Of 53 wells, 18 contained purgeable organics in at least one test, and all but two of these wells contained TCE and/or PCE. Of those two wells, one did not have purgeable organics in a retest and the other contained 1,2-dichloroethane very near the reporting level.[7]

TCE, PCE and similar purgeable halocarbons work well as contamination indicators for several reasons. Table 2 shows some data on selected halocarbons. Because of their wide versatilities, where there is a concentration of industrial activity, the probability of these materials being present in waste streams is high.

As noted in Table 2, volatile halocarbons are also generally resistant to degradation and adsorb poorly on soils. The octanol/water partition coefficients of the volatile halocarbons ~~are in the range where poor soil adsorption can~~ generally be expected.[8]

Thus, TCE, PCE and similar volatile halocarbons possess the prime requisites of contamination indicators: widespread use and dispersion, ease and sensitivity of analysis, environmental persistence and high mobility.

Table 2 also shows that volatile halocarbons are generally heavier than water. Thus, if discharged in a separate phase with water, the water rises to the surface and retards eva-

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Table 1
Results of Samples with Detectable Purgeable Organics

Well	TCE	PCE	CCl_4	1,1,1-trichloroethane	Benzene	Ethyl Benzene	Toluene
San Gabriel Basin							
A					7		
B	2.9						
C	6.5						
D	33	2.6					
E	3.2						
F	4.2	5.0	3.5				2.
G	11	12					
H	4.0	12					
I	17	11					
J	9.	4.2					
K	15.	6.2				0.5	0.5
L	7.3	6.8		18.			0.5
M	12.	6.	17.1			0.5	0.5
N	9.2	4.4					
O	11.	8.1	23			0.5	0.5
P[2]	102	39.4	1.0	2.1			
Bunker Hill Basin							
A	7.4	16					
B	2.9	5.2					
C	3.9	19					
D		1.5					
E	6.2						
F	176						
G		Trace					

Notes: 1. Sensitivity 0.5 ppb for all compounds
2. Sample P also had: 1,1-dichloroethene (0.8 ppb); 1,2-dichloroethene (0.5 ppb); chloroethane (0.7 ppb) 1,1- and 1,2-dichloroethane (1.0 and 1.6 ppb)

Table 2
Physical Data on Selected Halocarbons

Compound	Uses[1]	Annual Discharge[1]	Log K_{ow}[2]	Biodegradable[1]	Density[3]
TCE	solvent, chem mfg, degrasing, dry clng	10,000 tons	2.3	4	1.46
PCE	similar to TCE	2,000 tons	2.9	4	1.62
CCl_4	similar to TCE	20,000 t.	2.6	5	1.59

Notes: 1. From Ident. of Org. Cpds. in Eff. from Ind. Srces., USEPA, 1975. Biodegradable is scale from 1 (easily degraded) to 5 (refractory). Ann. Disch. is gross estimate.
2. From Water-Related Environmental Fate of 129 Priority Pollutants, USEPA, December 1979
3. From Handbook of Chemistry and Physics, 61st ed., CRC Press, 1980.

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poration of the halocarbon. The halocarbon will also tend to percolate into the soil ahead of the water. Upon reaching an aquifer as a nonaqueous phase, volatile halocarbons will tend to sink to the bottom of the aquifer. Soil can thus be contaminated from the ground surface completely to the bottom of the aquifer. Water subsequently flowing through that soil can be contaminated for a considerable time by halocarbon desorption. The excess solvent can also contaminate water flowing along the aquifer bottom. These considerations support observations that the entire groundwater interval in portions of the Main San Gabriel Basin are apparently contaminated by TCE, with increasing TCE content at greater depths.

Although selected halocarbons may be good indicators of areas of general organic contamination, it must be emphasized that this procedure is only a rough screen that relies on the high probability of the marker compounds being present in waste streams. Therefore, where only a limited area is of concern, sampling should be guided by an evaluation of the materials most likely to have been present in improperly handled wastes.

Finally, any selected halocarbon(s) should not be assumed as an organic contamination indicator without verifying its suitability for that purpose. Some general purgeable organic testing of wells showing varying levels of the marker should be completed (similar to this study) to verify the accuracy of the marker.

References

1. Torres, G., "Report on Hydrogeologic Aspects of Trichloroethylene in Groundwater, San Gabriel Valley, Los Angeles County", Addendum #2 (June 1980) to A Report on TCE Investigation (Los Angeles Regional Water Quality Control Board, April 1980)
2. Martin, R., Bunker Hill Artesian Zone Study (San Bernardino Valley Municipal Water District, October 1979)
3. Calif. Dep't. of Water Resources Bulletin #118-1, Appendix A (August 1967)
4. Los Angeles Department of Water and Power, Final E.I.R., Increased Pumping of the Owens Valley Groundwater Basin (June 1979)
5. Federal Register 44:23, 69464-69575 (Monday, December 3, 1979)
6. Bellar, T. and J. Lichtenberg, Jl. Am. Wtr. Wks. Assn. 44:12 739-744
7. Cabe Associates, Inc. Assessment of the Presence of Synthetic Organic Compounds in Delaware's Sources of Water Supply (June 1980)
8. Chiou, C., et. al., Science, Vol. 206 (16 Nov. 1979) 831-832

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Exhibit 10

FIELD FORM FOR WATER WORKS REVIEW

Place: San Bernardino
Purveyor: City of San Bernardino
Person Contacted: Joe Bocanegra, Larry Cox
Position: Engineering Supervisor.

Date: 9/23/81
Reviewing Engineer: W.C. Gedney

1. PERMIT STATUS
Permit Issued 10/7/64

2. PREVIOUSLY NOTED SANITARY HAZARDS AND DEFECTS IN OPERATION

Hazards and Defects (Note Date) — Corrections Found

Please see existing System Deficiency Record

3. CHANGES IN SYSTEM
See preliminary master plan CDM + Wilder

Are adequate maps maintained and kept up to date? Yes.
Planned Future Changes: See preliminary plan.

Attach schematic diagram if revised. Updated schematic requested.

4. CONSUMER AND PRODUCTION DATA

No. of service connections: 36,024 No. with Meters: 36 024
Approx. population served: 111,000
Water produced during recent 12 mo. period (Jan 80 to Dec 80): 9,230.32 m.g.
Maximum month (July): 1223.2 m.g.
Maximum Day: 52 m.g. — 36111 gpm/system, 1443 gpd/sc — max day
June 23 7 469 700
55.873 mg — 26,788 gpm/system, 1071 gpd/sc — Max month Avg Day

5. SOURCES
Main: 32 active wells
1 surface source (Devil Canyon)
1 infiltration gallery (Cajon wells)

Please see Attachment No. 1.

Standby: Many wells on a standby basis. (Perris Hill #4 and 17th st are capped)
Auxiliary: None
Changes in sewage works in vicinity since last review: None

Sampling taps: Provided
Meters: Provided
Well static and pumping levels: In file

6. TREATMENT
Type: Devil Canyon Treatment Plant (post filtration)
Cajon Transmission line
Lytle Creek well

DEFENDANTS' EXHIBIT 510 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

Records: OK
Reliability: Low at Lytle creek well

7. STORAGE (List)
31 tanks and Reservoirs with A total capacity of 77 million gallons.
Please see Attachment No. 2

8. DISTRIBUTION SYSTEM

Pressure Zones	Ave. Pressure Range Maintained	Min. Pressure Maintained During Max. Normal Flow
12	45 - 130 psi	30 psi

Mains:	Size	Material	Class or Gage
	4" - 30"	Steel, Cast Iron, ACP.	Cl. 200, 150

Depth of cover: 36" min.
Protection against corrosion: Cathodic protection and DD + W.
Compliance with Min. Standards Sec. 64628:
O.K.

Program to replace inadequate mains: None. Any replacement is done for leaks only.

Practice in separation (ver. & horiz.) between water and sewer lines. OK.

Dead Ends: Yes. Approx. No. Many
Flushing Program:

Program for Removal: None,

Valve location satisfactory: Yes
For past year approx. no. of leaks 7 Outages 0
Duration of water outages: Aver. N/A Max. N/A
Compliance with Min. Standards Sec. 64562;
Required Flow: 36,000 (1980), (1981).
Available Flow: 50,000

9. MAIN DISINFECTION PROGRAM

Line pre-flushed: Yes ✓ No ___ Type chemical used: Liquid chlorine in truck.
Method of application:
As per [illegible] or [illegible]

Contact time: 24 hrs, Final chlorine residual level maintained: 25 ppm
Practice with repaired mains:

Bacteriological tests made after main disinfection: Yes ✓ No ___

10. CROSS-CONNECTION CONTROL PROGRAM

Does system have any services to:
Sewage treatment plants or sewage pumping stations? Yes X No ___
Industrial plants having internal hazards which might result in pumping of or siphoning of toxic materials into community water supply? Yes X No ___
Premises having secondary (and unapproved) sources of water supply?
Yes X No ___

Are new services reviewed to establish need for backflow protection?
Yes X No___

Are existing services reviewed to establish need for backflow protection?
Yes___ No___

On what type of services is backflow protection being required?

What types of protective devices are required for various conditions and hazards?

Does the water purveyor have a list of backflow protection devices installed at the service connections in his system? Yes X No ___ 472 devices.
What is frequency of testing of devices? Annual.
Discuss any unsatisfactory performance records found.

11. BACTERIOLOGICAL QUALITY CONTROL PROGRAM -see attachments

Location of sample points: In system

Min. no. of samples required: 126 Min. no. collected: 126
Practice when 3 or more portions positive:

Attach summary of bacteriological analysis. Attached.

12. CHEMICAL QUALITY CONTROL PROGRAM

Adequacy of chemical analyses available:
Problems in chemical quality: TCE, PCE.

Measures taken to correct problems: Blending with other sources.

Attach latest analyses. Summary is attached

13. COMPLAINTS 107

Type:

Number: 107
Location: In system

14. ADDITIONAL COMMENTS

15. EXISTING SANITARY HAZARDS AND DEFECTS IN OPERATION

Cross Conn
Backflow

United States Summary Judgment Motion, Ex. 10, Page 123

DRAFT (8-25-67)

SUMMARY OF BACTERIOLOGICAL ANALYSES OF WATER SAMPLES

36039

Name of system City of San Bernardino Municipal Water Dept.

Analysis performed by Clinical

MONTH and YEAR	Number of samples tested	Number of portions confirmed	Percent portions confirmed	Number of samples with three or more portions confirmed	Percent of samples with three or more portions confirmed
January 1981	124	4	0.65	0	0
February	117	2	0.34	0	0
March	136	1	0.15	0	0
April	137	6	0.88	1	0.73
May	121	12	1.98	1	0.83
June	137	12	1.75	1	0.73
July 1981	134	6	0.90	0	0
August 1980	124	7	1.13	0	0
September	131	2	0.31	0	0
October	138	0	0	0	0
November	126	4	0.63	0	0
December 1980	153	6	0.78	0	0
TOTAL	1578	61	0.77	3	0.19

Comments: System requires 120 routine samples/mo

State of California
Department of Health

073075
Form 230-1166

United States Summary Judgment Motion, Ex. 10, Page 124

Exhibit 11

C. Yamamoto

EBMUD

EAST BAY MUNICIPAL UTILITY DISTRICT 2130 ADELINE STREET P.O. BOX 24055 OAKLAND CA 94623 • (415) 835 3000

RECEIVED
SANITARY ENGINEERING
BERKELEY
DEC 1981

December 21, 1981

SYSTEM WATER QUALITY MEMBERS

I am enclosing EBMUD's list of acceptable reservoir coatings. This list was compiled after several years of extensive testing of coatings for their potential to support bacterial growth, produce taste and odors or leach organic solvents when used in contact with potable water. This testing is described in more detail in the December, 1980 Journal AWWA article on page 693.

A summary of the results of the testing of all coatings is available upon request.

Very truly yours,

K. B. STINSON
Chairman, System Water
Quality Committee

Enc.

DEPARTMENT OF HEALTH SERVICES
MAR 15 1982
SAN BERNARDINO

BOARD OF DIRECTORS: JON C. REYNOLDS, President WALTER R. McLEAN, Vice President
HELEN DUBOIS JACK HILT KENNETH KOEMAN KENNETH H. SIMMONS SANFORD M. SKAGGS

United States Summary Judgment Motion,
Ex. 11, Page 125

EBMUD

EAST BAY MUNICIPAL UTILITY DISTRICT 2130 ADELINE STREET, P.O. BOX 24055, OAKLAND, CA 94623 • (415) 835-3000

EBMUD WATER QUALITY DIVISION LIST OF ACCEPTABLE RESERVOIR COATINGS

The attached list of acceptable reservoir coatings represents a summary of laboratory tests performed by the EBMUD Water Quality Control Section. The tests were conducted to evaluate the potential of various tank linings and sealants to support bacterial growth, produce tastes and odors or leach organic solvents when used in contact with potable water.

It should be known that the tests were done for District purposes, in District facilities and using District criteria and procedures. The District is not a standards laboratory or testing organization and does not hold itself out as such. No warranty or endorsement for any product is intended; the listing is merely a summation of materials which meet District standards for use inside of distribution reservoirs.

10BB10

BOARD OF DIRECTORS: JON Q. REYNOLDS, President WALTER R. McLEAN, Vice President
HELEN BURKE JACK HILL KENNETH KOFMAN KENNETH H. SIMMONS SANFORD M. SKAGGS

WATER QUALITY DIVISION

MATERIALS APPROVED FOR USE INSIDE OF DISTRIBUTION RESERVOIRS

Reservoir Tank Linings	Comments/Notes
High-Solids Vinyl Paint Systems (Inside Paint System No. 4)	
1. Ameron, Amercoat 33	Final coat white
2. Engard, #300 VR-3	Final coat gray (1)(2)
3. International, Intervinux VR-3	Final coat white
4. Mobil, Vinyl Enamel System	Final coat gray (2)
5. Tnemec, 50 VR-3	Final coat white
Epoxy Systems (Inside Paint System No. 1)	
1. Keeler & Long, No. D-1 Series Epoxy Hi-Build Enamel	No. L-1 Series also acceptable
No. 6548/7107 Epoxy White Primer	No. 3200 Kolor-Poxy Primer also acceptable
2. Wisconsin, Plasite 7122H-White	
Sealants	
1. Carlisle, Sure Seal Lap Sealant	(3)(6)
2. PRC, 270 Sealant-Gray	
3. PRC, 270 Sealant-Heavy Gray	Because of T & C Limited use only. (3)
Concrete Water Proofing	
1. Chevron, Sucoat	(6)
2. Xypex, Portland cement & siliceous aggregate	
Miscellaneous Approved Materials	
1. American, Aquata Poxy Paint & Gel	(6)(10)
2. Napco, 5-Z Shop Primer	
3. PRC, Primer #4	

United States Summary Judgment Motion, Ex. 11, Page 127

EXPLANATORY NOTES

(1) Vinyl chloride monomer found, possible significance not known. If product is used, curing should be carefully monitored by Water Quality Laboratory Section.

(2) Taste and Odor moderately high. Discuss possible specific use with Water Quality Division.

(3) Taste and Odor high, likely source of trouble. Discuss possible specific use with Water Quality Division.

(6) Bacterial growth support is minimal. Discuss possible specific use with Water Quality Division.

(10) This material will support bacterial growth. Use only for limited, special applications such as underwater repairs. Discuss possible specific use with Water Quality Division.

United States Summary Judgment Motion, Ex. 11, Page 128

Exhibit 12

State of California

Department of Health Services

Memorandum

To : C. E. Anderson

Date : February 25, 1982

Subject : "Koppers-Bitumastic Super Tank Solution" - Coal Tar Coating

DEFENDANTS' EXHIBIT 512 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

From : J. L. Stone
JLS.

On February 24, 1982, I received a phone call from a local purveyor who asked if this department had any concerns over the use of "Koppers-Bitumastic Super Tank Solution" as a coal tar coating for domestic water storage facilities. The inquiry was prompted after the purveyor noticed that the coating contained TCE.

I contacted Clarence Young to see if there was any firm departmental position on the use of "Koppers" in light of previous discussions within SEB concerning this very issue and was told the following:

-Although we do have concerns with reports of TCE, PCE and other organics leaching from this type of coating (as experienced in L. A.), it is still an approved and acceptable coating material and remains on the AWWA list. Clarence indicated the coating could be considered as being "conditionally approved" at the present time; I gather this is due to the questions being raised against it.

-It should be strongly recommended to anyone planning to use this type of coating material that the manufacturer's application instructions be followed implicitly.

-EPA may be conducting surveys in the future (possibly with the help of the states) to determine what utilities are using "Koppers" (or other similar products), and may do some special monitoring. The state apparently has no authority or budgetary support to investigate this matter on its own.

I also contacted Gary Yamamoto to gain some insight into how the L. A. District has been handling these questions. Gary reported the following:

-Samples collected from reservoirs coated with "Koppers Super Tank Coating" and having a lengthy detention time (i.e., slow circulation), TCE levels have been found in excess of the action level.

-Although Gary's personal opinion would be to discourage use of this type of coating, he recommended that whenever it is used, sampling should be required to determine whether or not leaching has occurred.

-EBMUD has run a number of qualitative tests on these coatings and apparently found discouraging results. "Koppers" coatings are not included on their "in-house" list of approved coatings.

Since coatings such as this are still considered acceptable to this department, I think we should have some general guidance concerning any requirements we wish to impose (i.e., special sampling, assurances of proper application, etc.).

JLS:ld
cc: Berk., S.D.

United States Summary Judgment Motion, Ex. 12, Page 129

Exhibit 13

State of California

Department of Health Services

Memorandum

To : C. E. Anderson

Date : February 25, 1982

Subject : Use of Koppers Bitumastic Super Tank Solution Coal Tar Coating

From : W. C. Gedney WCG

This memo is to follow up on Jeff Stone's memo regarding a request by Joe Bocanegra of the City of San Bernardino, regarding potential SEB concerns over the use of some tank lining materials. Specifically, Joe wanted to know if "Koppers Bitumastic Super Tank Solution" would be acceptable to SEB as he was in the process of ordering about 820 gallons of the solution to coat three new steel reservoirs currently under construction. As documented in his memo, Jeff Stone followed up with both Clarence Young and Gary Yamamoto.

Following collaboration with both Jeff and yourself, I contacted Joe Bocanegra and relayed the following:

1. SEB has not "banned" the use of this solution, however, we are concerned with the possibility of TCE leaching into storage reservoirs from the tank lining based on past experience. Provided the instructions for application and curing of the tank lining are strictly adhered to, the solution is still approved.

2. Recommended that if this tank lining is used, that TCE/PCE tests be performed following tank disinfection. This would also be prior to using the tank water in the system.

Joe stated that as long as the solution was not "banned" outright, the city would go ahead with the purchase. He also agreed to test for TCE/PCE in the tank. I will follow up further on this matter when we receive additional guidance from Berkeley.

WCG:ld

cc: Berk., S.D.

DEFENDANTS' EXHIBIT 511 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

United States Summary Judgment Motion, Ex. 13, Page 130

511

Exhibit 14

File. [illegible]

State of California

Department of Health Services

Memorandum

To : Sam Kalichman

Date : March 1, 1982

Subject: Koppers Water Tank Coating - Organics

From : Chet Anderson

At Asilomar, this problem was discussed and I understood some policy direction would be forthcoming shortly. I am concerned that, by only answering purveyor inquires, we are not being responsive to this potential problem. Attached are three memos from my staff all related to this issue.

I recommend that SEB-HQ develop a brief policy statement on this issue and immediately send it to all SEB offices. If possible, we should also send this policy to all water purveyors. This would assure that all purveyors constructing new tanks or recoating existing tanks would be notified, not just those who happen to ask SEB about this. SEB does not review all tank work in advance.

The following is suggested as a policy position:

"The State Department of Health Services, Sanitary Engineering Branch, has determined that several proprietary products used for coating new or existing tanks may result in relatively high concentrations of undesirable organics getting into the water stored in such tanks. It appears that this is more likely to occur if the manufacturer's instructions for application are not followed. The products in question do meet the current AWWA specifications and frequently are included on lists of approved tank coating compounds. The products in question are: (Can we list these or should we generalize?)

1. Koppers Bitumastic Tank Solution 300-M.

2. Koppers Super Tank Solution

3. (Are there other compounds of concern?)

There currently is no prohibition on the use of these compounds. However, special precautions must be taken as follows:

1. The manufacturers' recommendations on application must be closely followed.

2. Proper curing time must be provided as recommended. Additional curing time before the tank is filled should be provided if possible.

3. Following the maximum possible curing period and before the tank is placed in service, samples of the water in the tank must be taken and analyed by an approved laboratory for organic compounds

including TCE and PCE. The results of these tests should be discussed with SEB.

4. If the test results are high, draining the initial water from the tank, flushing, refilling and retesting will be required."

NOTE: Tim Gannon indicates that the high levels of organics may remain for an extended period of time (i.e. 5 years). There should be further discussion on this aspect.

It is suggested this item be discussed at the Regional Engineers' staff meeting.

CEA:mo

Attachments

cc: Berk. - J. M. Gaston
Berk. - C. Young
L.A. - G. Yamamoto
Santa Barbara - Tim Gannon

bcc: Berk., S.D., District

State of California

Department of Health Services

Memorandum

To : C. E. Anderson

Date : February 25, 1982

Subject : Kopper Bitumastic Super Tank Lining - City of Colton

From : W. C. Gedney
WCG

During a recent field review of the City of Colton water system, I had some very brief discussions with Mr. M. L. "Doc" Bowden from Koppers Company, Inc., regarding tank coatings. Mr. Bowden was inspecting two reservoirs that the city was considering recoating.

During the inspection of the reservoirs, Mr. Bowden expressed concern over our department's policy on TCE/PCE especially as it related to tank linings. He also mentioned that Koppers had conducted laboratory tests on their tank lining materials and that the results "clearly" showed that there was nothing for SEB to worry about. Unfortunately, Mr. Bowden did not have copies of the lab tests with him. Bowden said he would like to arrange for some type of meeting, preferably with John Gaston, to discuss the matter.

I mentioned to Bowden that to my knowledge no decisions had been made regarding the acceptability of Koppers tank coatings. In addition, I stated that additional tests would be useful in determining the acceptability of Koppers, or any one else's tank coatings.

WCG:ld

cc: Berk., S.D.

State of California

Department of Health Services

Memorandum

To : C. E. Anderson

Date : February 25, 1982

Subject : "Koppers-Bitumastic Super Tank Solution" - Coal Tar Coating

From : J. L. Stone
JLS.

On February 24, 1982, I received a phone call from a local purveyor who asked if this department had any concerns over the use of "Koppers-Bitumastic Super Tank Solution" as a coal tar coating for domestic water storage facilities. The inquiry was prompted after the purveyor noticed that the coating contained TCE.

I contacted Clarence Young to see if there was any firm departmental position on the use of "Koppers" in light of previous discussions within SEB concerning this very issue and was told the following:

-Although we do have concerns with reports of TCE, PCE and other organics leaching from this type of coating (as experienced in L. A.), it is still an approved and acceptable coating material and remains on the AWWA list. Clarence indicated the coating could be considered as being "conditionally approved" at the present time; I gather this is due to the questions being raised against it.

-It should be strongly recommended to anyone planning to use this type of coating material that the manufacturer's application instructions be followed implicitly.

-EPA may be conducting surveys in the future (possibly with the help of the states) to determine what utilities are using "Koppers" (or other similar products), and may do some special monitoring. The state apparently has no authority or budgetary support to investigate this matter on its own.

I also contacted Gary Yamamoto to gain some insight into how the L. A. District has been handling these questions. Gary reported the following:

-Samples collected from reservoirs coated with "Koppers Super Tank Coating" and having a lengthy detention time (i.e., slow circulation), TCE levels have been found in excess of the action level.

-Although Gary's personal opinion would be to discourage use of this type of coating, he recommended that whenever it is used, sampling should be required to determine whether or not leaching has occurred.

-EBMUD has run a number of qualitative tests on these coatings and apparently found discouraging results. "Koppers" coatings are not included on their "in-house" list of approved coatings.

Since coatings such as this are still considered acceptable to this department, I think we should have some general guidance concerning any requirements we wish to impose (i.e., special sampling, assurances of proper application, etc.).

JLS:ld
cc: Berk., S.D.

State of California

Department of Health Services

Memorandum

To : C. E. Anderson

Date : February 25, 1982

Subject : Use of Koppers Bitumastic Super Tank Solution Coal Tar Coating

From : W. C. Gedney WCG

This memo is to follow up on Jeff Stone's memo regarding a request by Joe Bocanegra of the City of San Bernardino, regarding potential SEB concerns over the use of some tank lining materials. Specifically, Joe wanted to know if "Koppers Bitumastic Super Tank Solution" would be acceptable to SEB as he was in the process of ordering about 820 gallons of the solution to coat three new steel reservoirs currently under construction. As documented in his memo, Jeff Stone followed up with both Clarence Young and Gary Yamamoto.

Following collaboration with both Jeff and yourself, I contacted Joe Bocanegra and relayed the following:

1. SEB has not "banned" the use of this solution, however, we are concerned with the possibility of TCE leaching into storage reservoirs from the tank lining based on past experience. Provided the instructions for application and curing of the tank lining are strictly adhered to, the solution is still approved.

2. Recommended that if this tank lining is used, that TCE/PCE tests be performed following tank disinfection. This would also be prior to using the tank water in the system.

Joe stated that as long as the solution was not "banned" outright, the city would go ahead with the purchase. He also agreed to test for TCE/PCE in the tank. I will follow up further on this matter when we receive additional guidance from Berkeley.

WCG:ld

cc: Berk., S.D.

FROM AS[illegible]NAR
12/01

FILE: RESERVOIRS

GARY YAMAMOTO (AVEK - WHOLESALER)

COMPLETE WTP's - State Proj Water

QUARTZ 14 MGD

ROSAMOND 10 MGD - NOT CONTINUOUS

PERCHLORETHYLENE

14 - 82 ppb from system

TCE, OTHER COMPOUNDS: Very high THS 212

i.e. Acetone 4,500
Toluene 2000
PCE 400 +

JMM and L.A. So Calif LAB

SOME WATER SITTING IN PIPELINES LENGTHY TIME - systems

ASSUMED Linings | Coatings in Tanks | PIPELINES
Raw water at WTP and Treated water } all negative

New system: 5 years

PROBLEM w/ LININGS - TANKS, ETC

1. What to do - Don't use Kaypers compounds?
2. Preventative -
3. Curing important?

United States Summary Judgment Motion, Ex. 14, Page 136

Exhibit 15

State of California

Memorandum

DEPARTMENT OF HEALTH SERVICES * SAN BERNARDINO *
APR 22 1982

Chester Anderson
Department of Health Services
SAN BERNARDINO
FILE: Reservoirs

To : Regional & District Engineers

Date : April 19, 1982

Subject: TCE in Water Tanks

From : Endel Sepp,
Sanitary Engineering Branch

There have been instances of high TCE levels in water tanks where TCE solvent was used to repair the reservoir coating. One cause of this problem may be that no aeration was used during the curing of the repair material. In order to remove the solvent, forced ventilation of the tank should be used during application and for at least 10 days afterward. The coated surface should then be washed down with water and disinfectant, and flushed before being put in service.

One manufacturer's recommendations concerning tank coat ventilation are as follows:

> "During coating application, the volume of fresh air introduced must provide good air movement. The volume of fresh air should be not less than 300 cu. ft. air/minute for each one gallon of coating applied/hour. It is customary in large tanks (0.5.2MM gallons) to use a ducted 10,000 c.f.m. blower.
>
> After application to completely remove all traces of solvent from the coating or tank, forced ventilation at the rate of at least one change of air/hour should be continued for a period of ten days. Temperature and humidity readings above or below 70°F. and 50% R. H. may extend or shorten the time required to some degree.
> Relative Humidity
> Before placing in service, the entire coated surfaces shall be washed down with water, disinfectant and flushed according to AWWA D102-64, Section 5.3."

The above appears to apply to similar coatings where TCE or PCE is used as the solvent.

State of California

Memorandum

Department of Health Services

To : Endel Sepp
SEB Berkeley

Date : May 27, 1982

Subject: Leaching of Organic Solvents from Reservoi Coatings

FILE: RESERVOIRS

From : Gary H. Yamamoto
SEB Los Angeles

This is in response to your memo of April 19, 1982 in which you stated that a possible cause of the presence of PCE (not TCE) in water tanks was that no aeration was used during the curing of the coating. The manufacturer's recommendations that you cited were the procedures verbatim listed by Koppers Company in their technical data sheet for their bitumastic Super Tank Solution.

The water utility in whose water tanks this problem was found was contacted by me. These reservoirs had two types of linings applied. Above the three foot level, they used Super Tank Solution. Below the three foot level, they used Mop and Glow enamel. The Super Tank Solution was applied first. Then the Mop and Glow enamel was applied. During the application of the enamel, a blower was used to provide fresh air for the workers. It took them 29 days to complete the application of the enamel. This is almost three times the length of time recommended by the manufacturer for air drying. After this, they sprayed the interior with disinfectant.

3 ft. from Top?

PCE is still being detected in the water from these reservoirs. To minimize the concentrations, the water utility does not allow the water to stay in the reservoir too long. Therefore, I still believe that the problem lies with the product and not the fact that procedures are not followed.

cc: J. Gaston
S. Nelson
C. Young
T. Gannon
S. Kalichman
F. Redlin
B. Ellsworth
R. McMillan
G. Gentry
C. Anderson
District

GHY:cl

DEPARTMENT OF HEALTH SERVICES * SAN BERNARDINO * JUN 1 1982

"Reservoir"

ES:rh

APR 12 1982
SAN BERNARDINO

Policy on Water Tank Coatings

It has been observed that relatively high concentrations of undesirable organics may leach into the water supply from some of the proprietary products used for coating new or existing water tanks. These products are usually those which contain coal tar. It appears that this is more likely to occur if the manufacturer's instuctions for application are not followed. The products in question meet the current AWWA specifications, ANSI/AWWA 102-78, and are often included on lists of approved tank coating compounds. There currently is no prohibition on the use of these compounds. However, to minimize the hazard of undesirable organics, special precautions should be taken as follows:

1. The manufacturers' recommendations on application must be closely followed.
2. Proper curing time must be provided, as recommended. Additional curing time before the tank is filled should be provided if possible.
3. Following the maximum possible curing period and before the tank is put into service, samples of the water in the tank must be taken and analyzed by an approved laboratory for organic compounds including TCE and PCE. The results of these tests should be discussed with the Sanitary Engineering Branch.

   Some how we need to say "sample after water has been in contact w/ coating for some period!"
4. If the test results are high, draining the initial water from the tank, flushing, refilling, and retesting will be required.

What is high? Acceptable levels? Probably doesn't need to be defined in this

Exhibit 16

State of California

Department of Health Services

Memorandum

B —
J —
M —

L. Anderson

File: Reservoirs

To : H. F. Collins, Ph.D.
Deputy Director
Environmental Health Division
OB#8/430

Date : August 6, 1982

Subject: Activity Report - August 6, 1982

From : John M. Gaston, Chief
Sanitary Engineering Branch

DEPARTMENT OF HEALTH SERVICES * SAN BERNARDINO * AUG 10 1982

1. Santa Clara Groundwater Survey:

We have recently received a letter from the Citizens for a Better Environment (CBE) remarking on our groundwater study in the Santa Clara Valley. While they generally commend the Department and others for our action they also suggest that the study has faults. Most specifically they feel that the water samples were held too long by the laboratory after being taken and that the results are questionable. We doubt this contention; the Sanitation and Radiation Lab is checking the raw data to confirm or deny our suspicions. We believe that CBE looked at the wrong dates and based their comments on the dates the sample results were reported rather than analysed.

All of their other complaints hinge on this "sample analysis time" point. We do not anticipate any additional action based upon their letter. The bottom line, as we see it, is that only the one original well is contaminated and the sampling program has confirmed that result. I will provide you (and CBE) with more information when we have an opportunity to look at the raw data.

2. Plastic Pipe:

The bill by Assemblyman Papan (AB - 2636) was not passed out of the Senate Government Organization Committee on Tuesday, August 3, 1982 thereby ending the threat that all plastic water pipe would have been banned. We were also notified that Stanford Research Institute has been selected to do the CEQA documentation for Housing and Community Development.

3. Tank Coatings & Linings:

We have seen a recent rash of incidents where either tri or tetrachloroethylene has been found in water supplies because of leaching from new tank linings. Generally these liners involve a coal tar compound and utilize a solvent (TCE/PCE) in the application of the paint or liner. This problem may have been with us for some time, but we never saw it because we never looked. The legal and engineering problems include:

1. This paint/liner is one of the "best" for use in water tanks.

2. We do not have statutory authority to ban or eliminate any specific coating compound. We can prohibit use of the water, but not the compound.

DEFENDANTS' EXHIBIT 517 FOR ID
BRIAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

United States Summary Judgment Motion, Ex. 16, Page 140

3. Tank Coatings & Linings cont.:

3. Legal Services does not recommend that we try to "informally" lobby against specific compounds or companies because of the obvious restraint of trade problems.

In order to try to control this growing problem we intend to do the following:

A. Notify all water utilities that we have seen some recent problems and ask that they notify us before deciding on a specific coating compound or company.

B. Collect good and bad accounts from the utilities to try to develop some historical information.

C. Meet with both utility and industrial representatives to try to resolve the problem.

We will keep you informed as to our progress.

cc: District and Regional Engineers
W. Kendall
W. MacPherson
C. Young
Ishida/Garfield
N. Lau, EPA
JMG:ba

Exhibit 17

EDMUND G. BROWN JR., Governor

ARTMENT OF HEALTH SERVICES
BERKELEY WAY
KELEY, CA 94704
415) 540-2154

August 17, 1982

VECTOR BIOLOGY & CONTROL SECT
AUG 9 1982
SAN BERNARDINO

MEMORANDUM

TO: All Large Community Water Systems

FROM: Sanitary Engineering Branch
Berkeley

SUBJECT: TANK COATINGS

As a part of the USEPA Safe Drinking Water Act program (Code of Federal Regulations, Title 40; Part 141.42; Special Monitoring for Corrosivity Characteristics), and because of several tank coating contamination incidents that have recently occurred we have assembled the enclosed package. This includes:

1. A description of State activities relative to the tank coating issue, and a suggested procedure for those utilities contemplating the use of specific tank coating materials.

2. An information transfer form to be used by water utilities in recording/reporting both good and bad tank coating incidents.

You are encouraged to read this material and to contact our field staff if questions or problems occur.

State Activities:

Background: The State of California does not have specific statutory authority to approve or disapprove individual tank coating compounds. The Waterworks Standards (Title 22, California Administrative Code) do address the tank coating issue in Sections 64604, Corrosion Protection. This provides that new and existing steel tanks may be coated or recoated using any/one of seven paint systems:

ANSI/AWWA D102-78

AWWA STANDARD FOR PAINTING STEEL WATER STORAGE TANKS
Section 3 - Inside Paint Systems

Sec. 3.2 System No. 1 - two or three coat catalyzed epoxy paint system.

Sec. 3.3 System No. 2 - five coat vinyl system.

Sec. 3.4 System No. 3 - three coat chlorinated rubber system.

