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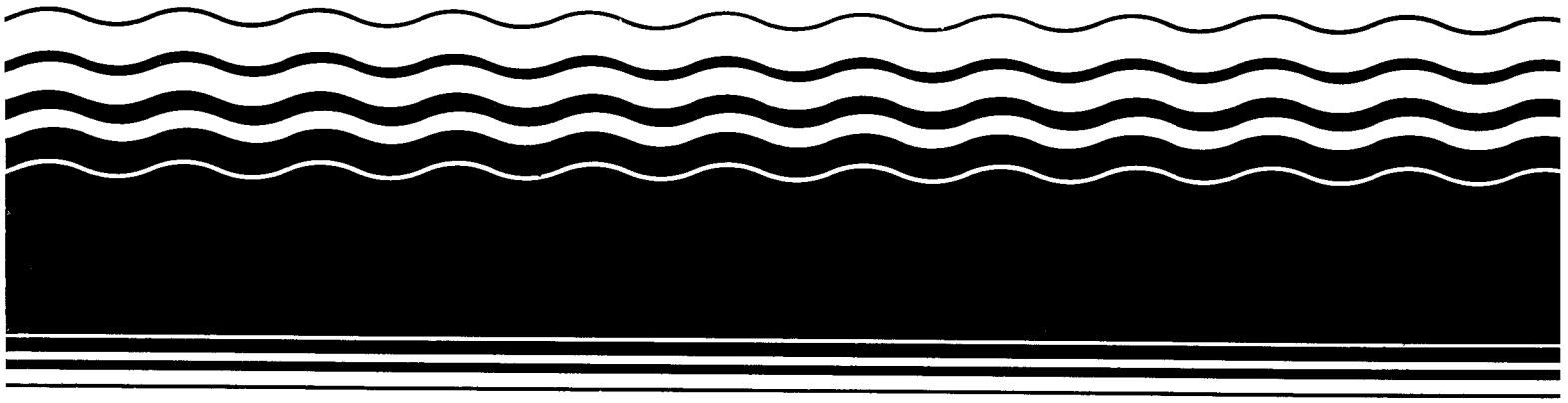
CERCLA Site Discharges to POTWS CERCLA Site Sampling Program

Detailed Data Report



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AUGUST 1990

CERCLA SITE DISCHARGES TO POTWS

CERCLA SITE SAMPLING PROGRAM

DETAILED DATA REPORT

Prepared by

THE INDUSTRIAL TECHNOLOGY DIVISION

OFFICE OF WATER REGULATIONS AND STANDARDS

OFFICE OF WATER

Prepared for

OFFICE OF EMERGENCY AND REMEDIAL RESPONSE

U.S. ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

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EXECUTIVE SUMMARY

The "CERCLA Site Discharges to POTWs CERCLA Site Sampling Program: Detailed Data Report" was prepared for the U.S. Environmental Protection Agency under Contract 68-03-3412. This document contains wastewater data obtained from sampling at seventeen CERCLA sites during a study of wastewater discharges from CERCLA sites to publicly owned treatment works (POTWs). This document serves as an appendix to the report summarizing the findings of the CERCLA site sampling program in Section 3 ("CERCLA Site Data Report") in the USEPA "CERCLA Site Discharges to POTWs Treatability Manual" (EPA/542/90/007).

Preceding the individual site summaries located in Attachment B in this document is a description of the methods used to screen and incorporate the data into an overall database. The site summaries in Attachment B consist of the following: a) a brief description of each site, b) a summary of analytical methods, c) a schematic of the on-site treatment facility (if applicable) with an overview chart characterizing the wastewater and treatment system, and, d) data tables of the compounds identified in the wastewater, with percent removals where applicable.

Sampling durations varied between sites from one- to five- day episodes. Sampling episode numbers are provided as a cross reference to the site listings in Section 3 of the "CERCLA Site Discharges to POTWs Treatability Manual". The reader should refer to this report for supplemental information and for an evaluation of the entire database generated from this sampling program.

REDUCTION OF CERCLA SITE SAMPLING DATA BASE

Prior to evaluating the CERCLA site data, it was necessary to reduce the data. The data base originally consisted of samples taken at various points in the treatment process and the corresponding contaminant concentration that was detected for each day that samples were collected. In order to compare treatability of contaminants across different sites and to determine the frequency with which contaminants occurred at the eighteen sites, an average concentration of each sample point was calculated for sites where sampling occurred for more than one day. Duplicate samples taken during each sampling event were also averaged with its respective sample location. In addition, raw wastewater samples collected at two different sample locations were averaged for Hyde Park (These samples were averaged since the leachate collected at the sample locations is pumped from the wells and combined in a holding lagoon where separation of the aqueous and non-aqueous phase occurs). For samples reported as non-detect, the detection limit was used in calculating the average.

At a number of sites, data was not used to calculate the average if it was qualified with an "R" or an "RR". At these sites, an "R" indicates that spike recovery was not within the control limits and "RR" indicates that the slope and correlation were not met on sample dilution. The data was therefore considered questionable and not used. The site, sample number, and specific compound qualified with an "R" or "RR" are summarized in Attachment A, Table A-1.

To determine the frequency of occurrence of contaminants at the sites, the averaged data were used as described above; however, if non-detect data were observed for a contaminant in more than fifty percent of the samples across the unit processes that composed the treatment system, the contaminant concentration was considered to be non-detectable and thus, not detected in all samples collected at the site. This criterion was followed to account for system or analytical anomalies that may have occurred. The criterion was not followed if the influent concentration was above the detection limit and all other samples collected over the system were non-detect. The criterion was also not followed for some of the organics data collected at Tyson's Dump. Many of the concentrations detected for duplicate samples collected at the site were higher than concentrations detected for other samples at the site. Therefore, if other samples collected at the site for a contaminant were non-detect, except for the concentration of the duplicate, the contaminant was considered non-detect in the wastestream when calculating the frequency of occurrence. The data not used due to this criterion is summarized in Attachment A, Table A-2.

Both field and laboratory blanks were analyzed for each site using the Superfund Contract Laboratory (CLP) Protocol. For blanks where contaminants were detected, the amount detected in the blank was multiplied by a factor of:

- 10 if the contaminant is commonly found in blanks (i.e., acetone, methylene chloride, and bis(2-ethylhexyl) phthalate)
- 5 if the contaminant is not commonly found in blanks (i.e., trans-1,2-dichloroethane and tetrachloroethene)

This value was then compared to the amount detected in the analytical sample. If the analytical concentration was less, the analytical concentration was considered non-detect at the reported concentration. If the analytical concentration was greater, the reported concentration was considered valid. For example, 116 $\mu g/\ell$ of acetone was detected in the laboratory blank (sample number 16083) analyzed for Reilly Tar and 121 $\mu g/\ell$ was detected in the corresponding analytical sample. The concentration for acetone for sample number 16083 was therefore reported as a non-detect at 121 $\mu g/\ell$ since it is less than 1,116 $\mu g/\ell$ (116 x 10). The site, sample number, compound, and corresponding analytical data affected by field or laboratory blank contaminants is presented in Attachment A, Table A-3.

ATTACHMENT A
DATA REDUCTION TABLES

TABLE A-1
DATA QUALIFIED WITH "R" OR "RR"

SITE	EPISODE	SAMPLE NUMBER	COMPOUND
GENEVA	1224	16062	ALUMNIUM
		16062	COBALT
		16062	IRON
		16062	MAGNESIUM
		16062	SELENIUM
		16062	TITANIUM
NYANZA	1310	16143	CHROMIUM
REILLY TAR	1239	16082	MAGNESIUM
		16082	MANGANESE
STRINGFELLOW	1805	18817	ARSENIC
		18817	SELENIUM
		18817	THALLIUM
		18825	ARSENIC
		18825	SELENIUM
		18825	THALLIUM
		18826	ARSENIC
		18826	SELENIUM
		18826	THALLIUM
		18834	SELENIUM
		18834	THALLIUM
		18834	ARSENIC
		18844	ARSENIC
		18844	SELENIUM
		18844	THALLIUM
TIME OIL	1804	18793	SELENIUM
		18803	SELENIUM
		18806	SELENIUM
UNITED CHROME	1738	17398	THALLIUM
		17400	THALLIUM
		17413	THALLIUM
VERONA	1223	16028	CHROMIUM
		16028	MANGANESE
		16028	MOLYBDENUM
		16046	CHROMIUM
		16046	MOLYBDENUM
WELL 12A	1808	18898	THALLIUM
		18907	THALLIUM
WHITEHOUSE OIL	1241	16139	ARSENIC
		16141	ARSENIC

TABLE A-1
DATA QUALIFIED WITH "R" OR "RR"

SITE	EPISODE	SAMPLE NUMBER	COMPOUND
GENEVA	1224	16062	ALUMNIUM
		16062	COBALT
		16062	IRON
		16062	MAGNESIUM
		16062	SELENIUM
		16062	TITANIUM
NYANZA	1310	16143	CHROMIUM
REILLY TAR	1239	16082	MAGNESIUM
		16082	MANGANESE
STRINGFELLOW	1805	18817	ARSENIC
		18817	SELENIUM
		18817	THALLIUM
		18825	ARSENIC
		18825	SELENIUM
		18825	THALLIUM
		18826	ARSENIC
		18826	SELENIUM
		18826	THALLIUM
		18834	SELENIUM
		18834	THALLIUM
		18834	ARSENIC
		18844	ARSENIC
		18844	SELENIUM
		18844	THALLIUM
TIME OIL	1804	18793	SELENIUM
		18803	SELENIUM
		18806	SELENIUM
UNITED CHROME	1738	17398	THALLIUM
		17400	THALLIUM
		17413	THALLIUM
VERONA	1223	16028	CHROMIUM
		16028	MANGANESE
		16028	MOLYBDENUM
		16046	CHROMIUM
		16046	MOLYBDENUM
WELL 12A	1808	18898	THALLIUM
		18907	THALLIUM
WHITEHOUSE OIL	1241	16139	ARSENIC
		16141	ARSENIC

TABLE A-2
NON-DETECT DATA

SITE	EPISODE	COMPOUND
BRIDGEPORT	1222	2,3,7,8-TCDF
		2-BUTANONE (MEK)
		4-METHYL-2-PENTANONE
		ARSENIC
		BENZENE
		BERYLLIUM
		CADMIUM
		COBALT
		METHYLENE CHLORIDE
CHEMDYNE	1807	ALUMINUM
		ARSENIC
		BERYLLIUM
		CADMIUM
		CERIUM
		CHROMIUM
		COBALT
		COPPER
		DYSPROSIUM
		GADOLINIUM
		GALLIUM
		GOLD
		IODINE
		IRIDIUM
		LANTHANUM
		LITHIUM
		MERCURY
		MOLYBDENUM
		NICKEL
		PHOSPHORUS
		SILVER
		SULFIDE, TOTAL (IODOMETRIC)
		THALLIUM
		TIN
		TITANIUM
		VANADIUM
		YTTRIUM
GENEVA	1224	MERCURY
		NITRATE + NITRITE, AS N
		PHOSPHORUS, TOTAL AS P
HYDE PARK	1220	2,4-DICHLOROPHENOL
		ANTIMONY
		BARIUM
		DEMETON
		DETA-BHC
		EPN
		GAMMA-BHC
		MERCURY
		OSMIUM
		RUTHENIUM

TABLE A-2 (CONTINUED)
NON-DETECT DATA

SITE	EPISODE	COMPOUND
HYDE PARK	1220	SELENIUM
		THALLIUM
LOVE CANAL	1219	2,3,7,8-TCDF
		ACETONE
		AZINPHOS METHYL
		CARBOPHENOTHION
		CHLORFEVINPHOS
		COBALT
		COUMAPHOS
		CROTOXYPHOS
		DEMETON
		DICHLORVOS
		DICROTOPHOS
		DIELDRIN
		DIMETHOATE
		DIOXATHION
		EPN
		ETHION
		FAMPHUR
		FENSULFOTHION
		IODINE
		LEPTOPHOS
		MEVINPHOS
		MONOCROTOPHOS
		NALED
		PHORATE
		PHOSMET
		PHOSPHAMIDON
		SELENIUM
		TETRACHLORVINPHOS
		TRICHLOROFON
REILLY TAR	1239	ALUMINUM
		COPPER
		DI-N-OCTYL PHTHALATE
		HEXACHLOROETHANE
		N-HEXACOSANE (N-C26)
		NITRATE + NITRITE, AS N
		PHOSPHORUS
		SELENIUM
		TELLURIUM
		TITANIUM
STRINGFELLOW	1221	2-BUTANONE (MEK)
		4,4-DDE
		4-METHYL-2-PENTANONE
		AZINPHOS METHYL
		CHLORFEVINPHOS
		CHLORPYRIFOS
		CROTOXYPHOS
		DELTA-BHC

TABLE A-2 (CONTINUED)
NON-DETECT DATA

SITE	EPISODE	COMPOUND
STRINGFELLOW	1805	2-NITROPHENOL
		4-CHLOROANILINE
		ACETOPHENONE
		ANTIMONY
		BENZYL ALCOHOL
		DYSPROSIUM
		GALLIUM
		IODINE
		IRIDIUM
		LEAD
		MERCURY
		METHAPYRILENE
		N,N-DIMETHYLFORMAMIDE
		N-NITROSOMORPHOLINE
		N-OCTACOSANE
		OCDD
		OCDF
		SILVER
		SULFIDE, TOTAL (IODOMETRIC)
		TIN
		TOTAL HpCDD
SYLVESTER	1325	1,2-DICHLOROETHANE
		1,3-DICHLOROBENZENE
		2-BUTANONE (MEK)
		ACETOPHENONE
		ACRYLONITRILE
		ANTIMONY
		BENZYLALCOHOL
		CADMIUM
		DIETHYL ETHER
		MERCURY
		MOLYBDENUM
		N-DODECANE (N-C12)
		N-TETRADECANE (N-C14)
		PHOSPHORUS
		TDS
TIME OIL	1804	CHEMICAL OXYGEN DEMAND
		LEAD
		PHOSPHORUS, TOTAL AS P
		RESIDUE, NON-FILTERABLE
		YTTRIUM
TYSON'S DUMP	1568	4-METHYL-2-PENTANONE
		ACETONE
		CADMIUM
		CHLOROBENZENE
		ETHYLBENZENE
		KEPONE
		M-XYLENE
		OSMIUM

TABLE A-2 (CONTINUED)
NON-DETECT DATA

SITE	EPISODE	COMPOUND
WESTERN PROCESSING	1739	1,1,2,2-TETRACHLOROETHANE
		1,1,2-TRICHLOROETHANE
		1,2-DICHLOROPROPANE
		2-BUTANONE (MEK)
		2-CHLOROETHYLVINYL ETHER
		2-METHYL-4,6-DINITROPHENOL
		ACETONE
		BROMODICHLOROMETHANE
		BROMOFORM
		CARBON TETRACHLORIDE
		CHLOROBENZENE
		CIS-1,3-DICHLOROPROPENE
		DIBROMOCHLOROMETHANE
		ETHYLBENZENE
		IODINE
		IRIDIUM
		LEAD
		MERCURY
		N-NITROSODI-N-PROPYLAMINE
		N-NITROSODIMETHYLAMINE
		OIL & GREASE, TOTAL RECOVERABL
		OSMIUM
		RUTHENIUM
		SELENIUM
		SILVER
		SULFIDE, TOTAL (IODOMETRIC)
		TELLURIUM
		THALLIUM
		TIN
		TRICHLOROFLUOROMETHANE
		VANADIUM
WHITEHOUSE OIL	1241	FLASH POINT

TABLE A-3
FIELD AND LABORATORY BLANK CONTAMINATION DATA

SITE	EPISODE	TYPE OF BLANK	SAMPLE NUMBER	COMPOUND	BLANK CONC. (UG/L)	SAMPLE CONC. (UG/L)	DETECTION LIMIT (UG/L)	CONCENTRATION REPORTED (UG/L)
HYDE PARK	1220	FIELD	16010	METHYLENE CHLORIDE	17.6	2279.0	10.0	2279.0 ND
		FIELD	16010	ACETONE	55.9	63472.0	50.0	63472.0 ND
REILLY TAR	1239	LAB	16082	BIS(2-ETHYLHEXYL)PHTHALATE	169.1	47.0	10.0	47.0 ND
		LAB	16083	BIS(2-ETHYLHEXYL)PHTHALATE	169.1	52.0	10.0	52.0 ND
		LAB	16083	ACETONE	115.8	121.0	50.0	121.0 ND
		LAB	16084	BIS(2-ETHYLHEXYL)PHTHALATE	406.8	776.0	10.0	776.0 ND
		LAB	16084	ACETONE	115.8	117.0	50.0	117.0 ND
		LAB	16085	BIS(2-ETHYLHEXYL)PHTHALATE	169.1	1720.0	10.0	1720.0
		LAB	16085	ACETONE	111.4	139.0	50.0	139.0 ND
		LAB	16086	BIS(2-ETHYLHEXYL)PHTHALATE	169.1	840.0	10.0	840.0 ND
		LAB	16087	BIS(2-ETHYLHEXYL)PHTHALATE	169.1	55.0	10.0	55.0 ND
		LAB	16087	ACETONE	111.4	116.0	50.0	116.0 ND
		LAB	16088	BIS(2-ETHYLHEXYL)PHTHALATE	169.1	782.0	10.0	782.0 ND
		LAB	16089	BIS(2-ETHYLHEXYL)PHTHALATE	169.1	88.0	10.0	88.0 ND
		FIELD	16090	ACETONE	120.8	145.0	50.0	145.0 ND
		LAB	16090	BIS(2-ETHYLHEXYL)PHTHALATE	16.8	147.0	10.0	147.0 ND
		LAB	16090	ACETONE	120.2	145.0	50.0	145.0 ND
		LAB	16091	BIS(2-ETHYLHEXYL)PHTHALATE	16.8	78.0	10.0	78.0 ND
		LAB	16091	ACETONE	120.2	125.0	50.0	125.0 ND
		LAB	16092	BIS(2-ETHYLHEXYL)PHTHALATE	16.8	366.0	10.0	366.0
		LAB	16092	ACETONE	120.2	139.0	50.0	139.0 ND
		LAB	16093	BIS(2-ETHYLHEXYL)PHTHALATE	16.8	30.0	10.0	30.0 ND
		LAB	16093	ACETONE	120.2	120.0	50.0	120.0 ND
		LAB	16094	BIS(2-ETHYLHEXYL)PHTHALATE	406.8	10829.0	10.0	10829.0
		LAB	16094	ACETONE	120.2	137.0	50.0	137.0 ND
		LAB	16095	BIS(2-ETHYLHEXYL)PHTHALATE	16.8	627.0	10.0	627.0
		LAB	16095	ACETONE	120.2	122.0	50.0	122.0 ND
		LAB	16096	BIS(2-ETHYLHEXYL)PHTHALATE	16.8	74.0	10.0	74.0 ND
		LAB	16096	ACETONE	120.2	139.0	50.0	139.0 ND
STRINGFELLOW	1240	FIELD	16106	N-DECANE	35.9	993.0	10.0	993.0
		FIELD	16106	N-DODECANE	24.5	1435.0	10.0	1435.0
		FIELD	16113	BIS(2-ETHYLHEXYL)PHTHALATE	12.2	26.0	10.0	26.0 ND
		FIELD	16113	N-DECANE	78.1	99.0	10.0	99.0 ND
		FIELD	16113	N-DODECANE	70.1	58.0	10.0	58.0 ND
		FIELD	16127	N-DODECANE	47.6	413.0	10.0	413.0
TIME OIL	1804	LAB	18793	1,1,2,2-TETRACHLOROETHANE	61.0	3589.0	10.0	3589.0
		LAB	18793	TRICHLOROETHENE	16.0	1634.0	10.0	1634.0
		LAB	18796	1,1,2,2-TETRACHLOROETHANE	61.0	3301.0	10.0	3301.0
		LAB	18796	TRICHLOROETHENE	16.0	310.0	10.0	310.0

TABLE A-3 (CONTINUED)
FIELD AND LABORATORY BLANK CONTAMINATION DATA

SITE	EPISODE	TYPE OF BLANK	SAMPLE NUMBER	COMPOUND	BLANK CONC. (UG/L)	SAMPLE CONC. (UG/L)	DETECTION LIMIT (UG/L)	CONCENTRATION REPORTED (UG/L)
TIME OIL	1804	LAB	18800	1,1,2,2-TETRACHLORETHANE	61.0	4160.0	10.0	4160.0
		LAB	18800	TRICHLOROETHENE	16.0	1761.0	10.0	1761.0
		LAB	18802	TRICHLOROETHENE	16.0	1305.0	10.0	1305.0
		LAB	18803	1,1,2,2-TETRACHLOROETHANE	61.0	3390.0	10.0	3390.0
		LAB	18806	TRICHLOROETHENE	16.0	1203.0	10.0	1203.0
		LAB	18808	1,1,2,2-TETRACHLOROETHANE	61.0	519.0	10.0	519.0
		LAB	18806	1,1,2,2-TETRACHLOROETHANE	61.0	2965.0	10.0	2965.0
		LAB	18808	TRICHLOROETHENE	16.0	150.0	10.0	150.0
VERONA	1223	LAB	16028	BENZYL ALCOHOL	20.9	25.0	10.0	25.0 ND
		LAB	16028	ETHYLBENZENE	11.1	22.0	10.0	22.0 ND
		LAB	16028	TETRACHLOROETHENE	21.4	348.0	10.0	348.0
		LAB	16030	BENZYL ALCOHOL	20.9	43.0	10.0	43.0 ND
		LAB	16031	BENZYL ALCOHOL	20.9	20.0	10.0	20.0 ND
		LAB	16032	BIS(2-ETHYLHEXYL)PHTHALATE	14.4	16.0	10.0	16.0 ND
		LAB	16032	ETHYLBENZENE	11.1	20.0	10.0	20.0 ND
		LAB	16032	TETRACHLOROETHENE	21.4	308.0	10.0	308.0
		LAB	16033	BIS(2-ETHYLHEXYL)PHTHALATE	14.4	15.0	10.0	15.0 ND
		LAB	16033	BENZYL ALCOHOL	20.9	23.0	10.0	23.0 ND
		LAB	16033	TRANS-1,2-DICHLOROETHENE	11.3	347.0	10.0	347.0
		LAB	16034	BIS(2-ETHYLHEXYL)PHTHALATE	14.4	60.0	10.0	60.0 ND
		LAB	16034	TRANS-1,2-DICHLOROETHENE	11.3	81.0	10.0	81.0
		LAB	16035	BIS(2-ETHYLHEXYL)PHTHALATE	14.4	37.0	10.0	37.0 ND
		LAB	16035	BENZYL ALCOHOL	20.9	18.0	10.0	18.0 ND
		LAB	16035	TRANS-1,2-DICHLOROETHENE	11.3	24.0	10.0	24.0 ND
		LAB	16036	TRANS-1,2-DICHLOROETHENE	11.3	72.0	10.0	72.0
		LAB	16037	ETHYLBENZENE	11.1	24.0	10.0	24.0 ND
		LAB	16037	TETRACHLOROETHENE	21.4	514.0	10.0	514.0
		LAB	16038	TRANS-1,2-DICHLOROETHENE	11.3	332.0	10.0	332.0
		LAB	16039	TRANS-1,2-DICHLOROETHENE	11.3	83.0	10.0	83.0
		LAB	16040	TRANS-1,2-DICHLOROETHENE	11.3	23.0	10.0	23.0 ND
		LAB	16041	TRANS-1,2-DICHLOROETHENE	11.3	11.0	10.0	11.0 ND
		LAB	16042	ETHYLBENZENE	11.1	27.0	10.0	27.0 ND
		LAB	16042	TETRACHLOROBENZENE	21.4	562.0	10.0	562.0
		LAB	16043	TRANS-1,2-DICHLOROETHENE	11.3	333.0	10.0	333.0
		LAB	16044	TRANS-1,2-DICHLOROETHENE	11.3	80.0	10.0	80.0
		LAB	16046	ETHYLBENZENE	11.1	29.0	10.0	29.0 ND
		LAB	16046	TETRACHLOROETHENE	21.4	525.0	10.0	525.0
		LAB	16047	TRANS-1,2-DICHLOROETHENE	11.3	376.0	10.0	376.0
		LAB	16052	TRANS-1,2-DICHLOROETHENE	11.3	21.0	10.0	21.0 ND

TABLE A-3 (CONTINUED)
FIELD AND LABORATORY BLANK CONTAMINATION DATA

SITE	EPISODE	TYPE OF BLANK	SAMPLE NUMBER	COMPOUND	BLANK CONC. (UG/L)	SAMPLE CONC. (UG/L)	DETECTION LIMIT (UG/L)	CONCENTRATION REPORTED (UG/L)
VERONA	1223	LAB	16053	TRANS-1,2-DICHLOROETHENE	11.3	22.0	10.0	22.0 ND
		LAB	16055	BIS(2-ETHYLHEXYL)PHTHALATE	14.4	12.0	10.0	12.0 ND
		LAB	16055	N-OCTACOSANE	16.6	12.0	10.0	12.0 ND

ATTACHMENT B
SITE SUMMARIES

SECTION B-1
TREATABILITY OF CERCLA POLLUTANTS
BRIDGEPORT RENTAL - EPISODE 1222

(ONE DAY SAMPLING EVENT)

BRIDGEPORT RENTAL - EPISODE 1222
SITE DESCRIPTION

The Bridgeport Rental and Oil Services (BROS) site is located on Cedar Swamp Road at the divergence of Route 130 and I-295 in Logan Township, Gloucester County, NJ, approximately one mile east of the Town of Bridgeport, NJ and about 2 miles south of the Delaware River. The total area of the site is about 30 acres. The site includes a tank farm and a 12.7 acre lagoon that contains waste oil and wastewater. The area surrounding the BROS facility is predominately rural and agricultural.

The BROS lagoon began to form in the 1940's when dumping of waste oil into a sand and gravel excavation was initiated. From the 1940's to present, the lagoon increased in size from 0.54 acres to 12.7 acres as various liquids and oil accumulated. Presently the lagoon is 21 feet deep in some locations and the bottom 13 feet of lagoon contents are in contact with the groundwater. The lagoon contents consist of a layer of surface oil and scum 1 to 2 feet thick, a middle aqueous layer approximately 10 feet thick, and a bottom layer of oily sludge. Review of analytical data from the middle of the aqueous layer indicated only low levels of contamination with 10-15 pollutants.

Remedial efforts at the BROS site have been divided into three separate contract phases. Phase I consists of removal of all tanks and waste associated with the tank farm and removal and on-site treatment of the aqueous phase liquid from the lagoon. Phase I began in the summer of 1987 and is projected to be completed by the end of 1987. Operation of the wastewater treatment system began only a few weeks prior to this site visit.

The second contract, projected to cover approximately three years, includes removal and disposal of nonaqueous waste from the lagoon by either on-site or off-site incineration and the final lagoon closure (backfill and revegetate). A third contract will include an RI/FS for the purpose of determining the most cost effective groundwater cleanup approach.

The present on-site treatment system for aqueous waste was designed by TAMS and constructed by the U.S. Army Corps. of Engineers (COE). The system includes oil/water separation, flocculation and sedimentation with chemical addition, dissolved air flotation, multi-media filtration, and granular activated carbon filtration. The treated wastewater is discharged to Little Timber Creek. Separated oil will be disposed of in the same manner as the oil removed from the lagoon. The system is projected to be used for treatment of aqueous phase liquids encountered during cleanup of buried drums, incidental maintenance pumping, and future groundwater cleanup.