United States Summary Judgment Motion, Ex. 17, Page 142

DEFENDANTS' EXHIBIT 513 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

513

Sec. 3.5 System No. 4 - four coat single-solution vinyl paint system.

Sec. 3.6 System No. 5 - hot-applied coal tar enamel.

Sec. 3.7 System No. 6 - three coat cold-applied coal tar enamel.

Sec. 3.8 System No. 7 - one coat metallic sprayed zinc system.

Problem and Suggested Procedure:

It has been observed that relatively high concentrations of undesirable organics may leach into the water supply from some of the proprietary products used for coating new or existing water tanks. These products are usually those which contain coal tar, or use TCE* or PCE** as the solvent and as seen in the System No. 6 coatings. It appears that this is more likely to occur if the manufacturer's instructions for application are not followed. The products in question meet the current AWWA specifications, ANSI/AWWA 102-78, and are often included on EPA lists of approved tank coating compounds. There currently is no prohibition on the use of these compounds; however, to minimize the hazard of undesirable organics, special precautions should be taken as follows:

1. Before these compounds are used the Sanitary Engineering Branch District Office should be contacted.

2. The manufacturer's recommendations on application must be closely followed.

3. Proper curing time must be provided, as recommended. Additional curing time before the tank is filled should be provided if possible. Adequate ventilation must be provided where required. In some cases it may be necessary to extend cure time beyond the manufacturer's recommendation.

4. Following the curing period the tank must be washed and disinfected before filling. A seven day soaking period should follow initial filling to determine the presence of any leached organics. Before the tank is put into service, samples of the water in the tank must be taken and analyzed by an approved laboratory for organic compounds including TCE and PCE. The results of these tests should be discussed with the Sanitary Engineering Branch.

5. If the test results are high, draining the initial water from the tank, flushing, refilling, and retesting will be required.

* TCE: Trichloroethylene

** PCE: Tetrachloroethylene (Perchloroethylene)

Information Transfer: In an attempt to develop more information on specific coatings and both good and bad performance we ask that you complete and return the enclosed form. Even though we cannot formally approve or disapprove specific coatings we feel that it will be very beneficial to the utilities and the coating manufacturers to develop this data and share it with all interested parties. Please make additional copies as required.

If you have additional questions or comments please feel free to contact our offices.

David P. Spath for
John M. Gaston, Chief
Sanitary Engineering Branch

Enclosure
cc: SEB Administrative Staff
H. F. Collins, Ph.D.
Nate Lau, EPA

☐☐-☐☐☐
Please Leave Blank

PROBLEMS ATTRIBUTED TO WATER TANK COATINGS

1. Name of Water System _____
2. Type of coating (name) _____
3. Date applied _____
4. Is coal tar lining used in distribution system? yes ☐ no ☐
5. If yes, in tanks? yes ☐ no ☐ In mains or transmission lines? yes ☐ no ☐
6. Problems experienced: Organics ☐ Taste & Odor ☐ Bacterial growth ☐ Other problems ☐ explain please.
7. Specific problems _____
8. Duration of problem _____
9. Corrective measures taken _____
10. Tank Details:
    a. Volume _____
    b. Depth _____
    c. Curing Time _____
    d. Other Tank Details _____

Please return to: Sanitary Engineering Branch
2151 Berkeley Way
Berkeley, CA 94704

Exhibit 18

State of California

Memorandum

M ✓
B ✓
J ✓

Department of Health Services

To : SEB Staff

Date : August 19, 1982

FILE = Reservoirs

Subject : Info on Tank Coatings

From : Chet Anderson

This information may be helpful to SEB staff in discussing proposed tank coatings with water purveyors. Most of the data was derived from discussions with Bill Harper, a P.E. specializing in corrosion control and coating materials. There are, generally speaking, three types of tank coatings where coal tar is involved. These are:

1. Coal Tar (solvent cutback) Paint. These are covered by AWWA Inside Paint System (IPS) No. 6 in D102-78. There are only three proprietary products available in this class. They are:

   (a) Koppers Bitumastic Super Tank solution (Attachment #1).

   (b) Tnemac 46-465 Hi-Build Tank Coating (Attachment #2).

   (3) Engard 800 Super Tank Coating

   All 3 products are generally specified in Construction Specs. as approved equals. These compounds are made by adding solvents to coat tar enamel which meets AWWA C-103. For example Koppers Super Tank solution contains 63% solids and 37% volatiles, by volume. All 3 previously used PCE as the cutback solvent but only Koppers does so at present. Tnemac stopped using PCE in 1981; Engard has only within the past 2 weeks stated they are dropping PCE from their formulation. (NOTE: Reportedly Koppers west coast reps are trying to get their HQ in Pittsburgh to eliminate PCE and use other solvents.) PCE has been used for a long time in these coatings because it was exempt under air emission standards. It was used instead of xylene for this reason. Apparently xylene and/or toluene (and maybe other solvents) are used by Tnemac and will be by Engard. Of interest is that both xylol and toluol are also present in Koppers Super Tank and have shown up in water samples from tanks coated with it.

DEFENDANTS' EXHIBIT 514 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

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These coatings are "cold applied" usually by spraying. While AWWA IPS #6 calls for 3 coats, 2 coats are frequently used to get 20 mils total thickness. One potential problem area is that the curing time required is related to the thickness of the coating. Since specifications do not limit a maximum thickness and because there is a tendency with corrosion protection to feel that "more is better," the coating may be applied too thick in some areas. The manufacturers' recommended curing time may then not be adequate.

These coatings are usually used to either coat (a) the entire interior or (b) only the upper portion of the tank that is subject to not being immersed in water some or much of the time.

2. Coal Tar Enamel. This compound is covered by AWWA I.P.S. #5. I understand that Koppers is the only producer of Coal Tar Enamel in the western U.S. (produced in Fontana). This is applied hot at 450°-490° F. No solvents are used. It comes in 600 lb. metal drums from which 25 lb. chunks are melted down in kettles. It has plasticizer(s) in it. It cures very rapidly. Within 30 seconds after application, it is cured. It only needs to be washed down and disinfected. It is only used in the lower 8 feet or so of tank walls and on the bottom because it must remain immersed to avoid problems if the outside tank wall is subject to hot temperatures. It appears there is no significant problem with solvents (i.e. PCE, etc.) since none are used.

3. Coal Tar Epoxy. (This is not the epoxy system covered by AWWA I.P.S. #1). This coating is not covered by AWWA Std. D102-78 but is in AWWA Std. C-103 which covers inside linings for water pipe. It is not too widely used for tanks but has been in some cases. It is used for pipelines and may be used in water treatment plants. It contains 75% solids and 25% volatiles by volume. It has a different curing mechanism featuring internal thermosetting where significant heat is generated in addition to the external volatilization of solvents similar to the solvent-cutbacks. 98% curing is achieved in 5 days. This type of compound has been widely used in the State Water Project large diameter pipelines such as at Edmunston, Windgap and other sites. (Specifically Koppers Bitumastic 300-M Coal Tar Epoxy was used). There are quite a few commercial products on the market including the following which might be encountered most frequently:

   a. Koppers (300-M)
   b. Tarset (this was the original)
   c. Engard (has several; 463 is the major one)
   d. Tnemac (Themac Tar & Poxy Tar)
   e. Ameron (#78)

Every manufacturer may have a number of epoxies. Coal tar epoxies have apparently not been too widely used in the West except in pipes but is used more in the East. Volatile organic solvents may be a problem depending on what solvent(s) are used and the curing process.

ALTERNATIVES AND COSTS:

Alternatives to the inside paint systems using coal tar products are of course the other AWWA I.P.S. systems No. 1 through 4. Rough cost information is that coal tar enamel is a little more expensive because of the application process (i.e. daubing or brushing which requires more time and special techniques). I.P.S. #6 coatings are about $1.00 per square foot and epoxy systems (IPS #1) are about $1.25 to $1.50 per square foot.

RECOMMENDED PROCEDURES:

There are 3 key points that should be emphasized in curing tank coatings, particularly those with solvents (esp. PCE).

1. The thickness of coating applied
2. The length of curing time
3. Whether "forced air" ventilation is used
4. The rinsing process and sequence. Followed before the tank is filled.

The following is a recommended sequence:

EXCELS OPTION

1. After interior has been coated and inspected and recoating done of any thin spots or holidays (pinpoint flaws) and has initially dried, thoroughly wash with high pressure potable water to remove residual solvents, dirt, dust, sand, etc.
2. Thoroughly drain all of this washdown water completely out of tank.

* 3. Begin air curing with a fan inside the tank blowing out the bottom manhole. The more air movement the better. (The volatile solvents are heavier than air.) Min. 14 days!

4. Disinfect tank, wash down walls, etc., and drain this washdown water (containing redeposited solvents, etc.) out of the tank.
5. Begin filling the tank with chlorinated water to meet disinfection requirements.

* It is estimated that 90% of tanks have not had exhaust fans used during curing. The solvent vapors are not going to leave the tank without this ventilation. If it is not removed, the vapors present inside the tank retard the curing of the coating.

SAMPLING:

While PCE seems to be the main concern, other volatile solvents may be used. It is suggested that sampling be done by a GC Scan for VOA's. This will show PCE, TCE, Xylene, Toluene and others (including chloroform which was found in one Engard 800 coated tank.)

NOTE: The PAH's are not detected by the VOA scan but this has not been our primary concern to date.

It is hoped this data will be helpful. Remember it is not the Gospel!

cc: Regional Engineers
Berk.

46-465 HI-BUILD TANK COATING

Coal Tar Pitch Solution

#2

LACSD 1.3 MG

- INTERIOR
- upper 16 feet

COATING PROFILE

DESCRIPTION	Water-resistant coating with excellent high film build and long-term protection. Meets the performance requirements of AWWA D102-78, Inside Painting System No. 6.
TYPICAL USE	Interior coating for large steel potable water storage tanks. **DO NOT USE FOR DEAD ENDS, STAGNANT OR VERY LOW FLOW LINES.**
PRIMER	Self-priming
SURFACE PREPARATION	STEEL: Commercial Blast Cleaning (SSPC-SP6) ALL SURFACES must be dry and clean.
COLOR	Black
FINISH	Semi-gloss
SOLIDS BY VOLUME	73.0 ± 2.0%
THEORETICAL COVERAGE	1,170 mil sq. ft. per gallon
DRY FILM THICKNESS	8 to 12 mils per coat (Minimum 2 coats)
CURING TIME—AT 75 F.	To recoat: 24 hours minimum or until the first coat dries firm. Immersion Service: 14 days minimum. Thorough drying must be allowed between coats and after application of the final coat prior to immersion. It is essential that the solvent vapors released during application and from the deposited film be removed from the tank by exhaust blowers or suction fans. After application, completely remove all traces of solvent from the coating or tank (normally 14 days). Forced ventilation may be necessary to insure thorough evaporation and removal of all solvents. Temperature and humidity readings above or below 75 F. and 50% R.H. may extend or reduce the time required. Before placing in service, the coating surfaces shall be washed down with water, disinfected and flushed according to AWWA D102-64, Section 5.3.

NOTE INSTRUCTIONS!

OUTDATED STD!

SHIPPING, STORAGE & SAFETY DATA

NUMBER OF COMPONENTS	One
PACKAGED IN	55 gallon drums, 5 gallon pails and 1 gallon cans
NET WEIGHT PER GALLON	13.70 ± 0.25 lbs.
STORAGE TEMPERATURE	Minimum 20 F. Maximum 120 F.
SHELF LIFE	12 months at recommended storage temperature
FLASH POINT—SETA	81 F.

DEPARTMENT OF HEALTH SERVICES
AUG 4 1982
SAN BERNARDINO

TNEMEC Company, Inc. 9p PAINTING MATERIALS

46-465 HI-BUILD TANK COATING

APPLICATION INFORMATION & SAFETY DATA

MIXING Stir thoroughly, making sure no pigment remains on the bottom of the can.

SPREADING RATE

	Dry Mils	Wet Mils	Sq.Ft./Gal.
Suggested	10.0	13.5	117
Minimum	8.0	11.0	146
Maximum	12.0	16.5	98

Allow for overspray and surface irregularities. Film thickness is based on closest 0.5 mil.

THINNING Use No. 23 Thinner. For air or airless spray, brush or roller, thin up to 10% if necessary.

SURFACE TEMPERATURE Minimum 40 F. Maximum 120 F.
The surface should be dry and at least 5 F. above the dew point. Coating will not cure below minimum surface temperature.

APPLICATION EQUIPMENT Air or airless spray, brush or roller

Air Spray Suggested equipment, or equal:

Gun	Fluid Tip	Air Cap	Air Hose ID	Mat'l Hose ID	Atomizing Pressure	Pot Pressure
DeVilbiss MBC-516 MBC-510	E	704	3/8" or 1/2"	1/2" or 3/4"	50 psi	20 psi

Low temperatures or longer hoses require higher pot pressure.

Airless Spray

Tip Orifice	Atomizing Pressure	Mat'l Hose ID	Manifold Filter
0.017" to 0.031"	2400—3000 psi	3/8" or 1/2"	60 mesh

Use appropriate tip and atomizing pressure for equipment, applicator technique and weather conditions.

Brush or Roller *For touch-up only.*

CLEAN UP INSTRUCTIONS Clean all equipment immediately after use with No. 23 Thinner. Flush and clean spray equipment before material sets up.

SAFETY INFORMATION CONTAINS XYLOL
WARNING! FLAMMABLE, VAPOR HARMFUL
Keep away from heat, sparks and open flame. Use only with adequate ventilation. Avoid breathing of vapor or spray mist. Avoid prolonged or repeated contact with skin. FOR USE IN CONFINED AREAS: Workmen must wear fresh airline respirators to avoid breathing concentrated vapors. Circulate adequate fresh air continuously during application. Hypersensitive persons should wear gloves or use protective cream. All lights and electrical equipment should be explosion-proof. Workmen should be required to use non ferrous tools and wear conductive and non-sparking shoes in areas where explosion hazards exist. Keep closures tight and upright to prevent leakage. Keep container closed when not in use. In case of spillage, collect and dispose of in accordance with local applicable regulations. FIRST AID: In case of skin contact, flush with plenty of water, for eyes flush with plenty of water for 15 minutes and get medical attention. If affected by inhalation of vapor, remove to fresh air.

WARRANTY The technical data contained herein is accurate to the best of our knowledge. Tnemec Company, Inc. warrants that coatings represented herein meet their formulation standards. No other warranty is expressed or implied, including warranties of merchantability and fitness for a particular purpose. Published technical data and instructions are subject to change without notice. Contact your Tnemec Representative for current technical data and instructions.

TNEMEC COMPANY, INC.
Post Office Box 1749
Kansas City, Mo. 64141
(816) 483-3400
(KC) Telex 43-4208
Manufacturing Plants:
Kansas City, Missouri
Baltimore, Maryland
Compton, California

FOR INDUSTRIAL USE ONLY

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KOPPERS

Protective Coatings

ATTACHMENT #1

TYPE OF COATING

COAL TAR

Product: BITUMASTIC SUPER TANK SOLUTION

DESCRIPTION: Bitumastic Super Tank Solution is a heavy duty, high build cold applied highly water resistant coal tar base coating. After normal agitation it is ready to apply. It is normally self priming and will produce a dried film thickness of 8 to 10 mils per coat with good film thickness retention on edges. The coating dries by solvent evaporation and is easy to recoat or repair. The dried film will not sag or flow at maximum temperatures encountered in normal atmospheric exposure and it will not crack at -20°F. Bitumastic Super Tank Solution has an unlimited shelf life with a minimum of settling. It is made from pitch derived from suitable tars, selected solvents and mineral fillers affording a highly water-resistant coating.

USE: FOR INDUSTRIAL USE ONLY. NOT INTENDED FOR USE IN THE HOME.

It is designed primarily for the long-term protection of the interior of large steel water storage tanks and the interior of steel water transmission pipelines used for either potable or irrigation water service.

DO NOT USE FOR DEAD ENDS, STAGNANT OR VERY LOW FLOW LINES.

Its required thick coat application deposits 4 to 5 times the thickness of conventional paint.

TECHNICAL DATA:

Number of coats:	2 minimum
Volume solids:	63%
Theoretical coverage:	1010 mil sq. ft./gal.
Coverage to achieve minimum dry film thickness:	80 to 100 sq. ft./gal. (allows for approximately 20% application loss).
Film build ratio:	
Minimum dry film required per coat:	8 to 10 mils
Wet film required per coat:	12.7 to 15.9 mils
Drying time at 70°F. and 50% relative humidity:	
To touch:	2 hours

TECHNICAL DATA
(Continued):

Between coats: A minimum of 24 hours, or until first coat dries firm.

Before submerging: The normal dry time is 10 days after the topcoat is applied. Thorough drying must be obtained between coats and after application of the final coat prior to submerging. It is essential that the solvent vapors released during application and from the deposited film be removed from the vessel or tank by means of exhaust blowers or suction fans. Ventilation blowers or fans should be ducted to or from the bottom of the tank.

During coating application, the volume of fresh air introduced must provide good air movement. The volume of fresh air should be not less than 300 cu. ft. air/minute for each one gallon of coating applied/hour. It is customary in large tanks (0.5-2MM gallons) to use a ducted 10,000 c.f.m. blower.

After application to completely remove all traces of solvent from the coating or tank, forced ventilation at the rate of at least one change of air/hour should be continued for a period of ten days. Temperature and humidity readings above or below 70°F. and 50% R.H. may extend or shorten the time required to some degree.

Before placing in service, the entire coated surfaces shall be washed down with water, disinfectant and flushed according to AWWA D102-64, Section 5.3.

Color: Flat Black

Thinner: Koppers Thinner 2000C. Do not use ordinary paint thinners, mineral spirits, gasoline or turpentine as they will destroy the material. Do not thin except in cold weather, when ½ pint of Koppers Thinner 2000C per gallon is the maximum amount allowable.

Cleaner: Koppers Thinner 2000C, to clean brushes, rollers or spray equipment.

Surface preparation: Apply only to clean dry surfaces. Remove weld spatter by chipping or grinding. Grind off all sharp edges or high points on weld seams. Remove oil and grease deposits with Koppers Thinner 2000C. Sandblast metal clean to NACE-3 or SSPC-SP-6-63.

The maximum height of sandblast profile must not exceed 3 mils.

Sandblasted surfaces must be coated the same day.

Primer:

Metal: Normally, self-priming. If a shop primer is required, apply one thinned coat of Bitumastic Super Tank Solution or Bitumastic Tank Solution for a minimum dry film thickness of 2.0 mils. The shop primed steel surfaces should not be stored for prolonged periods with exposure to full, direct sunlight.

Note: On non-ferrous metals, pretreat with Koppers 40 Passivator.

Mixing instructions: Mix thoroughly until a smooth, uniform texture is obtained. A slow speed power mixer should be used.

Exhibit 19

File: Tank Coatings.

State of California

Department of Health Services

Memorandum

To : SEB Staff

Date : October 4, 1982

Subject: Tank Coatings - Corrections to 8-19-82 Memo

From : Chet Anderson

Chet Anderson

I have been advised that there are two errors in technical references in my 8-19-82 memo on tank coatings as follows:

1. Page 1, Item #1: Change AWWA C-103 to AWWA C-203.

2. Page 2, Item #3: Change AWWA Std. C-103 to AWWA Std. C-210.

Several additional items of interest on this subject have come to my attention:

1. Inspection: This appears to be a key to getting a good job and avoiding problems. It seems that some contractors routinely do sloppy work and unless the water utility or its engineer maintains close surveillance and requires adherence to the specifications, problems may result. Examples are:

   a. Poor application and spraying resulting in "holidays" (pinpoint voids) or "thin areas" (less than required thickness). Ironically, the correction of these defects by brushing or swabbing may be the cause of continuing high organic chemical results because the thicker the application, the longer it takes to cure.

   b. Bidding the job to be done in too short a period resulting in cutting needed drying times between coats and curing time needed. (Example: I understand that one million gallon tank should take about 4 weeks minimum).

2. Tank Bottom: The preferred inside coating system seems to be a combination of AWWA I.P.S. #5 (coal tar enamel) on the tank bottom and the lower part of side walls with I.P.S. #6 (cold applied coal tar paint) on the upper walls. However, utilities recoating an existing tank may put the I.P.S. #6 on the entire tank (e.g.-Koppers Super Tank or equivalent).

DEFENDANTS' EXHIBIT 515 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

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The floor may be a prime suspect source of continuing high PCE levels leaching into the water despite recommended curing times being provided. This could relate to the fact that the temperature of the floor during coating may be quite a bit lower than the walls. Also the floor may get thicker applications. Finally the floor represents a major surface contact area especially at lower tank levels.

CEA:mo

cc: Sam Kalichman, San Diego SEB
All Regional Engineers
Berkeley
District

Exhibit 20

State of California

Department of Health Services

Memorandum

To : C. E. Anderson

Date : October 5, 1982

Subject : City of San Bernardino Tank Coating Problems

DEFENDANTS' EXHIBIT 516 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

From : W. C. Gedney WCG

This is to document the most pertinent current information available regarding the difficulties experienced by the City of San Bernardino relative to recently applied internal tank coatings. Five welded steel reservoirs are involved, four of which were constructed and just completed this year (Del Rosa No. 3 1720, 1895, and 2100 tanks). A fifth tank (Mountain) was also recoated. Attachment No. 1 summerizes information obtained from the City pertaining to dates that the various coatings were applied to these tanks and other technical information. As noted in this Attachment, all of the tanks were allowed to cure for an extended period of time except for the Mountain tank (only 11 days). However, none of the tanks during this initial coating period were ever provided with forced air ventilation as outlined in both the Kopper's and Tnemec coating specifications.

Generally speaking, the four new tanks have had very low levels of PCE, with the exception of Del Rosa No. 3. Chemical data for these four tanks is summarized in Attachment No. 2. Factors influencing the low PCE levels include both an extended curing period (43 to 68 days) and the fact that Tnemec 46-465 Hi-build tank coating was used, rather than Koppers Bitumastic Supertank solution. The PCE concentration in Del Rosa No. 3 is difficult to explain, especially since the only Koppers product known to have been used was the B-70 hot applied coal tar enamel. This tank was only in service for five days (until August 3.) The City took the tank off line after numerous taste and odor complaints were received. These complaints were for both a "chlorine" taste and an organic taste and odor in the water. The tank was drained and the City provided forced air ventilation for 13 days. A 1200 cfm blower was set up on top of the tank and the lower tank manhole was left open. No side blower was used. Also, the blower was only operated 12 - 14 hours each day. The tank was filled and tested again and while the taste and odor problems had disappeared, the PCE concentration was about the same as before.

A good deal of information concerning these tanks was obtained from Mike Lowe, Painting Supervisor for the City. All four of the tanks were coated in the manner described as follows. Prior to any tank coating being applied, each tank was entirely sandblasted to remove mill scale and profile, (Dates for each tank noted in Attachment No. 1). Then, the tank was sandblasted a second time in small

DEFENDANTS' EXHIBIT 516 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

sections and provided with the first coat of Tnemec 46-465 within an eight hour period. The City specifications called for this procedure to assure that the coating would adhere to the metal. This first coat was applied to a thickness of about 15 mils (wet thickness). When this procedure was completed, a second coating was applied over the entire first coat. (Dates for this also can be seen in Attachment Nol). The overall dry thickness was at least 20 mils in all tanks. At this point, the tank floor was sandblasted, primed and provided with a hot applied coal tar enamel. Following inspection and repairs, the tanks were left open for curing. Lowe stated that any holidays detected during the inspection of the floor were corrected with the Tnemic tank coating solution rather than the coal tar enamel. The 2100 and 1720 tanks were also provided with intermittent forced air ventilation for about 15 days (August 19 through September 3) as a precaution. Again, these ventilators only operated 12-14 hours each day. All four tanks are currently in use. Approval to use the Del Rosa No. 3 tank was granted recently provided that an ongoing monitoring program was initiated and that residence time of water in the tank was minimized. Joe Bocanegra from the City is currently working on having the tank floats adjusted to reduce detention time.

The Mountain tank was the only tank which used Koppers Supertank solution and incidentally was the only tank in which the City used their own work crews to apply the coating. Attachment No. 3 lists the PCE results obtained between July 23 through September 24 and briefly relates pertinent conditions during this time period. Records for the coating applied on this tank were not as complete as those for the other tanks as this was an "in-house" coating job. Mike Lowe did give me a fairly accurate account of the events.

These are as follows:

The tank was initially inspected on March 1, 1982 and it was determined that the tank roof was in need of repairs. The tank was taken out of service shortly thereafter and the entire roof was sandblasted around March 14 through April 30, 1982. After repairs were completed, the City decided to sandblast and recoat the tank because the old vinyl coating was also in very poor shape. Lowe estimated that 40% of this old coating throughout the interior of the tank had fallen away from the side and roof. The remaining 60% was given a "sweep-blast" during the recoating process which only removes the loose chunks. The tank was not sandblasted down to the bare metal except in those areas where the coating had failed. As described previously, the first coat was applied in the same small sections which were sandblasted and coated on the same day. This was applied to about 15 mils (wet thickness). The process was repeated until the roof and tank walls down to eight feet above the floor were completed. Then a complete second coat was applied around May 15 or 16. The final dry thickness was above 20 mils. The bottom eight feet and floor were then sandblasted and coated with Koppers between April 30

and June 9. As noted in Attachment No. 1, the tank then sat empty from June 9 through June 20. No forced air ventilation was provided during this period, but according to Lowe, the City had set up a 32,000 cfm blower whenever work was going on inside the tank. While this may have provided good air circulation for the upper tank walls and ceiling, the lower walls and floors would not have benefited from this. Disinfection was completed on June 22nd and the tank was in service from June 24 through August 3, 1982. As noted in Attachment No. 3, the tank was provided with some forced air ventilation for five day periods on two separate occasions. This procedure was basically identical to the one used on Del Rosa tank except for the time periods employed. The results unfortunately got worse since the later tests were taken on water which had been in contact with the coating for an extended duration. The tank has been out of service since August 3. The City plans to provide extended forced air ventilation in the near future.

In all, the City used about 770 gallons of Supertank solution to coat this tank. Only 5 to 7 gallons of Koppers 2000 C thinner was used to cut the coating. Assuming that the solvent is composed of 80% TCE and Koppers Supertank solution is only 63% solids (or 37% solvent) then approximately 228 gallons of TCE were used. The Mountain tank will remain out of service until this problem is resolved and I will provide updates on this problem in the future.

WCG:mo

cc: Berk., S.D.

Attachments

ATTACHMENT NO. 1

TO MEMORANDUM ON CITY OF SAN BERNARDINO TANK COATING PROBLEMS

CHRONOLOGY OF TANK COATING APPLICATION

Tank Name	Mountain	1720	1895	2100	Del Rosa No. 3
Capacity (MG)	2.0	5.0	5.0	2.0	3.0
D102 I.P.S. No. 6	Koppers Bitumastic	Themec	Themec	Themec	Themec
Coating Applied	Super Tank Solution	46-465	46-465	46-465	46-465
D102 I.P.S. No. 5 [1]	None [2]	Koppers B-70	Koppers B-70	Koppers B-70	Koppers B-70
Hot applied coal tar enamal Coating applied by	City crew	Contractor [3]	Contractor	Contractor	Contractor
Initial Sandblasting	April 30	May 17	April 12	June 22	April 30
2nd coating applied	May 16	June 28	April 16	June 29	May 6
Coal tar enamel applied	None	July 7	April 23	July 12	May 10
Curing time start	June 9	July 14	April 28	July 26	May 11
Tank disinfected	June 22	Sept. 6	July 7	Sept. 24	June 23
Total No. of days cured	11	52	68	58	43

NOTE:

1. Contrary to the City's tank coating specifications which originally called for the floor and lower 8 ft. of tank ring to be coated, only the floor and about 1 ft. of tank ring were coated.

2. No hot applied coal tar enamel was used. Koppers Supertank solution used to coat entire tank.

3. Contractor was Three Guys Painting.

ATTACHMENT NO. 2

TO MEMORANDUM ON CITY OF SAN BERNARDINO TANK COATING PROBLEMS.

CHEMICAL DATA ON FOUR TANKS WITH TNEMEC COATING.

Tank	1720	1895	2100	Del Rosa No. 3		
)ate Sampled	9-7-82	7-23-82	9-7-82	7-23-82	8-4-82	8-7-82
'OA Concentrations (ppb)						
'CE	1.7	0.3	2.5	16.0	16.0	14.0
'CE	ND	ND	ND	1.3	1.0	1.8
'oluene	1.3	1.3	5.4	37	32	0.45
:thylbenzene	0.4	0.7	3.5	~ 35-40	44	0.70
leta,Para Xylene	0.66	2.5	6.0	~ 180-200	86	Trace
'rtho xylene	0.5	0.7	3.3	~ 35-40	38	2.0
'otal THM	20.5	ND	ND	ND	ND	ND
'ontact Time	~4 days	18 days	~4 days	32 days	44 days	18 days

OTE:

1. Includes time period from when the tank started filling to sample date. Some dates of filling were approximate.

ATTACHMENT NO. 3

TO MEMORANDUM ON CITY OF SAN BERNARDINO TANK COATING PROBLEMS

CHEMICAL RESULTS FOR MOUNTAIN TANK

Date	PCE Concentration (ppb)	Comments/Conditions
June 22	Not sampled	Disinfection complete
24	Not sampled	Placed in service
July 23	197	Tank in service for 29 days. (A total contact period of 31 days).
August 3	171	Confirming test. Taken out of service this date following 40 days. (Total contact period of 42 days).
12	56	Following five days (Aug. 6-10) of intermittant forced air ventilation, tank was filled to about ½ capacity, then drained again. Total contact time was about 18 hours.
20	235	Another five day period (Aug. 14-18) with intermittant forced air ventilation occurred following draining of the tankon Aug. 13. Tank filled to 1/3 capacity and contact time prior to test was about 24 hours.
27	410	Retention time 8 days.
Sept. 2	810	Retention 14 days.
7	682	Retention 19 days.
24	Not sampled	Tank drained.

ATTACHMENT NO. 3

TO MEMORANDUM ON CITY OF SAN BERNARDINO TANK COATING PROBLEMS

CHEMICAL RESULTS FOR MOUNTAIN TANK

Date	PCE Concentration (ppb)	Comments/Conditions
June 22	Not sampled	Disinfection complete
24	Not sampled	Placed in service
July 23	197	Tank in service for 29 days. (A total contact period of 31 days).
August 3	171	Confirming test. Taken out of service this date following 40 days. (Total contact period of 42 days).
12	56	Following five days (Aug. 6-10) of intermittant forced air ventilation, tank was filled to about ½ capacity, then drained again. Total contact time was about 18 hours± before sample taken!
20	235	Another five day period (Aug. 14-18) with intermittant forced air ventilation occurred following draining of the tankon Aug. 13. Tank filled to 1/3 capacity and contact time prior to test was about 24 hours.
27	410	Retention time 8 days.
Sept. 2	810	Retention 14 days.
7	682	Retention 19 days.
24	Not sampled	Tank drained.
Oct 1-5		Forced Air Ventilation put c Continued ~~until~~ about 30 days started filling and sampling 1/3 full
Nov 5 ?		

Do not copy!
File with
original

S.B. Cary Specs-

SECTION 6.0

PROTECTIVE COATINGS

1.0 GENERAL

(a) The work of this Section shall include the protective coating of all specified sufaces, including all surface preparation, pretreatment, coating application, touch-up of factory-coated surfaces, protection of surfaces not to be coated, cleanup, and appurtenant work, including the furnishing of all tools, equipment, materials, and supplies and for performing all labor to complete the work, all in accordance with the requirements of the Contract Documents.

(b) In general, the following surfaces are to be coated or painted:

1. Exposed piping and other ferrous metal surfaces, interior and exterior.

2. All submerged or buried ferrous metal surfaces.

3. All structural and miscellaneous steel.

4. All interior surfaces of the reservoir(s).

5. Exterior surfaces of the reservoir(s).

(c) The following surfaces in general shall not be coated or painted:

1. Galvanized metals inside the reservoir(s).

2. Ferrous metals having approved factory finishes.

3. Non-ferrous metals and stainless steel surfaces.

4. Exterior surface of the reservoir floor plates.

2.0 REFERENCE SPECIFICATIONS AND STANDARDS

(a) Without limiting the generality of other requirements of these specifications, all cleaning, surface preparation, coating, and appurtenant work shall conform to the applicable requirements of the referenced portions of the standards specified herein.

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(b) Unless otherwise specified, all work and materials for the preparation and coating of metal surfaces shall conform to the applicable requirements specified in the Steel Structures Painting Manual, Volume 2, Systems and Specifications, latest edition, as published by the Steel Structures Painting Council.

3.0 CONTRACTOR SUBMITTALS

The Contractor shall provide 5 copies of a coating materials list which indicates the manufacturer and the coating number, keyed to the coating schedule herein, for approval of the Engineer prior to or at the time of sumittal of samples.

4.0 GENERAL REQUIREMENTS

4.1 Manufacturer's Recommendations - Unless otherwise specified herein, the coating manufacturer's printed recommendations and instructions for thinning, mising, handling, applying, and protecting his coating materials, for preparation of surfaces for coating, and for all other procedures relative to coating shall be structly observed. No substitutions or other deviations will be permitted without written permission of the Engineer.

4.2 Safety Requirements - (a) Respirators shall be worn by all persons engaged in and assisting in spray painting.

(b) Storage and mixing of paint materials shall be performed only in those areas designated by the Engineer.

(c) Coths and cotton waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day.

4.3 Storage, Mixing, and Thinning - Coating materials shall be protected from exposure to cold weather, and shall be thoroughly stirred, strained, and kept at a uniform consistency during application. Coatings of different manufacturers shall not be mixed together. Packaged paint may be thinned immediately prior to application in accordance with the manufacturer's printed directions, but not in excess of one pint of suitable thinner per gallon.

5.0 PREPARATION FOR COATING

5.1 General - All surfaces to receive protective coatings shall be cleaned as specified herein prior to application of said coatings. The Contractor shall examine all surfaces

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to be coated, and shall correct all surface defects before application of any coating material. All marred or abraded spots on shop-primed and on factory-finished surfaces shall receive touch-up restoration prior to any other coating application.

5.2 Items Not to be Coated - Hardware, hardware accessories, machined surfaces, and similar items in contact with coated surfaces and not specified to be coated shall be removed prior to surface preparation and coating operations. Following completion of coating each surface, all such removed items shall be reinstalled. Such removal and reinstallation shall be done by workman skilled in the respective trades involved.

5.3 Surface Preparation - (a) The following referenced surface preparation specifications of the Steel Structures Painting Council shall form a part of this specification:

1. Solvent Cleaning (SSPC-SP1): Removal of oil, grease, dirt, soil, salts, and contaminants by cleaning with solvent, vapor, alkalai, emulsion, or steam.

2. Hand Tool Cleaning (SSPC-SP2): Removal of loose rust, loose mill scale, and loose paint to degree specified, by hand chipping, scraping, sanding, and wire brushing.

3. Power Tool Cleaning (SSPC-SP3): Removal of loose rust, loose mill scale, and loose paint to degree specified, by power tool chipping, descaling, sanding, wire brushing, and grinding.

4. White Metal Blast Cleaning (SSPC-SP5): Removal of all visible rust, mill scale, paint, and foreign matter by blast cleaning, by wheel or nozzle (wet) using sand, grit, or shot.