Two previous removal actions to lower the liquid level of the lagoons before COE involvement, included pumping of the aqueous phase liquid through a mobile activated carbon treatment system.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

SUMMARY OF ANALYTICAL METHODS (cont.)

Analytical Category and Fraction	Technique	EPA Method No.
Classicals (sludge samples)		
Ammonia, as N	Titrimetric, Distillation	350.2
Nitrogen, Kjeldahl, total	Titrimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Cyanide, total	Colorimetric	9010[b]
pH		9045[b]
Residue, total	Gravimetric	160.3
Residue, total volatile	Gravimetric	160.4
Sulfide, total	Monier-Williams	c
Flash point (ignitability)	Pensky-Martens Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

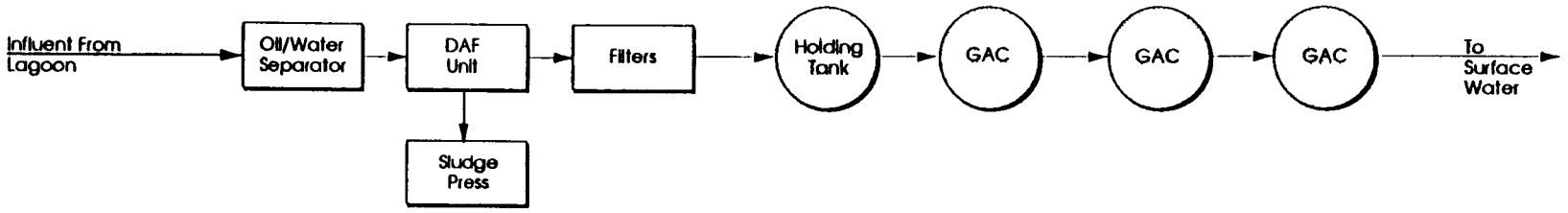
[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

b. Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

c. 49 CFR Part 425, Federal Register Vol. 52, No. 13, January 21, 1987

ANALYTICAL QUALIFIERS

NR	-	Not required by contract at this time.
Value	-	If the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit, put the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for Furnace).
U	-	Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).
E	-	Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.
S	-	Indicates value determined by Method of Standard Addition.
R	-	Indicates spike recovery is not within control limits.
*	-	Indicates duplicate analysis is not within control limits.
+	-	Indicates the correlation coefficient for Method of Standard Addition is less than 0.995.



Treatment: OS - DAF - MF - HT - GAC
Wastewater Type: Leachate
Average Flow: 300 GPM (24 Hours/7Days)
Surface Water Discharge

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge[3]	% Mass Removed OS[4]	% Mass Removed DAF[4]	% Mass Removed MF[4]	% Mass Removed GAC[4]	% Mass Removed Overall
Pollutant	PP : TCL . ITD	Min-Max	Min-Max	(LBS/YR) PP.ITD	(LBS/YR) PP.ITD	PP : ITD	PP : ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	5 : 8 : 16	6-3246 ug/L	6-101 ug/L	330 : 5,000	117 : 3,690	< 1 : 9	19 : 17	15 : 6	50 : < 1	65 : 26
Metals	5 : 14 : 19	8-51750 ug/l	19-313 ug/L	680 : 106,490	112 : 188,090	4 : 1	72 : < 1	37 : 5	< 1 : < 1	84 : < 1

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

3. OS = Oil/Water Separator
   DAF = Dissolved Air Flotation
   HT = Holding Tank
   MF = Multi-Media Filter
   GAC - Granular Activated Carbon

FIGURE B-1
BRIDGEPORT RENTAL - 1222
ONE DAY SAMPLING EVENT
REGION II LOGAN TOWNSHIP, NJ

BRIDGEPORT RENTAL - EPISODE 1222
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
O/W Separator+Dissolved Air Float.+Multi-media Filter+Holding Tank+Carbon Adsoroption

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
2,4-DIMETHYLPHENOL	UG/L	O/W Separator	101.000	110.000	-9
		Dissolved Air Float.	110.000	74.000	33
		Filter	74.000	24.000	68
		Holding Tank	24.000	16.000	33
		Carbon Adsorption	16.000	15.000	6
		Total Removal	101.000	15.000	85
ACETONE	UG/L	O/W Separator	3245.500	2925.000	10
		Dissolved Air Float.	2925.000	2426.000	17
		Filter	2426.000	2350.000	3
		Holding Tank	2350.000	2372.000	-1
		Carbon Adsorption	2372.000	2565.000	-8
		Total Removal	3245.500	2565.000	21
ACETOPHENONE	UG/L	O/W Separator	20.500	10.000	51
		Dissolved Air Float.	10.000	18.000	-80
		Filter	18.000	10.000	44
		Holding Tank	10.000	10.000	0
		Carbon Adsorption	10.000	10.000	0
		Total Removal	20.500	10.000	51
BENZOIC ACID	UG/L	O/W Separator	53.500	67.000	-25
		Dissolved Air Float.	67.000	124.000	-85
		Filter	124.000	60.000	52
		Holding Tank	60.000	50.000	17
		Carbon Adsorption	50.000	50.000	0
		Total Removal	53.500	50.000	7
BIS(2-CHLOROETHYL)ETHER	UG/L	O/W Separator	52.000	52.000	0
		Dissolved Air Float.	52.000	49.000	6
		Filter	49.000	48.000	2
		Holding Tank	48.000	45.000	6
		Carbon Adsorption	45.000	23.000	49
		Total Removal	52.000	23.000	56
HEXANOIC ACID	UG/L	O/W Separator	24.500	10.000	59
		Dissolved Air Float.	10.000	10.000	0
		Filter	10.000	10.000	0
		Holding Tank	10.000	10.000	0
		Carbon Adsorption	10.000	10.000	0
		Total Removal	24.500	10.000	59

BRIDGEPORT RENTAL - EPISODE 1222 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ISOPHORONE	UG/L	O/W Separator	58.500	60.000	-3
		Dissolved Air Float.	60.000	58.000	3
		Filter	58.000	60.000	-3
		Holding Tank	60.000	54.000	10
		Carbon Adsorption	54.000	23.000	57
		Total Removal	58.500	23.000	61
N-DOCOSANE (N-C22)	UG/L	O/W Separator	10.500	10.000	5
		Dissolved Air Float.	10.000	10.000	0
		Filter	10.000	10.000	0
		Holding Tank	10.000	10.000	0
		Carbon Adsorption	10.000	10.000	0
		Total Removal	10.500	10.000	5
N-EICOSANE (N-C20)	UG/L	O/W Separator	15.000	11.000	27
		Dissolved Air Float.	11.000	10.000	9
		Filter	10.000	10.000	0
		Holding Tank	10.000	10.000	0
		Carbon Adsorption	10.000	10.000	0
		Total Removal	15.000	10.000	33
N-HEXADECANE (N-C16)	UG/L	O/W Separator	23.000	21.000	9
		Dissolved Air Float.	21.000	10.000	52
		Filter	10.000	10.000	0
		Holding Tank	10.000	10.000	0
		Carbon Adsorption	10.000	10.000	0
		Total Removal	23.000	10.000	57
N-OCTADECANE (N-C18)	UG/L	O/W Separator	24.500	22.000	10
		Dissolved Air Float.	22.000	10.000	55
		Filter	10.000	10.000	0
		Holding Tank	10.000	10.000	0
		Carbon Adsorption	10.000	10.000	0
		Total Removal	24.500	10.000	59
N-TETRADECANE (N-C14)	UG/L	O/W Separator	17.500	18.000	-3
		Dissolved Air Float.	18.000	10.000	44
		Filter	10.000	10.000	0
		Holding Tank	10.000	10.000	0
		Carbon Adsorption	10.000	10.000	0
		Total Removal	17.500	10.000	43
P-CRESOL	UG/L	O/W Separator	72.500	66.000	9
		Dissolved Air Float.	66.000	36.000	45
		Filter	36.000	44.000	-22
		Holding Tank	44.000	27.000	39
		Carbon Adsorption	27.000	10.000	63
		Total Removal	72.500	10.000	86

BRIDGEPORT RENTAL - EPISODE 1222 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
PHENOL	UG/L	O/W Separator	35.000	36.000	-3
		Dissolved Air Float.	36.000	27.000	25
		Filter	27.000	45.000	-67
		Holding Tank	45.000	32.000	29
		Carbon Adsorption	32.000	27.000	16
		Total Removal	35.000	27.000	23
PESTICIDES					
AZINPHOS METHYL	UG/L	O/W Separator	50.000	44.000	12
		Dissolved Air Float.	44.000	0.000	100
		Filter	0.000	0.000	***
		Holding Tank	0.000	0.000	***
		Carbon Adsorption	0.000	30.000	***
		Total Removal	50.000	30.000	40
PCB-1254	UG/L	O/W Separator	6.050	4.900	19
		Dissolved Air Float.	4.900	0.000	100
		Filter	0.000	0.000	***
		Holding Tank	0.000	0.000	***
		Carbon Adsorption	0.000	1.000	***
		Total Removal	6.050	1.000	83
INORGANICS					
ALUMINUM	UG/L	O/W Separator	403.500	422.000	-5
		Dissolved Air Float.	422.000	66.000	84
		Filter	66.000	9.000	86
		Holding Tank	9.000	26.000	***
		Carbon Adsorption	26.000	37.000	-42
		Total Removal	403.500	37.000	91
BARIUM	UG/L	O/W Separator	15.000	16.000	-7
		Dissolved Air Float.	16.000	9.300	42
		Filter	9.300	9.300	0
		Holding Tank	9.300	9.300	0
		Carbon Adsorption	9.300	13.000	-40
		Total Removal	15.000	13.000	13
BORON	UG/L	O/W Separator	247.000	241.000	2
		Dissolved Air Float.	241.000	214.000	11
		Filter	214.000	177.000	17
		Holding Tank	177.000	142.000	20
		Carbon Adsorption	142.000	135.000	5
		Total Removal	247.000	135.000	45

BRIDGEPORT RENTAL - EPISODE 1222 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
CALCIUM	UG/L	O/W Separator	4145.000	4110.000	1
		Dissolved Air Float.	4110.000	3830.000	7
		Filter	3830.000	3850.000	-1
		Holding Tank	3850.000	3860.000	0
		Carbon Adsorption	3860.000	4030.000	-4
		Total Removal	4145.000	4030.000	3
CHROMIUM	UG/L	O/W Separator	53.500	55.000	-3
		Dissolved Air Float.	55.000	13.000	76
		Filter	13.000	6.000	54
		Holding Tank	6.000	8.000	-33
		Carbon Adsorption	8.000	4.000	50
		Total Removal	53.500	4.000	93
COPPER	UG/L	O/W Separator	26.000	24.000	8
		Dissolved Air Float.	24.000	37.000	-54
		Filter	37.000	18.000	51
		Holding Tank	18.000	20.000	-11
		Carbon Adsorption	20.000	17.000	15
		Total Removal	26.000	17.000	35
IRON	UG/L	O/W Separator	9045.000	9070.000	0
		Dissolved Air Float.	9070.000	8260.000	9
		Filter	8260.000	635.000	92
		Holding Tank	635.000	1300.000	***
		Carbon Adsorption	1300.000	308.000	76
		Total Removal	9045.000	308.000	97
LEAD	UG/L	O/W Separator	108.000	88.000	19
		Dissolved Air Float.	88.000	24.000	73
		Filter	24.000	24.000	0
		Holding Tank	24.000	24.000	0
		Carbon Adsorption	24.000	24.000	0
		Total Removal	108.000	24.000	78
MAGNESIUM	UG/L	O/W Separator	2885.000	2860.000	1
		Dissolved Air Float.	2860.000	2680.000	6
		Filter	2680.000	2690.000	0
		Holding Tank	2690.000	2720.000	-1
		Carbon Adsorption	2720.000	2460.000	10
		Total Removal	2885.000	2460.000	15
MANGANESE	UG/L	O/W Separator	708.000	705.000	0
		Dissolved Air Float.	705.000	847.000	-20
		Filter	847.000	814.000	4
		Holding Tank	814.000	797.000	2
		Carbon Adsorption	797.000	668.000	16
		Total Removal	708.000	668.000	6

BRIDGEPORT RENTAL - EPISODE 1222 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
NICKEL	UG/L	O/W Separator	18.500	21.000	-14
		Dissolved Air Float.	21.000	21.000	0
		Filter	21.000	19.000	10
		Holding Tank	19.000	11.000	42
		Carbon Adsorption	11.000	15.000	-36
		Total Removal	18.500	15.000	19
PHOSPHORUS	UG/L	O/W Separator	1285.000	1000.000	22
		Dissolved Air Float.	1000.000	1000.000	0
		Filter	1000.000	1000.000	0
		Holding Tank	1000.000	1000.000	0
		Carbon Adsorption	1000.000	1000.000	0
		Total Removal	1285.000	1000.000	22
POTASSIUM	UG/L	O/W Separator	1010.000	1000.000	1
		Dissolved Air Float.	1000.000	3940.000	***
		Filter	3940.000	3420.000	13
		Holding Tank	3420.000	3230.000	6
		Carbon Adsorption	3230.000	2930.000	9
		Total Removal	1010.000	2930.000	***
SILICON	UG/L	O/W Separator	2040.000	2090.000	-2
		Dissolved Air Float.	2090.000	1690.000	19
		Filter	1690.000	1620.000	4
		Holding Tank	1620.000	1580.000	2
		Carbon Adsorption	1580.000	1550.000	2
		Total Removal	2040.000	1550.000	24
SODIUM	UG/L	O/W Separator	51750.000	51900.000	0
		Dissolved Air Float.	51900.000	123000.000	***
		Filter	123000.000	124000.000	-1
		Holding Tank	124000.000	125000.000	-1
		Carbon Adsorption	125000.000	127000.000	-2
		Total Removal	51750.000	127000.000	***
SULFUR	UG/L	O/W Separator	7050.000	6210.000	12
		Dissolved Air Float.	6210.000	4230.000	32
		Filter	4230.000	4180.000	1
		Holding Tank	4180.000	4100.000	2
		Carbon Adsorption	4100.000	3090.000	25
		Total Removal	7050.000	3090.000	56
TITANIUM	UG/L	O/W Separator	8.000	9.000	-12
		Dissolved Air Float.	9.000	5.000	44
		Filter	5.000	5.000	0
		Holding Tank	5.000	5.000	0
		Carbon Adsorption	5.000	5.000	0
		Total Removal	8.000	5.000	38

BRIDGEPORT RENTAL - EPISODE 1222 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
VANADIUM	UG/L	O/W Separator	32.500	30.000	8
		Dissolved Air Float.	30.000	2.700	91
		Filter	2.700	2.700	0
		Holding Tank	2.700	5.000	-85
		Carbon Adsorption	5.000	4.000	20
		Total Removal	32.500	4.000	88
ZINC	UG/L	O/W Separator	312.500	309.000	1
		Dissolved Air Float.	309.000	42.000	86
		Filter	42.000	17.000	60
		Holding Tank	17.000	22.000	-29
		Carbon Adsorption	22.000	25.000	-14
		Total Removal	312.500	25.000	92
CONVENTIONALS/NONCONVENTIONALS					
BOD-5 DAY	UG/L	O/W Separator	52000.000	53000.000	-2
		Dissolved Air Float.	53000.000	26000.000	51
		Filter	26000.000	31000.000	-19
		Holding Tank	31000.000	26000.000	16
		Carbon Adsorption	26000.000	20000.000	23
		Total Removal	52000.000	20000.000	62
CHLORIDE	UG/L	O/W Separator	58000.000	58000.000	0
		Dissolved Air Float.	58000.000	260000.000	***
		Filter	260000.000	240000.000	8
		Holding Tank	240000.000	250000.000	-4
		Carbon Adsorption	250000.000	250000.000	0
		Total Removal	58000.000	250000.000	***
COD	UG/L	O/W Separator	545000.000	540000.000	1
		Dissolved Air Float.	540000.000	340000.000	37
		Filter	340000.000	320000.000	6
		Holding Tank	320000.000	250000.000	22
		Carbon Adsorption	250000.000	130000.000	48
		Total Removal	545000.000	130000.000	76
FLASH POINT	DEG C	O/W Separator	44.000	0.000	100
		Dissolved Air Float.	0.000	0.000	***
		Filter	0.000	0.000	***
		Holding Tank	0.000	0.000	***
		Carbon Adsorption	0.000	65.000	***
		Total Removal	44.000	65.000	-48

BRIDGEPORT RENTAL - EPISODE 1222 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
NITROGEN, TOTAL KJELDAHL	UG/L	O/W Separator	4750.000	3100.000	35
		Dissolved Air Float.	3100.000	3200.000	-3
		Filter	3200.000	1800.000	44
		Holding Tank	1800.000	1800.000	0
		Carbon Adsorption	1800.000	1100.000	39
		Total Removal	4750.000	1100.000	77
OIL & GREASE, TOTAL RECOVERABLE	UG/L	O/W Separator	25500.000	20000.000	22
		Dissolved Air Float.	20000.000	5000.000	75
		Filter	5000.000	6800.000	-36
		Holding Tank	6800.000	6700.000	1
		Carbon Adsorption	6700.000	5000.000	25
		Total Removal	25500.000	5000.000	80
PHOSPHORUS, TOTAL AS P	UG/L	O/W Separator	1500.000	1500.000	0
		Dissolved Air Float.	1500.000	360.000	76
		Filter	360.000	210.000	42
		Holding Tank	210.000	290.000	-38
		Carbon Adsorption	290.000	150.000	48
		Total Removal	1500.000	150.000	90
SPECIFIC CONDUCTIVITY	UMH/C	O/W Separator	275.000	270.000	2
		Dissolved Air Float.	270.000	680.000	***
		Filter	680.000	700.000	-3
		Holding Tank	700.000	690.000	1
		Carbon Adsorption	690.000	690.000	0
		Total Removal	275.000	690.000	***
SULFATE	UG/L	O/W Separator	52000.000	12000.000	77
		Dissolved Air Float.	12000.000	4700.000	61
		Filter	4700.000	16000.000	***
		Holding Tank	16000.000	100000.000	***
		Carbon Adsorption	100000.000	0.000	100
		Total Removal	52000.000	0.000	100
SULFIDE, TOTAL (IODOMETRIC)	UG/L	O/W Separator	4550.000	7900.000	-74
		Dissolved Air Float.	7900.000	3600.000	54
		Filter	3600.000	3800.000	-6
		Holding Tank	3800.000	4000.000	-5
		Carbon Adsorption	4000.000	1200.000	70
		Total Removal	4550.000	1200.000	74
TDS	UG/L	O/W Separator	370000.000	370000.000	0
		Dissolved Air Float.	370000.000	450000.000	-22
		Filter	450000.000	400000.000	11
		Holding Tank	400000.000	470000.000	-17
		Carbon Adsorption	470000.000	440000.000	6
		Total Removal	370000.000	440000.000	-19

BRIDGEPORT RENTAL - EPISODE 1222 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
TOC	UG/L	O/W Separator	125000.000	130000.000	-4
		Dissolved Air Float.	130000.000	82000.000	37
		Filter	82000.000	77000.000	6
		Holding Tank	77000.000	75000.000	3
		Carbon Adsorption	75000.000	48000.000	36
		Total Removal	125000.000	48000.000	62
TSS	UG/L	O/W Separator	16500.000	15000.000	9
		Dissolved Air Float.	15000.000	24000.000	-60
		Filter	24000.000	4000.000	83
		Holding Tank	4000.000	4000.000	0
		Carbon Adsorption	4000.000	4000.000	0
		Total Removal	16500.000	4000.000	76

SECTION B-2
TREATABILITY OF CERCLA POLLUTANTS
CHARLES GEORGE - EPISODE 1309

(ONE DAY SAMPLING EVENT)

CHARLES GEORGE - EPISODE 1309
SITE DESCRIPTION

The Charles George Land Reclamation Trust (CGLRT) site is an inactive municipal and industrial waste landfill, located on approximately 63 acres in the southwestern corner of Tyngsborough, Massachusetts, and on seven adjoining acres in the neighboring town of Dunstable. The site is in Middlesex County, about 60 miles northwest of Boston, Massachusetts, and 4 miles south of Nashua, New Hampshire.

The landfill is bordered on the north and northwest of Blodgett-Cummings Road and the Tyngsborough-Dunstable town boundary, on the east by the U.S. Route 3, on the south by the Cannongate II condominium complex, and on the west by Dunstable Road.

In the mid- to late 1950s, on-site waste disposal activities began near the intersection of Dunstable and Blodgett-Cummings roads. The site served as the Tyngsborough municipal dump, operated by a private contractor until 1973. The site was acquired by Charles George, Sr., in 1967, and by CGLRT in 1971. In 1973, the Massachusetts DWPC issued CGLRT a permit to accept hazardous waste (USEPA, 1985).

In 1976, the Town of Tyngsborough authorized the CGLRT to extend the landfill to the east, expanding its area from 38 to 63 acres (NUS, 1986). In 1977, CDM designed a clay liner for the landfill to prevent downward migration of leachate in the site's eastern and central portions. Previous investigations found no record of actual construction of a liner (NUS-RAMP, November 1983).

Hazardous wastes, including drummed and bulk VOCs and toxic metal sludges, were known to have been disposed on-site from January 1973 to June 1976. The quantity and burial locations of discarded wastes are not known. According to the preliminary RI report, CGLRT violated DEQE regulations from 1978 to 1982 (NUS, 1986). VOCs were found in 1982 at water supply wells serving the Cannongate condominium complex, located approximately 800 feet southeast of the landfill. The DEQE closed these wells in July 1982. A temporary, aboveground pipeline was installed to supply water to the complex. This water line froze during December 1982. In 1983, the Massachusetts Attorney General, acting for the DEQE, suspended use of the site as a landfill (USEPA, 1985).

Two RODs concerning the CGLRT have been issued by USEPA, one in December 1983 and the other in July 1985. To address Operable Unit I, the USEPA installed a temporary insulated pipeline under the ROD issued on December 29, 1983. A permanent waterline connecting the complex to the Lowell municipal water supply was required in the 1983 ROD. Under this ROD, the waterline may also serve as a water supply to a limited number of private residences in the Cannongate-Dunstable Road area, if necessary.

In 1983 and 1984, USEPA contracted for the installation of a security fence around portions of the landfill, regraded part of the landfill, placed a soil cover over exposed refuse, and installed 12 gas vents. Explorations during the

1984 preliminary RI disclosed the need for on-site source control measures. The objectives of Operable Unit II were addressed and a source control recommendation was presented in a subsequent source-oriented FS (NUS, 1985). As a result, USEPA issued their second ROD on July 11, 1985, to install a flexible membrane cap over the landfill surface, a leachate collection system, and additional gas vents as primary contaminant source-control measures. Operable Units III and IV are being addressed through a USEPA contract to Ebasco initiated in June 1986.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis o: Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulatio and Standards, Industrial Technology Division, Sample Control Center.

[b] Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 μg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 μg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

R - Spike recovery limits met after rerun on ICP.

Treatment: Future
Wastewater Type: Groundwater

	# Compounds Detected [1]	Conc ITD [2]	Conc PP [2]
Pollutant	PP : TCL : ITD	Min-Max	Min-Max
Total Organics	3 : 7 : 10	15-643 ug/L	15-93 ug/L
Metals	4 : 12 : 19	0 200-15900 ug/L	10-213 ug/L

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

FIGURE B-2
CHARLES GEORGE - 1309
ONE DAY SAMPLING EVENT
REGION I TYNGSBOROUGH, MA

CHARLES GEORGE - EPISODE 1309
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
RAW WASTE

COMPOUND	UNITS	RAW WASTE CONCENTRATION	QUAL.
ORGANICS			
1,1-DICHLOROETHANE	UG/L	15.000	
2-BUTANONE (MEK)	UG/L	643.000	
4-METHYL-2-PENTANONE	UG/L	125.000	
ACETONE	UG/L	729.000	
BENZENE	UG/L	51.000	
BENZOIC ACID	UG/L	77.000	
DIETHYL ETHER	UG/L	64.000	
HEXANOIC ACID	UG/L	35.000	
N,N-DIMETHYLFORMAMIDE	UG/L	422.000	
TOLUENE	UG/L	93.000	
INORGANICS			
ALUMINUM	UG/L	722.000	
ARSENIC	UG/L	213.000	M
BARIUM	UG/L	179.000	[]
BORON	UG/L	470.000	
CALCIUM	UG/L	159000.000	
IRON	UG/L	36100.000	
MAGNESIUM	UG/L	41800.000	
MANGANESE	UG/L	7230.000	
MOLYBDENUM	UG/L	12.000	
NICKEL	UG/L	44.000	
SILVER	UG/L	10.000	[]

CHARLES GEORGE - EPISODE 1309 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW WASTE CONCENTRATION	QUAL.
SODIUM	UG/L	91600.000	
TITANIUM	UG/L	40.000	
ZINC	UG/L	22.000	
OSMIUM	UG/L	0.200	
POTASSIUM	UG/L	2.000	
SILICON	UG/L	7.000	
STRONTIUM	UG/L	0.700	
SULFUR	UG/L	2.400	
CONVENTIONALS/NONCONVENTIONALS			
BOD	MG/L	130.000	
TSS	MG/L	140.000	
AMMONIA, AS N	MG/L	5.600	
CHLORIDE	MG/L	250.000	
COD	MG/L	180.000	
FLASH POINT	25 C	54.000	
NITROGEN, TOTAL KJELDAHL	MG/L	6.100	
PHOSPHORUS, TOTAL AS P	MG/L	0.470	
SPECIFIC CONDUCTANCE	UMH/CM-25C	1500.000	
TDS	MG/L	970.000	
TOC	MG/L	73.000	

SECTION B-3
TREATABILITY OF CERCLA POLLUTANTS
CHEMDYNE - EPISODE 1807

(FIVE DAY SAMPLING EVENT)

CHEMDYNE-EPISODE 1807
SITE DESCRIPTION

The Chem-Dyne site is located in a northern section within the limits of the City of Hamilton, Ohio. The site is bounded by a residential district, a municipal park, the Ford Hydraulic Canal which flows to the Great Miami River, and a railroad right-of-way adjacent to a sheet metal fabrication plant.

The Chem-Dyne site is believed to have begun receiving hazardous substances as early as 1974. Additionally, Spray-Dyne, an affiliated company, produced antifreeze solution on-site by recycling chemical wastes and using virgin chemicals. By 1976, Chem-Dyne was a rapidly growing corporation specializing in storage, recycling, and disposing a wide variety of industrial chemical waste. Chem-Dyne sold chemical fuels produced by mixing chemical wastes in bulk storage tanks, open containers, and gravel-lined loading docks. Other wastes were stored in drums and tanks (including at least one old leaking railroad tank car) in buildings and outdoors.

In five years of operation, the facility accepted waste from approximately 200 generators. Materials handled included pesticides and pesticide residues, chlorinated hydrocarbons, solvents, waste oils, plastics and resins, polybrominated biphenyls, polychlorinated biphenyls, flame retardants, acids and caustics, heavy metal and cyanide sludges, and package laboratory chemicals. More than 300,000 drums and 300,000 gallons of bulk materials were on-site when Chem-Dyne ceased operations.

Chem-Dyne operations resulted in uncontrolled releases of hazardous materials. Mixing of liquid wastes was often done in open gravel-lined pits, releasing noxious vapors into the atmosphere, and contaminating soil and groundwater. Reportedly, 55-gallon drums were punctured and were allowed to leak, or were dumped on the ground and into troughs and sewers. Wastes were frequently spilled, and at one time, a large pool of waste reportedly covered one portion of the site surface.