5. Commercial Blast Cleaning (SSPC-SP6): Blast cleaning until at least two thirds of each element of surface area is free of all visible residues.

6. Near-White Blast Cleaning (SSPC-SP10): Blast cleaning nearly to White Metal cleanliness, until at least 95 percent of each element of surface area is free of all visible residues, and achieves a 2-mil minimum anchor profile.

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(b) Galvanized surfaces to be coated shall be solvent-cleaned and degreased prior to application of an acid wash and a wash prime coat before applying the specified primer. Galvanized surfaces no to be coated shall be solvent-cleaned. Zinc-alloy surfaces shall be solvent-cleaned, only, prior to coating.

5.4 Protection of Coated Surfaces - Cleaning and coating shall be so programmed that dust and other contaminants from the cleaning process will not fall on wet, newly-coated surfaces.

6.0 COATING MATERIALS

6.1 Definitions - The term "coatings", "paint", or "finishes as used herein, shall be synonymous and shall include all surface treatments, primers, emulsions, enamels, paints, epoxy resins, and all other protective coatings, excepting galvanizing or anodizing, whether used as a pretreatment, primer, intermediate coat, or finishcoat.

6.2 General - Coating materials shall be sealed in containers that plainly show the designated name, formula or specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer, all of which shall be plainly legible at the time of use. Pigmented paints shall be furnished in containers not larger than five gallons. Materials shall conform to the specifications shown herein and to the requirements hereinafter specified.

6.3 Compatibility - Only compatible materials shall be used in the work. Particular attention shall be directed to compatibility of primers and finish coats. If necessary, subject to the approval of the Engineer, a barrier coat shall be applied between all existing prime coat and subsequent field coats to insure compatibility.

6.4 Colors - All colors and shades of colors of all coatings shall be as selected by the Engineer from painted samples of the mnaufacturer's standard colors,submitted as specified for Contractor Submittals, herein. Each coat shall be of a slightly different shade, as directed by the Engineer, to facilitate inspection of surface coverage of each coat.

6.5 Protective Coating Materials - Products shall be standard from recognized manufacturers regularly engaged in production of such materials for essentially identical or similar applications in the water works industry and industrial plants, and with not less than five years successful experience in

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such manufacture for such applications. Where requested, the Contractor shall provide the Engineer with the names of not less than 10 successful applications of the proposed manufacturer's products demonstrating compliance with this specification requirements.

6.6 Coating Manufacturers - Except as otherwise indicated herein, materials specified are from the catalogs of the companies listed under the "Materials List", herein. Materials by other manufacturers approved by the Engineer are acceptable provided that they are established to the satisfaction of the Engineer as being compatible with and of equal quality to the coatings of the existing facilities.

6.7 Materials List - All coating materials shall be of the following grades and brands, or an approved equal, in each case:

P1	Alkyd Primer	Tnemec 4-55 Koppers Primer 622
P2	Alkyd Enamel	Tnemec Series 2H Koppers Rustarmor 500 HB
P3	Fast-Drying Chlorinated Rubber, Synthetic Primer	AWWA Standard C203 Type B (fast-drying)
P4	High-Build, Coal Tar Base T and O Coating	AWWA Standard D102 System No. 6
P5	Coal-Tar Enamel Hot Applied Type	AWWA Standard D102 System No. 5
P6	Coal-Tar Mastic	3MEC-244

Top 16'

BRAND KOPPERS SUPER TANK.

7.0 COATING SCHEDULE FOR RESERVOIRS AND APPURTENANCES

All coatings shall conform to the following schedule of finishes, number of coats, and dry film thickness. All coating materials indicated therein are keyed to the identifying number listed under "Surface Preparation" and the "Materials List", herein.

Item	Surf. Prep.	1st Coat	2nd Coat	3rd Coat	Minimum Total Dry Film Thickness
Interior surfaces of steel tank reservoir floor plates and walls up to a point 8 feet above the bottom of the tank	SP10	P3 max. 4.0 mils	P5 AWWA SYSTEM No 5 - ILLUSTRATED SUPER TANK	--	3/32"
Interior surfaces of steel tank reservoir above a point 8 feet above the bottom of the tank including roof	SP10	P4	P4	--	20 mils
Exterior surfaces of steel tank reservoir	SP6	P1	P2	P2	6 mils
Exterior surfaces of all exposed piping, valves, supports, and Miscellaneous metal work	SP2	P1	P2	P2	6 mils
Miscellaneous buried ferrous surfaces	SP3	P8	P8	--	125 mils

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8.0 PAINT SYSTEM FOR STEEL TANK RESERVOIRS

8.1 General - (a) The work shall include the protective coating of all interior reservoir surfaces, including but not limited to wall, roof, framing, roof plates, columns, floor, interior piping, flanged access manholes, flanged outlets, and shall include all exterior tank surfaces, including roof hatch, overflow pipe, and exterior ladder and cage.

(b) General requirements for the protective coating of the work specified herein are as follows:

1. Reservoir painting shall conform to the applicable requirements of AWWA Standard D102. The application of the primer shall follow immediately after cleaning, and prior to formation of any form of corrosion.

2. Sandblasting and priming shall be completed on any particular area within the period of an 8-hour working day. Any sandblasted area not painted within the 8-hour period shall be resandblasted prior to priming. Primers and finish coatings shall be compatible.

3. Maximum particle size of the abrasive particles used in blast cleaning shall be that which will produce a height profile in accordance with the recommendations of the manufacturer of the protective coating which is to be applied to the surface being cleaned.

4. Field blast cleaning for all surfaces on the tank shall be accomplished by dry sandblasting method.

5. At all times during the blast-cleaning operations, adequate means shall be employed to absolutely insure that existing protective coatings shall not be exposed to abrasion from blast-cleaning operations.

6. The Contractor shall at all times keep the area of his work in a reasonable clean condition, and shall not permit blasting materials to accumulate in an uncontrolled manner such as to constitute a nuisance of hazard to the satisfactory prosecution of the work or the operation of the existing facilities.

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8. Any Coating applied upon improperly prepared surface or edge shall be removed and recoated to the staisfaction of the Engineer at the sole expense of the Contractor.

8. Prior to erection, all interior surfaces, except for bottom floor plates, that will be made inaccessible after erection shall be sandblasted as specified herein and shall receive a prime coat as applicable and as specified hereinafter.

8.2 Interior Surfaces - All interior surfaces of floor plates and walls shall be sandblasted as previously specified, and up to a point 12 feet above the floor of the tank shall be covered with a prime coat of fast drying chlorinated rubber, synthetic primer as specified in the Materials List as P3. The primer shall be applied by spray, brush, or roller at the rate of approximately one gallon to 375 square feet of surface. The primer shall be applied in such a manner as to produce a uniform coat free from drips, runs, thin spots, or floor areas. The work on the floor shall start opposite the manhole and shall proceed toward the point of entry to avoid traffic over the freshly-primed surface. After the primer on the floor has dried sufficiently, it shall be protected from traffic damage by covering it with canvas, drop cloths, or other suitable methods.

8.3 Application of Coal-Tar Enamel - (a) A coating of hot coal-tar enamel shall be applied over the P3 prime coat of the fast-drying, chlorinated rubber, synthetic primer in accordance with the manufacturer's printed instructions, and the applicable requirements of AWWA C203. The primer shall be thoroughly dry and hard before application of the enamel. The enamel shall not be applied over primer which has dried for less than one hour nor more than 14 days. If this maximu drying time is exceeded, a second coat of said primer shall be applied. No surface shall in any case receive more than two coats of primer, nor a thickness of primer greater than 4 mils, dry-film thickness.

(b) All interior surfaces not previously specified to be coated with coal-tar enamel shall receive a high-build, coal-tar base T & O coating as specified in the Materials List as P4 in accordance with the coating schedule specified in Paragraph 8.0, herein.

8.4 Exterior Surfaces - All exterior surfaces except bottom of floor plates shall be blast-cleaned (SP6) and coated with an alkyd prime coat P1 and alkyd enamel finish P2 in accordance with the coating schedule specified in Paragraph 7.0, herein.

8.5 Miscellaneous Buried Ferrous Surfaces - All buried valves, small pipes and other miscellaneous buried ferrous metal surfaces shall be coated with coal-tar mastic shown in Materials List as P6.

9.0 WORKMANSHIP

(a) Skilled craftsmen and experienced supervision shall be used on all work.

(b) Clean drop cloths shall be used. All damage to surfaces resulting from the work hereunder shall be cleaned, repaired, and refinished to the complete satisfaction of the Engineer at no cost to the Owner.

(c) All coatings shall be applied under dry and dust-free conditions and, unless otherwise approved, shall not be applied when the temperature is below 50 degrees F. Coating shall be done in a workmanlike manner so as to produce an even film of uniform thickness. Edges, corners, crevices, and joints shall receive special attention to insure that they have been thoroughly cleaned and that they receive an adequate thickness of paint. The finished surfaces shall be free from runs, drips, ridges, waves, laps, brush marks, and variations in color, texture, and finish. The hiding shall be so complete that the addition of another coat would not increase the hiding. All coats shall be applied so as to produce a film of uniform thickness.

10.0 COATING APPLICATION

10.1 Shop Coating - Fabricated metal work and equipment subject to possible adverse action by moist atmosphere from the immediate vicinity of water surfaces and required to be field coated shall not be shop coated. Any such work delivered to the jobsite with a shop coat shall have this coating removed. Manufactured equipment with baked-enamel factory finishes shall be exempt from this requirement.

10.2 Time of Coating - (a) Sufficient time shall be allowed to elapse between successive coats to permit satisfactory recoating, but, once commenced, the entire coating operation shall be completed without delay. No additional coating of any structure, equipment, or other item designated to be painted shall be undertaken until the previous coating has been completed for the entire structure, piece of equipment, or other item, without specific permission of the Engineer.

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(b) Piping shall not be coated until it has been pressure-tested and approved.

10.3 Thickness of Coating - The mil-thicknesses specified in the "Coating Schedule" shall mean dry-film thicknesses, and shall be achieved and verified for each coat.

10.4 Application of Field-Applied Coatings - Except where in conflict with the manufacturer's printed instructions, or where otherwise specified herein, the Contractor may use brush, roller, air spray, or airless spray application at his option. Rollers for applying enamel shall have a short nap. Areas inaccessible to spray coating shall be coated by brushing or other sutiable means.

11.0 TESTING AND INSPECTION

11.1 General - (a) Thickness of paint and other coatings shall be checked with a non-destructive, magnetic type thickness gage. Except as otherwise provided, testing of coal-tar coatings for steel tank reservoir(s) shall be by an approved spark testing unit. All pinholes shall be marked, repaired in accordance with the manufacturer's recommendations, and retested. No pinholes or other irregularities will be permitted in the final coating.

(b) The Contractor shall furnish and make available for the Engineer's use at all times when painting and coating is being done and until final acceptance of all such coatings, coating inspection devices in good working condition for the detection of holidays and measurement of film thickness of paint and other coatings.

(c) Acceptable devices include Tinker-Rasor low-voltage holiday-detector, Nordson Wet Film Gage No. 790010 for wet-film gaging, and a Microtest Unit for dry-film thickness gaging.

11.2 Steel Tank Coatings - The Contractor shall electrically test all separate interior coating by means of approved electrical flaw detectors. All electrical tests of the coatings shall be made in the presence of the Engineer. All defective coating shall be satisfactorily repaired by the Contractor and the defective coating shall again be electrically tested. The Contractor shall furnish all labor, material, and equipment necessary to accomplish the testing. Coal-tar enamel shall be tested with a high voltage type holiday detector, approximately 67 volts. Exterior coatings shall be checked with a dry-film thickness gage.

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12.0 CLEANUP

Upon completion of the work, staging, scaffolding, and containers shall be removed from the site or destroyed in an approved manner. Paint spots, oil, or stains upon adjacent surfaces shall be removed and the entire job left clean. All damage to surfaces resulting from the work of the Contractor shall be cleaned, repaired, or refinished to the complete satisfaction of the Engineer at no cost to the Owner.

13.0 GUARANTEE AND WARRANTY INSPECTION

All materials and workmanship shall be guaranteed for a period of one year from the date of acceptance of the project. A warranty inspection will be conducted during the eleventh month following acceptance of all reservoir coating and painting work, Contractor's project manager and painting subcontractors superintendant shall attend the inspection. All defective work shall be repaired in accordance with this specification and as directed by the Owner.

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SECTION 7.0

TESTING AND DISINFECTION

1.0 GENERAL

The work of this Section includes all field testing and disinfection of the reservoir, complete, including the furnishing of all tools, equipment, materials, and supplies and for furnishing all labor to complete the work, all in accordance with the requirements of the Contract Documents.

2.0 RESPONSIBILITY

The Contractor shall provide all labor and materials or subcontract services, except water, for testing and disinfection of the reservoir as specified herein. Proposed firms and methods shall be subject to approval by the Engineer and shall be replaced or changed if required.

3.0 RELATED WORK SPECIFIED ELSEWHERE

(a) Shop testing of piping and appurtenances shall be performed in accordance with the requirements specified in the Section to which such work is appurtenant.

(b) Field testing and disinfection, as specified herein, shall be applicable to the work specified in Section 30, "Steel Reservoir and Appurtenances."

4.0 TESTING OF RESERVOIR AND APPURTENANCES

All field testing of the reservoir and appurtenances shall be performed by the Contractor and shall be in accordance with the following requirements.

(a) Inspection shall conform to AWWA Standard D100, Section 11, or Appendix C as appropriate for the material used. A written report certifying the inspection work shall be submitted by the Contractor.

(b) Testing shall be performed in accordance with the requirements of AWWA Standard D100, Section 11 and as specified hereinafter.

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(1) Testing of bottom plates shall be as specified in Section 11.12

(2) Testing of the reservoir shall be in accordance with the sequence of Section 11.13.1.1 The Owner will provide water for filling of the reservoir. All visible joints shall receive final inspection for leakage, and a careful check shall be made for hidden leakage if evidenced by additional water being required to maintain water in the tank at overflow level. All leaks shall be repaired by the Contractor to the satisfaction of the Engineer, and full costs of all repairs and supplemental testing shall be borne by the Contractor.

5.0 FLUSHING AND DISINFECTING

5.1 Disinfection of Steel Reservoirs and Appurtenances - The Contractor shall disinfect the reservoir in accordance with AWWA Standard D105-80.

4.2 Protection of Personnel - (a) The Contractor shall not allow any person to enter or remain an any area where the concentration of chlorine vapor in the air is in excess of one part per million without respiratory protective equipment, as required by Cal/OSHA Safety Orders of the State of California, Department of Industrial Relations. All work of disinfection of the tank and connecting lines shall conform to the applicable requirements of the General Industry Safety Orders.

(b) The Contractor shall provide respiratory protective equipment for all persons subject to such exposure, which equipment shall be as approved by the U.S. Bureau of Mines as specified in said General Industry Safety Orders.

(c) The crew size shall be such that one workman with spare protective equipment is immediately available for rescue work, exclusive of the equipment operators.

THREE GUYS PAINTING

Tower, Tank and Bridge Coatings

September 18, 1981

Mr. Jerry Thompson
American Bridge - Division of
U. S. Steel
P. O. Box11925
Fresno, California 93775

Re: San Bernardino Welded Steel Reservoirs.
American Bridge Contract NO. K - 9515.

Dear Mr. Thompson:

We are listing below the products we propose to use on the above-referenced reservoirs as per specification Section 6, Material List 6.7:

AREA	TYPE PRODUCT	MANUFACTURER
P 1	Alkyd Primer	Tnemec - 4-55
P 2	Alkyd Enamel	Tnemec - Series 2-H
P 3	Chlorinated Rubber	Koppers Jet-Set
P 4	High Build Coal Tar T and O	Tnemec 46-465
P 5	Coal Tar, Hot Applied	Koppers - B-70

We are enclosing three color charts for the finish color selection by the district. If the colors on these charts are not acceptable, please advise the colors selected by the District.

Sincerely,
THREE GUYS PAINTING

George Ardizzone

ga:os
enclosure

ENGINEER'S REVIEW OF SHOP DRAWINGS

- NO EXCEPTIONS TAKEN ☑
- MAKE CORRECTIONS NOTED ☐
- REVISE AND RESUBMIT ☐
- REJECTED ☐

CHECKING ONLY FOR CONFORMANCE WITH THE DESIGN CONCEPT AND COMPLIANCE WITH THE CONTRACT DOCUMENTS.

BY ARC DATE 10-1-81

JOHN EGAN AND ASSOCIATES

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P.O. Box 1291, Fallbrook CA 92028 (714) 728-8587 Contractor Lic. 286825

Mike Lowe

7/28	1595	ZONE COMPLETE
5/ [illegible]	1513	ZONE COMPLETE
6/9		FINISHED MOUNTAIN
6/22		DISINFECT MOUNTAIN
6/23	1515	DISINFECT
7/14	1720	COMPLETE
7/26	2100	COMPLETE

completed cuttings

ALL-J ENTERPRISES

(714) 891-9383
892-0071

RICHARD H. JONES
Manufacturers Representative

March 1,1982

Mr.Mike Lowe
Painting Supervisor
City of San Bernardino
P.O.Box 710
San bernardino,Ca.92403

Inspection Report

Mountain Reservoir 2M.G. 120'x24' built in 1964 buy Western Steel.

COATING: Vinyl System; Interior Roof

CONDITION: Most of the roof plates have started rusting. Nearly all irrigular surfaces have started to rust these include, edges of all roof plates, rafters, ring girders, and earthquake rods. Some coating remains,however, rust is undercutting it badly.

RECOMMONDATION: Sand blast to (SSPC-SP10) Near White Metal all rusting areas, this includes ring girder and support columns. ~40%

Brush-off Blast Cleaning (SSPC-SP7) remainder of roof structure to remove all detrimental foreign matter to degree specified. ~60%

APPLICATION: Apply two or more coats of KOPPERS SUPER TANK SOLUTION to a dry film thickness of not less than 18 mils.

UPPER SHELL 16': Vinyl System

CONDITION: Heavy blistering in the fluctuating zone, minor blistering throughout remainder of shell.

RECOMMONDATION: Sand blast to (SSPC-SP10) Near White Metal all rusting or failing surfaces.

Brush-off Blast Cleaning (SSPC-SP7) remainder of shell.

OFFICES 11942 ARTHUR, DR. ANAHEIM, CA 92804

APPLICATION: Apply two or more coats of KOPPERS SUPER TANK SOLUTION to a dry film thickness of not less than 16 mils.

SHELL LOWER 8' Hot Applied Coal Tar Enamel

CONDITION: Due to depth of water, unable to properly inspect at this time.

RECOMMONDATION: Sandblast to (SSPC-SP10) any rusting or failing area.

Brush-off Blast Cleaning (SSPC-SP7) remainder of ring to remove all detrimental foreign matter to degree specified.

APPLICATION: Apply two or more coats of KOPPERS SUPER TANK SOLUTION to a dry film thickness of not less than 16 mils.

FLOOR: Hot Applied Coal Tar Enamel

CONDITION: Due to depth of water, unable to properly inspect at this time.

RECOMMONDATION: This area would recieve the same recommondation and application as the lower 8' of shell providing the condition of the coating is the same.

Mountain cont.

The following is the approximate figures to be used as a guide for square footage and amount of coating materials.

120'x 2-'

ROOF: 13662 sq.ft.

SHELL: 9050 " "

FLOOR: 11310 " "

MISC.: 1000 " "

TOTAL: 40,022 " "

MATERIAL

ROOF: 405 Gallons

SHELL: 175 "

FLOOR: 225 "

MISC.: 20 "

TOTAL 825 "

COST OF MATERIAL

$9.40 per gallon in Drums

15 Drums KOPPERS SUPER TANK SOLUTION _____ $7755.00

2 Drums KOPPERS 2000C THINNER _____ $525.25

Tax _____ $496.82

TOTAL _____ $8777.07

Thank you for the opportunity working with you and furnishing the materials for this job. Should you have any questions regarding these materials please contact me at (714)891-9383.

Very truly yours

Dick

Richard H.Jones
ALL-J Enterprises

RESERVOIRS - CITY OF SAN BERNARDINO MUNICIPAL WATER DEPT.

NO.	NAME OF RESERVOIR	TYPE OF TANK	TANK DIAMETER	HEIGHT	GAL. CAPACITY	OVERFLOW ELEVATION	MAP NO.
1.	ANTIL PLANT	CONCRETE with IRON ROOF	73' x 43.4'	11.8'	258,000	1053.0'	A-17
2.	COLLEGE/DC. 2	STEEL	120'	32'	2,580,000	1720.0'	U-40
3.	DEL ROSA 1.	STEEL	48'	36'	460,000	1513.0'	F-11
4.	DEL ROSA 2.	STEEL	44'	18'	190,000	1513.0'	P-26
5.	ELECTRIC DR.	CONCRETE with GALV ROOF	34' x 204'	22'	8,000,000	1415.0'	N-11
6.	GILBERT PL.	CONCRETE with WOOD ROOF	47' x 27'	13'	108,000	1130.0'	E-17
7.	LYNWOOD PL.	CONCRETE with WOOD ROOF	64'	10'	223,000	1234.5'	I-37
8	LYTLE CR. 1.	CONCRETE GALVANIZED ROOF	200' x 195'	8.2'	3,500,000	1311.0'	A-14
9	LYTLE CR. 2.	CONCRETE	294' x 214'	16'	7,500,000	1247.83'	E-28
10	MILL & D PL.	CONCRETE IRON ROOF	100' x 50'	12'	437,200	1003.0'	J-19
11.	MTN. RES. 2.	CONCRETE WOOD ROOF	64'	10'	223,000	1633.0'	H-25
12.	MTN. RES. 1.	STEEL	120'	24'	2,000,000	1633.0'	U-30
13.	NEWMARK 2.	CONCRETE	294' x 214'	16'	2,500,000	1416.0'	U-14
14	NEWMARK 3	CONCRETE	214' x 214'	16'	5,500,000	1416.0'	K-10
15	NEWMARK 4	CONCRETE	294' x 254'	16'	8,900,000	1416.0'	Z-27
16.	19th ST. PL.	CONCRETE IRON ROOF	72' x 42.4'	13'	258,000	1241.0'	C-12
17.	N. "E" ST. PL.	CONCRETE WOOD ROOF	50'	10'	122,000	1198.0'	H-26
18	PERRIS HILL PL.	CONCRETE W/ALUMINUM ROOF	95' x 51.4'	13'	407,000	1311.0'	B-8
19.	P.H. RES.	CONCRETE	340' x 150'	30'	10,000,000	1177.0'	T-38
20.	QUAIL CYN. 1.	STEEL	20'	18'	40,000	1776.0'	M-26
21.	QUAIL CYN. 2.	STEEL	20'	18'	40,000	1776.0'	M-26
22	QUAIL (DALEY)	CONCRETE	114' x 94'	16'	1,250,000	2101.75'	AA-11
23	RIDGEVIEW	STEEL	50'	24'	330,000	1724 ~~1875.0'~~	U-21
24	7th ST. RES.	CONCRETE	48'	10'	101,000	1151.0'	N-40
25	17th & SIERRA W.	CONCRETE	45' x 27'	13.6'	108,500	1064.0'	H-16
26	SHANDIN HILLS	CONCRETE IRON ROOF	50' x 50'	12'	219,000	1612.0'	J-18
27	SYCAMORE 1.	STEEL	105'	40'	2,500,000	1580.0'	R-25
28	SYCAMORE 2.	STEEL	50'	32'	448,000	1580.0'	U-39
29	TERRACE 2.	STEEL	76'	36'	1,160,000	1249.0'	T-8
30	TERRACE 3.	STEEL	80'	36'	1,285,000	1312.0'	K-29
31	TERRACE ELEVATED	STEEL	28'	25'	100,000	1383.0'	P-29
32	30th & MT. VIEW PL.	CONCRETE TILE ROOF	40' x 25'	13.6'	97,200	1415.0'	K-6
33	27th & ACACIA PL.	CONCRETE	28' x 15.4'	13'	247,400	1192.0'	N-30
34	WATERMAN	CONCRETE	354' x 234'	16'	10,000,000	1249.0'	D-28
35.	MEYERS CYN.	STEEL	38'	24'	210,000	2090.0'	SPEC'S -881
36	DEVIL CYN. RES.	CONCRETE METAL ROOF	76' x 42'	11'	220,000	1880.0'	E-19
37	DEVORE	STEEL	122'	24'	2,000,000	2100.0'	E-39
38.	WATER UTIL.	STEEL	166'	32'	5,000,000	1916.5'	E-39
39	PALM AVE	STEEL	192'	24'	5,000,000	1720.0'	E-39
40.	DEL ROSA 3	STEEL	130'	32'	3,000,000	1513.0'	E-39

Exhibit 21

SAN BERNARDINO MUNICIPAL WATER DEPARTMENT

Inter-Departmental Correspondence

DATE: October 18, 1982

TO: Herbert B. Wessel

FROM: Joseph F. Stejskal

SUBJECT: PAINT REQUIRED FOR SYCAMORE #1 STEEL RESERVOIR

To recoat the interior of the Sycamore #1 Steel Reservoir, we will need approximately 780 gallons of paint @ $18.00 per gallon which computes to approximately $14,000 not including tax.

Your consideration will be appreciated.

Respectfully,

Joseph F. Stejskal
Director-Engineering
Construction-Maintenance

JFS:eg
cc: J. Bocanegra
P. Squires

DEFENDANTS' EXHIBIT 545 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-10-99
WITNESS: STEJSKAL, V.II

United States Summary Judgment Motion, Ex. 21, Page 182

545 CITY01002

K7540-L 3M-4-74 BARCO DIV. STATIONERS CORP.

Exhibit 22

SAN BERNARDINO MUNICIPAL WATER DEPARTMENT

Inter-Departmental Correspondence

November 9, 1982

TO: Herbert B. Wessel

FROM: Joseph F. Stejskal

SUBJECT: MOUNTAIN RESERVOIR OVERFLOW

I spoke with Larry Cox concerning the high water overflow that occurred Thursday evening at the Mountain Reservoir. Larry stated that they were refilling the reservoir after aerating it for a 30-day period to aid the evaporation process following recoating the reservoir.

Joe Perez put the Mountain Boosters on hand at 3:00 p.m. to fill the reservoir and forgot to tell the duty operator. According to our level charts, the reservoir started to overflow at approximately 11:00 p.m. At 11:30 p.m., we were notified by the answering service and the boosters were returned to automatic at 12:00 midnight.

Larry Cox has discussed the incident with Joe Perez and gave him a verbal warning. Larry assures me that Joe Perez is an exceptionally loyal and talented employee, but at times tends to be foregetful. Larry has instructed Joe to keep a daily log of key activities performed and to go over the check list log each evening prior to quitting time. If Joe follows this procedure, it should eliminate any future recurrences of this nature.

Respectfully,

Joseph F. Stejskal
Director-Engineering
Construction-Maintenance

JFS:eg
cc: L. Cox

DEFENDANTS' EXHIBIT 546 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-10-99
WITNESS: STEJSKAL, V.II

United States Summary Judgment Motion, Ex. 22, Page 183

CITY00990

546

75 3/70

Exhibit 23

File - Tank Coatings

Inspecting, painting, and maintaining steel water tanks

DEFENDANTS' EXHIBIT 559 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-16-99
WITNESS: HARPER, V.I

William B. Harper

Water tanks require periodic inspection for signs of deteriorating paint coatings and regular maintenance of exterior and interior finishes. Dark exterior colors appear to degenerate faster than lighter colors and also cause more problems with interior coatings because of solar heat absorption. Methods of inspection are described as are procedures for repainting and recoating tanks.

Coating and painting water tanks is often assigned a relatively low priority by water utilities during construction and subsequent maintenance operations. A study of a typical construction schedule for a project would show the importance of painting and coating. This article is based on 25 years of experience with water tank coatings and on data gathered by inspecting 400–500 steel water tanks throughout the United States during the past eight years. Coating and painting generates almost as many concerns and problems as all the other items in a project combined. This article highlights methods that can be used to place coating and painting water tanks in proper perspective.

Most of the tanks inspected during the past eight years were located in the southwestern United States; a limited number were located in the Midwest and Northwest. Environments ranged from coastal to mountain to desert with temperature ranges of -18°C to 52°C (0°F to 125°F). Most were located in semiarid climates, but many were located in regions where they were subjected to snow, rain, and other severe weather conditions.

Capacities of the tanks ranged from 189 kL to 30 ML (50 000 gal to 8 mil gal) with the majority falling within the 1.8 to 3.7 ML (500 000 gal to 1 mil gal) capacity range. Most were constructed of welded carbon steel, although a number of water service tanks were API bolted tanks. A minimal number were of riveted construction.

Although most states and AWWA D102-78, Standard for Painting Steel Water-Storage Tanks recommend or require a one-year warranty period for all coating and painting work, it is interesting to note that less than 20 percent of this great number of tanks had been inspected while under warranty. In fact, most of the tanks had had no maintenance since initial coating—periods varying from one year to more than 20 years. In cases in which maintenance had been performed, it was generally inadequate to protect the tank sufficiently for a prolonged period of time.

Interior inspections

Methods of inspecting interior surfaces of tanks included floating on a raft with the water level ranging from four to eight feet from maximum, observing the interior from the inside ladder with the water level sufficiently lowered to enable a cursory inspection, and draining the tank so that an inspection could be made from the floor and from a rolling scaffold. Lighting ranged from a combination of natural light and hand-held lanterns to high-powered auxiliary lights.

Coating and paint systems on interior surfaces included coal-tar enamel, coal-tar cutbacks, coal-tar epoxies, epoxies, vinyls, chlorinated rubbers, asphalt cutbacks, asphalt emulsions, phenolics, metallizing, and a number of unidentifiable systems.

None of the tanks inspected had experienced icing conditions; consequently, this phenomenon is not considered. Specific local conditions should determine any program of inspection, painting, or maintenance.

For understanding the scope of the inspections performed and the procedures used for inspecting interior surfaces, four physical areas are discussed: (1) the underside of roof plates and roof structural members, including everything above the top of the shell, (2) the shell, (3) the columns, piping, ladder, and other appurtenances located between the level of the floor and the roof, and (4) the floor.

Underside of roof plates. Generally, unless there was a complete failure of the total roof area, plate surfaces on the roof showed only spot failure with general failure occurring at the plate lap seams. Rafters failed in varying degrees with considerable corrosion of the ends of rafters, nuts and bolts, and the tops of the bottom flanges. Many areas around screened vents or cupolas were severely corroded because of the passage of moist air. Of the various types of coatings used on these surfaces, coal-tar cutback coatings showed failure after prolonged exposure because of the effects of heat. The principal reason for this kind of failure was the color selected for the exterior.

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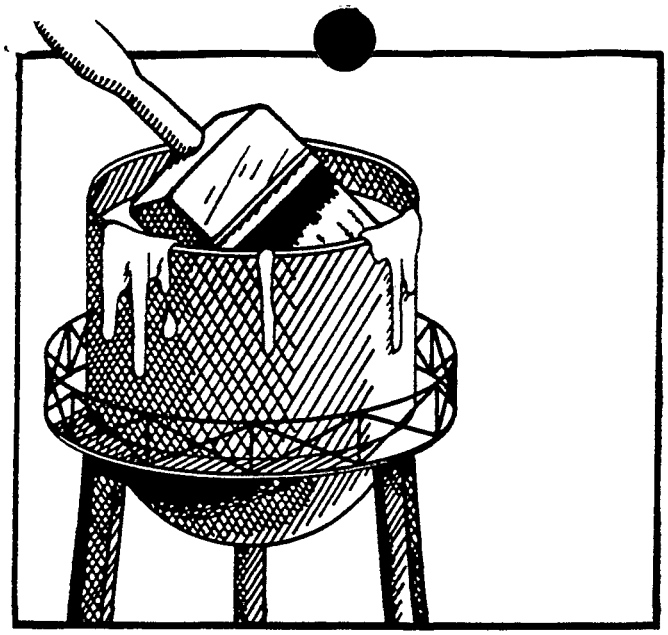

When properly selected and applied under critical inspection conditions, epoxies and vinyls withstood a greater range of temperatures and because of this were generally more economical than coal-tar cutbacks.

Shell. The shell surfaces of tanks showed a decided difference in the longevity of the surfaces that were constantly submerged compared with those that were intermittently submerged. Generally, the coatings that were constantly submerged showed considerably less failure than did the higher areas. Intermittently submerged areas exhibited minor failures such as alligatoring, checking or cracking, or extensive failures such as blistering or disbondment. Beyond doubt, these are the most critical regions in tanks, and special care should be taken to ensure that they are totally protected.

Columns and other appurtenances. Coatings on columns and other appurtenances failed depending on the configuration of the columns, the pipes, or the ladders. For instance, structural columns showed greater failure than did pipe columns because of areas where 90-degree angles occurred or, where columns were welded, continuous welds were not maintained.

Major problem areas on piping were found in brackets that attach piping to the shell. In many cases, the area of the pipe closest to the shell exhibited total coating failure. Lack of coating or insufficient thickness of coating was caused by the painter's being too near the surface to use correct spraying techniques.

The structural configuration of ladders causes coating problems. Ladders should be made of noncarbon steel to forestall corrosion or should be replaced frequently.

Floors. Many floor surface coating failures were caused by neglecting to repair mechanical damage to the coating during maintenance operations. Other failures were caused by not performing electrical continuity tests when the coating was applied. However, most failures resulted from contamination on the floor at the time of application; for example, sand and dust from blast cleaning were not removed completely and the coating was applied over these contaminants, causing an impaired bond.

Corrosion was more severe on floor surfaces than in any other area of the tanks. Some tank bottoms were replaced with new steel plates: some were repaired structurally by welding plates over perforations and pitted areas; some were coated with fiberglass-reinforced plastic; and others were recoated with a standard coating. The depth and extent of corroded areas determined the system used to remedy the problem.

Interiors. When defective coatings are repaired, it is mandatory that all defective coating be removed by abrasive blast cleaning to near-white metal. Preparing the surface for minor repairs can be done by hand or by power tool cleaning. If only spot repair is done, feathering the edges is necessary to avoid undercutting or curling the existing finish.

The application of coatings should be monitored to ensure correct mixing of materials (especially critical with multicomponent coatings), to ensure correct application techniques, and to attain the specified dry film thickness. When recoating is complete, electrical flaw detection techniques should be used to ensure that the finish coating is free of voids, pinholes, or other defects. Electrical detection used on all interior surfaces, including areas above the water level, is a sound economic practice and cheap insurance.

No specific interior coating system is recommended. The selection should be made by considering factors such as service histories, availability of an applicator and a product, and ease of maintenance. The cost of coating or paint material should never be the sole deciding factor.

Cathodic protection, when used in conjunction with a good interior coating system, affords additional safeguards for immersed areas. There is some difference of opinion about the type of cathodic system to use and the proper intervals for installing a system. Each organization should obtain the services of qualified staff members or outside corrosion consultants to evaluate requirements for cathodic protection.

Exterior inspections

Exterior lower shell surfaces were inspected from ground level. Areas of the shell adjacent to ladders were inspected from ladders. Roof surfaces were inspected by traversing the roof.