A number of environmental incidents were reported at the Chem-Dyne facility during its operation, including at least five fish kills, a series of fires, many odor complaints, and a fuming railroad tank car incident caused by improper mixing of chemical wastes. Legal actions resulting from Chem-Dyne's handling of wastes resulted in settlements with which Chem-Dyne did not comply. Eventually, court action forced Chem-Dyne to stop operations, remove wastes from the site, and clean up suspected soil and groundwater contamination.

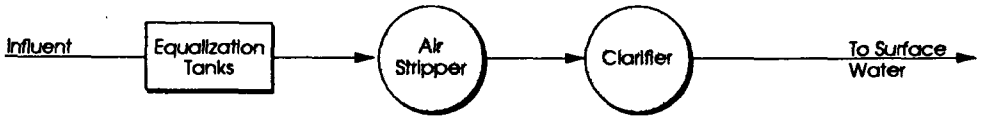
The Chem-Dyne facility ceased operation in January 1980 when the state of Ohio named a receiver to assume operations and respond to the problems at Chem-Dyne. In 1981, the receivership ran short of funds to continue waste removal from the site and stopped operation. USEPA began removal actions and initiated a site remedial investigation (RI) and feasibility study (FS) in March 1982. Potentially responsible parties (PRPs), generators of wastes left on-site, were also identified and contacted to remove wastes and negotiate cleanup contributions.

As a result of the initial cleanup operations, all containerized surface waste has not been removed from the site, and an RI and FS have been completed. The RI indicated extensive soil contamination by priority pollutant acids and volatile organic compounds (VOCs), several of which are considered carcinogens. Inorganic chemicals, semivolatile organic compounds, and pesticides were found in the upper three feet of soils at the site while VOCs were found mainly in the upper six feet of soil.

A hydrogeological investigation and chemical analyses of groundwater samples conducted as part of the RI indicated that a contaminant consisting primarily of VOCs is present in groundwater near the site and has the potential to affect receptors in the near future. Aquifer characteristics suggest that plume contaminants could be taken in by a number of industrial production wells located within a one-mile radius, resulting in near-term exposures due to volatilization of contaminants within these industrial facilities from the use of contaminated water. The city of Hamilton's contamination of drinking water would result in long-term exposures due to contamination of the drinking water supply.

RI sampling and observation also indicated extensive contamination of some of the utilities and buildings on-site which present a future source of soil and groundwater contamination and pose a current threat from direct contact or air exposure.

The FS developed and evaluated remedial action alternatives to address environmental problems as identified in the site RI. USEPA issued a Record-of-Decision (ROD) on July 5, 1985, documenting the selection of a remedial action alternative which has since been implemented. Remediation includes source control measures and groundwater extraction, treatment by air stripping, clarification, and vapor-phase carbon adsorption for air stripping offgas discharge in part to the aquifer to increase the efficiency of the extraction system and also to the Ford Canal.



Treatment: Air Stripping
Wastewater Type: Groundwater
Average Flow: 750 GPM (24 Hours/7Days)
60% to Surface Water/ 40% Reinjected

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge[3]	% Mass Removed AS[4]	% Mass Removed CL[4]	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	12 : 12 : 16	0.027ppt - 444 ug/L	34 - 444 ug/L	5,110 : 6,300	344 : 490	89 : 88	41 : 34	93 : 92
Metals	4 : 11 : 16	2 - 137,167 ug/L	6 - 34 ug/L	225 : 669,420	97 : 375,900	13 : 3	78 : 42	57 : 43

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. Taken from concentration averages over a four day sampling event

3. Based on pollutant concentration averages

4. AS = Air Stripping
   CL = Clarifier

FIGURE B-3
CHEMDYNE - 1807
FIVE DAY SAMPLING EVENT
REGION V HAMILTON, OH

CHEMDYNE - EPISODE 1807
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
EQUALIZATION TANK + AIR STRIPPER

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
1,1,1,2-TETRACHLOROETHANE	UG/L	Air Stripping	70.33	10.00	86
		Clarifier	10.00	10.00	0
		Total Removal	70.33	10.00	86
1,1,2,2-TETRACHLOROETHANE	UG/L	Air Stripping	85.00	38.40	55
		Clarifier	38.40	39.17	-2
		Total Removal	85.00	39.17	54
1,1,2-TRICHLOROETHANE	UG/L	Air Stripping	244.33	32.00	87
		Clarifier	32.00	29.17	9
		Total Removal	244.33	29.17	88
1,1-DICHLOROETHANE	UG/L	Air Stripping	70.17	18.00	74
		Clarifier	18.00	16.50	8
		Total Removal	70.17	16.50	76
1,1-DICHLOROETHENE	UG/L	Air Stripping	49.67	10.00	80
		Clarifier	10.00	10.00	0
		Total Removal	49.67	10.00	80
1,2-DICHLOROETHANE	UG/L	Air Stripping	37.50	10.00	73
		Clarifier	10.00	10.00	0
		Total Removal	37.50	10.00	73
1234678-HpCDD	NG/L	Air Stripping	0.03	0.02	22
		Clarifier	0.02	0.02	10
		Total Removal	0.03	0.02	30
BENZENE	UG/L	Air Stripping	45.83	10.00	78
		Clarifier	10.00	10.00	0
		Total Removal	45.83	10.00	78
CHLOROBENZENE	UG/L	Air Stripping	34.83	10.00	71
		Clarifier	10.00	10.00	0
		Total Removal	34.83	10.00	71
ETHYLBENZENE	UG/L	Air Stripping	33.50	10.00	70
		Clarifier	10.00	10.00	0
		Total Removal	33.50	10.00	70
M-XYLENE	UG/L	Air Stripping	50.50	10.00	80
		Clarifier	10.00	10.00	0
		Total Removal	50.50	10.00	80
O-+P-XYLENE	UG/L	Air Stripping	39.33	10.00	75
		Clarifier	10.00	10.00	0
		Total Removal	39.33	10.00	75

CHEMDYNE - EPISODE 1807 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
OCDD	NG/L	Air Stripping	0.20	0.04	80
		Clarifier	0.04	0.04	7
		Total Removal	0.20	0.04	81
OCDF	NG/L	Air Stripping	0.06	0.04	33
		Clarifier	0.04	0.04	7
		Total Removal	0.06	0.04	38
TETRACHLOROETHENE	UG/L	Air Stripping	444.17	10.00	98
		Clarifier	10.00	10.00	0
		Total Removal	444.17	10.00	98
TOTAL HpCDD	NG/L	Air Stripping	0.03	0.02	22
		Clarifier	0.02	0.02	10
		Total Removal	0.03	0.02	30
TOTAL HpCDF	NG/L	Air Stripping	0.04	0.02	48
		Clarifier	0.02	0.02	10
		Total Removal	0.04	0.02	53
TRANS-1,2-DICHLOROETHENE	UG/L	Air Stripping	229.00	10.00	96
		Clarifier	10.00	10.00	0
		Total Removal	229.00	10.00	96
TRICHLOROETHENE	UG/L	Air Stripping	224.83	10.00	96
		Clarifier	10.00	10.00	0
		Total Removal	224.83	10.00	96
TRICHLOROFLUOROMETHANE	UG/L	Air Stripping	200.83	17.20	91
		Clarifier	17.20	43.67	**
		Total Removal	200.83	43.67	78
VINYL CHLORIDE	UG/L	Air Stripping	58.83	10.00	83
		Clarifier	10.00	10.00	0
		Total Removal	58.83	10.00	83
INORGANICS					
ANTIMONY	UG/L	Air Stripping	34.00	12.06	65
		Clarifier	12.06	10.47	13
		Total Removal	34.00	10.47	69
ARSENIC	UG/L	Air Stripping	15.12	28.86	**
		Clarifier	28.86	17.40	40
		Total Removal	15.12	17.40	**
BARIUM	UG/L	Air Stripping	238.00	227.20	5
		Clarifier	227.20	209.50	8
		Total Removal	238.00	209.50	12

CHEMDYNE - EPISODE 1807 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
BORON	UG/L	Air Stripping	143.17	126.80	11
		Clarifier	126.80	126.83	0
		Total Removal	143.17	126.83	11
CALCIUM	UG/L	Air Stripping	137166.67	134000.00	2
		Clarifier	134000.00	129666.67	3
		Total Removal	137166.67	129666.67	5
IRON	UG/L	Air Stripping	3653.33	1774.00	51
		Clarifier	1774.00	100.50	94
		Total Removal	3653.33	100.50	97
MAGNESIUM	UG/L	Air Stripping	43016.67	42620.00	1
		Clarifier	42620.00	40850.00	4
		Total Removal	43016.67	40850.00	5
MANGANESE	UG/L	Air Stripping	266.17	250.80	6
		Clarifier	250.80	233.00	7
		Total Removal	266.17	233.00	12
POTASSIUM	MG/L	Air Stripping	6.40	6.38	0
		Clarifier	6.38	6.45	-1
		Total Removal	6.40	6.45	-1
SELENIUM	UG/L	Air Stripping	5.75	7.04	**
		Clarifier	7.04	11.80	**
		Total Removal	5.75	11.80	**
SILICON	MG/L	Air Stripping	2.58	2.46	5
		Clarifier	2.46	2.42	2
		Total Removal	2.58	2.42	6
SODIUM	UG/L	Air Stripping	19433.33	19500.00	0
		Clarifier	19500.00	19666.67	-1
		Total Removal	19433.33	19666.67	-1
STRONTIUM	MG/L	Air Stripping	0.68	0.66	3
		Clarifier	0.66	0.60	9
		Total Removal	0.68	0.60	12
SULFUR	MG/L	Air Stripping	31.82	31.22	2
		Clarifier	31.22	32.23	-3
		Total Removal	31.82	32.23	-1
YTTRIUM	UG/L	Air Stripping	2.00	2.00	0
		Clarifier	2.00	2.00	0
		Total Removal	2.00	2.00	0

CHEMDYNE - EPISODE 1807 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ZINC	UG/L	Air Stripping	13.67	11.60	15
		Clarifier	11.60	9.50	18
		Total Removal	13.67	9.50	30
CONVENTIONALS/NONCONVETIONALS					
CHLORIDE	MG/L	Air Stripping	40.67	40.80	0
		Clarifier	40.80	42.00	-3
		Total Removal	40.67	42.00	-3
CORROSIVITY	MPY	Air Stripping	1.67	0.00	**
		Clarifier	0.00	3.33	**
		Total Removal	1.67	3.33	**
FLASH POINT	25 DEG C	Air Stripping	10.83	0.00	**
		Clarifier	0.00	21.67	**
		Total Removal	10.83	21.67	**
FLUORIDE	MG/L	Air Stripping	0.21	0.22	-5
		Clarifier	0.22	0.89	**
		Total Removal	0.21	0.89	**
NITRATE + NITRITE, AS N	MG/L	Air Stripping	0.23	0.22	2
		Clarifier	0.22	0.27	**
		Total Removal	0.23	0.27	**
NITROGEN, TOTAL KJELDEHL	MG/L	Air Stripping	0.26	0.28	-6
		Clarifier	0.28	0.24	15
		Total Removal	0.26	0.24	10
OIL & GREASE, TOTAL RECOVERABLE	MG/L	Air Stripping	8.67	7.44	14
		Clarifier	7.44	5.63	24
		Total Removal	8.67	5.63	35
RESIDUE, FILTERABLE	MG/L	Air Stripping	628.33	622.00	1
		Clarifier	622.00	615.00	1
		Total Removal	628.33	615.00	2
RESIDUE, NON-FILTERABLE	MG/L	Air Stripping	12.12	11.16	8
		Clarifier	11.16	5.83	48
		Total Removal	12.12	5.83	52
SPECIFIC CONDUCTANCE	UMH/CM-25C	Air Stripping	906.67	928.00	-2
		Clarifier	928.00	3415.00	**
		Total Removal	906.67	3415.00	**
SULFATE	MG/L	Air Stripping	97.00	93.80	3
		Clarifier	93.80	99.00	-6
		Total Removal	97.00	99.00	-2

CHEMDYNE - EPISODE 1807 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
TOTAL ORGANIC CARBON	MG/L	Air Stripping	2.47	2.40	3
		Clarifier	2.40	2.68	**
		Total Removal	2.47	2.68	-9

CHEMDYNE AIR SAMPLING ANALYTICAL DATA

Air Influent = Carbon Scrubber Inlet

Air Effluent = Carbon Scrubber Outlet

EPISODE 1807
SUMMARY OF ANALYTICAL RESULTS
CHEMDYNE
HAMILTON, OHIO

		AIR INFLUENT				
		DAY 1 (AMBIENT)	DAY 1	DAY 2	DAY 3	DAY 3
COMPOUND	UNITS	18879	18898	18900	18902	18904
ORGANICS						
BENZENE	µg/l	0.8 U	182	256	382	366
CARBON TETRACHLORIDE	µg/l	0.4 U	3.8	8 U	16 U	3 U
CHLOROBENZENE	µg/l	0.5 U	58	92	102	99
CHLOROFORM	µg/l	0.5 U	20	24	46	40
DICHLORODIFLOUROMETHANE	µg/l	2.8	3.1	10 U	21 U	10 U
ETHYLBENZENE	µg/l	0.6 U	117	435	457	398
ETHYL CHLORIDE	µg/l	0.9 U	11	19 U	39 U	19 U
M-DICHLOROBENZENE	µg/l	0.4 U	1.2	8 U	17 U	8 U
O-DICHLOROBENZENE	µg/l	0.4 U	8.1	8 U	17 U	12
O-XYLENE	µg/l	0.6 U	17	25	23	26
P-DICHLOROBENZENE	µg/l	0.4 U	1.6	8 U	17 U	8 U
P-XYLENE	µg/l	1.2	257	564	586	527
TETRACHLOROETHENE	µg/l	0.64	111	203	546	457
TOLUENE	µg/l	0.71	26	37	51	50
TRICHLOROETHENE	µg/l	0.81	158	409	663	587
TRICHLOROFLUOROMETHANE	µg/l	3.4	4.7	9 U	18 U	9 U
VINYL CHLORIDE	µg/l	0.9 U	729	1160	3,020	2,590
1,1-DICHLOROETHANE	µg/l	0.6 U	50	59	93	90
1,1-DICHLOROETHENE	µg/l	0.6 U	183	309	487	423
1,1,1-TRICHLOROETHANE	µg/l	0.53	10	13	24	21
1,1,2-TRICHLOROETHANE	µg/l	0.53	253	411	857	774
1,1,2-TRICHLORO-1,2,2-TRIFLOUROETHANE	µg/l	0.3 U	4.7	6.7	13 U	8.0
1,1,2,2-TETRACHLOROETHANE	µg/l	0.4 U	116	7 U	15 U	319
1,2-DICHLOROETHANE	µg/l	0.6 U	57	66	133	126
1,2-DICHLOROPROPANE	µg/l	0.5 U	4.7	11 U	22 U	11 U
cis-1,2-DICHLOROETHENE	µg/l	3.1	599	1540	2260	2050
1,2-TRANS-DICHLOROETHENE	µg/l	0.6 U	79	126	190	154
1,2,4-TRIMETHYLBENZENE	µg/l	0.5 U	40	10 U	62	62
1,3,5-TRIMETHYLBENZENE	µg/l	0.5 U	17	13	21 U	19

EPISODE 1807
SUMMARY OF ANALYTICAL RESULTS
CHEMDYNE
HAMILTON, OHIO

		AIR EFFLUENT			
		DAY 1	DAY 2	DAY 3	DAY 3
COMPOUND	UNITS	18899	18901	18903	18905
ORGANICS					
BENZENE	µg/l	43	145	166	178
CARBON TETRACHLORIDE	µg/l	2.9	14 U	11 U	16 U
CHLOROBENZENE	µg/l	1 U	20 U	15 U	22 U
CHLOROFORM	µg/l	27	34	31	33
DICHLORODIFLOUROMETHANE	µg/l	11	18 U	14 U	21 U
ETHYLBENZENE	µg/l	1 U	21 U	16 U	23 U
ETHYL CHLORIDE	µg/l	23	34 U	26 U	39 U
M-DICHLOROBENZENE	µg/l	1.0 U	15 U	11 U	17 U
O-DICHLOROBENZENE	µg/l	1.0 U	15 U	11 U	17 U
O-XYLENE	µg/l	1 U	21 U	16 U	23 U
P-DICHLOROBENZENE	µg/l	1.0 U	15 U	11 U	17 U
P-XYLENE	µg/l	1 U	21 U	16 U	23 U
TETRACHLOROETHENE	µg/l	4.3	13 U	10 U	15 U
TOLUENE	µg/l	2 U	24 U	18 U	27 U
TRICHLOROETHENE	µg/l	80	322	328	379
TRICHLOROFLUOROMETHANE	µg/l	34	15 J	12 U	18 U
VINYL CHLORIDE	µg/l	2,150	2,780	2280	2470
1,1-DICHLOROETHANE	µg/l	78	76	69	70
1,1-DICHLOROETHENE	µg/l	392	390	325	359
1,1,1-TRICHLOROETHANE	µg/l	6.4	17	12	19 U
1,1,2-TRICHLOROETHANE	µg/l	16	48	66	86
1,1,2-TRICHLORO-1,2,2-TRIFLOUROETHANE	µg/l	7.8	12 U	9 U	13 U
1,1,2,2-TETRACHLOROETHANE	µg/l	0.9 U	13 U	10 U	15 U
1,2-DICHLOROETHANE	µg/l	61	106	87	88
1,2-DICHLOROPROPANE	µg/l	1 U	20 U	15 U	22 U
cis-1,2-DICHLOROETHENE	µg/l	1120	1930	1570	1770
1,2-TRANS-DICHLOROETHENE	µg/l	151	147	132	133
1,2,4-TRIMETHYLBENZENE	µg/l	1 U	19 U	14 U	21 U
1,3,5-TRIMETHYLBENZENE	µg/l	1 U	19 U	14 U	21 U

SECTION B-4
TREATABILITY OF CERCLA POLLUTANTS
GENEVA INDUSTRIES - EPISODE 1224

(ONE DAY SAMPLING EVENT)

GENEVA - EPISODE 1224
SITE DESCRIPTION

The Geneva Industries site is a 13.5 acre tract located at 9334 Caniff Road in Houston, Texas immediately adjacent to the limits of the city of South Houston. The site is within one mile of Interstate Highway 45 and within two miles of William P. Hobby Airport. The property is bound on the north by Caniff Road, on the southwest by Easthaven Boulevard, and on the east by a Harris County Flood Control Channel.

The site is an abandoned refinery which manufactured a variety of organic compounds including biphenyl, polychlorinated biphenyls (PCBs), phenyl phenol, naptha, and Nos. 2 and 6 fuel oils from 1967 through 1978.

Prior to 1967, the property was used for petroleum exploration and production. Geneva Industries began manufacturing biphenyl by distillation of toluene dealkylation bottoms in June 1967, began producing PCBs in June 1972, and declared bankruptcy in November 1973. Since that time, four other corporations owned and operated the Geneva facility, including:

Pilot Industries, February 1974 - December 1976
Intercoastal Refining, December 1976 - December 1980
Lonestar Fuel Co., December 1980 - May 1982
Fuhrmann Energy, May 1982 - Present

Operation of the facility ceased in September 1978 and was never resumed. The current owner, Fuhrmann Energy, has salvaged much of the equipment onsite for resale.

Records from the Texas Water Quality Board and the Harris County Pollution Control district indicate that several citations were issued to the various owners for unauthorized discharges of wastewater into the adjacent flood control channel. These records also indicate that plant operation was marked by numerous spills and process leaks and that housekeeping and disposal practices deteriorated with time. As of 1981, the site contained processing tanks, piping, and equipment, three open and one closed wastewater lagoon, a diked tank area, several drum storage areas, a landfill, and possibly a landfarm.

A Planned Removal was performed by EPA during the period from October 1983 to February 1984 to close out three onsite lagoons, remove all drummed waste on the surface, remove all offsite soils containing greater than 50 ppm PCBs, install a cap over all onsite soils containing greater than 50 ppm PCBs, and improve site drainage. Approximately 3,400 cubic yards of contaminated soils and sludges, 550 drums, and 30 tons of asbestos were removed and transported to an approved disposal facility in Emmelle, Alabama. Other removal actions to plug abandoned wells onsite and remove storage tank materials were performed in May and September 1984, respectively.

A Cooperative Agreement for a Remedial Investigation and Feasibility Study (RI/FS) for $630,000 was awarded by EPA to the State of Texas in December 1983.

D'Appolonia, Inc., not IT Corporation, in association with Environmental Research and Technology, Inc., and Rollins Environmental Services (TX) Inc., was contracted by the State to conduct the RI/FS. The initial site work was completed in September 1984, at which time it was determined that additional field work would be required. An amendment to the grant for $300,000 was awarded in March 1985 to investigate possible a seismic faulting at the site. All field work was completed in October 1985.

The Remedial Investigation was completed in December 1985. The Feasibility Study began in December 1984 and completed in April 1986. The long feasibility study period was due to the need for the extensive fault investigation conducted in September 1985. The detailed development and evaluation of remedial alternatives could not be done until the effects of possible faulting across the site could be determined.

Due to the temporary protective cap placed on the site during the 1984 Planned Removal, on-site surface expressions of faulting were not discovered during the site investigation. However, faulting in the vicinity of Geneva Industries has been documented by the United States Geologic Survey. To further define the potential for faulting at the site, an area survey was conducted to locate surficial expressions of faulting within 1/2 mile of the site.

Wells M-5 and M-9 tap the shallow water and deep water aquifers, respectively. Remediation efforts include plans to convert monitoring wells M-5 and M-9 to extraction wells for a future pump and treat system. These two wells were the recommended sample points for an EPA-ITD sampling effort.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (C_{14} to C_{18}-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

[b] Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

ANALYTICAL QUALIFIERS

NR	-	Not required by contract at this time.
Value	-	If the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit, put the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for Furnace).
U	-	Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).
E	-	Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.
S	-	Indicates value determined by Method of Standard Addition.
R	-	Indicates spike recovery is not within control limits.
*	-	Indicates duplicate analysis is not within control limits.
+	-	Indicates the correlation coefficient for Method of Standard Addition is less than 0.995.

Treatment: Future
Wastewater Type: Groundwater

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]
Pollutant	PP : TCL : ITD	Min-Max	Min-Max
Total Organics	20 : 25 : 32	11 ppt-10445 ug/L	16-10,445 ug/L
Metals	5 : 14 : 23	3-1,075,000 ug/L	5-25 ug/L

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

FIGURE B-4
GENEVA INDUSTRIES - 1224
ONE DAY SAMPLING EVENT
REGION VI HOUSTON, TX

GENEVA INDUSTRIES - EPISODE 1224
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
AVERAGE RAW WASTE CONCENTRATION

COMPOUND	UNITS	RAW WASTE CONCENTRATION
ORGANICS		
2,3,7,8-TCDF	UG/L	10.854
2-METHYLNAPHTHALENE	UG/L	15.000
BENZENE	UG/L	15.500
BIPHENYL	UG/L	5541.500
CHRYSENE	UG/L	24.000
DIBENZOFURAN	UG/L	30.000
ETHYLBENZENE	UG/L	244.000
FLUORENE	UG/L	246.500
N-DECANE (N-C10)	UG/L	14.500
N-DODECANE (N-C12)	UG/L	10.500
NAPHTHALENE	UG/L	326.500
PHENANTHRENE	UG/L	130.000
TOLUENE	UG/L	27.500
TRANS-1,2-DICHLOROETHENE	UG/L	130.000
TRICHLOROETHENE	UG/L	474.500
PESTICIDES		
PCB-1232	UG/L	10445.000
INORGANICS		
ALUMINUM	UG/L	332.000
BARIUM	UG/L	870.500
BORON	UG/L	430.000
CADMIUM	UG/L	5.200

GENEVA INDUSTRIES - EPISODE 1224 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW WASTE CONCENTRATION
CALCIUM	UG/L	405500.000
CHROMIUM	UG/L	20.500
COBALT	UG/L	9.600
IRON	UG/L	936.000
MAGNESIUM	UG/L	208000.000
MANGANESE	UG/L	1655.000
MOLYBDENUM	UG/L	42.000
NICKEL	UG/L	25.000
SELENIUM	UG/L	21.000
SODIUM	UG/L	1075000.00
TIN	UG/L	35.000
TITANIUM	UG/L	15.000
VANADIUM	UG/L	3.000
YTTRIUM	UG/L	2.500
ZINC	UG/L	14.000
LITHIUM	UG/L	0.050
SILICON	UG/L	2.950
STRONTIUM	UG/L	4.550
SULFUR	UG/L	6.750
CONVENTIONALS/NONCONVENTIONALS		
BOD	MG/L	6.850
O & G	MG/L	54.000
TSS	MG/L	170.000
AMMONIA, AS N	MG/L	0.210

GENEVA INDUSTRIES - EPISODE 1224 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW WASTE CONCENTRATION
CHLORIDE	MG/L	2900.000
COD	MG/L	165.000
FLASH POINT	25 C	42.500
FLUORIDE	MG/L	0.480
SPECIFIC CONDUCTANCE	UMH/CM-25C	9100.000
SULFATE	MG/L	14.500
TDS	MG/L	6600.000
TOC	MG/L	34.500

SECTION B-5
TREATABILITY OF CERCLA POLLUTANTS
GOLD COAST OIL - EPISODE 1242

(ONE DAY SAMPLING EVENT)

GOLD COAST OIL - EPISODE 1242
SITE DESCRIPTION

The Gold Coast Oil Corporation (GCO) site is a 2-acre parcel of flat, sandy land located at 2835 SW 71st Avenue, Miami, Florida. The site has no distinguishable surface drainage and is enclosed by a fence with a locking gate. It is bordered on the north and west by railroad tracks, on the south by a group of small businesses and on the east by SW 71st Avenue. The site operations are currently inactive. The Coral Gables Canal is approximately 850 feet south of the site on the other side of the small businesses. The canal drains to the Biscayne bay and on to the Atlantic Ocean.

The site property is owned by Seabord Systems Railroad Company, which is now known as CSX Transportation, who leased the property to Gold Coast Oil Corporation in the early 1970s. Gold Coast Oil, along with Solvent Extraction, Incorporated were in the business of distilling mineral spirits and lacquer thinner and reclaiming solvents. All waste generated by the solvent recovery operations were disposed or stored on site; no waste was shipped off-site during the 11 years of operation. Blowdown from the operations sprayed directly onto the ground, and 53 drums of sludge-contaminated soil were stored in the southwest area of the site near the distillation unit. Still-bottomwaste from the distilling operation was pumped into a tank truck for storage. There were also 2500 corroded and leaking drums containing sludge from the distilling operation, contaminated soils, and paint sludges located on site, along with large storage tanks of hazardous waste.

Representatives of the Dade County Department of Environmental Resources Management (DERM) took samples of illegally dumped and stored sludge, and from on-site wells at the Gold Coast Oil site on April 22, 1980. DERM issued a complaint for temporary, permanent, mandatory and prohibitory injunctive relief, civil damages, and civil penalties against Gold Coast Oil, on January 14, 1981. On March 16, 1981, the complaint was amended to include CSX Transportation, the owner of the property.

The DERM reported the site to the EPA in early May 1981. The EPA Surveillance and Analyses Division (SAD) conducted a sampling investigation of the site in June 1981. The SAD sampled groundwater from existing wells, soil, and waste material. In August 1981, the EPA filed a complaint against Gold Coast Oil along with a Consent Agreement and Final Order. In the fall of 1981, the Gold Coast Oil site was submitted to the EPA for inclusion on the Interim National Priority List. Two hazard ranking scores by Ecology and Environment's (E&E) Field Investigation Team (FIT) was 46:51.