Exterior coatings were usually alkyd primers and topcoats, but tanks erected or repainted recently were apt to be coated with epoxies, urethanes, vinyls, or chlorinated rubbers. The exterior surfaces of most of the tanks inspected were in good to excellent condition. The major problems resulted from excessive chalking because of age, from graffiti, or from physical damage caused by vandalism or by work crews. A limited number of coatings failed because an insufficient paint film was applied initially or simply because the life expectancy of the paint had been exceeded. These failures were usually on roof surfaces and on shell surfaces exposed to the most severe weather environments, e.g., prevailing winds.

The most common reason for repainting exteriors of tanks was aesthetic. Most of the tanks had been coated with standard alkyd, resulting in excessive chalking after a service life of five or more years. Silicone alkyds maintain color fastness better than conventional alkyd

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systems. The additional cost of silicone alkyd finishes is minimal compared with the cost of standard alkyds. Where severe conditions exist, urethane finishes offer the ultimate for color and gloss retention. However, unless color and gloss retention are overriding considerations, the added expense is difficult to justify for normal environmental conditions.

In more severe environments, vinyls, chlorinated rubbers, urethanes, or other alternatives to alkyds should be considered, although alkyd finishes suffice for most applications.

When repainting tank exteriors, it is mandatory to wash the surface first with a chemical solution to remove dirt, dust, long-term oxidation, and other surface contaminants. The most economical and efficient way to do this is to apply a mixture of trisodium phosphate and water to the surface and to scrub the surface with a stiff-bristled broom. There are many commercial ready-mixed cleaners available that perform satisfactorily, but the main consideration should be to use a chemical that will cut through and remove oxidation and will not leave a grease film or residue on the surface.

Washing with a solvent is ineffective since it merely moves the products of oxidation from one area to another. Solvents may also leave a greasy residue on the tank that could interfere with adhesion of the coating.

After washing is completed, surfaces showing defects should be cleaned by abrasive blast cleaning, power tool cleaning, or by hand cleaning. If inspection indicates the paint will require extensive replacement, existing paint should be removed completely by abrasive blast cleaning to ensure long-term service from the new finish.

If spot cleaning is specified, it is necessary to remove the finish to the base metal only in defective areas. Areas cleaned to base metal should then be feathered to allow a smooth transition from old to new paint. Feathering will also eliminate visible defects in the previous film and give an aesthetically pleasing finish. Areas stripped to base metal during remedial cleaning require sufficient primer and intermediate coats to obtain the minimum dry film thickness specified originally. The surface should then be covered with one coat of finish so that high and low spots will not be produced. If there is any doubt that one finish coat will cover the existing finish completely and adequately, two finish coats should be specified.

Color selection. Color selection is now a major consideration. The desire to blend a water structure with its environment should always be tempered by considering the role color plays in the service life of interior coatings located above the minimum water level, i.e., on the underside of the roof and on the upper shell. Water tanks painted with dark colors such as sage green or cypress green have reflectivity ratings in the 40s, indicating heat absorption ratings of more than 50 percent. In other words, these colors absorb more of the sun's rays than they reflect, resulting in premature embrittling in the internal coatings on the underside of the roof and in the zones of fluctuating water levels.

For example, two tanks, located within a few miles of each other, were inspected. The tanks were the same age, and the interior coatings were the same. However, different colors had been chosen for the exterior—one light-colored and the other darker. The darker one showed extensive failure of the interior coating whereas the lighter one showed only minor failure.

Shading or shielding tank exteriors also contributes directly to the longevity of interior coatings. In some tanks showing almost total coating failure because of dark exterior colors, small interior areas were in excellent condition if they had been shielded by trees or tank appurtenances.

To summarize, color selection should be based on reflectivity ratings above 50 percent to give maximum protection of interior coatings. Where possible, high priority should also be given to planting trees or erecting architectural shielding structures. Selection of exterior colors is therefore one of the most important factors in coating and painting tanks. The cost of repairing a failed finish system at today's prices justifies careful consideration of the economic role of color selection.

Maintenance

Most water utilities' maintenance programs indicate that tank painting is either inadequate or ignored. It is usually performed on an emergency basis when someone in authority notices the deplorable condition of a tank and orders immediate action. A few suggestions could help improve painting maintenance programs.

First, every water organization, large or small, should inspect all tanks periodically. The first step to take after the tank has been painted or repainted is to enforce the warranty provisions of the contract. The owner can have all the coating in top condition at no cost. However, warranty inspections must occur within the stated warranty period unless otherwise agreed to by the contractor. Many thousands of dollars of maintenance funds have been expended unnecessarily by warranty inspections being performed one day too late.

Second, after completion of warranty repairs, periodic inspections should be scheduled, preferably on a cycle of three years or less. Remedial measures at that time should be minor, enabling maintenance personnel to perform the required work at minimal expense.

Third, good records of inspections and remedial work should be maintained to monitor the status of coating and paint. When remedial work exceeds the capabilities of maintenance personnel, a qualified firm should be hired to inspect the tank and to plan repairs and repainting by a qualified contractor.

Conclusion

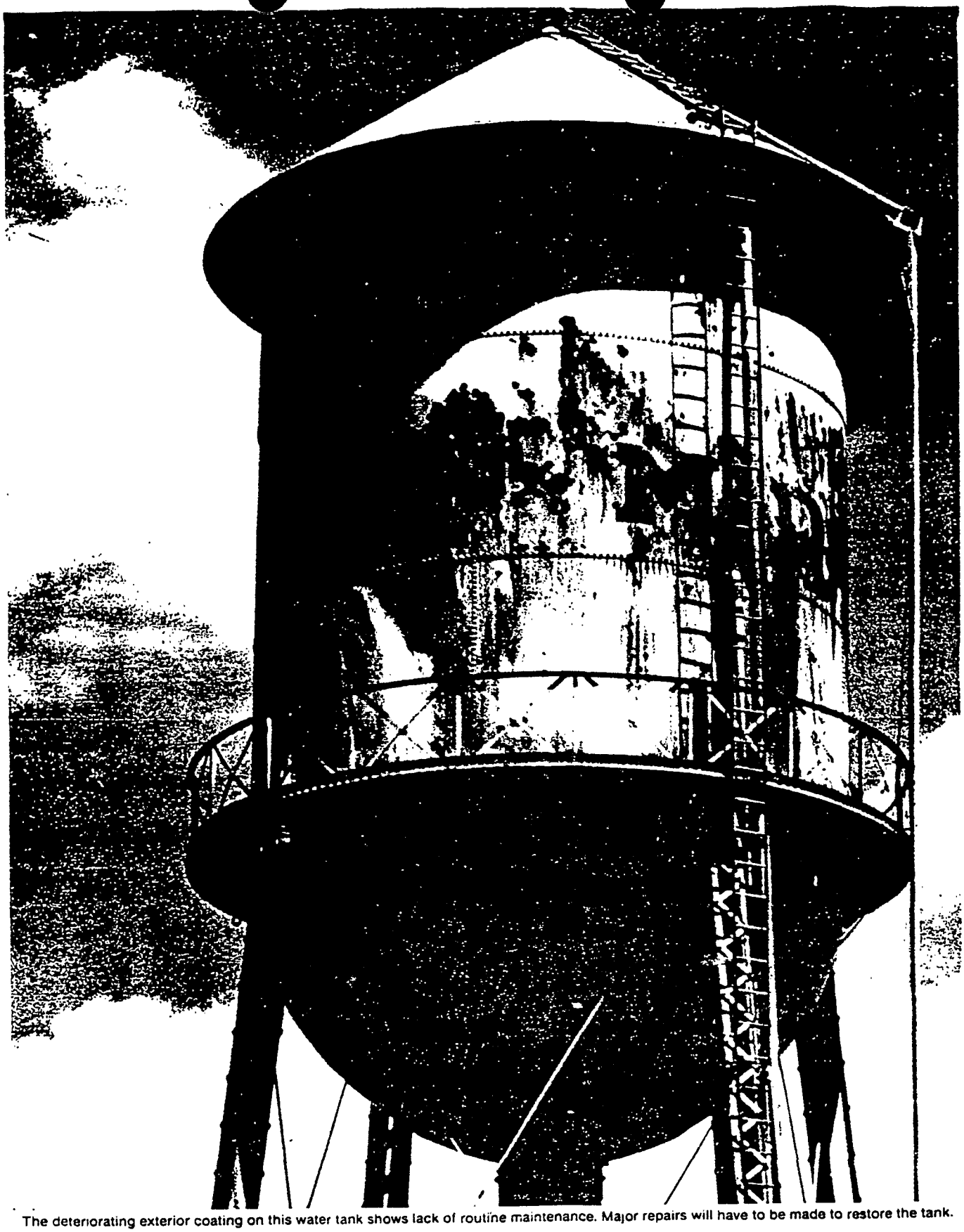
Tank coating and painting need not present problems that seem to be unending and insurmountable. A well-planned program of inspection, painting, and maintenance is within reach of every water organization since professional assistance is available from a variety of sources. Awareness of the problem and initiation of a plan of remedial action will lead to many years of trouble-free operation of steel water tanks.

Acknowledgment

The author thanks M.L. Bowden, western region coatings sales manager of Koppers Co., Inc., Los Angeles, Calif., for assisting with tank inspections and reports.

William B. Harper is president of Harper and Associates, Inc., P.O. Box 7518, Riverside, CA 92513.

United States Summary Judgment Motion, Ex. 23, Page 186



The deteriorating exterior coating on this water tank shows lack of routine maintenance. Major repairs will have to be made to restore the tank.

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Exhibit 24

SAN BERNARDINO MUNICIPAL WATER DEPARTMENT

Inter-Departmental Correspondence

December 6, 1982

TO: Herbert B. Wessel

FROM: Joseph F. Stejskal

SUBJECT: MOUNTAIN RESERVOIR

At approximately 6:30 a.m. on Saturday, December 4, 1982, the Mountain Reservoir system went dry. Shortly after 7:30 a.m., Bill Schroeder placed the Mountain Boosters on hand and started to refill the Reservoir. What caused the outage is as follows:

> The Reservoir level was set at 12' - 6' to facilitate the aeriation of the new coating to reduce the TCE level in the water. This was done at Bill Gedney's request.
>
> Apparently, the recent winds and rain blew a cover off of an electrical connection on the tank exposing the electrical connectors resulting in a corroded connector; therefore, boosters did not receive the "on" signal. Sonitrol has both audio and visual signals for reservoir alarms but according to Larry, they stated that they missed the "low level" alarm because their buzzer was not working.
>
> Bill and Frank Gamboa had the system bled and everyone back in normal service by 10:00 a.m. Larry Cox repaired the electrical problem and was in contact with employees of Sonitrol that same day.

Larry and Joe B. have decided to raise the float levels by 10'+- to afford us greater storage capacity in that system.

Respectfully,

Joseph F. Stejskal

Joseph F. Stejskal
Director-Engineering
Construction-Maintenance

DEFENDANTS' EXHIBIT 547 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-10-99
WITNESS: STEJSKAL

United States Summary Judgment Motion, Ex. 24, Page 188

JFS:eg
cc: J. Bocanegra
L. Cox
P. Squires

CITY00961

547

75 8/79

Exhibit 25

Department of Health Services

Memorandum

To : John M. Gaston, Chief
Sanitary Engineering Branch

Date : January 12, 1983

Subject: Coal Tar Interior Coatings in Potable Water Tanks

From : Joe Como JPC
Sanitary Engineering Branch

Coal tar coatings have been used for corrosion protection in public water systems since 1912. Coal tar coating are made with a combination of coal tar pitch and other materials to give desired properties for a particular use. The pitch improves the qualities of good adhesion and water impermeability.

Coal tar is obtained by destructive distillation of bituminous coal. The tar is recovered from coke oven gas by partial condensation. The tar can be further processed by fractional distillation to yield tar acids, tar bases, naphthalene, and creosote oil. The residue remaining after distillation is commonly referred to as pitch. It is dark brown to black in color and may range from a sticky mass to brittle solid. Most coal tar pitches melt between 60° and 70°C.

Coal tar pitch itself is generally not suitable as a protective coating for metal work. It softens when exposed to the sun in warm weather. At tempertures below freezing, it becomes brittle and may crack or separate from the metal surface. Flowing water will produce ripples in the coating, creating thin spots that reduce its protective capacity.

There are generally two types of coal tar coatings, hot applied and cold applied. The hot applied coating is formulated as an enamel by combining coal tar pitch with coal, coal tar base oil and talc (up to 30% by weight). The cold applied coal tars are a combination of coal tar pitch with suitable organic solvents. The solvents are usually aromatics like xylene or toluene and/or an alkene like tetrachloroethylene (PCE). The cold applied coal tar systems include cold applied coal tar paint, cold applied tasteless and odorless coal tar paint, coal tar epoxy, coal tar urethane, and coal tar emulsion.

The coal applied coal tar is easier to apply than the hot applied coal tar enamel because it can be brushed or sprayed on at ambient temperature. The paint exhibits thixotropic properties (gel that can be liquified by shaking) and can be applied in a thick film of approximately 20 mils without sagging or running. It will shrink and crack if exposed to direct sunlight and will be damaged by ice.

OTHER COAL TAR SYSTEMS:

Coal Tar Epoxy Paint

This is a two component paint which uses a polyamide resin and an aromatic

catalyst as a curing agent. One component of the paint contains a refined coal tar pitch, resin, polyamine catalyst, a mineral filler, a gelling agent, and a volatile thinner. The second component of the paint system is a liquid type epoxy resin which is mixed with the first component just prior to application. The mixed paint contains approximately 75% by volume of nonvolatile film forming solids. Each coat will give a dry film thickness of approximately 8 mils. Coal tar epoxy resin paints cure as a hard film and the service life is in excess of 20 years. Coal tar epoxies chalk when exposed to sunlight.

Coal Tar Urethane Paints

Coal tar pitch can also be combined with polyurethane to make a coating having properties similar to coal tar epoxy paints. The coatings can be formulated for fast or slow drying, to give a hard, flexible, or soft film, and for ability to resist chemical attack. Single component coatings can be prepared that cure by oxidation or by reaction with atmospheric moisture. Two component coatings can be prepared that use a catalyst to cure in a manner similar to epoxy paints. The abrasion resistance, hardness, and impact resistance of urethane is considered to be outstanding.

Coal Tar Emulsion Paint

These are basically the same as cold applied coal tar paints except that water is used as a vehicle instead of organic solvents. Coal tar pitch, a mineral filler such as magnesium silicate, and rust inhibitor such as zinc oxide are suspended in water. They adhere satisfactorily to damp surfaces and are reported to be practically odorless. The Bureau of Reclamation has found them to be less watertight than solvent based paints.

NON COAL TAR SYSTEMS:

Epoxy Paint

The chemical names have been changed to protect the innocent but this is basically the same as a coal tar epoxy without the coal tar. They also contain an organic solvent.

Vinyl Paint

Vinyls are inert in water and provide a hard, tough, smooth film with low moisture absorption properties. The AWWA Standards (D102-78) include two interior vinyl paint systems. One is a five-coat vinyl system. The other is a four-coat system based on a high solids vinyl resin. The five-coat system consists of a primer of zinc chromate, vinyl butyral wash coat and four coats of a vinyl resin paint. The four-coat system is a high solids vinyl formulation developed by the Bureau of Reclamation. Total film thickness is 5 mils.

Wax Coatings

Found in the AWWA Standard D102-64 but deleted from the revision D102-78. These are hot and cold applied wax systems. Both are blends of petroleum waxes and oils containing corrosion inhibitors.

Chlorinated Rubber

Chlorinated rubber is made by exposing natural rubber to chlorine gas until it contains approx. 67% chlorine. The resultant resin is hard and brittle and must be plasticized with other resins or with linseed oil or alkyd resin. High build systems are formulated to allow a 5-6 mil dry thickness using three coats.

Metallic Sprayed Zinc

This is 99.9% pure zinc that has been melted, atomized in high pressure air, and blown onto the steel surface as a 10 mil coating. It provides long service life and freedom from rust. This coating is relatively expensive.

Asphalt Based Linings

Asphalt is a term used to describe a variety of dark resinous materials; some are natural and some are by-products of petroleum cracking or distillation. Standards for asphalt coatings and linings customarily specify petroleum asphalt.

Asphalt and asphalt enamels show less resistance to water absorption than coal tar enamels and pitches. They exhibit a rapid increase in water absorption with time whereas the water absorption curve for coal tar enamel does not increase with time. For this reason, asphalt coatings are not widely used as a protective lining for new steel water tanks or pipelines. The AWWA does not include asphalt coatings in their standards for lining water pipelines or storage tanks. They are used as a seal coat over cement mortar linings in cast iron and ductile iron pipe. In this service the coating serves primarily as a seal to retain the moisture in the cement long enough to effect proper curing.

Compounds Identified in Potable Water and Attributed to the Use of Coal Tar Linings

Coal tar includes a number of toxic substances listed as priority pollutants by the Environmental Protection Agency. Elevated concentrations of polycyclic aromatic hydrocarbons (PAHs) were found in the effluent of a storage tank coated with coal tar (Alben, K. Environ. Sci. Technol. 1980, 14 468-470). From a storage tank in New York State Alben found PAH conc. increasing 5-30X from influent to effluent. One PAH, fluoranthene, is among the six PAHs designated by the World Health Organization to indicate a health hazard from contamination of drinking water. With respect to this standard the levels of fluoranthene and other PAHs are considered significant. The results corroborate analyses by EPA of leachate from a storage tank in Pascagoula Mississippi which was precipitated by repeated taste and odor complaints after the coating, Koppers Super Tank, had been applied. The tank was drained and filled 4 times and there were taste and odor complaints and unacceptable bacteria counts after the first three times. Eighteen compounds were identified in the first samples, obtained approximately 5 months after the coating was applied (see table 5-1)

Authorities for Water Tank Coatings

1) EPA maintains a list of approved internal tank coatings which is based on a

TABLE 5-1

ESTIMATED CONCENTRATIONS OF COMPOUNDS DETECTED IN THE WATER IN THE BAYOU CASSOTTE GROUND STORAGE WATER TANK USING GAS CHROMATOGRAPHY/MASS SPECTROMETRY

Compound	Sample Date and Concentration (μg/l)				
	9/6/77		1/16/78	2/21/78	
	A	B	A	A	B
naphthalene	5.4	6.7		1.3	2.7
methyl naphthalene	0.75	1.4	0.63	<1	1.3
biphenyl	0.21	0.40		<1	<1
acenaphthene	2.8	4.6	1.3	3.1	8.0
dibenzofuran	3.1	5.0	1.1	2.3	6.3
fluorene	3.4	5.1	1.5	2.9	8.0
phenanthrene/anthracene	8.7	9.3	4.5	14	35
carbazole	0.70	1.3	0.44	3.9	11
bromoform	<10	<10	<10		
C_4 alkylchlorobenzene	<50	<50	<50	2.7	7.3
indene	<10	<10			
C_3 alkylbenzene	<10	<10			
anthraquinone	<10	<10	<10	2.3	8.3
methyl benzofuran	<10	<10		<1	1.0
quinoline	<10	<10		<1	<1
methyl styrene/indan/indene	<10	<10		1.7	2.6
methylene phenanthrene/methyl phenathrene	<10	<10	<10	1.2	4.0
pyrene	<10	<10	<10	2.2	7.0
2,5-diethyltetrahydrofuran			11		
dimethyl naphthalene				1.2	2.7
fluoranthene				2.7	9.7

A Sample obtained from a valve approximately 3 feet above the bottom of the tank

B Sample obtained from the top of the tank

Source: Adapted from McClanahan, 1978.

list and testing procedure adopted by the U.S. Public Health Service in the 1960's. Since EPA took over authority on tank coatings from FDA, it has not performed any tests on new materials. Approval of new materials is given based on their similarity of chemical composition to those materials approved in the past. The testing procedure used by the PHS is a gravimetric procedure that is not at all amenable to testing for volatile organics.

2) The AWWA D102-78 outlines 7 different inside painting systems. The cold applied coal tars would fall under system #6 which requires 1 coat of primer and 2 coats of coal-tar paint. Total system thickness should be 20 mils. All painting systems (except #7) must have forced air ventilation after the final application. "Continuous forced air ventilation at a rate of at least one complete air change every 4 hours shall be provided for at least 48 hours..... or until coating is completely cured in accordance with the paint manufacturer's recommendations. Tank manholes shall be kept open for an additional 7 days. Air shall be exhausted from the lowest portion of the tank with top openings kept open and clear."

3) Manufacturers vary in their suggested curing times. Some don't mention forced air ventilation and recommend very short curing times - as low as 24 hours. In reviewing the technical data sheets from various manufacturers I have found no instance where a manufacturer would give reasonable estimates on the time and method of curing. Most manufacturers state that curing time will vary depending on the relative humidity, air temperature (actually steel surface temperature) and amount of air flow but nothing more specific than this. From my conversations with a representative from Koppers, they have espressed an unwillingness to conduct any field or laboratory research on how curing is affected by the variables I've mentioned.

4) East Bay Municipal Utility District maintains a list of acceptable reservoir coatings. They have judged coatings on their potential to support bacteria growth, produce taste and odors or leach organic solvents when in contact with potable water.

Questionaire Summary

A questionaire was sent by this office to all large water system asking if they used coal tar products in their distribution systems, and if they have experienced any problems. To date we have had about a 45% return on questionaires. Of these, approximately 75% claim they use coal tar products with most of it being a cold applied coal tar applied to a water tank. Approximately 40% knew they used one of the Koppers products. A surprising number didn't know what was in their tanks. A very small number said they had experienced problems with the product. Problems were always precipitated by taste and/or odor complaints.

Case Studies

A problem we are seeing is that contractors are not always following the manufacturers procedures or D102-78. More times than not it has become evident that contractors are taking unjustified shortcuts. Bid proposals and contracts don't usually contain explicit directions on appliction procedures to be followed. At a minimum the manufacturer's directions should be followed as well as the D102-78 procedures. Suggested or necessary verbage could be given

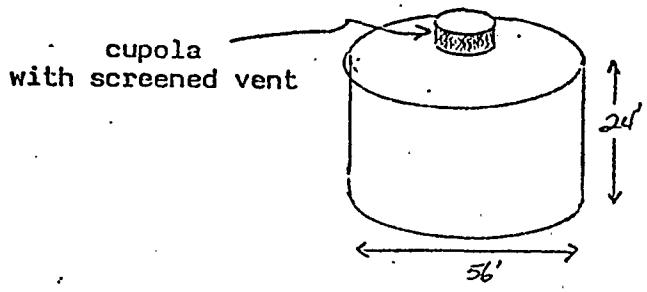
to utilities to include in their contracts and bid proposals. Such verbage should address those variables that can affect organic leaching. Possibly a "model contract" or "model bid proposal" could be developed by our office to be used by utilities. The following pages are summaries of cases where utilities have experienced problems of solvent contamination in the water supply. The information was compiled with input from SEB in San Bernardino, Los Angeles, Santa Rosa, Fresno, and Berkeley, as well as the utilities. In each case generic product descriptions have been used per your request so that these sheets can be given to any utilities that request information on tank coatings. The actual product names have been provided on separate paper. Forced air ventilation is indicated on the case summaries as FAV.

Utility Name/Tank Name	Product Name
Crystal Falls Water Company- Mona Vista Tank	Koppers Tank Solution
- Comstock Tank	Dupont Vinyl and Glue
- Main Plant Tank	Koppers Tank Solution
Cedar Ridge Water Company- Main Plant Tank	Koppers Tank Solution
North Marin Co. Water District- Balboa St. Tank	Glidden Durkee Glid-Guard
- Pt. Reyes Tank	Epoxy No. 69740 & Glid-Guard Glid-Zinc Inorganic Coating
North Coast Co. Water District- Fairmont Tank	Engard 800 as primer
- Sharp Park Tank	Koppers B-70 Enamel Koppers Tank Solution
City of Santa Clara- Northside Tank	Koppers Bitumastic Primer
- Serra Tank #3	" B-70 Enamel
	" Super Tank Solution
East Kern Co. Water Agency- Eastside Water Treatment Plant Tank	Koppers B-70 Enamel
- Mojave Tank Farm	" Super Tank Solution
Pinecrest	Koppers Super Tank Solution
San Bernardino- (five tanks)	See Case Summary Sheet
Yosemite Lakes Park	Koppers Super Tank Solution
Lake Arrowhead CSD- Bernia Tank	Koppers B-70 Enamel Tnemac 46-465
Burlingame- Alcarzer Tank	Koppers Super Tank Solution
Loma Linda	Koppers Super Tank Solution

1) Utility Name/Tank Name: CRYSTAL FALLS WATER COMPANY - Mona Vista Tank

2) Representative: Spencer Gregg (209) 532-2279

3) Tank Volume/Dimensions: 410,000 gallons welded steel



4) Recoat or New Coat? New

5) Type of Coating(s): Cold-applied coal-tar (spray applied)

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

3 coats - thicknesses unknown. At least 2 days curing between coats (more than 2X recommended by manufacturer) Top coat cured and passively ventilated for 4 months.

7) Special Circumstances: They were unaware of any requirements for forced air ventilation (FAV) after painting was completed. FAV would have been required for only 7 days.

Tank in service in February 1982

8) Wash Down/Disinfection: Field with super chlorinated water and drained.

9) Sampling and Analysis: By SEB personnel - 9/82

PCE: 17ppb $CHCl_3$: 49 ppb (did not look for toluene or xylene)

By SEB personnel - 1/6/83

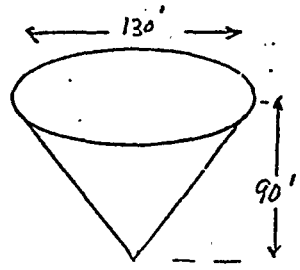
PCE: 0.94 ppb Toluene: trace Xylene: 1.6ppb

1) Utility Name/Tank Name: CRYSTAL FALLS WATER COMPANY - Comstock Tank

2) Representative: Spencer Gregg (209) 532-2279

3) Tank Volume/Dimensions:

Subsurface storage tank - 756,000 gallons with hypolon liner - sheets are solvent glued together



4) Recoat or New Coat? New coat

5) Type of Coating(s): sheet polymer and glue

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

One coat. Curing about 2 weeks with passive ventilation through top.

7) Special Circumstances: Solvent glue contained PCE. Tank in service January 1982

8) Wash Down/Disinfection: One wash down

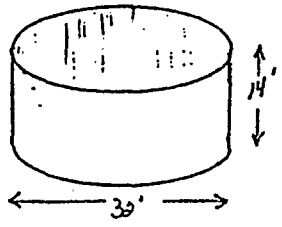
9) Sampling and Analysis: By SEB personnel on 9/3/82

PCE: 2.7 ppb

1) Utility Name/Tank Name: CRYSTAL FALLS WATER COMPANY - Main Plant Clarifier

2) Representative: Spencer Gregg (209) 532-2279

3) Tank Volume/Dimensions: Open top clarifer



4) Recoat or New Coat? New

5) Type of Coating(s): Cold-applied Coal-tar (spray applied)

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

2 coats: 1st cured passively > 24 hours
2nd " " 20 days

2 mils five dry coat

7) Special Circumstances: In service June 1982

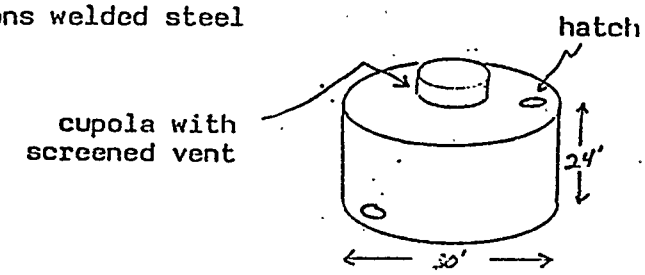
8) Wash Down/Disinfection: Filled with super chlorinated water and drained

9) Sampling and Analysis: By SEB personnel on 9/82
PCE: 1.0 ppb

1) Utility Name/Tank Name: CEDAR RIDGE WATER COMPANY - Main Plant Tank

2) Representative: Spencer Gregg (209) 532-2279

3) Tank Volume/Dimensions: 126,000 gallons welded steel



4) Recoat or New Coat? New

5) Type of Coating(s): Cold-applied Coal-tar (roller applied)

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

2 coats - unknown thickness -
bottom and sides cured passively for 14 days
top - passive ventilation for 30 days

7) Special Circumstances: Tank bottom and sides were erected and coated, cured 14 days. Top was coated before installation, cured 30 days. FAV for entire tank >5 days.

Average $t_d \cong 2$ days Tank in service 10/15/82

8) Wash Down/Disinfection: Filled with super chlorinated water and drained

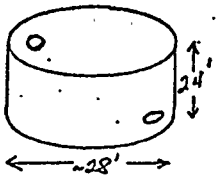
9) Sampling and Analysis: By SEB personnel on 1/6/83

PCE: 139 ppb Tolvene: 5.5 ppb Xylene: <1.0 ppb

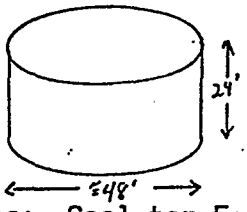
1) Utility Name/Tank Name: NORTH MARIN COUNTY WATER DISTRICT - Balboa St. Tank & Pt. Reyes Tank

2) Representative: Bill Melson (415) 897-4133

3) Tank Volume/Dimensions: Balboa St. Tanks 100,000 gallon welded steel



Pt. Reyes Tank: 300,000 gallon welded steel



4) Recoat or New Coat? Recoat

5) Type of Coating(s): Below water line: Coal-tar Epoxy (spray applied)
Above water line: Inorganic Zinc (spray applied)

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

2 coats of epoxy: 2 days curing passively between coats
16 - 25 mils dry thickness

1 coat zinc: 5 - 6 mils dry thickness

1 month passive ventilation after top coat

7) Special Circumstances: Holiday patching on epoxy was so extensive that it may be more realistic to consider the epoxy to be a 3 coat system. Tanks sampled after a 7 day soaking period before tank went on line.

8) Wash Down/Disinfection:

2X washed down with 50ppm chlorine solution then filled over a period of 2 weeks.

9) Sampling and Analysis:

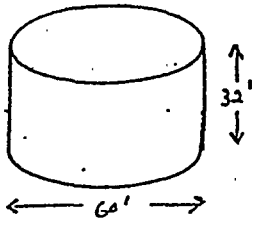
By utility on 10/26/82 and analysed by SRL PCE: below detection
THMs: small amount

1) Utility Name/Tank Name: NORTH COAST COUNTY WATER DISTRICT - Fairmont Tank and Sharp Park Tank

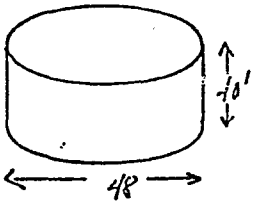
2) Representative: John Regan (415) 355-3462

3) Tank Volume/Dimensions:

Fairmont Tank: 600,000 gallon welded steel



Sharp Park Tank: 500,000 gallon welded steel



4) Recoat or New Coat? Recoat

5) Type of Coating(s): Primer: Cold-applied Coal-tar

Bottom 2/3: Hot-applied enamel Top 1/3: Cold applied Coal tar

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

Primer: 1 coat 8 mils dry thickness aired > 24 hours passive ventilation

Enamel: 3/32" dry thickness; coal-tar: 8 mils to final thickness of 16 mils FAV for 4 weeks

7) Special Circumstances: Tanks were held for 7 day soaking period before sample was taken and before it was put in service.

8) Wash Down/Disinfection: Washed down three times - 4 hours/day for 3 days

9) Sampling and Analysis: By SEB personnel

Fairmont Tank: PCE 4.2 ppb

Sharp Park Tank: PCE trace

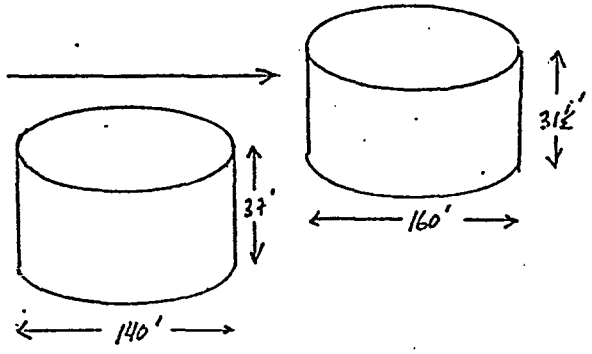
1) Utility Name/Tank Name: CITY OF SANTA CLARA - Northside and Serra Tank #3

2) Representative: Dick Hathorn (408) 984-3183

3) Tank Volume/Dimensions:

Northside Tank: 4.7 MG

Serra Tank #3: 4.2 MG



4) Recoat or New Coat? New

5) Type of Coating(s): Hot applied coal-tar enamel (dab applied)
Cold applied coat-tar (spray applied)

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

1 coat coal-tar primer on whole tank - 8 hours to cure
1 coat enamel up to 20' level
2 coats cold applied coal-tar above 20' level - 1st coat 4 hours with FAV. Entire tank - 2 weeks curings without FAV

7) Special Circumstances: Northside in service 1978
Serra Tank #3 in service January 1981

8) Wash Down/Disinfection:

Filled with 200 ppm chlorine solution then drained.

9) Sampling and Analysis:

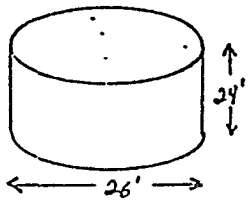
By SEB personnel on 11/82
Northside tank: PCE 1.8 ppb
Serra Tank #3: PCE 0.73 ppb

1) Utility Name/Tank Name: PINECREST

2) Representative: Leonard Doten (209) 965-3234

3) Tank Volume/Dimensions:

98,000 gallon welded steel



4) Recoat or New Coat? New

5) Type of Coating(s): Cold-applied Coal-tar

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

One Coat: 3 weeks of passive ventilation.
thickness unknown

7) Special Circumstances: Tank in service 7/17/82. The detention time in this tank is approximately 18 hours.

8) Wash Down/Disinfection:

9) Sampling and Analysis: By SEB personnel on 9/3/82
PCE: 11 ppb
Benzene: trace

1) Utility Name/Tank Name: SAN BERNARDINO - Mountain, 1720,1895,2100, Del Rosa #3 Tanks

2) Representative: Mike Lowe

3) Tank Volume/Dimensions:

See attachment (prepared by Bill Gedney of SEB, San Bernardino)

4) Recoat or New Coat? All new coats except for Mountain Tank

5) Type of Coating(s): Hot-applied coal-tar enamel
cold - applied coal-tar

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

dry thickness of cold-applied coal-tar > 20 mils
see attachment for additional details

7) Special Circumstances:

8) Wash Down/Disinfection: unknown

9) Sampling and Analysis: see attachment

ATTACHMENT NO. 1

TO MEMORANDUM ON CITY OF SAN BERNARDINO TANK COATING PROBLEMS

CHRONOLOGY OF TANK COATING APPLICATION

Tank Name	Mountain	1720	1895	2100	Del Rosa No. 3
Capacity (MG)	2.0	5.0	5.0	2.0	3.0
D102 I.P.S. No. 6	Koppers Bitumastic	Tnemec	Tnemec	Tnemec	Tnemec
Coating Applied	Super Tank Solution	46-465	46-465	46-465	46-465
D102 I.P.S. No. 5 [1]	None [2]	Koppers B-70	Koppers B-70	Koppers B-70	Koppers B-70
Hot applied coal tar enamal Coating applied by	City crew	Contractor [3]	Contractor	Contractor	Contractor
Initial Sandblasting	April 30	May 17	April 12	June 22	April 30
2nd coating applied	May 16	June 28	April 16	June 29	May 6
Coal tar enamel applied	None	July 7	April 23	July 12	May 10
Curing time start	June 9	July 14	April 28	July 26	May 11
Tank disinfected	June 22	Sept. 6	July 7	Sept. 24	June 23
Total No. of days cured	11	52	68	58	43

NOTE:

1. Contrary to the City's tank coating specifications which originally called for the floor and lower 8 ft. of tank ring to be coated, only the floor and about 1 ft. of tank ring were coated.