Also, in October 1981, the FDER conducted a RCRA interim status inspection and reported the results to EPA. On December 1, 1981, EPA filed a Default Order against Gold Coast Oil for failing to file a timely answer to the complaint issued previously and for non-payment of the civil penalty imposed. In December 1981, an earth resistivity survey by FIT IV was conducted. In early 1982, Dade County, with the assistance of FDER, began to prepare an enforcement case against the property owner, the CSX Transportation Company, as well as the

Gold Coast Oil Corporation. CSX Transportation was also advised that the EPA was going to undertake immediate removal of the hazardous waste on-site under the authority of CERCLA. Neither of these actions were undertaken because in June of 1982, CSX Transportation evicted Gold Coast Oil from the property and agreed to voluntarily clean up the site. In July 1982, CSX Transportation submitted for approval a cleanup and disposal plan to clean up the site's surface.

The cleanup action of the surface contaminants at the GCO site was undertaken the following month. The clean-up, conducted by Chemical Waste Management under contract to the Railroad, involved removing the drums, emptying the storage tanks and excavating and removing contaminated soils to a depth of approximately six inches.

In March 1983, the Florida Department of Environmental Regulation requested that EPA take the lead at this site, and in September 1983 the GCO site was added to the National Priority List with a 46.5 hazardous ranking score.

In June 1983, a Remedial Action Master Plan (RAMP) was developed by NUS Corporation under an EPA contract. In March 1984, BCM Eastern Incorporated, consultants for the PRP Steering Committee, produced an "Environmental Investigation of the Gold Coast Site". In June 1984 a "Draft Remedial Alternatives Evaluation Report for the Gold Coast Oil Corporation Site" was produced by Engineering and Science under an EPA contract. In May 1985 BCM Eastern submitted a "Selection of Remedial Approach" report, again a report for the PRP Steering Committee.

The Biscayne Aquifer Study area-wide groundwater Record of Decision was signed by the Assistant Administrator, Office of Solid Waste and Emergency Response in September 1985. The cleanup levels established as a result of that study and that Record of Decision have been revised and approved by the Florida Department of Environmental Regulation for the Gold Coast Oil site.

The groundwater data associated with the site indicate an area of significant contamination in the northeast corner of the site. The levels of contaminants have generally decreased across the site except for the levels of trichloroethylene and tetrachloroethylene which have increased in this northeast corner. The levels of metals in the groundwater are considered to be at normal environmental levels since they are relatively constant throughout the entire area of the site. Wells M-8 and M-13 are considered representative of the area of highest levels of contamination and are recommended sample points for an EPA-ITD sampling effort.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis o Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulati and Standards, Industrial Technology Division, Sample Control Center.

[b] Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 µg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 µg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

Treatment: Future
Wastewater Type: Groundwater

Pollutant	# Compounds Detected[1] PP : TCL : ITD	Conc ITD[2] Min-Max	Conc PP[2] Min-Max
Total Organics	4 : 5 : 6	12-58,017 ug/L	30-58,017 ug/L
Metals	3 : 10 : 15	4-205,000 ug/L	4-1,130 ug/L

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

FIGURE B-5
GOLD COAST OIL - 1242
ONE DAY SAMPLING EVENT
REGION IV MIAMI, FL

GOLDCOAST OIL - EPISODE 1242
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
RAW WASTE

COMPOUND	UNITS	RAW WASTE CONCENTRATION	QUAL.
ORGANICS			
1,2 DICHLOROBENZENE	UG/L	30.000	
O-TOLUIDINE	UG/L	15.000	
STYRENE	UG/L	12.000	
TETRACHLOROETHENE	UG/L	58017.000	
TRANS-1,2-DICHLOROETHENE	UG/L	636.000	
TRICHLOROETHENE	UG/L	2622.000	
INORGANICS			
ALUMINUM	UG/L	866.000	
BARIUM	UG/L	22.000	[]
BORON	UG/L	232.000	
CALCIUM	UG/L	205000.000	
CHROMIUM	UG/L	12.000	
IRON	UG/L	10400.000	
MAGNESIUM	UG/L	2960.000	[]
MANGANESE	UG/L	72.000	
SELENIUM	UG/L	3.500	[] M
SODIUM	UG/L	5560.000	
TITANIUM	UG/L	13.000	
ZINC	UG/L	1130.000	
SILICON	MG/L	4.000	

GOLDCOAST OIL - EPISODE 1242 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW WASTE CONCENTRATION	QUAL.
STRONTIUM	MG/L	2.000	
SULFUR	MG/L	5.000	
CONVENTIONALS/NONCONVENTIONALS			
TSS	MG/L	72.000	
AMMONIA, AS N	MG/L	5.200	
CHLORIDE	MG/L	32.000	
COD	MG/L	240.000	
FLASH POINT	25 C	44.000	
FLUORIDE	MG/L	0.420	
NITRATE + NITRITE, AS N	MG/L	0.092	
NITROGEN, TOTAL KJELDAHL	MG/L	7.000	
PHOSPHORUS, TOTAL AS P	MG/L	1.200	
SPECIFIC CONDUCTANCE	UMH/CM-25C	730.000	
SULFATE	MG/L	15.000	
TDS	MG/L	500.000	
TOC	MG/L	38.000	

SECTION B-6
TREATABILITY OF CERCLA POLLUTANTS
HYDE PARK LANDFILL - EPISODE 1220

(ONE DAY SAMPLING EVENT)

HYDE PARK - EPISODE 1220
SITE DESCRIPTION

The Hyde Park landfill is approximately 15 acres in area and is located northwest of the City of Niagara Falls in the northwest corner of the Town of Niagara. It is immediately surrounded by several industrial facilities and property owned by the Power Authority for the State of New York. There is a residential neighborhood to the northwest and south of the landfill. The Niagara River is located 2,000 feet to the northwest.

From 1954 until 1975, Occidental Chemical Corporation (OCC), then known as Hooker Chemical and Plastics Corporation, disposed of approximately 80,000 tons of chemical wastes in the Hyde Park Landfill. These wastes included chlorobenzenes, hexachlorocyclopentadiene (C-56) and trichlorophenols. Previous chemical analyses have identified 2,3,7,8-tetrachlorodibenzo-p-dioxin in the Hyde Park wastes.

In 1979, EPA and, in 1980, the State of New York Department of Environmental Conservation (NYSDEC) sued OCC to clean up the on-site and off-site contamination resulting from leakage of chemical wastes from the landfill. Negotiations were held among all the parties and on April 30, 1982, a Stipulation and Judgement approving the Hyde Park Settlement Agreement was approved by the United States District Court.

The Settlement Agreement provided that OCC (1) conduct surveys and tests (Aquifer Survey Program) to determine how far and how deep groundwater had carried chemicals away from the Hyde Park Landfill and (2) assess ways to contain and/or clean up this contamination through the use of Requisite Remedial Technology (RRT). OCC completed this survey program in December 1983 and presented its findings to the federal and state governments. The findings stated that a two-phase "plume" of chemicals is migrating away from the landfill: a non-aqueous phase liquid (NAPL) and an aqueous phase liquid (APL). NAPL is composed of many chemicals that do not dissolve readily in water. It moves more slowly than APL through soil and rock, and is more dense than water. APL also is composed of many chemicals; however, the chemicals are dissolved in groundwater and tend to be carried along with it. The APL plume has spread further away from the landfill than the NAPL plume.

As required by the Settlement Agreement, OCC began a RRT Study in October 1983 to determine which remedies were most appropriate to clean up and/or contain the chemicals that had escaped and were continuing to escape from the Hyde Park Landfill. OCC submitted its RRT report to the EPA and NYSDEC in May 1984 and the agencies responded to the report in September 1984. Since that time, the EPA, NYSDEC, and OCC have had many meetings to resolve outstanding issues and concerns raised by OCC's report and the agencies' review of that report. The RRT ultimately agreed to by the parties is described in a document entitled Stipulation on Requisite Remedial Technology Program submitted to the United States District Court for approval on November 26, 1985.

To date, OCC has installed a barrier collection system around the perimeter of the landfill and capped the site. Leachate intercepted by the barrier drain

system collects in two wet-wells located at the two western corners of the landfill. The leachate is pumped from the wet-wells to a holding lagoon where separation of APL and NAPL occurs. The APL is transferred from the lagoon to a tank truck several times each day. The truck hauls the waste to OCC's off-site pretreatment facility. The NAPL removed to an on-site storage area consisting of four 10,000 gallon railroad tank cars surrounded by a clay dike. Presently, OCC is requesting authorization to incinerate the NAPL at an incineration facility located at its plant on Buffalo Avenue in Niagara Falls.

SUMMARY OF ANALYTICAL METHODS

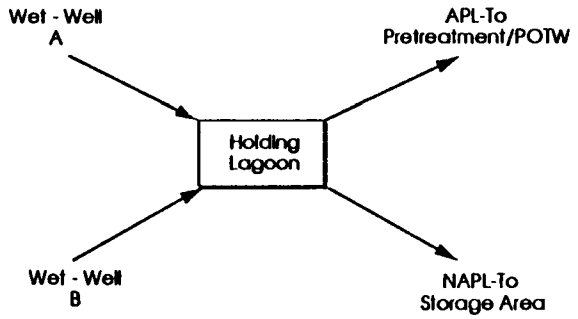
Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals and Elements		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfide, total (iodometric)	Titrimetric	376.1

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March, 1983.

[a] Analytical methods for ITD/RCRA Sampling Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

ANALYTICAL QUALIFIERS

NR	-	Not required by contract at this time.
Value	-	If the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit, put the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for Furnace).
U	-	Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).
E	-	Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.
S	-	Indicates value determined by Method of Standard Addition.
R	-	Indicates spike recovery is not within control limits.
*	-	Indicates duplicate analysis is not within control limits.
+	-	Indicates the correlation coefficient for Method of Standard Addition is less than 0.995.



Treatment: Lagoon
Wastewater Type: Leachate
Average Flow: <6,000 GPD
To 48 MGD POTW

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP : ITD	(LBS/YR) PP : ITD	PP : ITD
Total Organics	15 : 17 ; 40	0.38 ppt-2,316,700 ug/L	32ppt-1,548,330 ug/L	195,180 : 484,690	118,500 : 517,250	39 : < 1
Metals	5 : 13 : 24	16-349,500 ug/L	24-1567 ug/L	270 : 801,930	91 : 521,260	66 : 35

NOTES:
1. APL = Aqueous Phase Liquid
   NAPL = Non-Aqueous Phase Liquid

2. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

3. From samples collected from a one day sampling event

4. Based on average of raw leachate collected from two wet-wells

FIGURE B-6
HYDE PARK - 1220
ONE DAY SAMPLING EVENT
REGION II NIAGRA FALLS, NY

HYDE PARK - EPISODE 1220
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
HOLDING LAGOON

COMPOUND	UNITS	RAW LEACHATE	AQUEOUS PHASE	PERCENT REMOVAL
ORGANICS				
1,1,2,2-TETRACHLOROETHANE	UG/L	2942.000	2435.000	17
1,2-DICHLOROETHANE	UG/L	1835.500	1211.000	34
2,3,7,8-TCDD	UG/L	31.622	40.450	-28
2,3,7,8-TCDF	UG/L	0.385	0.440	-14
ACETONE	UG/L	52518.000	63472.000	-21
BENZENE	UG/L	2934.500	2363.000	19
BENZOIC ACID	UG/L	2316700.00	3210030.000	-39
BENZYL ALCOHOL	UG/L	13308.000	8220.000	38
CHLOROBENZENE	UG/L	2670.500	2267.000	15
CHLOROFORM	UG/L	8958.000	7076.000	21
CHLOROMETHANE	UG/L	10566.000	7049.000	33
ETHYLBENZENE	UG/L	2639.000	2156.000	18
METHYLENE CHLORIDE	UG/L	3544.500	2279.000	36
PHENOL	UG/L	1548330.00	932050.000	40
TETRACHLOROETHENE	UG/L	3615.500	3037.000	16

HYDE PARK - EPISODE 1220 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW LEACHATE	AQUEOUS PHASE	PERCENT REMOVAL
TOLUENE	UG/L	13483.000	9757.000	28
TRANS-1,2-DICHLOROETHENE	UG/L	1359.500	1000.000	26
TRICHLOROETHENE	UG/L	3525.500	2661.000	25
PESTICIDES				
AZINPHOS ETHYL	UG/L	1.200	2.000	-67
AZINPHOS METHYL	UG/L	51.700	46.400	10
CHLORFEVINPHOS	UG/L	7.250	6.500	10
CHLORPYRIFOS	UG/L	5.000	1.600	68
CROTOXYPHOS	UG/L	14.400	13.100	9
DELTA-BHC	UG/L	1.600	3.200	***
DIAZINON	UG/L	10.100	13.000	-29
DICHLORVOS	UG/L	27.600	2.100	92
DICROTOPHOS	UG/L	29.100	2.000	93
DIMETHOATE	UG/L	28.450	0.500	98
DIOXATHION	UG/L	27.000	66.900	***
DISULFOTON	UG/L	0.500	16.800	***

HYDE PARK - EPISODE 1220 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW LEACHATE	AQUEOUS PHASE	PERCENT REMOVAL
FENSULFOTHION	UG/L	1.950	1.000	49
FENTHION	UG/L	4.250	5.000	-18
LEPTOPHOS	UG/L	13.050	11.700	10
MALATHION	UG/L	7.650	1.500	80
MEVINPHOS	UG/L	1.600	0.500	69
PARATHION	UG/L	4.450	3.300	26
PHORATE	UG/L	21.000	4.300	80
SULFOTEPP	UG/L	1.000	2.200	***
TERBUFOS	UG/L	4.950	5.800	-17
TETRACHLORVINPHOS	UG/L	0.850	0.500	41
INORGANICS				
ALUMINIUM	UG/L	3515.000	2760.000	21
ARSENIC	UG/L	28.500	6.000	79
BORON	UG/L	14950.000	0.000	100
CADMIUM	UG/L	23.500	21.000	11
CALCIUM	UG/L	821500.000	665000.000	19