2. No hot applied coal tar enamel was used. Koppers Supertank solution used to coat entire tank.

3. Contractor was Three Guys Painting.

ATTACHMENT NO. 2

TO MEMORANDUM ON CITY OF SAN BERNARDINO TANK COATING PROBLEMS

CHEMICAL DATA ON FOUR TANKS WITH TNEMEC COATING

Tank ate Sampled	1720 9-7-82	1895 7-23-82	2100 9-7-82	Del Rosa No. 3 7-23-82	8-4-82	8-7-82
IA Concentrations (ppb)						
IE	1.7	0.3	25	16.0	16.0	14.0
IE	ND	ND	ND	1.3	1.0	1.8
oluene	1.3	1.3	5.4	37	32	0.45
thylbenzene	0.4	0.7	3.5	35-40	44	0.70
ta,Para Xylene	0.66	2.5	6.0	~ 180-200	86	Trace
tho xylene	0.5	0.7	3.3	~ 35-40	38	2.0
otal TIM	20.5	ND	ND	ND	ND	ND
ontact Time	~4 days	18 days	~4 days	32 days	44 days	18 days

OTE:

1. Includes time period from when the tank started filling to sample date. Some dates of filling were approximate.

ATTACHMENT NO. 3

TO MEMORANDUM ON CITY OF SAN BERNARDINO TANK COATING PROBLEMS

CHEMICAL RESULTS (FOR MOUNTAIN TANK

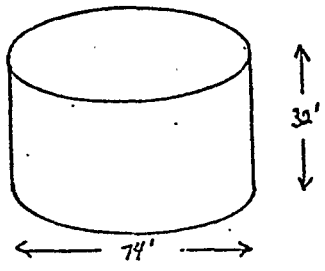
Date	PCE Concentration (ppb)	Comments/Conditions
June 22	Not sampled	Disinfection complete
24	Not sampled	Placed in service
July 23	197	Tank in service for 29 days. (A total contact period of 31 days).
August 3	171	Confirming test. Taken out of service this date following 40 days. (Total contact period of 42 days).
12	56	Following five days (Aug. 6-10) of intermittant forced air ventilation, tank was filled to about ½ capacity, then drained again. Total contact time was about 18 hours.
20	235	Another five day period (Aug. 14-18) with intermittant forced air ventilation occurred following draining of the tankon Aug. 13. Tank filled to 1/3 capacity and contact time prior to test was about 24 hours.
27	410	Retention time 8 days.
Sept. 2	810	Retention 14 days.
7	682	Retention 19 days.
24	Not sampled	Tank drained.

1) Utility Name/Tank Name: YOSEMITE LAKES PARK

2) Representative:

3) Tank Volume/Dimensions:

1 MG welded Steel



4) Recoat or New Coat? New

5) Type of Coating(s): Cold-applied Coal-tar

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

2 coats - 16 mils dry thickness. Each coat cured 7-8 days without FAV

7) Special Circumstances: Tank had been in service 2 months at time of sampling.

8) Wash Down/Disinfection:

9) Sampling and Analysis: By SEB personnel on 9/7/82.

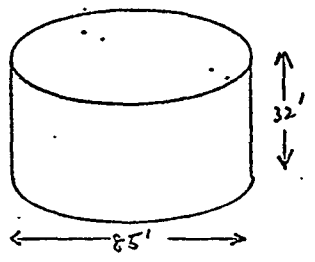
PCE & Benzene: trace

1) Utility Name/Tank Name: LAKE ARROWHEAD CSD - Bernia Tank

2) Representative: Michael Harper (714) 780-9055

3) Tank Volume/Dimensions:

1.3 MG welded steel



4) Recoat or New Coat? New Coat

5) Type of Coating(s): Hot applied coal tar enamel (dab applied)
Cold applied coal tar (spray applied)

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

Enamel applied to floor and 16 feet up side
Top and rest of side: 2 coats cold applied coal tar. approx. 24 mils dry thickness
24 hours to 2½ weeks curing between coats with forced air ventilation (FAV).
22 days curing with FAV after top coat.

7) Special Circumstances:

Inspector for the utility was on-site during the entire job.
Tank was filled and soaked 7 days before sampling.

8) Wash Down/Disinfection: Washed down 5 times.

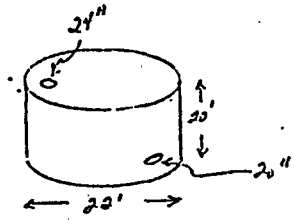
9) Sampling and Analysis: By SEB personnel on 10/28/82.
PCE: 0.23 ppb Xylene:0.75 ppb Toluene: 0.50 ppb

1) Utility Name/Tank Name: BURLINGAME - ALCARZER TANK

2) Representative: Lawrence Nelson (415) 342-8931 ext. 25

3) Tank Volume/Dimensions:

50,000 gallon welded steel
(concrete bottom)



4) Recoat or New Coat? Recoat

5) Type of Coating(s): Cold-applied Coal-tar

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

3 coats over top and sides: 3-7 days curing between coats with FAV.
after top coat: 10-12 days of FAV for 8 hours/day.
30-35 mils dry thickness

7) Special Circumstances: Part of the tank may have been painted with a coating that was mislabeled and may not have been meant for steel water tanks. The utility is investigating this. The tank was filled with water and soaked 7 days before sampling - 11/15/82

The coating keeps expanding! In the span of two weeks the thickness has increased to above 40 mils. The utility has decided to sandblast off this coating and try something else. The manufacturer has not responded to repeated inquiries from the utility.

8) Wash Down/Disinfection: One washdown

9) Sampling and Analysis: By private laboratory: PCE >600 ppb SEB advised utility to drain, fill again and hold 7 more days. SEB actually sampled the tank after 10 more days of soaking. PCE: 1300 ppb

1) Utility Name/Tank Name: LOMA LINDA

2) Representative: Rick Wellington (714) 796-6248 (714) 796-2531

3) Tank Volume/Dimensions:

1 MG welded steel

4) Recoat or New Coat? Recoat

5) Type of Coating(s): Cold-applied Coal-tar

6) Number of Coats/Thicknesses/Curing Times/Ventilation:

Roof and top 1/4: 2 coats of coal tar to 20-30 mils dry thickness.
Bottom and 3/4 of side: 1/2 of this area was touched up with coal tar.
Enamel was already present. 2 coats to 20-30 mils dry thickness.
1 - several days curing between coats and 19 days FAV after top coat.

7) Special Circumstances: Tank removed from service after 1½ months FAV for 23 days. After 5½ of soaking PCE: 790 ppb

8) Wash Down/Disinfection: 6 times washed down

9) Sampling and Analysis: Much sampling done by SEB. After 4½ days of soaking PCE: 612 ppb Tolvene: 66 ppb

State Programs

New York:

The New York State Department of Health - Bureau of Public Water Supply operates a program where a list of "acceptable" internal tank coatings is established. Utilities in New York State must choose a coating from this list. The nice part about their system is that it puts most of the burden of work on the manufacturers. Basically, New York State uses their regulatory authority under Plans and Specifications approved to establish control over internal coating systems.

Under the program manufacturers must supply technical data on their products. After review by New York State, the manufacturer is supplied with a laboratory testing procedure and is told what parameters are to be analyzed for under a simulated tank situation. Testing must be conducted by an independent laboratory and results supplied directly to New York State. Levels of water contaminant and leaching rates are examined using expected detention times, interim primary drinking water standards, and SNARL values. A decision is then made whether to list the tank coating as an approved substance. Currently, New York lists 87 approved tank coatings. This is a considerable larger number of coatings than are probably used in California (indication from questionaire). I have come across approximately a dozen different coatings that are normally used with the largest single coating being Koppers cold applied coal tar.

Utah:

As of January 1, 1984, Utah will institute a regulation to require paint manufacturers to certify to their Safe Drinking Water Committee that an internal coating "will not import hazardous levels of toxic substances or cause tastes or odors to be imparted in the water used for culinary purposes." (SEE ATTACHMENT).

Attachment

cc: D. Spath
C. Young

JC:rh

Change in regulation from Utah Drink Water Committee
Changes are underlined

2.3.3 RESERVOIR MAINTENANCE AND DISINFECTION

All materials used to re-coat the interior of storage structures must be ~~suitable~~ certified for potable water contact. ~~Approval~~ Certification of the coating material must be given ~~by~~ to the ~~Division of Environmental Health~~ Executive Secretary prior to application.

Effective January 1, 1984, the manufacturer shall certify in writing to the Executive Secretary that the particular product specified by name and manufacturer number will not impart hazardous levels of toxic substance or cause tastes or odors to be imparted into the water used for culinary purposes. Such certification shall be in accordance with appendix I-1.

The design engineer is cautioned to insure, by adequate inspection, that the paint or coating manufacturers' recommendations are followed so that adequate curing will result.

After a reservoir has been entered for maintenance or recoating, it must be disinfected prior to being placed into service. Procedures given in AWWA Standard D105 must be followed in this regard.

2.3.4 SPRING COLLECTION AREA MAINTENANCE

Spring collection areas should be periodically cleared of vegetation to prevent root growth from clogging collection lines. It may be advantageous to allow, and perhaps encourage, the growth of grasses and other shallow rooted vegetation for erosion control and to inhibit the growth of more detrimental flora.

No pesticide [e.g. herbicide] may be applied on a spring collection area without the prior written approval of the ~~Division of Environmental Health~~ Executive Secretary. Such approval shall be given 1] only when acceptable pesticides are proposed, 2] when the pesticide product manufacturer certify that no harmful substance will be imparted to the water in accordance with Appendix I-1 and 3] only when spring development meets the requirements of these regulations [see Section 6.3.5].

6.2.4 WELL MATERIALS, DESIGN AND CONSTRUCTION

When any product is used to coat, seal, patch or otherwise attach itself to the surface of any well construction material in such a way as to come into contact with the drinking water, the manufacturer of the product shall certify, effective January 1, 1984, as to the products non-toxicity in accordance with Appendix item I-1.

6.2.4.1 PERMANENT STEEL CASING PIPE SHALL

a. be new pipe meeting AWWA specifications for a minimum weight and thickness [see Table 6-1],

b. have additional thickness and weight if minimum thickness is not considered sufficient to assure reasonable life expectancy of the well,

c. be capable of withstanding forces to which it is subjected,

d. be equipped with a drive shoe when driven,

e. have full circumferential welds or threaded coupling joints,

f. project at least eighteen inches above the anticipated final ground surface and at least twelve inches above the anticipated pump house floor level. At sites subject to flooding the top of the well casing shall terminate at least five feet above the highest known flood elevation.

6.2.4.2 NON-FERROUS CASING MATERIAL

The use of any non-ferrous material for a well casing shall receive prior approval of the Executive Secretary.

6.3.5 Spring Development

The development of springs for culinary puposes must comply with the following requirements [also see diagrams in the Appendix, Item F]:

a. The spring collection device, whether it be collection tile, infiltration boxes or tunnels must be covered with a minimum of ten feet of relatively impervious soil cover. Such cover must extend a minimum of fifteen feet in all horizontal directions from the spring collection device.

b. Were it is impossible to achieve the ten feet of relatively impervious soil cover, an acceptable alternate will be the use of an impermeable liners. ~~which has been found to acceptable for contact with culinary water by a reputable authority acceptable to the Executive Secretary, provided that:~~ The manufacture of the liner shall certify, effective January 1, 1984, as to the liners non-toxicty in accordance with Appendix Item I-1. In addition the following shall also be provided:

1. the liner is of sufficient thickness and installed in such a manner as to ensure its integrity for the service life of the spring source,

2. a minimum of two feet of relatively impervious soil cover is placed over the impermeable liner,

3. the soil and liner cover are extended a minimum of fifteen feet in all horizontal directions from the collection devices.

c. Each spring collection area must be provided with at least one junction box to permit spring inspection and testing.

d. All junction boxes and/or collection boxes, must comply with Section 11 with respect to access manholes, air vents, and overflow piping. All lids for spring boxes must be gasketed and the chamber must be adequately vented.

CONVENTIONAL COMPLETE TREATMENT

8.0 GENERAL

Treatment plants used for the purification of surface supplies must conform to the requirements given herein. The plants must have, as a minimum, facilities for flash mixing of coagulant chemicals, flocculation, sedimentation, filtration and disinfection.

The overall design of a water treatment facility must be carefully examined to assure the compatability of all devices and processes. The design of treatment processes and devices shall depend on an evaluation of the nature and quality of the particular water to be treated. The combined unit processes must produce water meeting all established drinking water standards as given in Section 3.

When any product is used to coat, seal, patch or otherwise attach itself to the surface of any treatment construction in such a way as to come into contact with the drinking water, the manufacture of the product shall certify, effective January 1, 1984, as to the products non-toxicity in accordance with Appendix item I-1.

Direct filtration (i.e. elimination of sedimentation basin) may be acceptable and regulations governing this method are given in Section 9.3.

WATER STORAGE

11.0 GENERAL

Storage for finished water, sized in accordance with Section 11.1 shall be provided as an integral part of each water supply system. Elevated storage with gravity flow is preferred. However, low level reservoirs may be used provided adequate pressure in the distribution system can be maintained by pressure pumps. In this instance, any hydropneumatic tanks which are used cannot be credited toward total storage.

The materials and designs used on finished water storage structures shall provide stability and durability as well as protect the quality of the stored water. Steel structures shall follow the current AWWA standards concerning steel tanks, standpipes, reservoirs, and elevated tanks wherever they are applicable. Other materials of construction are acceptable when properly designed to meet the requirements of this section, provided it can be shown that they will not impart toxic substances to the stored water.

When any product is used to coat, seal, patch or otherwise attach itself to the interior surface of any storage structure in such a way as to come into contact with the drinking water, the manufacture of the product shall certify, effective January 1, 1984, as to the products non-toxicity in accordance with Appendix item I-1.

11.1 SIZING

Storage facilities ...

MISCELLANEOUS TREATMENT METHODS

9.0 GENERAL

Included in this section ...

... Waste disposal (Section 8.15)

i. Disinfection (Section 7 and Section 8.14)

When any product is used to coat, seal patch or otherwise attach itself to the surface of any treatment construction in such a way as to come into contact with the drinking water, the manufacture of the product shall certify, effective January 1, 1984, as to the products non-toxicity in accordance with appendix item I-1.

11.3.14 INTERNAL COATINGS

All internal coatings must be ~~approved~~ certified for potable water contact. ~~by a recognized authority and shall be acceptable to the Department of Health~~ Certification of the coating material must be given to the Executive Secretary prior to application. Water must not be introduced into the vessel until the required curing time has passed. After proper curing, the coating shall not transfer any substance to the water which will be toxic or cause tastes or odors.

Effective January 1, 1984, the manufacturer shall certify in writing to the Executive Secretary that the particular product specified by name and manufacturer number will not impart hazardous levels of toxic substance or cause tastes or odors to be imparted into the water used for culinary purposes. Such certification shall be in accordance with appendix I-1.

The design engineer is cautioned to insure, by adequate inspection, that the paint or coating manufacturers' recommendations are followed so that adequate curing will result.

Proper protection must be given to all metal surfaces by paints or other protective coatings.

12.1 MATERIALS

When any product is used to coat, seal, patch or otherwise attach itself to the interior surface of any piping material in such a way as to come into contact with the drinking water, the manufacture of the product shall certify, effective January 1, 1984, as to the products non-toxicity in accordance with appendix item I-1.

12.1 MATERIALS

12.1.1 STANDARDS...

PROPOSED REGULATION ADDITION

APPENDIX ITEM I-1

The wording to be used in a product or material non-toxicity certification shall be as follows:

"_____ hereby certifies that _____
[company] [product name and manufacture

_____ which is presented to the State of Utah to be used in
number]

the State of Utah in connection with _____
[name and type of water facility .

_____
the product will be used to coat i. e.: pipelines, storage tanks, weirs, etc.]

and which use will cause the product to come into contact with drinking water: 1] does not impart hazardous levels of toxic substances to the water, and 2] does not cause tastes or odors to be imparted into the water. The _____
[company]

Company recognized that use of the product in the State of Utah does not represent state endorsement that the product will not impart hazardous levels of toxic substances or will not cause tastes or odors. Such responsibility lies with the _____ and any liability in such regard rests with the _____.
[company] [company]

Before offering a certification to the Executive Secretary, the manufacturer of any paint or coating system shall conduct sufficient tests to adequately evaluate the toxicity and taste imparting potentials of any paint or coating system. Such tests shall be performed on a statistically significant sampling size and on varying chemical quality waters to determine the non-toxicity and non-taste imparting aspects of the paint or coating system. The manufacturer shall also maintain all supporting documentation [i.e. text methodology and data] which forms the basis of the certification. The manufacturer may be required to furnish to the State of Utah all such methodology and data upon request. Also the manufacturer shall recertify products at least every five years. If the formulation of a product changes the manufactuerer shall notify the Executive Secretary and recertify the new formulation.

The design engineer is cautioned to insure, by adequate inspection, that the paint or coating manufacturer's recommendations are followed so that adequate curing will result.

Exhibit 26

State of California

Department of Health Services

Memorandum

To : C. E. Anderson

Date : April 21, 1983

Subject: Tank Coating Problems - San Gabriel Valley Water Co.

From : W. C. Gedney WCG

This memo will summarize the tank coating difficulties experienced by the San Gabriel Valley Water Company - Fontana Division with their new 5.0 m.g. welded steel reservoir. Attachment No. 1 summarizes all of the PCE test results to date. Attachment No. 2 is a summary of the chronological events relative to coating application, curing dates, etc., for this tank. The following is a brief description of the events surrounding this episode.

General Superintendent Gerald Black contacted us on August 22, 1982, to inform us of the company's intent to use Koppers Supertank Solution on their new tank for internal corrosion protection. Black was fully advised of the problems experienced by other water purveyors who had used this product relative to high PCE levels. We sent him a copy of the SEB August 17, 1982 memorandum on tank coatings and he was again reminded that it was critically important to provide adequate, effective curing time to avoid PCE problems.

On August 27, 1982, Black came to our office to review tank plans and specifications. These showed that only the upper two tank rings (24 ft.) and tank ceiling would be coated with the Supertank solution. The bottom two rings (16 feet) and floor were to be coated with hot applied coal tar enamel.

Construction was completed on January 21, 1983. The Water Company provided a total of 128 hours of forced air ventilation. Initial PCE results following a 10 day soaking period were 72 and 57 ppb. The Water Company requested that they be allowed to blend the water from the tank into the distribution system rather than simply waste it and this was allowed, provided they met the Action Level at all times. The tank was dry by March 17 and kept empty for 11 days. A retest on April 5, 1982 showed that the PCE concentration was down to 24 ppb in the new tank . The Water Company had previously proposed by letter dated March 21, 1983 that a "permanent" blending and monitoring operation be established and this was granted again as long as they met the Action Level. As can be seen from Attachment No. 1, the PCE concentration in the new tank and both the blended water in the concrete tank and distribution system has dropped below the 4.0 ppb action level for PCE. Monitoring will continue as agreed to until the end of April.

DEFENDANTS' EXHIBIT 520 FOR ID
EXCHANGE, CER NO. 11223
DATE: 6-3-99

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A reduced monitoring program should be instituted at the beginning of May. This would consist solely of weekly samples from the new tank. This could be reduced further in a few months if results warranted it.

Some conclusions can be reached from this incident:

(1) Unlike the City of San Bernardino's Mountain tank and the City of Loma Linda's 1.0 MG tank which were both provided with Supertank Solution throughout the entire tank interior, Only the upper 3/5's of this tank have been coated.

(2) Inspite of repeated warnings to provide continuous forced air ventilation, this was not provided. For example, for a 5.0 MG tank, Koppers recommends that at the minimum, forced air ventilation be provided at a sufficient rate to allow one change of air/hour in the tank. This would be performed for a 24 hr/day 10 day period. The Company's forced air ventilation was for 128 hours total.

Additional follow-up will be performed on this problem in the near future.

WCG:mo

cc: Berk., S.D.

Attachments

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ATTACHMENT NO. 1

TO MEMORANDUM ON SAN GABRIEL VALLEY WATER COMPANY

T.C.E. RESULTS ON NEW 5.0 MG TANK

ALL RESULTS ARE IN PARTS PER BILLION (ppb)

Date	5.0 m.g. Steel Tank	3.0 m.g. Concrete Reservoir	Distribution System[1]
3/1	72[2]	-	-
"	59[2]	-	-
3/8	-	-	< .1
4/5	24[3]	-	-
4/6	9.0[4]	5.0	0.7
4/11	1.5	1.2	0.7
4/18	2.5	1.5	0.5
4/25	4.3	2.8	0.4

1 Palmetto & Baseline

2 Duplicate samples taken after 128 hours forced air and 10 days soaking.

3 Sample taken after initial tank volume emptied, tank empty for 11 days, refilled and 7 days soaking.

4 Rapid turnover rate of water in tank, very short detention time.

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ATTACHMENT NO. 2

TO MEMORANDUM ON SAN GABRIEL VALLEY WATER COMPANY

CHRONOLOGICAL EVENTS ON NEW 5.0. M.6. TANK

Date:	Comments:
December 9, 1982	Sandblasting of tank started. Lower two rings (16 feet) coated with Koppers Bitumastic 70 B hot applied coal tar enamel. AWWA Standard D102, I.P.S. No. 5 used. Upper 3 rings (24 feet) coated with Koppers Super Tank Solution per AWWA Standard D102 IPS No. 6.
December 30, 1982	Internal coating completed. This included testing, holiday correction, etc.
January 13, 1983	Two 10,000 cfm airblowers installed. This provided for a complete tank volume change every 67 minutes.
January 27, 1983	Both airblowers removed. On the average, they ran 8 hours/day for 15 days. Measured time was 128 hours. Based on the information provided by Koppers this forced air ventilation period was only 48% of the Koppers recommended period.
February 8, 1983	Disinfection started. Tank sat empty a total of 12 days without forced air ventilation up to this time.
February 15, 1983	Filling completed.
February 22, 1983	Bacteriological testing complete. All negative.
March 1, 1983	First tests for PCE completed after a 10 day contact period. Results showed 73 ppb and 59 ppb.
March 5, 1983	To avoid dumping 5 mg of water, SGVWCo. requested that they be allowed to blend this water into the system. This was granted based upon their ability to blend at a 20:1 ratio and meet the Action Level.
March 8, 1983	Blending initiated. System PCE level was < 0.1 ppb.
March 17, 1983	Gerald Black requested that they be allowed to go on a"permanent" blending operation using this tank. This was granted. A written request was received on March 21. Tank was dry at this point.

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Date:	Comments:
April 5, 1983	Tank sampled for PCE following a 7 day soaking period. Results showed a 24 ppb PCE concentratior in the tank. This was following an 11 day drying period. No forced air ventilation used.
April 6, 1983	Blending initiated. Results in Attachment No. 1. This is accomplished by blending water from the new tank into the nearby 3.0 mg concrete reservoir at a 1:10 ratio. Blended water PCE concentration is well below 4.0 ppb

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Exhibit 27

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

George Deukmejian, Governor

DEPARTMENT OF HEALTH SERVICES
SANITARY ENGINEERING BRANCH
50 Front Street, Room 2050
San Diego, California 92101
Telephone: (619) 237-7391

MAY 1 9 1983

May 16, 1983

TO: All Large Community Water Systems in Imperial, Riverside, and San Diego Counties

FROM: K. W. Campbell, District Engineer
Sanitary Engineering Branch

SUBJECT: Tank Coatings

The Sanitary Engineering Branch has adopted a statewide policy regarding the procedures to be followed when storage tanks are to be coated or recoated. This policy was developed after water contamination incidents occurred with coal tar enamel coatings and concern was developed over the potentially equal hazard to health presented by the residual volatile fractions left by the myriad of alternative tank coating systems.

We request each water utility to provide this office with the following information in writing prior to coating or recoating any domestic water storage tank:

1. Identification of tank(s) to be coated.
2. Brand and name of coating(s) to be applied.
3. Technical data sheets for the coating(s).
4. Material Safety Data Sheet for the coating(s).
5. Contractor's name (if applicable)
6. Approximate dates of coating work to be done.

We further request each utility to take the following steps to reduce the possibility of consumers receiving water with residuals exceeding Recommended Action Levels established for various organic materials:

1. Follow all recommendations set forth by the manufacturers for the coatings closely. This includes not only those recommendations for preparation of the surface and the thickness of the material applied but also those for controlling the effects caused by unfavorable temperature and humidity conditions on the application and curing. If weather conditions will different than recommended, the manufacturer should be contacted for specific instructions.

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EXHIBIT
705
6-17-99 NF

2. Forced Air Ventilation must be used for proper curing. Air should be drawn out from the lowest part of the tank since the volatile organic vapors are heavier than air. If there is any doubt about the adequacy of the curing conditions, additional curing time with continued forced air ventilation should be provided. Experience, though limited, has shown reduction of organics can be achieved in the amount of time suggested only if conditions are near ideal.

3. Following the curing period the tank must be washed and disinfected before filling. A seven day soaking period followed by determination of the presence of any leached organics must precede the placement of the tank in service. Samples of the water in the tank must be taken and analyzed by an approved laboratory for specified organic compounds. The tests to be run will be determined by this office after review of the information submitted prior to start of the work. Enclosed for your convenience is a copy of the latest list of laboratories approved for organics analysis.

4. A report of the above tests results must be sent to this office for evaluation. Approval must be received from this office before delivering water from the tank to consumers. The following table lists some of the volatile organics commonly found in cold applied coal tar coatings. Unrestricted use of the tank will be allowed if constituent concentrations are below the Recommended Action Level. The list below is not all inclusive and additional tests may be required.

Constituent	Recommended Action Level
Trichloroethylene (TCE)	5 ppb
Tetrachloroethylene (PCE)	4 ppb
Trichloroethane (TCA)	Appropriate level under review
Xylene (Xylol)	620 ppb
Toluene (Toluol)	100 ppb
Methylethyl Ketone (MEK)	750 ppb*

*This is a ten day exposure level.

5. Also enclosed is a tank coating data sheet. Please make copies and return a completed form to this office for each tank coated or recoated.

It should be noted that we are not approving or disapproving individual tank coating compounds, but are regulating the amount of organic constituents in water delivered to consumers.

☐ ☐ - ☐ ☐ ☐
Please Leave Blank

PROBLEMS ATTRIBUTED TO WATER TANK COATINGS

1. Name of Water System _____
2. Type of coating (name) _____
3. Date applied _____
4. Is coal tar lining used in distribution system? yes ☐ no ☐
5. If yes, in tanks? yes ☐ no ☐ In mains or transmission lines? yes ☐ no ☐
6. Problems experienced: Organics ☐ Taste & Odor ☐ Bacterial growth ☐ Other problems ☐ explain please.
7. Specific problems _____
8. Duration of problem _____
9. Corrective measures taken _____
10. Tank Details:
    a. Volume _____
    b. Depth _____
    c. Curing Time _____
    d. Other Tank Details _____

Please return to: Sanitary Engineering Branch
2151 Berkeley Way
Berkeley, CA 94704

COAL-TAR TANK COATING DATA SHEET

SEB# [ ][ ] - [ ][ ][ ]

NAME OF UTILITY:

NAME AND LOCATION OF TANK:

AMONT OF STORAGE:

DIMENSIONS OF TANK (ie-height, width, diameter):

WAS THIS A NEW OR RECOATED TANK? NEW [ ] RECOATED [ ]

OUTLINE THE SANDBLASTING PROCEDURE:

WAS COATING DONE BY THE UTILITY OR A CONTRACTOR? IF CONTRACTOR, GIVE NAME, ADDRESS, AND TELEPHONE NUMBER:

PLEASE FILL IN THE FOLLOWING TABLE:

COATINGS (in the order that they were applied)	ONE	TWO	THREE
MANUFACTURER AND NAME OF COATING			
DATE APPLICATION STARTED DATE APPLICATION COMPLETED			
WAS COATING CUT WITH THINNER?			
TIME CURED BEFORE THE NEXT COAT WAS APPLIED (except final coat)			
DRY THICKNESS OF COAT			
TEMPERATURE AND RELATIVE HUMIDITY AT TIME OF COATING AND DURING THE CURING TIME			
CURING TIME OF FINAL COAT			
WAS CONTINUOUS FORCED AIR VENTILATION USED AFTER FINAL COAT IN ACCORDANCE WITH AWWA D102-78 OR MANUFACTURERS SPECIFICATIONS?			

DRAW A CROSS-SECTIONAL DIAGRAM OF THE TANK SHOWING THE APPROXIMATE LOCATION OF ACCESS PORTS WHERE VENTILATION OCCURRED:

WAS SAMPLING DONE OF THE TANK WATER AFTER FILLING? YES NO
IF YES, INDICATE HOW LONG THE WATER WAS IN THE TANK BEFORE SAMPLING AND WHAT ANALYSIS WAS PERFORMED AND THE RESULTS:

WHAT IS THE APPROXIMATE RETENTION TIME IN THE TANK?

Exhibit 28

STATE OF CALIFORNIA—HEALTH AND WELFARE AGENCY

GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF HEALTH SERVICES
SANITARY ENGINEERING BRANCH
Santa Ana District
28 Civic Center Plaza, Room 325
Santa Ana, CA 92701

Phone: (714) 558-4410

May 19, 1983

TO: All Large Community Water Systems

SUBJECT: COATINGS FOR STORAGE RESERVOIRS

Our investigation of taste and odor complaints from tank coatings so far have only implicated the coal tar coatings. High concentrations of some volatile chemicals have been found in water that has been in contact with these coatings. A memo dated August 17, 1982, was sent to you to this effect (Attachment 1). There may be volatile fractions from the myriad of other coating systems that present an equally potential health hazard. For this reason, you are directed to implement the following procedures for all interior storage reservoir paints or other protective coatings:

1. Before coating any new or existing water reservoir, you will contact our office.

2. The manufacturer's recommendations on application must be closely followed. This includes effects of temperature and humidity on the application and curing.

3. Proper curing time must be provided, as recommended. Additional curing time before the tank is filled should be provided if possible. Forced air ventilation must be used for proper curing. Air should be drawn from the lowest part of the reservoir since volatile vapors are heavier than air. In some cases it may be necessary to extend cure time beyond the manufacturer's recommendations.

4. Following the curing period the reservoir must be washed and disinfected before filling. A seven day soaking period shall follow initial filling to determine the presence of any leached organics.

5. After a seven day soaking period, samples of the water in the reservoir must be taken and analyzed by an approved laboratory (Attachment 2) for volatile organics constituents.

6. The results of these tests shall be submitted to this office for review. If the test results are high, draining the initial water from the reservoir, flushing, refilling, and retesting will be required. If the test results are acceptable, we will then consent to putting the reservoir in service.

If you have any questions or comments, please feel free to contact our office.

Sincerely,

Franklin T. Hamamura
District Sanitary Engineer

cc: Engineering Consultants
Attachments
FTH:jc

DEFENDANTS' EXHIBIT 521
DATE: 6-3-99
WITNESS: GEDNEY

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TANK COATING DATA SHEET

NAME OF UTILITY: SEB# ☐☐-☐☐☐

NAME AND LOCATION OF TANK:

AMOUNT OF STORAGE:

DIMENSIONS OF TANK (ie-height, width, diameter):

WAS THIS A NEW OR RECOATED TANK? NEW ☐ RECOATED ☐

OUTLINE THE SANDBLASING PROCEDURE:

WAS COATING DONE BY THE UTILITY OR A CONTRACTOR? IF CONTRACTOR, GIVE NAME, ADDRESS, AND TELEPHONE NUMBER:

PLEASE FILL IN THE FOLLOWING TABLE:

COATINGS (in the order that they were applied)	ONE	TWO	THREE
MANUFACTURER AND NAME OF COATING			
DATE APPLICATION STARTED			
DATE APPLICATION COMPLETED			
WAS COATING CUT WITH THINNER?			
TIME CURED BEFORE THE NEXT COAT WAS APPLIED (except final coat)			
DRY THICKNESS OF COAT			
TEMPERATURE AND RELATIVE HUMIDITY AT TIME OF COATING AND DURING THE CURING TIME			
CURING TIME OF FINAL COAT			
WAS CONTINUOUS FORCED AIR VENTILATION USED AFTER FINAL COAT IN ACCORDANCE WITH AWWA D102-78 OR MANUFACTURERS SPECIFICATIONS?			

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DRAW A CROSS-SECTIONAL DIAGRAM OF THE TANK SHOWING THE APPROXIMATE LOCATION OF ACCESS PORTS WHERE VENTILATION OCCURRED:

WAS SAMPLING DONE OF THE TANK WATER AFTER FILLING? YES ☐ NO ☐
IF YES, INDICATE HOW LONG THE WATER WAS IN THE TANK BEFORE SAMPLING AND WHAT ANALYSIS WAS PERFORMED AND THE RESULTS:

WHAT IS THE APPROXIMATE RETENTION TIME IN THE TANK?

Exhibit 29

State of California · Department of Health
Sanitation and Radiation Laboratory
Southern California Laboratory
SAMPLE FOR CHEMICAL ANALYSIS

Cy to JDK ED 6 CS B-C

Date Received	6-8-83 (Leave Blank)
Lab. No.	9274
Purveyor and Address (include city and county)	City of San Bernadino
System Number	3 6 0 3 9
Serial Number	C 22673
Sampling Point	Mountain Tank
Collected by	W. Gedney
Date and Hour Collected	9:46 6/8/83

Type of Sample: ☐ Raw Surface Water ☐ Wastewater ☒ Drinking Water: ☒ Raw ☐ Treated ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☐ WSS Dist. # ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☒ Other SEB-SBOND

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as $CaCO_3$)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify): YOA-PCE, TCE

Chloroform = 1.5 mg/l
trichloroethylene = 2.0 mg/l
bromodichloromethane = 1.5 mg/l
chlorodibromomethane = 1.1 mg/l
tetrachloroethylene = 30 mg/l
bromoform = 2.8 mg/l

Date Reported	Analyst
6-14-83	P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (4/74)

United States Summary Judgment Motion, Ex. 29, Page 234

DEFENDANTS' EXHIBIT 519 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-3-99
WITNESS: GEDNEY

519

RECEIVED
JUN 16 1983
Dept. of Health Services
San Bernardino

State of California · Department of Health
Sanitation and Radiation Laboratory
Southern California Laboratory
SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 11/24/82 (Leave Blank) 1947

Purveyor and Address (include city and county): City of S. Bdno.

System Number: 3 6

Serial Number: C 16808

Sampling Point: Mt. Tank (6½')

Collected by: L. Cox

Date and Hour Collected: 7:30pm 11/22/82

Type of Sample: ☐ Raw Surface Water ☒ Drinking Water: ☐ Raw ☒ Treated ☐ Wastewater ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☒ WSS Dist. # S. Bdno. ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as Ca CO_3)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify):

PCE = 8.8 µg/l

TCE = 0.42 µg/l

[redacted]

Date Reported	Analyst
11-24-82	P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (4/74)

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State of California Department of Health Services
Sanitation and Radiation Laboratory Section
Southern California Laboratory Section
SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 10-1-82 (Leave Blank)
Lab. No: 75-67

Purveyor and Address (include city and county): C.L.A.W.A. ID-C

System Number: 3161 [redacted]
Serial Number: C 24588

Sampling Point: New ID "C" Tank

Collected by: WCG
Date and Hour Collected: 9/27/82 1100

Type of Sample:
- ☐ Raw Surface Water
- ☒ Drinking Water
  - ☐ Raw
  - ☒ Treated
- ☐ Waste water:
  - ☐ Raw ☐ Chlorinated
- ☐ Trade Waste
- ☐ Other

Send Report To:
- ☒ WSS Dist. S. 130 WC
- ☐ County HD
- ☐ DOT Dist. #
- ☐ National Park Serv.
- ☐ RWQCB #
- ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

☐ Ca		☐ Hardness (mg/l as Ca CO_3)	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS
- ☐ Al
- ☐ Ag
- ☐ As
- ☐ B
- ☐ Cd
- ☐ Cr
- ☐ Cu
- ☐ Hg
- ☐ Pb
- ☐ Ni
- ☐ Se
- ☐ Zn
- ☐

☒ Other analyses desired (specify):

TCE = none detected
PCE = 128 µg/L

Date Reported: 10-5-82
Analyst: P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µ mhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (2-80)

United States Summary Judgment Motion, Ex. 29, Page 237

State of California Department of H[illegible]vices
Sanitation and Radiation Laboratory S[illegible]
Southern California Laboratory Section
SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 12-8-82 (Leave Blank)
Lab. No: 8062

Purveyor and Address (include city and county): City of San Bernardino

System Number: 3 6 X 0 3 9

Serial Number: C 21586

Sampling Point: Mt. Tank. 8 ft.

Collected by: R. Hulls

Date and Hour Collected: 12-2-82 9:15

Type of Sample: ☐ Raw Surface Water ☐ Drinking Water ☐ Raw ☐ Treated ☐ Waste water: ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☒ WSS Dist. # S. Bdo ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as Ca CO_3)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS

☐ Al
☐ Ag
☐ As
☐ B
☐ Cd
☐ Cr
☐ Cu
☐ Hg
☐ Pb
☐ Ni
☐ Se
☐ Zn
☐

☒ Other analyses desired (specify):

TCE = 1.9 mg/l
PCE = 49 mg/l

Date Reported	Analyst
12-9-82	P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (2-80)

United States Summary Judgment Motion, Ex. 29, Page 238

Sanitation and Radiation Laboratory
Southern California Laboratory Section
SAMPLE FOR CHEMICAL ANALYSIS

10/15/82 (Leave Blank) 7637

Purveyor and Address (include city and county): City of San Bernardino

System Number: 36 [illegible]

Serial Number: C 24600

Sampling Point: Del Rosa No. 3

Collected by: R. Huls.

Date and Hour Collected: 10/4/82

Type of Sample: ☐ Raw Surface Water ☐ Drinking Water ☐ Raw ☐ Treated ☐ Waste water: ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☒ WSS Dist. 5 ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as Ca CO_3)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify):

TCE = 1.0 ppb

PCE = 8.9 ppb

Date Reported: 10-19-82

Analyst: UP

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µ mhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (2-80)

United States Summary Judgment Motion, Ex. 29, Page 239

State of California - Department of H[illegible]ces
Sanitation and Radiation Laboratory S[illegible]
Southern California Laboratory Section
SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 10/15/0[illegible] (Leave Blank)

Lab. No.: 7638

Purveyor and Address (include city and county): City of San Bernardino

System Number: B6 [illegible]

Serial Number: C 25162

Sampling Point: Del Rosa No. 3.

Collected by: R. Hul[illegible]

Date and Hour Collected: 10/12/82

Type of Sample:
- ☐ Raw Surface Water
- ☒ Drinking Water
  - ☒ Raw
  - ☐ Treated
- ☐ Waste water:
  - ☐ Raw ☐ Chlorinated
- ☐ Trade Waste
- ☐ Other _____

Send Report To:
- ☒ WSS Dist. 5 (Bdno) ☐ County HD
- ☐ DOT Dist. # _____ ☐ National Park Serv.
- ☐ RWQCB # _____ ☐ Other _____

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as Ca CO_3)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS
- ☐ Al
- ☐ Ag
- ☐ As
- ☐ B
- ☐ Cd
- ☐ Cr
- ☐ Cu
- ☐ Hg
- ☐ Pb
- ☐ Ni
- ☐ Se
- ☐ Zn
- ☐

☒ Other analyses desired (specify):
TCE = 1.0 ppb.
PCE = 8.3 ppb.

Date Reported: 10-7-82

Analyst: NP

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µ mhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (2-80)

United States Summary Judgment Motion, Ex. 29, Page 240

State of California Department of He[illegible]
Sanitation and Radiation Laboratory
Southern California Laboratory

SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 10/2[illegible]/82 (Leave Blank) 7753

Purveyor and Address (include city and county): San Bernardino, City

System Number: R6

Serial Number: C 09306

Sampling Point: Del Rosa #3

Collected by: Bill Gedner

Date and Hour Collected: 10/18/82

Type of Sample: ☐ Raw Surface Water ☐ Drinking Water: ☒ Raw ☐ Treated ☐ Wastewater ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☐ WSS Dist. # ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☒ Other SER Sn. Bdo.

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as Ca CO_3)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS

☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify):

PCE = 2.1 ppb.
TCE = 7.7 ppb.

Date Reported: 11-1-82

Analyst: NP

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (4/74)

United States Summary Judgment Motion, Ex. 29, Page 241

State of California Department of Health
Sanitation and Radiation Laboratory
Southern California Laboratory

SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 11-16-82 (Leave Blank) 1904

Purveyor and Address (include city and county): City of San Bernardino

System Number: 36

Serial Number: C 09311

Sampling Point: Del Rosa Reservoir

Collected by: R. Hely

Date and Hour Collected: 11/10/82

Type of Sample: ☐ Raw Surface Water ☐ Waste water ☐ Drinking Water: ☐ Raw ☐ Treated ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☒ WSS Dist. # 36 ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as $CaCO_3$)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify):

TCE = 1.3 mg/l

PCE = 9.7 mg/l

Date Reported	Analyst
11-17-82	P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. μmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (4/74)

United States Summary Judgment Motion, Ex. 29, Page 242

State of California - Department of [redacted]vices
Sanitation and Radiation Laboratory
Southern California Laboratory Sect[redacted]

SAMPLE FOR CHEMICAL ANALYSIS

Date Received [redacted] 8-6-82 (Leave Blank)

Lab. No. 6874

Purveyor and Address (include city and county): City of San Bernardino

System Number:

Serial Number: C 21558

Sampling Point: Del Rosa 3 M.G.

Collected by: Roy Huls

Date and Hour Collected: 8/4/82 150pm

Type of Sample: ☐ Raw Surface Water ☒ Drinking Water ☒ Raw ☐ Treated ☐ Waste water: ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☐ WSS Dist. # ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☒ Other SER, San Berdo

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as Ca CO_3)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify): TAKEN BEFORE TANK DRAINED

VOA:
trichloroethylene = 1.0 mg/l
tetrachloroethylene = 16 mg/l
toluene = 32 mg/l
ethyl benzene = 44 mg/l
m+p xylene = 86 mg/l
o-xylene = 38 mg/l

Date Reported	Analyst
8-6-82	PH

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (2-80)

State of California - Department of H[illegible]
Sanitation and Radiation Laboratory S[illegible]
South-ern California Laboratory Section
SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 9-8-82 (Leave Blank)
Lab. No.: 7350

Purveyor and Address (include city and county): City of San Bernardino

System Number: 3 6

Serial Number: C 21572

Sampling Point: Del Rosa No. 3 Res.

Collected by: R. Hols

Date and Hour Collected: 9/7/82 AM

Type of Sample: ☐ Raw Surface Water ☐ Drinking Water ☐ Raw ☐ Treated ☐ Waste water: ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☒ WSS Dist. # ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

☐ Ca		☐ Hardness (mg/l as $CaCO_3$)	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify):

VOA
tetrachloroethylene = 1.8 µg/l
tetrachloroethylene = 14 µg/l
toluene = 0.45 µg/l
ethyl benzene = 0.70 µg/l
m, p Xylenes = trace
o-xylene = 2.0 µg/l

Date Reported: 9-10-82
Analyst: P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (2-80)

B.M.

United States Summary Judgment Motion, Ex. 29, Page 244

State of California - Department of He[illegible]
Sanitation and Radiation Laboratory
Southern California Laboratory

SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 7-28-82 (Leave Blank)

Lab. No.: 6692

Surveyor and Address (include city and county): City of San Bernardino

System Number: 36

Serial Number: C 11773

Sampling Point: Mtn. Reservoir

Collected by: WC6

Date and Hour Collected: 7/23/82 Am.

Type of Sample: ☐ Raw Surface Water ☒ Drinking Water: ☐ Raw ☐ Treated ☐ Wastewater ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☐ WSS Dist. # S.B.W.D. ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as Ca CO_3)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ [illegible]	
		☐ NO_3	

TRACE ELEMENTS

☐ Al
☐ Ag
☐ As
☐ B
☐ Cd
☐ Cr
☐ Cu
☐ Hg
☐ Pb
☐ Ni
☐ Se
☐ Zn
☐

☒ Other analyses desired (specify):

PCE = 197 µg/L
TCE = 1.4 µg/L
Toluene = none detected

Date Reported	Analyst
7-29-82	P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (4/74)

United States Summary Judgment Motion, Ex. 29, Page 245

State of California - Department of H[redacted]ces
Sanitation and Radiation Laboratory S[redacted]
Southern California Laboratory Section
SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 8-6-82 (Leave Blank)
Lab. No.: 6878

Purveyor and Address (include city and county): CITY OF SAN BERNARDINO

System Number:

Serial Number: C 21556

Sampling Point: MOUNTAIN TANK

Collected by: ROY HULS

Date and Hour Collected: 8/3/82 11:15

Type of Sample: ☐ Raw Surface Water ☒ Drinking Water ☒ Raw ☐ Treated ☐ Waste water: ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☐ WSS Dist. # ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☒ Other SER

Results are expressed as mg/l unless specified

Sn. Bndo

☐ GENERAL MINERAL ANALYSIS

			(mg/l as Ca CO_3)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify):

PCE = .171 mg/L
TCE = 0.76 mg/L

TAKEN BEFORE RESERVOIR OBAICUES

Date Reported	Analyst
8-6-82	PA

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µ mhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-600 (2-80)

United States Summary Judgment Motion, Ex. 29, Page 246

State of California - Department of He[illegible]
Sanitation and Radiation Laboratory
Southern California Laboratory

SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 8-24-82 (Leave Blank) 7222

Purveyor and Address (include city and county): City of San Bernardino

System Number: 3 6

Serial Number: C 07553

Sampling Point: Mountain Reservior

Collected by: Roy Huls

Date and Hour Collected: 8/20/82 PM

Type of Sample: ☐ Raw Surface Water ☒ Drinking Water: ☐ Raw ☐ Treated ☐ Wastewater ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☒ WSS Dist. 6 ☐ County HD ☐ DOT Dist. # ☐ National Park.Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

			(mg/l as $CaCO_3$)
☐ Ca		☐ Hardness	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ B. Alk	

TRACE ELEMENTS

☐ Al
☐ Ag
☐ As
☐ B
☐ Cd
☐ Cr
☐ Cu
☐ Hg
☐ Pb
☐ Ni
☐ Se
☐ Zn
☐

☒ Other analyses desired (specify):

PCE = 235 µg/l
TCE = 1.2 µg/l
VOA
toluene = 4.9 µg/l

Date Reported	Analyst
8-31-82	P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (4/74)

United States Summary Judgment Motion, Ex. 29, Page 247

State of California - Department of H[illegible]vices
Sanitation and Radiation Laboratory [illegible]
Southern California Laboratory Section
SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 9-8-8[illegible] (Leave Blank)

Lab. No.: 7348

Purveyor and Address (include city and county): City of San Bdno.

System Number: 36

Serial Number: C 21570

Sampling Point: Mt. Reservoir

Collected by: R. Huls

Date and Hour Collected: 1100 9/2/82

Type of Sample: ☐ Raw Surface Water ☒ Drinking Water ☐ Raw ☐ Treated ☐ Waste water: ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☒ WSS Dist. S Bdno. ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

☐ Ca		☐ Hardness (mg/l as Ca CO_3)	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify):

VOA.

trichloroethylene = 0.92 µg/l

tetrachloroethylene = 810 µg/l

Date Reported: 9-10-82

Analyst: P.H.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µmhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

I.D.H.

Form LAB-800 (2-80)

United States Summary Judgment Motion, Ex. 29, Page 248

State of California Department of Health Services
Sanitation and Radiation Laboratory Section
Southern California Laboratory Section
SAMPLE FOR CHEMICAL ANALYSIS

Date Received: 9-8-82 (Leave Blank)		Lab. No.: 7352
Purveyor and Address (include city and county): City of S. Bdno.	System Number: 36	Serial Number: C 21574
Sampling Point: Mountain Res.	Collected by: R. Huls	Date and Hour Collected: 9/7/82 AM.

Type of Sample: ☐ Raw Surface Water ☐ Drinking Water ☐ Raw ☐ Treated ☐ Waste water: ☐ Raw ☐ Chlorinated ☐ Trade Waste ☐ Other

Send Report To: ☒ WSS Dist. # S. Bdno ☐ County HD ☐ DOT Dist. # ☐ National Park Serv. ☐ RWQCB # ☐ Other

Results are expressed as mg/l unless specified

☐ GENERAL MINERAL ANALYSIS

☐ Ca		☐ Hardness (mg/las $CaCO_3$)	
☐ Mg		☐ HCO_3	
☐ Fe Total		☐ CO_3	
☐ Mn		☐ OH	
☐ Na		☐ Total Alk.	
☐ K		☐ Cl	
☐ pH		☐ SO_4	
☐ Total Dissolved Solids		☐ F	
		☐ NO_3	

TRACE ELEMENTS: ☐ Al ☐ Ag ☐ As ☐ B ☐ Cd ☐ Cr ☐ Cu ☐ Hg ☐ Pb ☐ Ni ☐ Se ☐ Zn ☐

☒ Other analyses desired (specify):

VOA

trichloroethylene = 0.89 µg/l
tetrachloroethylene = 68.3 µg/l

Date Reported	Analyst
9-12-82	PH.

☐ Turb. TU	☐ NH_3-N	☐ BOD	☐ Susp. Solids	☐ PO_4
☐ Spec. Cond. µ mhos/cm	☐ ORG-N	☐ Grease	☐ Set Solids ml/l/hour	☐ MBAS

Form LAB-800 (2-80)

United States Summary Judgment Motion, Ex. 29, Page 249

Exhibit 30

File

CITY CLASSIFICATION OF PI

JUNE 30, 1983

*(Includes Pipe in San Bernardino Water Utilities Corporation as of December 31, 1982)

Diameter and Class	Length in Miles	Percent of Total
1½" Gal.	0.1091	.02%
2" Gal.	0.8686	.19%
2" S.B.	2.8486	.62%
2" C.I.	0.1600	.04%
2½" S.B.	1.2500	.27%
2½" Gal.	0.1800	.04%
3" S.B.	7.9757	1.75%
3" Gal.	0.2003	.04%
3" C.I.	0.0100	-0-
4" Steel	14.8733	3.26%
4" S.B.	6.7967	1.49%
4" C.I.	37.4337	8.20%
4" D.I.	0.1467	.03%
4" Standard Steel	0.0133	-0-
4" Cement Lined & Wrapped Steel	0.0841	.02%
4½" O.D.	2.7700	.61%
5" Steel	0.4200	.09%
6" C.I.	77.7316	17.02%
6" S.B.	0.5800	.13%
6" [illegible] Steel	[illegible] .68	11.24%
6" Cement Lined Steel	4.2600	.93%
6" Cement Lined & Cement Coated	0.4800	.11%
6" Cement Lined & Wrapped Steel	[illegible] 53.7897	.53%
6" Dipped & Wrapped Steel	0.0100	-0-
6" Ductile Iron	0.5814	.13%
6" Transite	0.0700	.02%
8" C.I.	40.7487	8.92%
8" C.I. (Tyton)	0.0900	.02%
8" Standard Steel	30.2987	6.63%
8" Cement Lined Steel	4.9200	1.08%
8" Cement Lined & Wrapped Steel	7.1971	1.58%
8" Cement Lined & Cement Coated	0.4200	.09%
8" Ductile Iron	6.9688	1.53%
8" Dipped & Wrapped Steel	0.5900	.13%
8" Transite	0.0700	.01%
10" C.I.	0.0700	.01%
10" Steel	2.2400	.49%
10" "O" 10 Ga. Cement Lined Steel	0.0900	.02%
10" Transite	0.9300	.20%

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~~Pedroza~~ EXHIBIT ~~315~~ 500 (TK)
FOR IDENTIFICATION
THEODORA M. KELLY, C.
6-1 19 99
(WITNESS Pedroza

CITY CLASSIFICATION OF PI

JUNE 30, 1983

*(Includes Pipe in San Bernardino Water Utilities Corporation as of December 31, 1982)

Diameter and Class	Length in Miles	Percent of Total
10" Ductile Iron Pipe	0.0114	-0-
10" Standard Steel	0.0015	-0-
12" C.I.	46.8051	10.25%
12" S.B.	0.0700	.02%
12" Steel	28.1295	6.16%
12" Cement Lined Steel	5.1700	1.13%
12" Cement Lined & Cement Coated	2.5900	.57%
12" Cement Lined & Wrapped Steel	3.9565	.87%
12" Ductile Iron Pipe	2.9395	.64%
14" Steel	0.0600	.01%
16" C.I.	1.0200	.22%
16" Steel	21.7336	4.76%
16" Cement Lined Steel	1.4000	.31%
16" Cement Lined & Cement Coated	5.9200	1.30%
16" Cement Lined & Wrapped Steel	3.2874	.72%
16" Standard Steel	0.0057	-0-
18" C.I.	0.1700	.04%
18" Steel	0.2500	.05%
18" Cement Lined & Cement Coated	0.2300	.05%
20" C.I.	2.4800	.54%
20" Steel	7.6300	1.67%
20" Cement Lined & Cement Coated	1.9700	.43%
20" 10 Ga. Cement Lined Steel	.0500	.01%
22" Steel	1.5400	.34%
24" Steel	4.0200	.88%
24" Cement Motar Lined & Cement Coated Steel	1.5079	.33%
26" Steel	0.3600	.08%
30" C.I.	0.0200	-0-
30" Steel	1.9000	.42%
30" Cement Lined Steel	0.2100	.05%
30" Cement Lined & Cement Coated	3.0134	.66%
TOTAL	456.7306	100.00%

Exhibit 31

FIELD FORM FOR WATER WORKS REVIEW

Place: City of San Bernardino
Purveyor: City of San Bernardino
Person Contacted: Joe Bocanegra, Larry Cox
Position: Engineering Supervisor

Date: 10/6/83
Reviewing Engineer: W.C. Gedney

1. PERMIT STATUS

Issued 10/7/64

2. PREVIOUSLY NOTED SANITARY HAZARDS AND DEFECTS IN OPERATION

Hazards and Defects (Note Date) — Corrections Found

Refer to existing System Deficiency Record.

3. CHANGES IN SYSTEM

New Storage tanks added
New well (Cajon No. 3) is in the process of being test pumped.
Amended permit issued. City now has WUC in system.

Are adequate maps maintained and kept up to date? ~~Need new schematic diagrams~~
Planned Future Changes: According to master plan

Attach schematic diagram if revised. ~~Need updated schematic~~.

4. CONSUMER AND PRODUCTION DATA

No. of service connections: 32,200 No. with Meters: 32,200
Approx. population served: 110,000
Water produced during recent 12 mo. period (Jan 82 to Dec 82): 10,285,315 m.g.
Maximum month (July): 1,409 m.g.
Maximum day (): m.g.
Monday: 51,486 gpm/sec
174 gpd/sc
Average/day

5. SOURCES

Main: 36 active wells
1 surface source (Devil Canyon)
1 in filtration gallery (Cajon wells).

Standby: Many wells on standby
Auxiliary: Perris hill #4 and 17th st are capped.)
Changes in sewage works in vicinity since last review:

Sampling taps: Provided
Meters: Provided.
Well static and pumping levels: In file / Well Data Sheets

6. TREATMENT

Type: Chlorination

DEFENDANTS' EXHIBIT 522 FOR ID
CASE NO. 11684
DATE 6-3-99
WITNESS GEDNEY

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Records: ok
Reliability: Better reliability needed at Little Creek well

7. STORAGE (List)
See Reservoir Data Sheets.

8. DISTRIBUTION SYSTEM

Pressure Zones	Ave. Pressure Range Maintained	Min. Pressure Maintained During Max. Normal Flow
12	45-130psi	30psi

Mains:	Size	Material	Class or Gage
	4"-30"	Steel, Cast Iron, ACP	Cl 150, 200 12 gauge.

Depth of cover: 30" min
Protection against corrosion: Cathodic protection + UD+W
Compliance with Min. Standards Sec. 64628:
OK

Program to replace inadequate mains: None; replacement for leaks only

Practice in separation (ver. & horiz.) between water and sewer lines. ok

Dead Ends: Yes Approx. No. MANY
Flushing Program:

Program for Removal: No

Valve location satisfactory: Yes
For past year approx. no. of leaks 21 Outages 3
Duration of water outages: Aver. 2hrs Max. 16hrs.
Compliance with Min. Standards Sec. 64562;
Required Flow: 38,000
Available Flow: 58,000

9. MAIN DISINFECTION PROGRAM

Line pre-flushed: Yes ✓ No___ Type chemical used: Liquid Chlorine in tank
Method of application:
As per AWWA specs.

Contact time: 24 Final chlorine residual level maintained: ~5ppm
Practice with repaired mains:

Bacteriological tests made after main disinfection: Yes ✓ No___

10. CROSS-CONNECTION CONTROL PROGRAM

Does system have any services to:
Sewage treatment plants or sewage pumping stations? Yes X No___
Industrial plants having internal hazards which might result in pumping of or siphoning of toxic materials into community water supply? Yes X No___
Premises having secondary (and unapproved) sources of water supply?
Yes X No___

Are new services reviewed to establish need for backflow protection? Yes X No ___

Are existing services reviewed to establish need for backflow protection? Yes X No ___

On what type of services is backflow protection being required?
See *Comments - STP through private reviewers

What types of protective devices are required for various conditions and hazards?
RPPBP, DCVA, AVGAP, PVB, AVB.

Does the water purveyor have a list of backflow protection devices installed at the service connections in his system? Yes X No ___ 510 devices
What is frequency of testing of devices? Annually
Discuss any unsatisfactory performance records found.

11. BACTERIOLOGICAL QUALITY CONTROL PROGRAM

Location of sample points: Throughout system.

Min. no. of samples required: 138 Min. no. collected: ~~136~~ 138
Practice when 3 or more portions positive: ~~Attached~~
Collect followups and analyze

Attach summary of bacteriological analysis. Attached

12. CHEMICAL QUALITY CONTROL PROGRAM

Adequacy of chemical analyses available: Good
Problems in chemical quality: Some possible TCE/PCE problems.

Measures taken to correct problems: Blending with other sources.

Attach latest analyses. Summary attached.

13. COMPLAINTS

Type: ~~222~~ 224

Number: T+O (23), Color 9, Turb 31, Pressure ~~158~~ 92 57 water outage complaints
Location: Throughout system

14. ADDITIONAL COMMENTS

See def. list.

15. EXISTING SANITARY HAZARDS AND DEFECTS IN OPERATION

Exhibit 32

INTERIM REPORT

WARRANTY INSPECTIONS-INTERIOR COATINGS
OF FOUR STEEL RESERVOIRS

MUNICIPAL WATER DEPARTMENT
SAN BERNARDINO, CALIFORNIA

HARPER & ASSOCIATES INSPECTION SERVICES

Coating & Painting Inspection Services

P.O. BOX 7518 RIVERSIDE, CA 92513 • (714) 780-9055

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EXHIBIT 590
W. Harper, Vol II
6/28/99

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INTERIM REPORT

WARRANTY INSPECTIONS-INTERIOR COATINGS
OF FOUR STEEL RESERVOIRS

MUNICIPAL WATER DEPARTMENT
SAN BERNARDINO, CALIFORNIA

HARPER & ASSOCIATES INSPECTION SERVICES

COATING & PAINTING INSPECTION SERVICES

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INTERIM REPORT

SUBJECT:	Warranty Inspection of Interior Coatings
STRUCTURE:	Del Rosa Reservoir 3.0 M.G. Steel Water Reservoir (130'x32')
ERECTED BY:	U.S.S. Fabricators in 1982
LOCATION:	San Bernardino, California
OWNER:	City of San Bernardino
INSPECTED BY:	Michael G Harper, Cary Murakami and Jerald K. Iverson
INSPECTION DATES:	November 7,8,9 & 17, 1983

The Reservoir was drained. Inspection of the roof and structural members plus the upper 24' of the shell and columns was performed from a rolling scaffold adjusted as necessary to allow access to all parts. Inspection of the lower 8' -- shell, columns and floor was performed from the floor. Photographs were taken to support findings and will be included in the finished report. Light was supplied by a combination of battery operated and 110 volt hand held lights.

Surfaces above the 1 foot level appeared to be coated with Tnemec 46-465 Tank Solution, a high build coal tar base coating. The floor and approximately one foot of the shell were coated with hot-applied coal tar enamel.

The coating was chipped/scraped away from various places on the roof, shell, columns and floor to expose the substrate -- 2 spots showed minor evidence of possible sandblasting preparation; 15 spots at random locations revealed definite evidence no attempt to prepare surfaces by sandblasting had been made prior to coating application.

Corrosion as a result of improper coating techniques was evident on:

1. Irregular Surfaces: Overflow pipe brackets; all earthquake rods/nuts/bolts/threads; rafter and girder flanges (top and bottom); tops of girders; bottoms and ends of rafters and girders; rafter mounting clips/nuts/bolts; top horizontal shell weld (full circumference); lap seam edges.

2. Flat surfaces: Roof sheets; inside overflow funnel; girder and rafter webs; shell.

3. Columns.

4. Restricted access areas.

Other coating problems discovered:

1. Overspray: On top of coated surfaces; between coats; heavy overspray build-up on flanges and no sound coating underneath; quantity ranging from light overspray to heavily rippled coating.

2. Sand and debris: In some cases sand was coated over; in other cases, sand covered flanges were totally avoided.

3. Pinholes: Some created by application over sand, overspray, etc.; some created due to lack of brush application.

4. Coating checked and cracked.

5. Unrepaired mechanical damage.

6. Improper coating material: Exterior enamel applied inside reservoir.

Conclusions:

Coatings, both hot and cold applied appeared to have been applied over unprepared/improperly prepared surfaces.

Improper techniques/practices degraded coating integrity over approximately 50% of the cold applied areas.

Irregular areas received no "special atention".

Problems dictate total removal and replacement of coating system.

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INTERIM REPORT

WARRANTY INSPECTION
PALM/KENDALL RESERVOIR

CITY OF SAN BERNARDINO
SAN BERNARDINO, CALIFORNIA

NOVEMBER 9, 1983

HARPER & ASSOCIATES INSPECTION SERVICES

COATING & PAINTING INSPECTION SERVICES

P.O. BOX 7518 • RIVERSIDE • CALIF • 92513 • (714) 780-9055

INTERIM REPORT

SUBJECT:	Warranty Inspection of Interior Coatings
STRUCTURE:	Palm/Kendall Reservoir 5.0 M.G. Steel Water Reservoir (180'x24)
ERECTED BY:	U.S.S. Fabricators in 1982
LOCATION:	San Bernardino, California
OWNER:	City of San Bernardino
INSPECTED BY:	Michael G. Harper and Jerald K. Iverson
INSPECTION DATE:	November 9, 1983

Inspection of the interior roof and structural members was performed from a rubber raft with water level at 22 feet. The shell and lower portions of the reservoir were not inspected at this time. Lighting was supplied by battery operated, hand held lights. Photographs were taken to support findings and will be included in the full report.

Inspected surfaces were coated with Tnemec 46-465 Tank Solution. Random measurements registered 14-33 mils.

The coating was chipped and scraped away from various places on the roof, structural members and columns to expose the substrate. Each spot examined in this manner revealed definite evidence no attempt to prepare surfaces by sandblasting had been made prior to coating application.

Corrosion as a result of improper coating techniques was evident on:

1. Irregular Surfaces: All earthquake rods/nuts/bolts/ threads; rafter and grider flanges (top and bottom); tops of girders; bottoms and ends of rafters and

girders; rafter mounting clips/nuts/bolts; top horizontal shell weld (full circumference); lap seam edges.

2. Flat surfaces -- roof sheets; girder and rafter webs.

3. Restricted access areas.

Other coating problems discovered:

1. Overspray: On top of coated surfaces; heavy overspray build-up on flanges and no sound coating underneath; quantity ranging from light overspray to heavy rippled coating.

2. Sand was coated over and formed a crust on rafter and girder flanges.

3. Coating was checked and cracked.

4. Unrepaired mechanical damage.

Conclusions:

Coating appeared to have been applied over totally unprepared/improperly prepared surfaces.

Improper coating techniques/practices degraded coating integrity over approximately 50% of the areas.

Irregular areas received no "special attention".

Problems dictate total removal and replacement of coating system.

INTERIM REPORT

WARRANTY INSPECTION
CAJON RESERVOIR

CITY OF SAN BERNARDINO
SAN BERNARDINO, CALIFORNIA

NOVEMBER 10, 1983

HARPER & ASSOCIATES INSPECTION SERVICES

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INTERIM REPORT

WARRANTY INSPECTION
CAJON RESERVOIR

CITY OF SAN BERNARDINO
SAN BERNARDINO, CALIFORNIA

NOVEMBER 10, 1983

HARPER & ASSOCIATES INSPECTION SERVICES

COATING & PAINTING INSPECTION SERVICES

P.O. BOX 7518 • RIVERSIDE • CALIF • 92513 • (714) 780-9055

INTERIM REPORT

SUBJECT:	Warranty Inspection of Interior Coatings
STRUCTURE:	Cajon Reservoir 5.0 M.G. Steel Water Reservoir (166'x32)
ERECTED BY:	U.S.S. Fabricators in 1982
LOCATION:	San Bernardino, California
OWNER:	City of San Bernardino
INSPECTED BY:	Michael G. Harper and Jerald K. Iverson
INSPECTION DATE:	November 10, 1983

Inspection of the interior roof and structural members was performed from a ruber raft with water level at 30 feet. The shell and lower portions of the reservoir were not inspected at this time Lighting was supplied by battery operated, hand held lights. Photographs were taken to support findings and will be included in the full report.

Inspected surfaces were coated with Tnemec 46-465 Tank Solution. Random measurements registered 16-20 mils thick.

The coating was chipped and scraped away from various places on the roof, structural members and columns (with the exception of one column) to expose the substrate. Each spot examined in this manner revealed definite evidence no attempt to prepare surfaces by sandblasting had been made prior to coating application. One spot showed evidence of sandblasting with a very fine grade sand -- this created insufficient profile for adhesion.

Corrosion as a result of improper coating techniques was evident on:

1. Irregular Surfaces: all earthquake rods/nuts/bolts/threads; rafter and girder flanges (top and bottom); tops of girders; bottoms and ends of rafters and girders; rafter mounting clips/nuts/bolts; top horizontal shell

weld (full circumference); lap seam edges.

2. Flat surfaces: Roof sheets; girder and rafter webs.

3. Columns.

4. Restricted access areas.

Other coating problems discovered:

1. Overspray: On top of coated surfaces; heavy overspray build-up on flanges and no sound coating underneath; overspray ranged from light accumulation to heavily rippled coating.

2. Sand and debris: In some cases sand was coated over; in other cases, sand and overspray measured 1/8" thick on girder flanges.

3. Coating was checked and cracked.

4. Unrepaired mechanical damage.

Debris (empty can, tins, wrappers, etc) was not removed from site at conclusion of project.

Conclusions:

Coating appeared to have been applied over totally unprepared/improperly prepared surfaces.

Improper coating techniques/practices degraded coating integrity over approximately 40% of the applied subject areas.

Problems dictate total removal and replacement of coating system.

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INTERIM REPORT

WARRANTY INSPECTION
DEVORE RESERVOIR

CITY OF SAN BERNARDINO
SAN BERNARDINO, CALIFORNIA

NOVEMBER 9, 1983

HARPER & ASSOCIATES INSPECTION SERVICES

COATING & PAINTING INSPECTION SERVICES

P.O. BOX 7518 • RIVERSIDE • CALIF • 92513 • (714) 780-9055

INTERIM REPORT

SUBJECT:	Warranty Inspection of Interior Coatings
STRUCTURE:	Devore 2100 Zone Reservoir Steel Water Reservoir
ERECTED BY:	U.S.S. Fabricators in 1982
LOCATION:	San Bernardino, California
OWNER:	City of San Bernardino
INSPECTED BY:	Michael G. Harper and Jerald K. Iverson
INSPECTION DATE:	November 9, 1983

Inspection of the interior roof and structural members was performed from a rubber raft with water level at 22 feet. The shell and lower portions of the reservoir were not inspected at this time. Lighting was supplied by battery operated, hand held lights. Photographs were taken to support findings and will be included in the full report.

The extensive overfill damage to the roof, structural members and shell was not a contributing factor to the coating problems herein described. Inspected surfaces were coated with Tnemec 46-465 Tank Solution. Random measurements registered 16-24 mils.

The coating was chipped and scraped away from various places on the roof, structural members and columns to expose the substrate. Each spot examined in this manner revealed definite evidence no attempt to prepare surfaces by sandblasting had been made prior to coating application.

Corrosion as a result of improper coating techniques was evident on:

1. Irregular Surfaces: all earthquake rods/nuts/bolts/ threads; rafter and girder flanges (top and bottom); tops of girders; bottoms and ends of rafters and

girders; rafter mounting clips/nuts/bolts; top horizontal shell weld (full circumference); lap seam edges.

2. Flat surfaces -- roof sheets; girder and rafter webs.

3. Restricted access areas.

Other coating problems discovered:

1. Overspray: On top of coated surfaces; heavy overspray build-up on flanges and no sound coating underneath; quantity ranging from light overspray to heavy rippled coating.

2. Sand was coated over and formed a crust on rafter and girder flanges.

3. Coating was checked and cracked.

4. Unrepaired mechanical damage.

Conclusions:

Coating appeared to have been applied over totally unprepared/improperly prepared surfaces.

Improper coating techniques/practices degraded coating integrity over approximately 50% of the areas.

Irregular areas received no "special attention".

Problems dictate total removal and replacement of coating system.

Exhibit 33

Reservoir Coatings

CALIFORNIA SURVEY OF SOLVENTS LEACHING FROM COLD-APPLIED COAL TAR PAINTS USED AS INTERNAL COATINGS IN POTABLE WATER STORAGE TANKS

Joseph P. Como, P.E.

California Department of Health Services

DEFENDANTS' EXHIBIT 524 FOR ID
BRYAN CUL CO. NO. 11023
DATE: 6-3-99
WITNESS: GEDNEY

United States Summary Judgment Motion, Ex. 33, Page 272

Protective paints and coatings are used in the drinking water industry for corrosion control. Products currently in use include acrylics, coal tar enamels and cutbacks, asphalts, epoxies, vinyls, phenolics, rubber, metallizing and waxes[1,2].

Coal tar products are by far the most commonly used linings in California for the internal surface of potable water storage tanks and pipelines. The most widely used is coal tar cutback paint, otherwise known as cold-applied coal tar paint. These paints are relatively inexpensive, long lasting, and are easily available to water suppliers.

One of the earliest uses of coal tar paints was referenced in 1744 by George Berkeley of England[3]. In the United States it has been used since 1912. Concern has existed for years over the presence of potentially harmful ingredients in coal tar used in contact with food. The U.S. Food and Drug Administration has taken the position that coal tar pitch is not a suitable component for coatings that will be in contact with potable water or any other food[5]. Their concern centers around the presence of polycyclic aromatic hydrocarbons (PAH) in the coal tar pitch. PAHs are known to leach into potable water exposed to surfaces coated with commercial coal tar products and are listed as priority pollutants by the Environmental Protection Agency (EPA). Some of these are also known carcinogens. In spite of this, little work has been done to determine its possible health affects[4].

Alben[6] determined the level of PAH at the inlet and outlet of a 12,000 gallon potable water storage tank which had a 5 year old commercial coal tar coating. She reported effluent concentrations increased from 5 to 30 times that of the influent. Total PAH concentrations at influent and effluent were 29 ng/l and 410 ng/l respectively. The EPA guidelines for water quality criteria establish 2.8 ng/l (parts per trillion) to be a 1:1,000,000 cancer risk over a lifetime of exposure[7].

The Health Department of Nassau County, New York investigated consumer complaints of a "turpentine" like taste and odor in drinking water from a potable water storage tank under the control of the New York Water Service Corporation[8]. The 1.0 M.G. tank was painted with an coal tar epoxy resin. Analysis of water in the tank showed it to contain: 61 ppb xylene, 17 ppb toluene, and 14 ppb ethylbenzene.

The Department investigated contamination of six other potable water storage tanks and found them to contain unacceptably high levels of volatile organic chemicals (VOC) including benzene and tetrachloroethylene(PCE). With a number of months of overflowing and use, the total VOC level decreased below acceptable New York State levels. VOC levels were also shown to subsequently increase with increased water residence time. All of the coatings were on the EPA and New York State Health Department lists of acceptable coatings.

The Sanitary Engineering Branch (SEB) of the California Department of Health Services became concerned about contamination of potable water

supplies from cold-applied coal tar paints because some water suppliers in Southern California had reported finding volatile organic chemicals (VOC) in tanks containing these paints. Further tests showed the major VOC to be tetrachloroethylene (PCE) with smaller amounts of xylene and toluene. The product used was Koppers Bitumastic Super Tank Solution. These chemicals are components of the solvent used with this cold-applied coal tar paint.

INVESTIGATION

Cold-applied coal tar systems conform with Internal Painting System (IPS) No. 6 in AWWA D102-78. They rely on complete solvent evaporation for curing. SEB therefore suspected that solvents were not being completely released after painting because of inadequate ventilation.

SEB decided to address the situation as follows: 1) find out how extensive coal tar use is in California and what the associated problems have been, and 2) get analytical data on the VOC content of water in tanks immediately after they are painted with cold-applied coal tar and also in tanks that have already experienced problems with volatile organic chemicals.

To accomplish the first objective, survey forms were sent out to all large community water systems in the state ($\geq$200 service connections).

Water suppliers were asked to indicate what coating, if any, was used in their tanks, the size of the tanks, and their curing times. Additionally, they were to document any associated bacteriological, taste, odor, or organics problems that they were aware of. Many phone conversations were conducted between SEB personnel and concerned water suppliers and painting contractors in order to get a feeling for various field practices.

RESULTS OF SURVEY

Of the 1260 questionaires that were sent out, 643 were completed and returned. The results are given in table 1.

Greater than 78% of the potable water storage tanks in the State have coal tar linings. Seventy-nine percent of these are cold-applied coal tar. Only ~ 1/2% of the water suppliers that responded reported any problems in the catagories listed above.

The survey results suggest that only three proprieters manufacture more than 90% of the cold-applied coal tar paints used in California. Table 2 lists those paints and the solvent components that we are aware of.

RESULTS OF SURVEY FOR COAL TAR USE IN POTABLE WATER STORAGE TANKS

NUMBER OF LARGE COMMUNITY WATER SYSTEMS TO RECEIVE QUESTIONNAIRE	1260
NUMBER TO RETURN COMPLETED QUESTIONNAIRE	643
NUMBER OF POTABLE WATER STORAGE TANKS	1929
Number with internal paint or coating	1848
Number with coal tar paint or coating	1447
Number with cold-applied coal tar*	1144
Number with coal tar enamel*	406
Number with coal tar epoxy	172
Number with unknown paint or coating	316
REPORTED PROBLEMS	
Taste and odor	42
Bacterial	9
Organics (other than cases in tables 3,4,& 5)	4

*many tanks have both cold-applied coal tar and coal tar enamel

TABLE 1

TABLE 2

MANUFACTURER	COATING	SOLVENTS (may not be complete)
Koppers Company, Inc.	Bitumastic Super	tetrachloroethylene(PCE)†
Pittsburg,Pa	Tank Solution	xylene, toluene
Tnemac Company, Inc. Kansas City, MO	46-465 Hi-Build Tank Coating	1,1,1-trichloroethane(TCA) xylene
Engard Coatings Corp. Huntington Beach, CA	800 Super Tank Coating	methyl isobutyl ketone(MIBK) xylene, toluene

†Koppers has recently said that they are removing PCE from their paint

At the time of this investigation Koppers Bitumastic Super Tank Solution was the only one of the three commonly used cold-applied coal tar paints to report having PCE in their formulation. It is also the most commonly used cold-applied coal tar, accounting for over 70% of the market in the State. Tnemac seems to hold a much smaller percentage of the market with its TCA containing paint.

It is a common practice to use two different coating systems in the same tank. An example is using hot applied enamel below low water level and cold-applied coal tar on the inside roof and down the side of the low water level. All tanks are above ground.

It became evident in conversation with painting contractors and water suppliers that very few were attempting to follow or were even aware of manufacturers' specifications for forced air ventilation (FAV) during curing or were knowledgeable of AWWA D102-78 minimum requirements. Few were achieving the minimum ventilation requirements. Koppers, Tnemac, and Engard all note the need for ventilation in the instruction sheets that come with their paints. Tnemac recommends that FAV be used a mimimum of 14 days to remove all traces of solvent vapors.

Koppers requires FAV for 10 days; Engard makes no mention of FAV, but recommends a final drying time of 15 days at 70°F.
Both Tnemac and Koppers note that temperature and humidity may affect the length of time for curing- Tnemac says that temperature and humidity readings above or below 75°F and 50% relative humidity may extend or reduce the time required. Koppers say the same but instead using 70°F. Engard lists three temperatures and suggests minimum drying times given a film thickness of 8 mils. Engard does not mention a specific relative humidity.

None of these three coating manufacturers gives a good idea of how removal of the organic vapors is related to temperature and humidity.

Engard comes the closest with their list of temperatures and drying times. It seems to be up to every individual water supplier to come up with their own estimate of curing and allowable weather conditions.

It is also common for water suppliers and painting contractors to substitute an extended period of passive ventilation for a shorter period of FAV. AWWA D102-78 requires 1 air exchange/4 hours. Koppers requires 1 air exchange/hour. Neither Tnemac nor Engard make specific recommendations on the volume of air that is required.

Another common practice during curing is to keep the top hatch(s) open for passive ventilation while the bottom hatch(s) remain closed. This practice is meant to prevent easy access to the tank interior by unauthorized people after workers have left the site. This practice traps, in the tank, VOCs that are heavier than air. All of the VOCs listed in table 2 are heavier than air.

Still another problem is that many community water systems will typically schedule recoating activities when there is the least demand on their system. This is usually during the winter months, which presents the worst of possible situations for proper curing- high humidity and low temperature.

INDIVIDUAL CASE ANALYSIS

The second objective, to look at individual cases, was assisted by the California Water Service Company of San Jose. Between February 1982 and June 1983, water was sampled from thirty-eight potable water storage tanks in twenty large community water systems. Details of the application and curing process were gathered in an attempt to find out why some tanks yielded high levels of VOCs and some did not.

EPA's Office of Drinking Water has drafted 16 "water health effects advisories" for unregulated drinking water contaminants that are commonly found in water supplies. The advisories are called Suggested No Adverse Response Levels (Snarls) and recommend "the level of contaminant in drinking water at which adverse health effects would not be anticipated." These Snarls could lead to national drinking water standards or maximum contamination levels (MCLs). All of the solvent components listed in table 2, with the exception of methyl isobutyl ketone, have recommended health advisory levels.

The solvent components of greatest concern to SEB are 1,1,1-trichloroethane (TCA) and tetrachloroethylene (PCE). The State has established an Action Level of 300 ppb for TCA and 4 ppb for PCE[8]. The Action Level for PCE is based on a 1:1,000,000 cancer risk as suggested by the EPA Water Quality Criteria Document on TCE/PCE for a life time of exposure (EPA actually suggests 3.5ppb). For TCA, the Action Level is based on a taste and odor threshold. The EPA health advisory suggests 1000 ppb of TCA as a toxicity threshold.

PCE has been reported to produce liver and kidney damage and central nervous system disorders in humans. EPA recommends maximum concentrations of 175 ppb and 20 ppb for 10 day and for "long term exposure" (7-11 months) respectively. For xylene, EPA has recommended a Snarl (Suggested No Adverse Response Level) of 620 ppb.

Procedure:

Samples were taken from the forty potable water storage tanks. Tables 3,4, and 5 summarize the painting details and water sampling results. Each table corresponds to one of the three different cold-applied coal tar paints. Most of the water suppliers were located in the Los Angeles and San Francisco Bay areas with a few representing more rural areas (figures 1,2, and 3).

Sixteen of the tanks were painted with Koppers Bitumastic Super Tank Solution, five with Tnemac 46-465 Hi Build Coal Tar, and seventeen with Engard 800. Analysis was performed using a modification of EPA Test Method 624 for purgeables[10]. In addition, EPA Test Method 625 (base/neutral fraction only) was employed on water from tanks containing Engard 800 for the detection of methyl isobutyl ketone (MIBK)[11]. The California Water Service Company supplied records of temperature, relative humidity, and ventilation during three tank painting procedures.

RESULTS

None of the water samples exceeded applicable EPA health advisories for toluene, xylene, or TCA. The State Action Level for TCA was also not exceeded.

Of the sixteen tanks painted with Koppers Bitumastic Super Tank Solution, nine exceeded the State Action Level for PCE. Three of the tanks that were in violation had been operating for at least three months above the action level. In the case of Crystal Falls' Mona Vista Tank, the level of PCE indicates a potential for a chronic health risk.

Surprisingly, all of the water samples from tanks painted with Tnemac 46-465 Hi-Build Tank Coating had detectable levels of PCE. In addition Del Rosa #3 had detectable levels of trichloroethylene. The State Action Level for PCE was exceeded in both the Del Rosa #3 and 2100 Tanks. Neither PCE or TCE are listed as solvent components in these paints.

MIBK showed up in water samples from four of the seventeen tanks painted with Engard 800. The highest was Los Altos Vineyard #2 Tank with 33 ppb. No TCA was detected in tanks painted with Engard 800.

Table 6 shows a correlation between FAV requirements and subsequent PCE levels for tanks that contain Koppers Bitumastic Super Tank Solution. In this table I ignored the use of passive ventilation and only included tanks that were in service for three months or less. Three months was

KOPPERS BITUMASTIC SUPER TANK SOLUTION

WATER SUPPLIER -tank name-	TANK VOLUME	NUMBER COATS	TOTAL THICKNESS	CURING# TIME	VENTILATION*	ANALYSIS RESULTS
PINECREST -Pinecrest-	0.098 MG	1	?	(I) ? (F)3 wks	- PAS	11 ppb PCE 3 mos in service
EAST KERN CO WTR AGENCY -Eastside-	1.0 MG	2	16 mils	(I)24 hrs (F)2 wks 4 mos	FAV FAV PAS	1.7ppb PCE >1 yr in service
SAN BERNARDINO -Mountain-	2 MG	2	>20 mils	(I) ? (F)11 dys ~~2 mos~~	 PAS ~~FAV~~	682 ppb PCE after intermitent service
YOSEMITE LAKES PARK	1 MG	2	16 mils	(I)8 dys (F)8 dys	FAV FAV	trace PCE 2 mos in service
BURLINGAME -Alcarzar-	0.05 MG	3	35-40 mils	(I)3 dys (F)4 dys	FAV FAV	1300 ppb PCE after disinfection
LOMA LINDA	1 MG	2	20-30 mils	(I)>1 dy (F)19 dys	FAV FAV	612 ppb PCE after disinfection 66 ppb toluene
BEAR GULCH -Arrowhead #2-	1 MG	3	20 mils	(I)>24 hrs (F)11 dys	FAV FAV	650 ppb PCE after disinfection
SAN GABRIEL V WTR CO.	5 MG	?	?	(I) ? (F) 128 hrs	? FAV	72 ppb PCE after disinfection 59ppb PCE
SAN JOSE -Pike Road-	0.18 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 27 dys	FAV FAV PAS	200 ppb PCE after disinfection

TABLE 3

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KOPPERS BITUMASTIC SUPER TANK SOLUTION

WATER SUPPLIER -tank name-	TANK VOLUME	NUMBER COATS	TOTAL THICKNESS	CURING# TIME	VENTILATION*	ANALYSIS RESULTS
CRYSTAL FALLS WATER COMPANY -Mona Vista-	0.41 MG	3	?	(I)4 dys (F)4 mos	PAS PAS	17 ppb PCE 7 mos in service 0.94 ppb PCE 11 mos in service
-Main Plant-	0.075 MG	2	12 mils	(I)24 hrs (F)20 dys	PAS PAS	1.0 ppb PCE 3 mos in service
CEDAR RIDGE WTR CO. -Main Plant-	0.126 MG	2	?	(I)14 dys (F)30 dys 5 dys	PAS PAS FAV	139 ppb PCE 3 mos in service 5.5 ppb toluene
NORTH COAST CO. WTR DISTRICT -Fairmont-	0.6 MG	2	16 mils	(I) ? (F)4 wks	- FAV	below detection after disinfection
-Sharp Park-	0.5 MG	2	16 mils	(I) ? (F)4 wks	- FAV	below detection after disinfection
CITY OF SANTA CLARA -North Side-	4.7 MG	2	?	(I)4 hrs (F)2 wks	FAV PAS	1.8 ppb PCE 4 yrs in service
-Serra #3-	4.2 MG	2	?	(I)4 hrs (F)2 wks	FAV PAS	0.73 ppb PCE 2 yrs in service

*FAV = forced air ventilation; PAV = passive ventilation
#(I) = intermediate coats; (F) = final coat

TABLE 3 continued

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ENGARD 800 SUPER TANK

WATER SUPPLIER -tank name-	TANK VOLUME	NUMBER COATS	TOTAL THICKNESS	CURING# TIME	VENTILATION*	ANALYSIS RESULTS	
BEAR GULCH -Ridgeway #2-	0.5 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 10 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
-Intermediate-	0.25 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 13 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
BAKERSFIELD -Hillcrest #5-	1 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 21 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
-Skyline #5-	1 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 13 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
-Primavera #5-	0.25 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 24 dys	FAV FAV PAS	7.7 ppb MIBK	after disinfection
-Mt.Vernon-	0.45 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 16 dys	FAV FAV PAS	4.0 ppb MIBK	after disinfection
-Monte Vista #3-	0.5 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 61 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection

TABLE 4

ENGARD 800 SUPER TANK

WATER SUPPLIER -tank name-	TANK VOLUME	NUMBER COATS	TOTAL THICKNESS	CURING# TIME	VENTILATION*	ANALYSIS RESULTS	
BAKERSFIELD -Station 147 #3-	0.5 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 100 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
EAST LOS ANGELES -Reservoir 10A-	1 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 48 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
-Reservoir 13A-	0.5 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 39 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
HERMOSA-REDONDO -Reservoir 1C	1.5 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 20 dys	FAV FAV PAS	1.4 ppb toluene 1.2 ppb xylene	after disinfection
-Reservoir 10A-	3.5 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 15 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
OROVILLE -High Duty #2-	2 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 11 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
SAN CARLOS -Beverly #1-	0.2 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 64 dys	FAV FAV PAS	9.4 ppb MIBK 23 ppb toluene 19 ppb xylene	after disinfection

TABLE 4 continued

ENGARD 800 SUPER TANK

WATER SUPPLIER -tank name-	TANK VOLUME	NUMBER COATS	TOTAL THICKNESS	CURING# TIME	VENTILATION*	ANALYSIS RESULTS	
LOS ALTOS-SUBURBAN -Pinecrest-	0.25 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 13 dys	FAV FAV PAS	no VOCs or MIBK detected	after disinfection
-Ramona #1-	0.125 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 15 dys	FAV FAV PAS	19 ppb PCE@	after disinfection
-Vineyard #2-	1.5 MG	3	20 mils	(I)>24 hrs (F)>48 hrs 16 dys	FAV FAV PAS	33 ppb MIBK 10 ppb toluene 6.1 ppb xylene	after disinfection

*FAV = forced air ventilation; PAV = passive ventilation
#(I) = intermediate coats; (F) = final coat
@see text for explanation

TABLE 4 continued

TNEMAC 46-465 HI-BUILD COAL TAR COATING

WATER SUPPLIER -tank name-	TANK VOLUME	NUMBER COATS	TOTAL THICKNESS	CURING# TIME	VENTILATION*	ANALYSIS RESULTS	
SAN BERNARDINO -1720-	5 MG	2	>20 mils	(I) ? (F)52 dys	? PAS	1.7 ppb PCE 1.7 ppb toluene 1.2 ppb xylene	after disinfection
-1895-	5 MG	2	>20 mils	(I) ? (F)68 dys	? PAS	0.3 ppb PCE 2.0 ppb toluene 3.2 ppb xylene	after disinfection
-2100-	2 MG	2	>20 mils	(I) ? (F)58 dys	? PAS	25 ppb PCE 8.9 ppb toluene 9.3 ppb xylene	after disinfection
-Del Rosa #3-	3 MG	2	>20 mils	(I) ? (F)43 dys	? PAS	16 ppb PCE 1.3 ppb TCE 72-76 ppb toluene 215-240 ppb xylene	after disinfection
LAKE ARROWHEAD CSD -Bernia-	1.3 MG	2	24 mils	(I)24 hrs (F)22 dys	FAV FAV	0.2 ppb PCE 0.8 ppb xylene 0.5 ppb toluene	after disinfection

*FAV = forced air ventilation; PAV = passive ventilation
#(I) = intermediate coats; (F) = final coat

TABLE 5

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LARGE COMMUNITY WATER SYSTEMS
USING
KOPPERS BITUMASTIC SUPER TANK SOLUTION

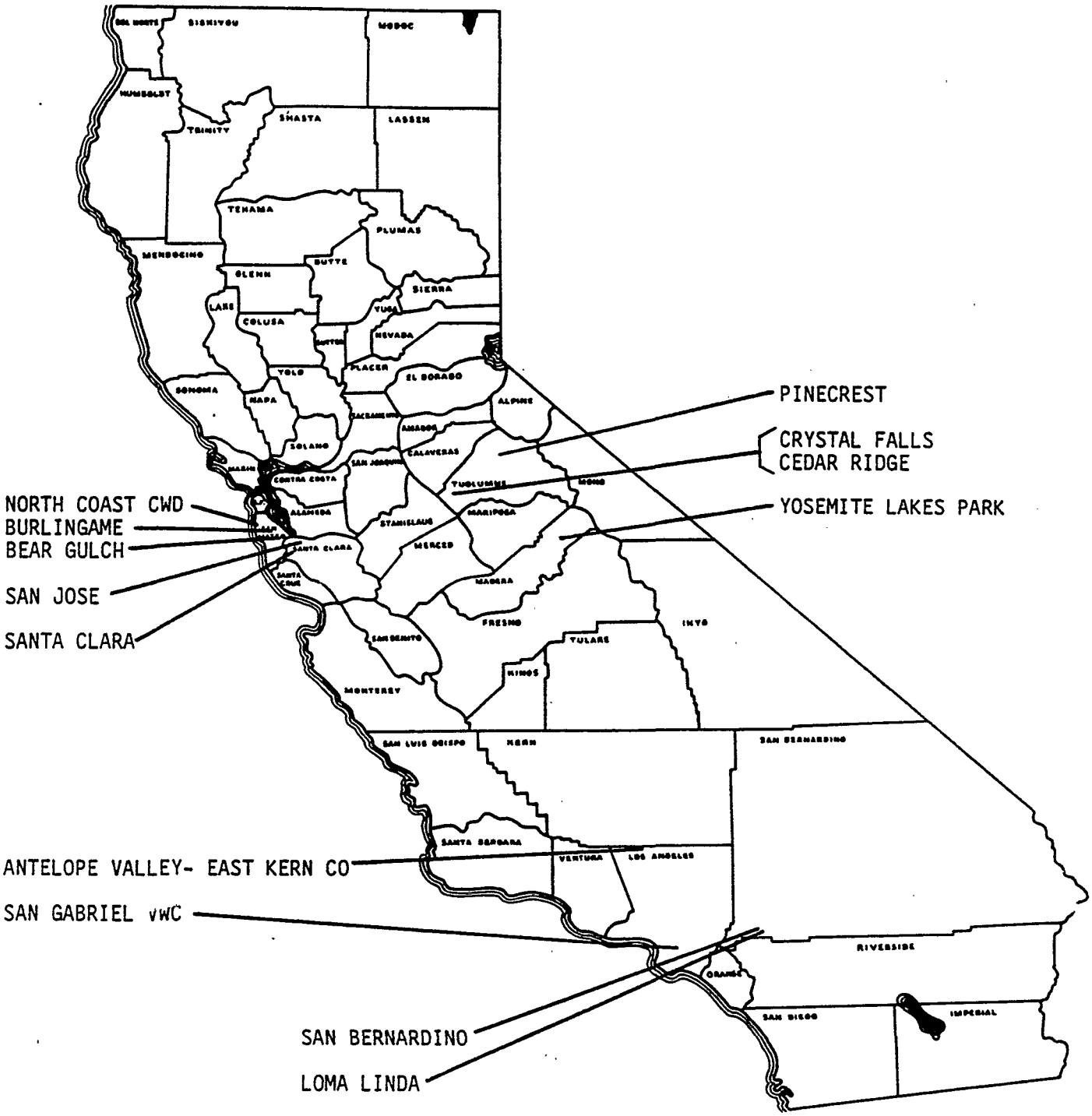

FIGURE 1

United States Summary Judgment Motion, Ex. 33, Page 285

LARGE COMMUNITY WATER SYSTEMS
USING
ENGARD 800 SUPER TANK

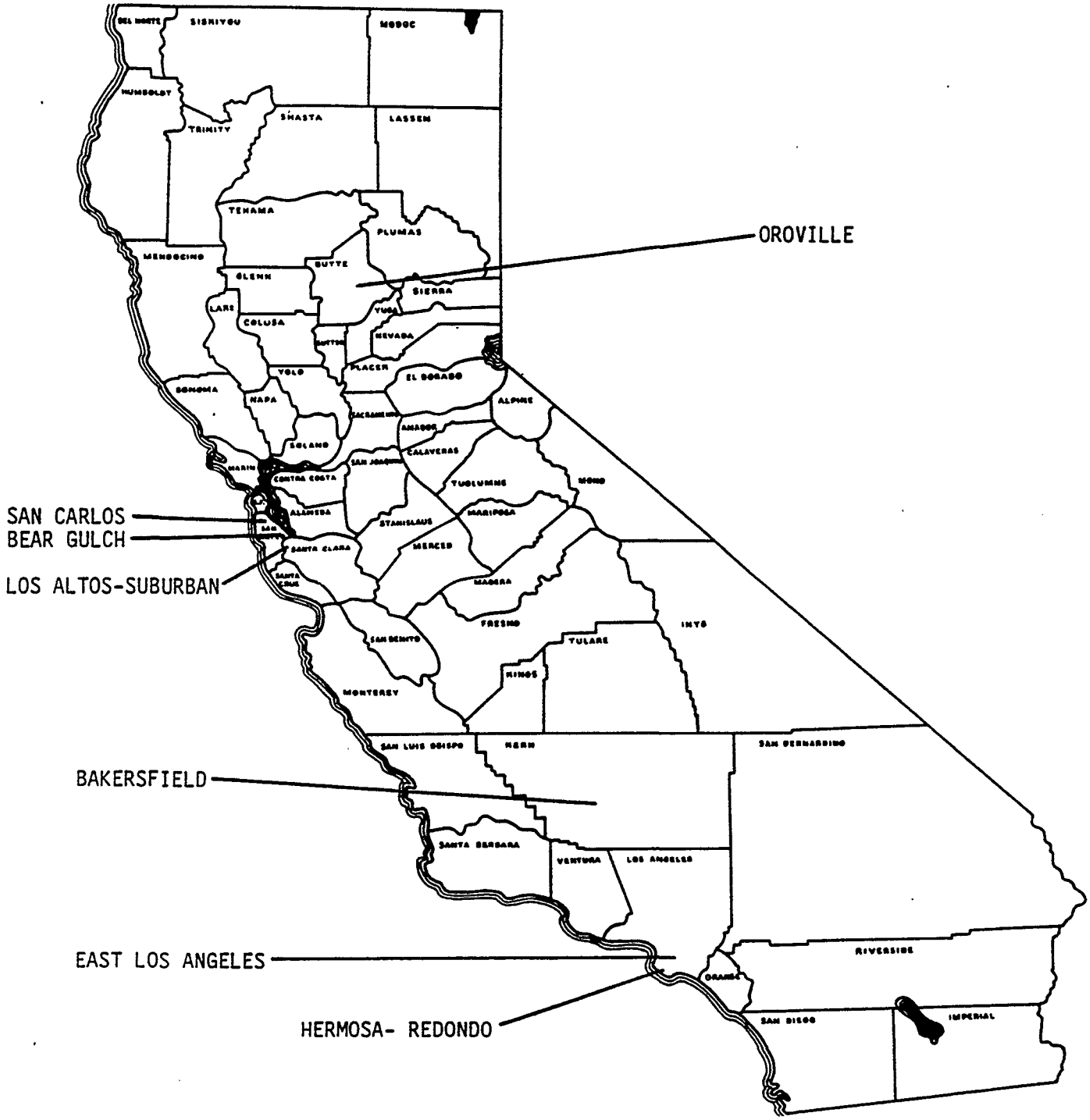

FIGURE 2

United States Summary Judgment Motion, Ex. 35, Page 286

LARGE COMMUNITY WATER SYSTEMS
USING
TNEMAC 46-465 HI-BUILD COAL TAR

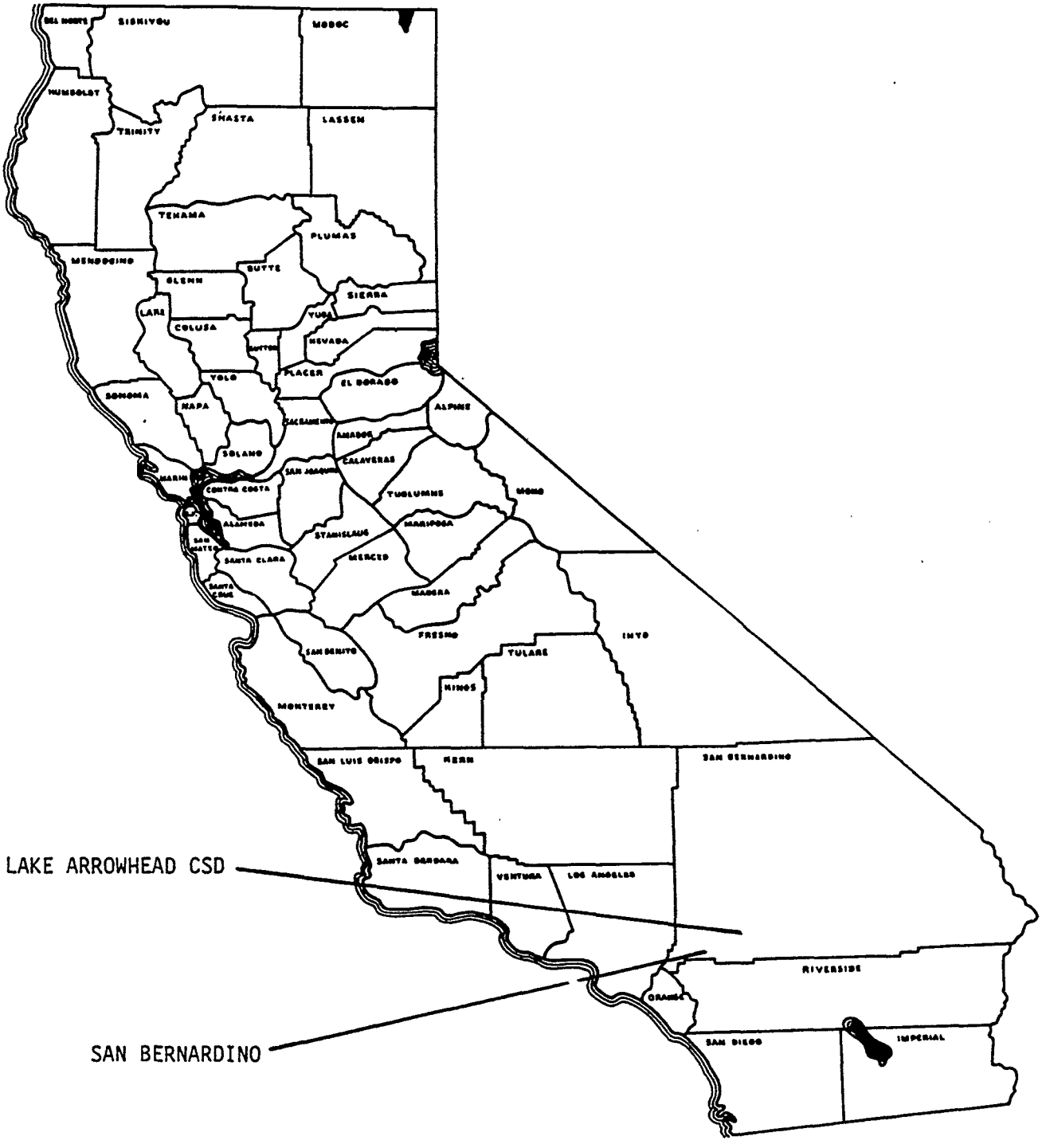

FIGURE 3

COMPARISON OF POTABLE WATER STORAGE TANKS USING†
KOPPERS BITUMASTIC SUPER TANK SOLUTION

	exceeded State Action Level for PCE	did not exceed State Action Level for PCE
FAV ≥ time recommended by manufacturer	SAN BERNARDINO Mountain Tank LOMA LINDA Tank	NORTH COAST COUNTY Fairmont Tank NORTH COAST COUNTY Sharp Park Tank
no FAV or < time recommended by manufacturer	CEDAR RIDGE COUNTY Main Plant Tank PINECREST Tank BURLINGAME Alcarzar Tank SAN GABRIEL 5 MG Tank SAN JOSE Pike Road Tank BEAR GULCH Arrowhead #2 Tank	CRYSTAL FALLS Main Plant Tank YOSEMITE LAKES PARK Tank

†Three months or less in service

TABLE 6

about the time that the six tanks in Nassau County had decreased to within a few parts per billion for total VOCs. The results of this comparision are not very definitive. Although the majority of cases are as we suspected- high PCE if FAV requirements are not followed- there are also a few anomalies. It may be that we don't have enough information about other important variables like humidity and temperature, and the efficiency of ventilation. A definite trend may develop when a larger number of cases are studied.

If ventilation is the controlling factor in solvent removal, we would expect that VOC levels would be low when manufacturers' instructions on ventilation were adhered to. Of course, this also assumes that manufacturers design their ventilation requirements to completely eliminate VOCs. Crystal Falls Main Plant Tank and Yosemite Lakes Park Tank did not meet manufacturers requirements for FAV and did not exceed the State Action Level. However, Yosemite Lakes Park almost met the minimum FAV requirement and had already been in service for two months before sampling. The Crystal Falls tank had been in service three months before sampling and had thinner coats than any of the other tanks.

Even more interesting is that in the Loma Linda and San Bernardino Mountain Tanks, FAV exceeded manufacturer's minimum specifications and yet very high levels of PCE were found. Final coatings in each case were thicker than normal.

DETAILS OF SOME INDIVIDUAL CASES

San Gabriel Valley Water Company-Fontana Division:

A 5.0 MG tank was painted with Koppers Bitumastic Super Tank Solution on the upper 3/5 of its shell. Although the water supplier was told repeatedly that at a minimum the manufacturer's instructions pertaining to FAV must be adhered to, they failed to do so. Not only were minimum requirements not adhered to, but it would have been more prudent to exceed the minimum of 10 days FAV since the application occurred during the winter months. Painting was completed on January 21, 1983 and FAV was applied at a rate of 1 air exchange/67 minutes for a total period of 5 days. An additional 12 days was allowed for passive ventilation. SEB allowed the tank to operate provided that the water was blended in the system to meet the State Action Level. Over a period of two months the PCE level dropped to about the State Action Level (see figure 5).

Burlingame- Alcazar Tank:

The 50,000 gallon tank was painted with Koppers Bitumastic Super Tank Solution on its sides and roof. Three coats were applied with 3-7 days of FAV for 8 hours/day between coats. After the final coat, 10 more days of FAV was applied for 8 hours/day. Total coating thickness was between 35-40 mils. The tank was filled after disinfection. After 7 days of soaking the PCE concentration was greater than 600 ppb. The

PCE LEVELS IN SAN GABRIEL VALLEY WATER COMPANY 5.0 MG TANK

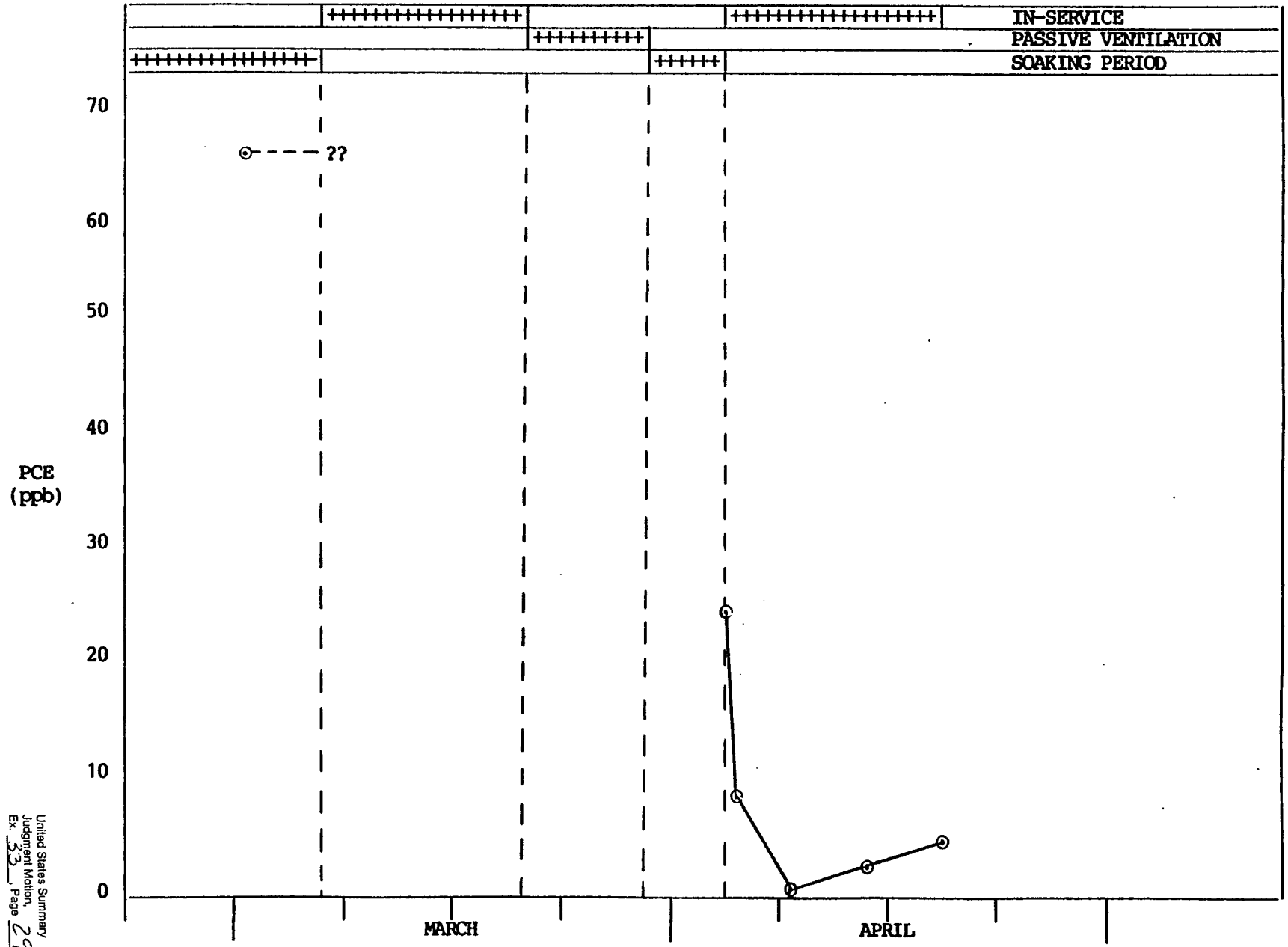

FIGURE 5

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tank was drained and filled again. After 10 more days of soaking the PCE concentration was 1300ppb. The water supplier decided to sandblast the coating off and use a non-PCE containing coating. It is unknown what the rate of FAV was but the required time period for FAV was not achieved.

Bear Gulch- Arrowhead #2:

The one million gallon tank was painted with Koppers Bitumastic Super Tank Solution on the inside roof and upper 6 feet of the wall. Relative humidity and temperature were recorded during the application and curing process (see figure 8). Subsequent PCE levels were very high (see figure 6). Application of paint was accomplished over a 2 month period. Three coats were applied for a total thickness of 20 mils. A total of 32 days of forced air ventilation was provided for the intermediate coats, but less than 4 days was provided after the final coat. The forced air ventilation rate was 4 tank volumes/ hour with air drawn out of the bottom access hatch. An additional 11 days of passive ventilation was provided after the final coat. Even though ventilation between coats was more than adequate, forced air ventilation after the final coat fell short of the manufacturer's specification of 10 days. Since the relative humidity was above 50% and the temperature was below 70°F, more than 10 days of forced air ventilation should have been provided. As mentioned previously, it is unknown how much longer would have been necessary.

San Jose- Pike Tank:

Koppers Bitumastic Super Tank Solution was applied during the late fall months of 1982. At least 24 hours of forced air ventilation was provided between coats with at least 48 hours of forced air ventilations after the final coat. An additional 27 days of passive ventilation was provided. Subsequent PCE contamination levels were very high (see figure 7). It is not known what the relative humidity and temperature was during application and curing. Given the time of year, relative humidity and temperature were probably not ideal. Force air ventilation was inadequate.

Bakersfield Hillcrest Tank and Oroville High Duty #2 Tank:

Relative humidity and temperature were recorded during the application and curing time (see figures 9,10). Both tanks were painted with Engard 800. Engard recommends a final drying time of 15 days at 70°F. In each case greater than 48 hours of forced air ventilation was provided after the final coat. Hillcrest received an additional 21 days of passive ventilation and High Duty #2, an additional 11 days. VOCs were not detected in either case. High Duty #2 was not ventilated for the required period of time.

Los Altos- Suburban Ramona #1 Tank:

The following account is provided by the California Water Service Company: "Coating of the Ramona #1 tank was started using an early Engard 800 formulation containing PCE. By the time this mistake was discovered,

PCE LEVELS IN BEAR GULCH ARROWHEAD #2 TANK

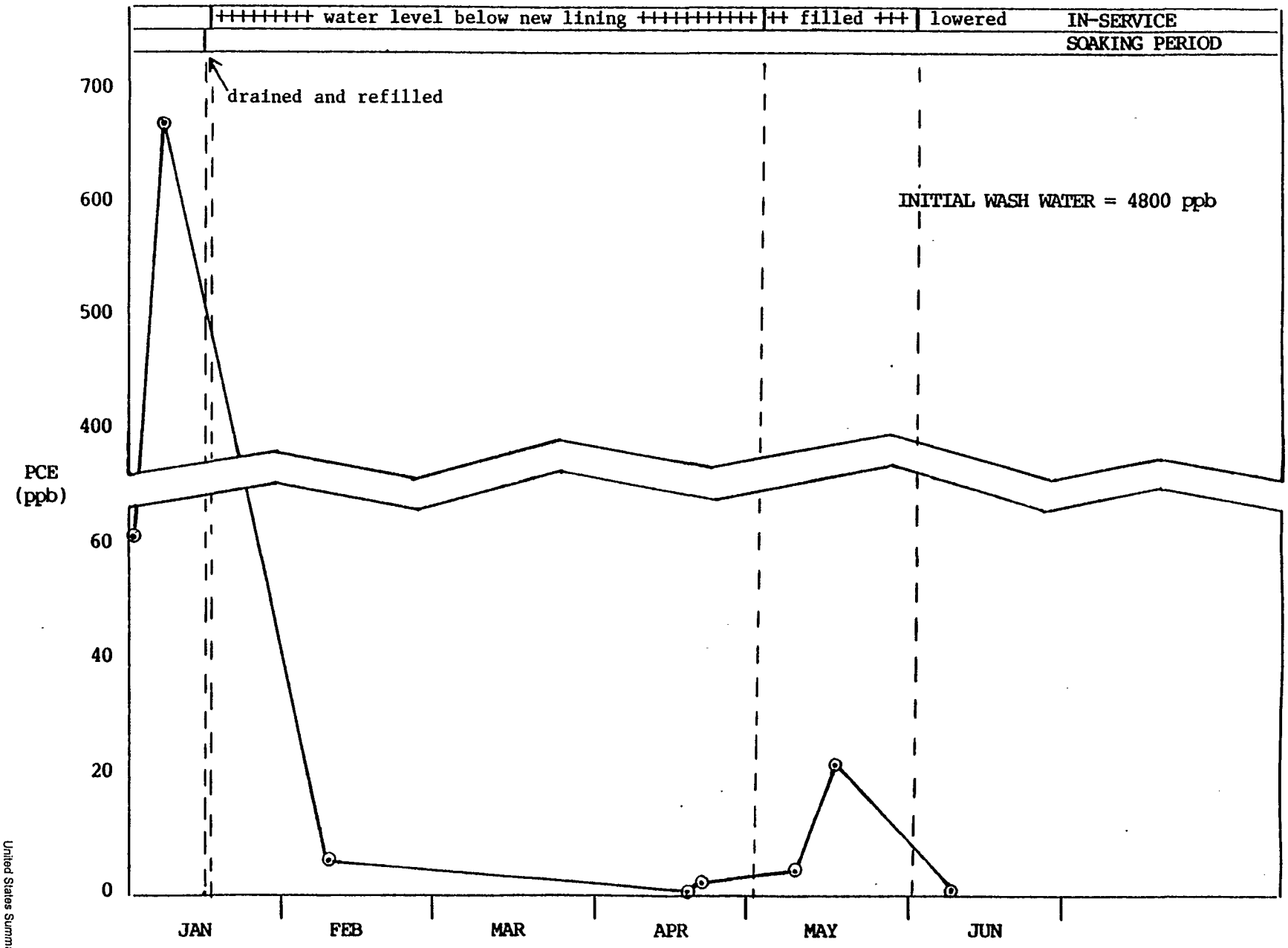

FIGURE 6

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PCE LEVELS IN SAN JOSE PIKE ROAD TANK

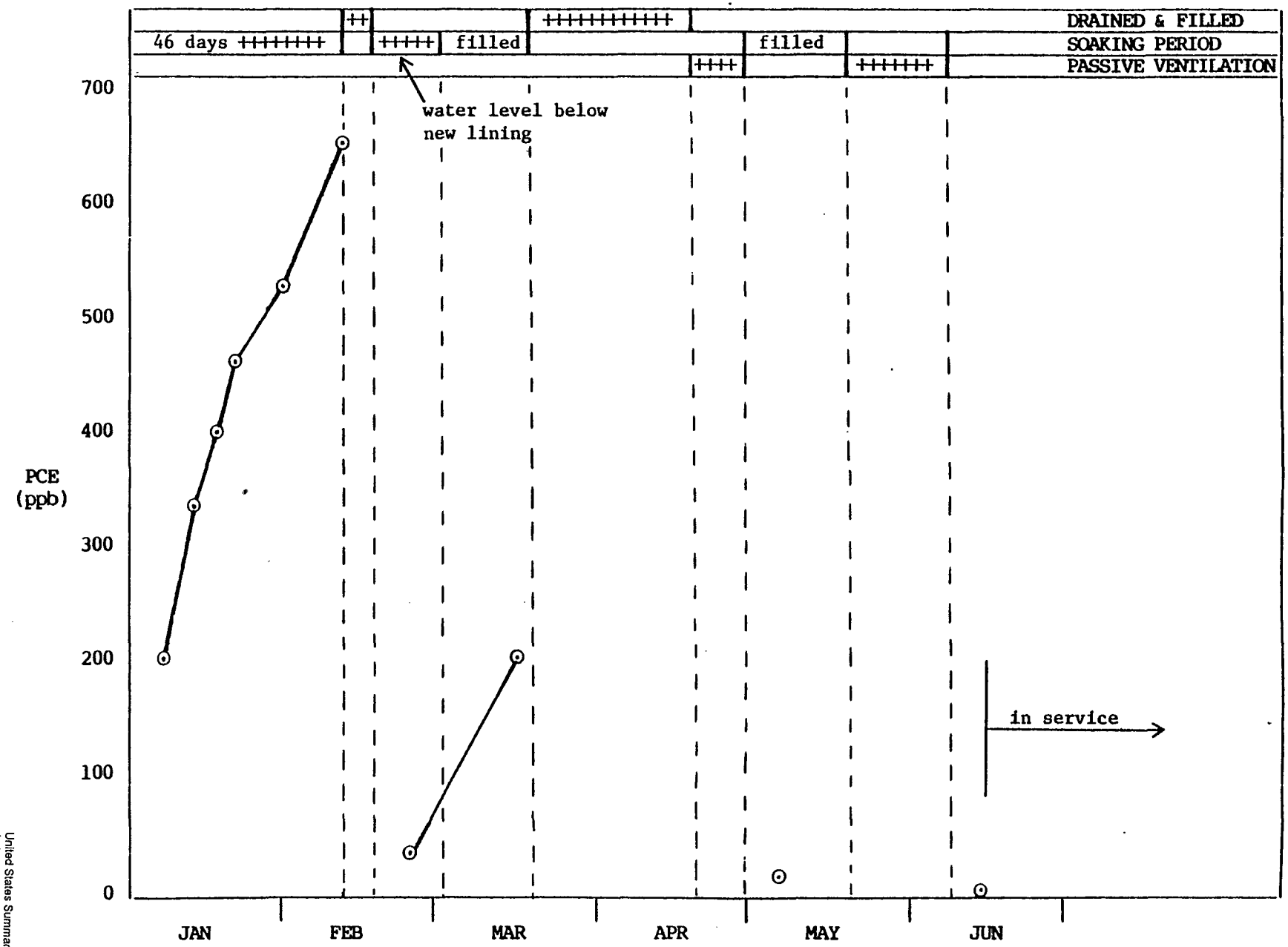

FIGURE 7

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BEAR GULCH ARROWHEAD #2 TANK

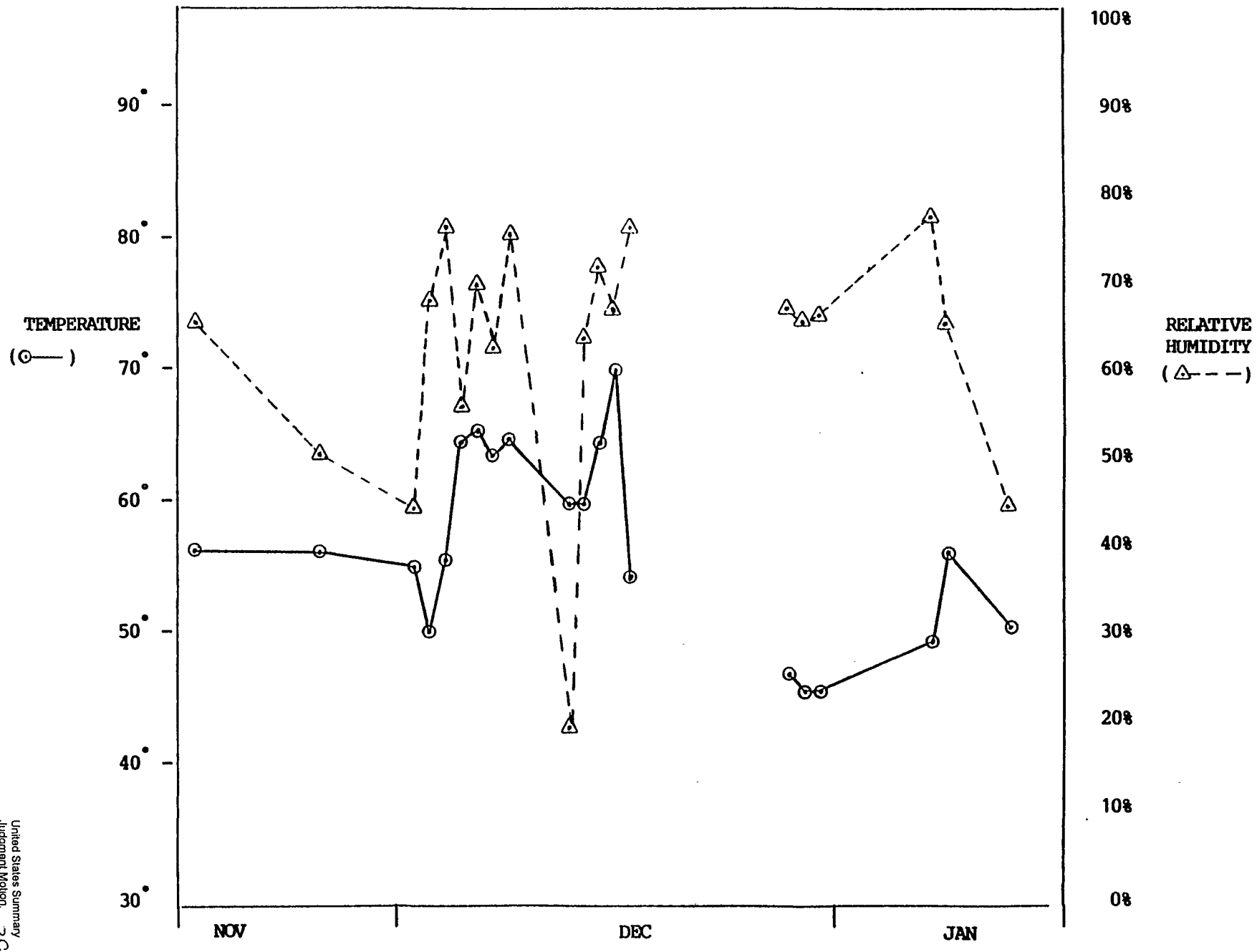

FIGURE 8

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OROVILLE TANK- TEMPERATURE AND RELATIVE HUMIDITY DURING APPLICATION

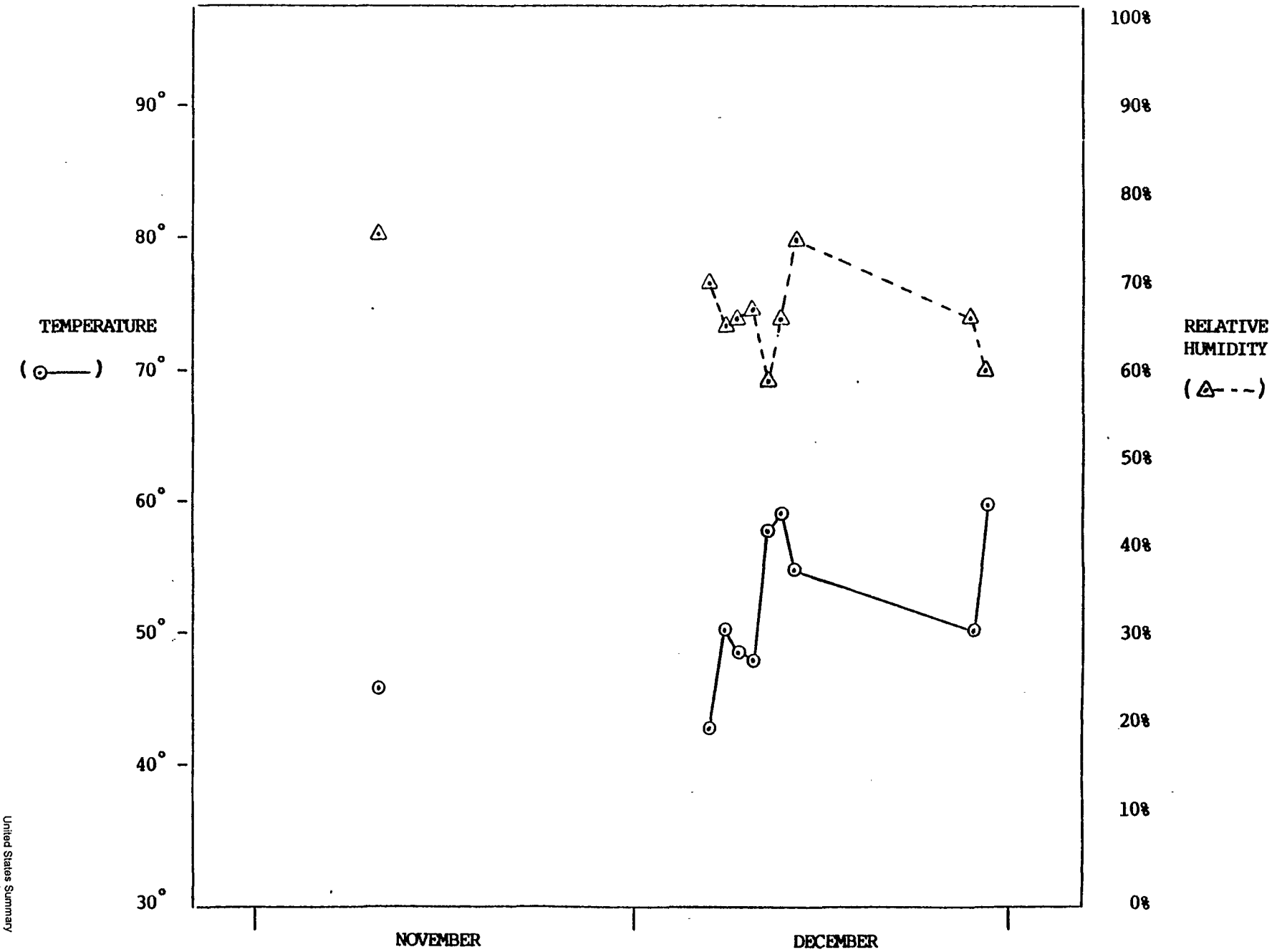

FIGURE 9

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HILLCREST TANK- TEMPERATURE AND RELATIVE HUMIDITY DURING APPLICATION

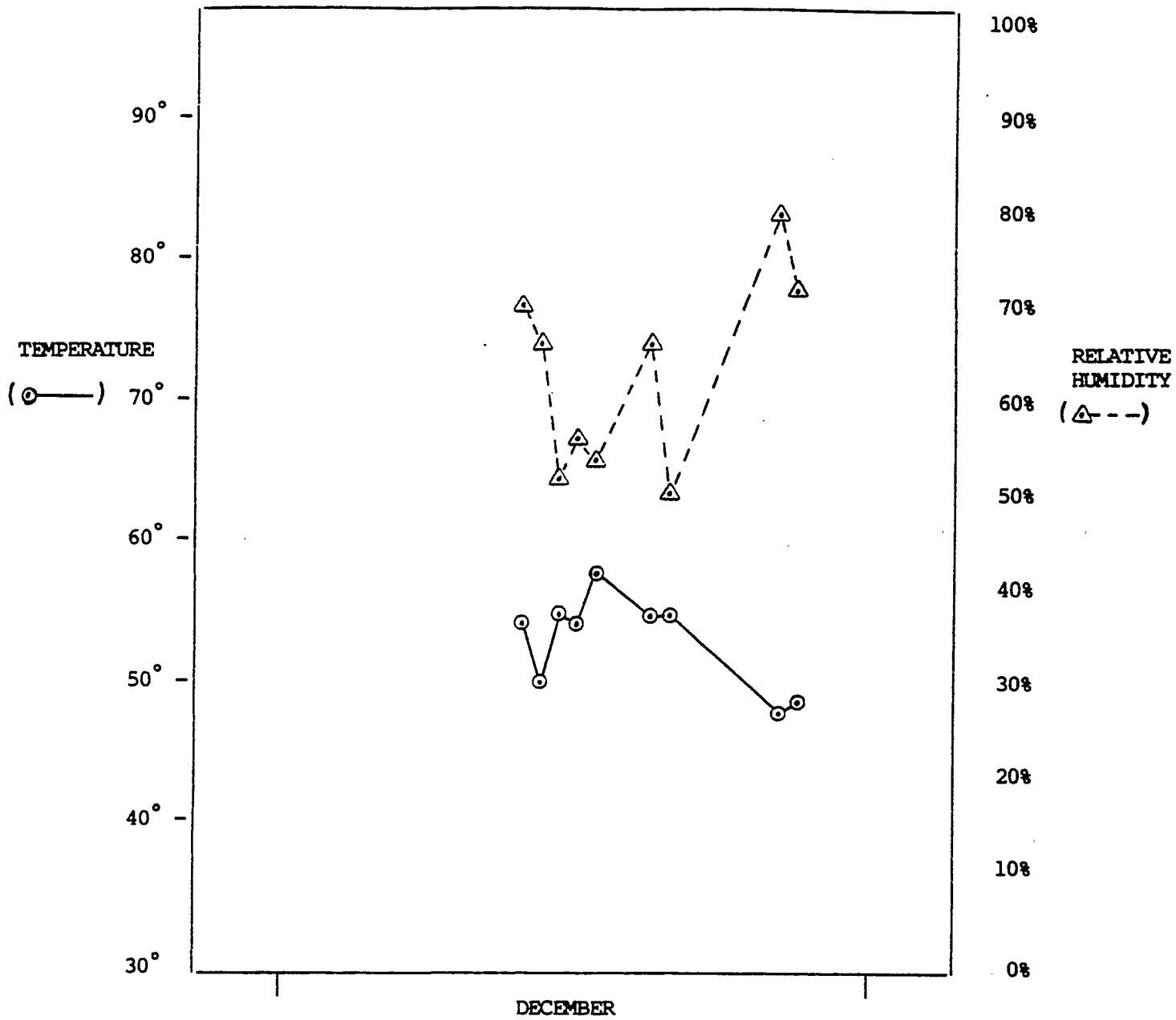

FIGURE 10

approximately 40-45 gallons had been applied. After drying, this product was sand blasted off, and the entire tank coated with new formula Engard 800 (without PCE). After filling, chemical samples have shown high PCE concentrations and the tank has not been put into service." It is unknown why there was still residual PCE in the tank.

What is interesting to note is that after the initial samples were analyzed and discovered to contain PCE, the tank was drained and forced air ventilation for 2 full months (in addition to the 2 days of forced air ventilation and 15 days of passive ventilation during application and initial curing). After refilling samples still contained high levels of PCE (up to 23 ppb). A possible explanation for the continued high PCE levels is that ventilation was ineffective. During the 2 months, air was blown into the bottom of the tank and escaped through the roof vent. Since PCE is heavier than air, drawing air out of the tank through the bottom would have been more effective.

REGULATORY ASPECTS

The California Department of Health Services has the responsibility of regulating public and privately owned community water systems in the State. Title 22 of the California Health and Safety Code gives SEB the authority to regulate water suppliers and enforce primary and secondary drinking water standards. They must also approve changes in any water treatment process. EPA has delegated to the State primary authority for Federal drinking water regulations. However, the State does not have the statutory authority to regulate the corrosion prevention paints and coatings used in potable water storage tanks.

EPA maintains a listing of approved water treatment additives. Internal storage tank coatings are also contained on this list. EPA has the statutory ability to regulate these paints and coatings through the Safe Drinking Water Act and the Toxic Substances Control Act. EPA sees its role only as a consultant to the states and maintains that it is primarily the states' responsibility when it comes to chemicals that come in contact with potable water during storage and distribution.

Prior to 1979 the FDA held responsibility for linings in potable water storage tanks. The FDA established a protocol for testing linings based on a gravametric procedure which determined the amount of particulates that a lining released into a controlled volume of water[12]. The method did not have the ability to determine if volatile organic chemicals would leach into the water supply. A manufacturer would submit lining material for testing and if it passed the test it was put on the FDA approval list.

A Memoradum of Understanding (MOU) between the EPA and the FDA was published in the Federal Register on July 20, 1979. This MOU transfered the responsibility of all water supply additives to the EPA. The EPA continues to maintain a list of acceptable linings as did the FDA.

In terms of testing, the EPA has not improved on the gravametric procedure established by the FDA. They are currently examining third party testing protocol. They are considering a contractual agreement with the National Sanitation Foundation to conduct a testing program using Federal funding. In the interim they have established a moratorium on testing of new products. They will offer a favorable opinion of a new product if it is "virtually identical" to another product having favorable EPA advisory, or when individual components have been previously accepted by the EPA or the FDA.

Some states have realized the need for better regulation in this area and have taken the initiative to establish programs for the approval of linings used in their states. Manufacturers must submit to a State approval process in both New York and Utah.

In the New York State Program, which is administered by the Bureau of Public Water Supply, a manufacturer must have his or her product approved and listed with the Bureau before a public water supplier may use it[13]. Technical data on the lining is supplied to the Bureau. After review, the manufacturer is supplied with a laboratory testing procedure and is told what parameters are to be analyzed for. A laboratory bench test is conducted which is suppose to simulate actual field conditions. Testing must be conducted by an outside laboratory and the results supplied to the Bureau. Criteria for the analysis is based on Interim Primary Drinking Water Standards and EPA Snarls. There is criticism however that New York's procedure falls short of actually imitating actual field conditions. The experiences of the Nassau County Health Department tend to confirm this.

As of January 1, 1984, Utah will institute regulations to require paint manufacturers to certify to a safe drinking water committee that an internal coating "will not impart hazardous levels of toxic substances or cause tastes or odors to be imparted in water used for culinary purposes" [14].

CONCLUSIONS

Manufacturers of these cold-applied coal tar paints do not adequately address the release of volatile organic chemicals. The directions given for curing are vague at best. As a consequence, water suppliers are not giving adequate attention to the release of these vapors.

Common practices by water suppliers and painting contractors may inhibit the release of solvent vapors. Relatively low priority is given to tank coating activities by many water suppliers. In many cases they have skimped on the ventilation requirements or have substituted passive ventilation when forced air ventilation is called for. It is not clear if an extended period of passive ventilation can substitute for forced air ventilation. Nor is it clear how much more passive ventilation would be necessary.

Painting activities are usually scheduled during the winter months which presents the worst of possible weather conditions- high humidity and low temperature.

Another common practice is to seal off the bottom access hatch while leaving the top hatch(s) open. If the vapors are heavier than air they will tend to accumulate at the bottom of the tank. All of the VOCs listed as components of the three commonly used cold-applied coal tars are heavier than air. Manufacturers should provide more explicit instructions in this area.

Koppers Bitumastic Super Tank Solution was the only cold-applied coal tar of the three that was reported to contain PCE in their formulation. Koppers has recently notified the State Health Department of their plans to eliminate PCE from their product. The analytical results of water from tanks containing Tnemac Hi-Build Coal Tar showed PCE contamination; 2 tanks with significant levels. If indeed this paint does not contain PCE then the source of the contamination is unknown.

Our results show PCE as being the volatile organic chemical of immediate concern. Nineteen of the 38 tanks in which water was analyzed had detectable levels of PCE with 11 exceeding the State Action Level. Although xylene, toluene, and TCE were also found, levels did not exceed EPA Water Health Advisories, and in the case of TCE, the State Action Level of 5 ppb. Relative humidity, temperature, ventilation, and the thickness of applied coats seem to be important factors for the release of solvent vapors.

Much more research is needed to establish control over contamination of our potable water supplies from coal tar products. Since coal tar is is widely used in California, the State Health Department should take a more active role in preventing a potential health problem.

The State Action Levels were established in response to ground water contamination where alternate sources of drinking water do not exist or would be impractical to establish. Contamination of ground water is a difficult if not impossible problem to alleviate. Organic chemical contamination via our potable water storage tanks is something that should not have to exist. We have become much more aware and concerned about organic chemical contamination in our drinking water sources. Many programs, both State and Federal, are trying to address this issue. Contamination by materials in contact with our finished water supplies should be controlled.

Exhibit 34

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JOB DESCRIPTION	DATE ISSUED	C. O. NO.	FIELD SHEET PAGE NO.	DATE OF COMPLETION	DISTRIBUTION SHEET	D.S. NO.	CHECKED BY	DISTRIBUTION MAP	CHECKED BY	GATE BOOK	CHECKED BY	FIRE DEPT. NOTIFICATION	CHECKED BY	PIPE RECORD	CHECKED BY	METER BOOK	REMARKS
GEOTHERMAL PROJECT	11/15	3241	G	8-25-87 closed		217											BLOOD BANK SERVICE
GEOTHERMAL PROJECT	11/15	3242	G	8-25-87		217											DOG POND SERVICE
GEOTHERMAL PROJECT	11/15	3243	G	5-20-87 OAN EPD		159											W.W.T.P. SERVICES AND RETROFITS
4976 ALTA DRIVE	11/15	3244	124	11/21/83	11/21/83	394	(L)	11/21/83	(L)	11/21/83	(L)			11-21-83	(L)		2" DOM. SERVICE
W.W.T.P. UNIT 2 SO. CLARIFIER	11/15	3245		2-11-91													REPAIR DRIVE MECHANISM INSTALL MONIT. WELL
TRACT #11742, VAIL LANE	11/16	3246	82A	2-8-84	3/22/84	394	(L)	3/22/84	(L)	3-26-84	(L)	3/22/84	(L)	3/22/84	(L)		WATER MAIN EXTENSION
TRACT #11865 & #11883 (TR. Noted complete yet)	11/20	3247	29-31	2-21-86 1-24-	3-27-86 3/12/83	174		3/12/83		3-27-86 3/12/83		3-27-86 3/10/83		3-25-86 3/16/83		Yes	8" & 12" MAIN INSTALLATION
TRACT NO. 11842 IRVINGTON AVE & HONYSUCKLE LANE	11/21	3248	177 118	12-2-83	2-16-84	370	(L)	1-26-84	OK	1-23-84	OK	1-26-84	OK	11-26-84			8" STEEL WATER MAIN EXTENSION
Mountain Tank (Cut access hatch)	11/11	3249		6-8-84													Rid Hanford of TCE & TCP Lining Remove Contaminant Pump for TCE & PCE
Newmark #3	12/2	3250		Mar 21 89													20" FIRE SERVICE
MINI PARK #2 - 1451 - 23rd STREET	12/9	3251	144	2-15-84	2-16-84	144	OM	2-16-84	OM	2-16-84	OM			2-16-84	OM		Destage bowl assembly
Cajon #3	12/12	3252		4-26-84													4" Turbine meter Intertie
So. Calif. Water Co. Intertie 28TH & Muscott	12/28	3253	15	1-5-84	1-5-84	146		1-16-84	(L)	1-15-84	(L)			3-16-84	(L)		9" Main Installation
TR. #11770 - Acacia Way & "E"	12/5/84	3254	27	2-17-84	1-5-84	166		1-2-84	(L)	1-3-84	(L)			11-1-84	(L)		
HYDROGENERATOR	12/5	3255		CANCELLED													
2.5 [illegible] HANDICAP [illegible]	12/19	3256	9	2-26-84	OM	374	[illegible]	3-8-84	OM	3-8-84	OM			3-8-84	OM		2" Dom. Ser.
2 [illegible] HANDICAP [illegible]	[illegible]	[illegible]	9	2-26-84	OM	374	3-8-84	3-8-84	OM	3-8-84	OM			3-8-84	OM		
[illegible]		3258		CANCELLED - SEE CO. NO. 3270													
Renaud Lin [illegible]	12/4	3259	144	4-17-84	1-18-84	80	EW	1-18-84	EW	1-18-84	EW			10/30/84	EW		6" Dom. Ser.
Mark Lowering, Pine & Irvington	1/12	3260		2-14-84	2-14-84	370	(L)	2-14-84	(L)	2-14-84	(L)	2-14-84	(L)	2-14-84	(L)		RELOCATION FH
Dog Pond - 8F [illegible]	12	3261		1-23-84													
W.W.T.P. - 24" Butterfly Valves	1/24	3262		6-18-84													
W. D. Yards - Pipe Rack Lot	1/16	3263		1-11-84													Repairs for Bldg. Ing. Lot
295 "E" St.	[illegible]	[illegible]		[illegible]	[illegible]	80	EW	1-18-84	EW	[illegible]	EW						
4" Intertie Relocation (Co [illegible])	[illegible]	[illegible]		11-1-84	[illegible]	242				11-30-84				11-30-84			

DEFENDANTS' EXHIBIT 579 FOR ID
BRYAN LUI, CSR NO. 11223
DATE: 6-22-99
WITNESS: LOWE, V. II

579