HYDE PARK - EPISODE 1220 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW LEACHATE	AQUEOUS PHASE	PERCENT REMOVAL
COBALT	UG/L	16.000	10.000	38
COPPER	UG/L	28.850	130.000	***
IODINE	UG/L	2000.000	1000.000	50
IRON	UG/L	763000.000	0.000	100
LITHIUM	UG/L	9400.000	5400.000	43
MAGNESIUM	UG/L	254000.000	201000.000	21
MANGANESE	UG/L	12800.000	0.000	100
MOLYBDENUM	UG/L	293.000	251.000	14
NICKEL	UG/L	1567.000	0.000	100
PHOSPHORUS	UG/L	118000.000	88000.000	25
POTASSIUM	UG/L	621000.000	438000.000	29
SILICON	UG/L	6400.000	5200.000	19
SODIUM	UG/L	3495000.00	2500000.000	28
STRONTIUM	UG/L	3150.000	2300.000	27
SULFUR	UG/L	471500.000	379000.000	20
TANTALUM	UG/L	500.000	500.000	0

HYDE PARK - EPISODE 1220 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW LEACHATE	AQUEOUS PHASE	PERCENT REMOVAL
TITANIUM	UG/L	36.500	40.000	-10
URANIUM	UG/L	1000.000	1000.000	0
ZINC	UG/L	555.000	593.000	-7
CONVENTIONALS/NONCONVENTIONALS				
AMMONIA, AS N	UG/L	7900.000	6300.000	20
BOD	UG/L	6500000.00	4700000.000	28
COD	UG/L	10400000.0	7400000.000	29
FLUORIDE	UG/L	12000.000	11000.000	8
NITRATE + NITRITE, AS N	UG/L	5500.000	390.000	93
NITROGEN, TOTAL KJELDAHL	UG/L	44000.000	31000.000	30
O&G	UG/L	545000.000	0.000	100
PHOSPHORUS, TOTAL AS P	UG/L	310000.000	150000.000	52
SULFIDE, TOTAL (IODOMETRIC)	UG/L	76000.000	89000.000	-17
TDS	UG/L	128500.000	680000.000	***
TOC	UG/L	3350000.00	2500000.000	25
TSS	UG/L	18500000.0	13000000.000	30

SECTION B-7
TREATABILITY OF CERCLA POLLUTANTS
LOVE CANAL - EPISODE 1219

(ONE DAY SAMPLING EVENT)

LOVE CANAL - EPISODE 1219
SITE DESCRIPTION

Love Canal is an abandoned landfill once owned by Hooker Chemicals (now Occidental Chemical Corporation) where 21,800 tons of both drummed and undrummed liquid and solid chemical wastes were disposed from 1942 to 1953. Love Canal is now a contained area controlled by the New York State Department of Environmental Conservation (NYSDEC) since August 1978.

NYSDEC installed a French drain around the dump boundary and capped the site in 1979. Leachate and groundwater intercepted by the drain collects in four collection chambers located along the collection system. In the northern and central sectors of the canal, vertical centrifugal pumps transfer leachate from the collection chambers to six underground storage cells (30,000-gallon total capacity) located behind the leachate treatment plant. Horizontal centrifugal pumps transfer leachate collected in the southern sector to a 25,000-gallon in-ground holding tank at a rate of 300 gpm.

Raw leachate from the holding tank and the storage cells is pumped to a 2,000-gallon fiberglass storage tank located inside the treatment building. A double-diaphragm pump transfers the water from the fiberglass tank to the 15,600-gallon rectangular clarifier that contains redwood flights and weirs. Equipment is available for the addition of coagulants and flocculants, however, it is not used. Every other month, sludge is removed from the clarifier to a fiberglass holding tank. The effluent from the clarifier flows by gravity to a 2,000-gallon fiberglass filter feed tank. Two double-diaphragm pumps transfer the water at a rate of 160 gpm from the filter feed tank through two separate feed lines to 50 μm polypropylene filter bags (a series of two in each line). Filtrate from the filters combines before going to two Calgon carbon adsorbers operated in series. Treated wastewater is discharged from the treatment system to the City's sewer at an average rate of 40,000 gallons per operating day.

Sludge removed from the clarifier is transferred to a 1,500-gallon sludge holding tank. Supernatant from the sludge holding tank is recycled back to the filter feed tank, and the settled sludge is pumped to one of the four on-site outdoor storage tanks, each with a 10,000-gallon capacity. Three of the four outdoor sludge storage tanks are unlined: one is epoxy-lined. The Love Canal pretreatment system produces approximately 150 gallons per month of sludge, which is being stored on-site until NYSDEC officials can find a suitable means for its disposal.

All of the treatment system piping at Love Canal was teflon-lined, and the system itself was designed by Conestoga-Rovers & Associates, Waterloo, Ontario, Canada.

The entire pretreatment system at Love Canal is closed to the atmosphere, and 55-gallon carbon canisters scrub the vented gases from the treatment plant unit operations, including the raw leachate holding tank, the clarifier, the filter feed tank, and the sludge holding tank.

The current average wastewater discharge from Love Canal is 40,000 gallons per operating day. During the summer, discharge occurs approximately once every two weeks; during the spring, discharge is as often as twice per week. The volume of discharge has decreased from 4.5 to 2.5 million gallons per year since capping of the site was completed.

The pollutants identified in previous studies at Love Canal are Lindane (33 percent), and chlorinated hydrocarbons (67 percent) such as toluene, benzene, heptachlor, di-octyl phthalates, chloroform, methylene chloride, tetrachloroethylene, trichloroethylene, total phenols, and chlorobenzene.

SUMMARY OF ANALYTICAL METHODS

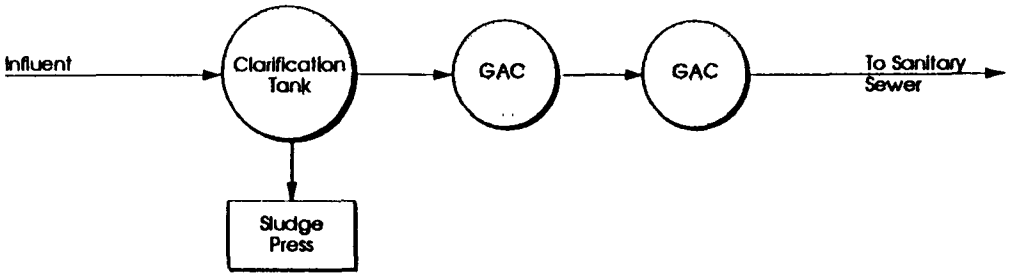
Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals and Elements		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfide, total (iodometric)	Titrimetric	376.1

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March, 1983.

[a] Analytical methods for ITD/RCRA Sampling Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

ANALYTICAL QUALIFIERS

NR	-	Not required by contract at this time.
Value	-	If the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit, put the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for Furnace).
U	-	Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).
E	-	Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.
S	-	Indicates value determined by Method of Standard Addition.
R	-	Indicates spike recovery is not within control limits.
*	-	Indicates duplicate analysis is not within control limits.
+	-	Indicates the correlation coefficient for Method of Standard Addition is less than 0.995.



Treatment: Granular Activated Carbon
Wastewater Type: Leachate
Average Flow: 40,000 GPD (2Days/Wk)
To 48 MGD POTW

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading	Discharge	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD
Total Organics	15 : 18 : 22	6ppt-51496 ug/L	6ppt-18,166 ug/L	3050 : 7,800	12 : 23	> 99 : > 99
Metals	2 : 10 : 19	27-225000 ug/L	70-144 ug/L	19 : 40,220	7 : 37,130	63 : 8

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

FIGURE B-7
LOVE CANAL - 1219
ONE DAY SAMPLING EVENT
REGION II NIAGRA FALLS, NY

LOVE CANAL- EPISODE 1219
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
HOLDING TANK + CARBON ADSORPTION

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
ORGANICS							
2,3,7,8-TCDD	PPT	Holding Tank	5.948		13.460		***
		Carbon Adsorption	13.460		0.867		94
		Total Removal	5.948		0.867		85
1,1,2,2-TETRACHLOROETHANE	UG/L	Holding Tank	1305.000		1122.000		14
		Carbon Adsorption	1122.000		10.000	U	99
		Total Removal	1305.000		10.000	U	99
1,2,3-TRICHLOROBENZENE	UG/L	Holding Tank	596.000		1000.000	U	-68
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	596.000		10.000	U	98
1,2,4-TRICHLOROBENZENE	UG/L	Holding Tank	4662.000		3875.000		17
		Carbon Adsorption	3875.000		10.000	U	100
		Total Removal	4662.000		10.000	U	100
1,2-DICHLOROBENZENE	UG/L	Holding Tank	719.000		1000.000	U	-39
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	719.000		10.000	U	99
1,4-DICHLOROBENZENE	UG/L	Holding Tank	964.000		1000.000	U	-4
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	964.000		10.000	U	99
2,4,5-TRICHLOROPHENOL	UG/L	Holding Tank	1167.000		1000.000	U	14
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	1167.000		10.000	U	99
2,4-DICHLOROPHENOL	UG/L	Holding Tank	833.000		1000.000	U	-20
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	833.000		10.000	U	99
BENZENE	UG/L	Holding Tank	1740.000		1386.000		20
		Carbon Adsorption	1386.000		10.000	U	99
		Total Removal	1740.000		10.000	U	99
BENZOIC ACID	UG/L	Holding Tank	51496.000		49528.000		4
		Carbon Adsorption	49528.000		50.000	U	100
		Total Removal	51496.000		50.000	U	100
BENZYL ALCOHOL	UG/L	Holding Tank	709.000		1000.000	U	-41
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	709.000		10.000	U	99
CARBON TETRACHLORIDE	UG/L	Holding Tank	141.000		100.000	U	29
		Carbon Adsorption	100.000	U	10.000	U	90
		Total Removal	141.000		10.000	U	93

LOVE CANAL - EPISODE 1219 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
CHLOROBENZENE	UG/L	Holding Tank	3773.000		3305.000		12
		Carbon Adsorption	3305.000		10.000	U	100
		Total Removal	3773.000		10.000	U	100
CHLOROFORM	UG/L	Holding Tank	518.000		417.000		19
		Carbon Adsorption	417.000		10.000	U	98
		Total Removal	518.000		10.000	U	98
HEXANOIC ACID	UG/L	Holding Tank	131.000		1000.000	U	***
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	131.000		10.000	U	92
P-CRESOL	UG/L	Holding Tank	161.000		1000.000	U	***
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	161.000		10.000	U	94
PENTACHLOROBENZENE	UG/L	Holding Tank	548.000		2000.000	U	***
		Carbon Adsorption	2000.000	U	20.000	U	99
		Total Removal	548.000		20.000	U	96
PHENOL	UG/L	Holding Tank	199.000		1000.000	U	***
		Carbon Adsorption	1000.000	U	10.000	U	99
		Total Removal	199.000		10.000	U	95
TETRACHLOROETHENE	UG/L	Holding Tank	1299.000		1147.000		12
		Carbon Adsorption	1147.000		10.000	U	99
		Total Removal	1299.000		10.000	U	99
TOLUENE	UG/L	Holding Tank	18166.000		15403.000		15
		Carbon Adsorption	15403.000		10.000	U	100
		Total Removal	18166.000		10.000	U	100
TRANS-1,2-DICHLOROETHENE	UG/L	Holding Tank	170.000		133.000		22
		Carbon Adsorption	133.000		10.000	U	92
		Total Removal	170.000		10.000	U	94
TRICHLOROETHENE	UG/L	Holding Tank	601.000		461.000		23
		Carbon Adsorption	461.000		10.000	U	98
		Total Removal	601.000		10.000	U	98
INORGANICS							
ALUMINIUM	UG/L	Holding Tank	140.000	[]	91.000	[]	35
		Carbon Adsorption	91.000	[]	8.700	U	90
		Total Removal	140.000	[]	8.700	U	94
BARIUM	UG/L	Holding Tank	77.000	[]	72.000	[]	6
		Carbon Adsorption	72.000	[]	76.000	[]	-6
		Total Removal	77.000	[]	76.000	[]	1

LOVE CANAL - EPISODE 1219 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
BORON	UG/L	Holding Tank	2290.000		2370.000		-3
		Carbon Adsorption	2370.000		2100.000		11
		Total Removal	2290.000		2100.000		8
CALCIUM	UG/L	Holding Tank	225000.000		219000.000		3
		Carbon Adsorption	219000.000		212000.000		3
		Total Removal	225000.000		212000.000		6
IRON	UG/L	Holding Tank	6700.000		6780.000		-1
		Carbon Adsorption	6780.000		114.000		98
		Total Removal	6700.000		114.000		98
MAGNESIUM	UG/L	Holding Tank	55300.000		54600.000		1
		Carbon Adsorption	54600.000		53900.000		1
		Total Removal	55300.000		53900.000		3
MANGANESE	UG/L	Holding Tank	850.000		818.000		4
		Carbon Adsorption	818.000		859.000		-5
		Total Removal	850.000		859.000		-1
MOLYBDENUM	UG/L	Holding Tank	31.000		29.000		6
		Carbon Adsorption	29.000		24.000		17
		Total Removal	31.000		24.000		23
NICKEL	UG/L	Holding Tank	144.000		138.000		4
		Carbon Adsorption	138.000		17.000	[]	88
		Total Removal	144.000		17.000	[]	88
SODIUM	UG/L	Holding Tank	89200.000		86700.000		3
		Carbon Adsorption	86700.000		83700.000		3
		Total Removal	89200.000		83700.000		6
TIN	UG/L	Holding Tank	33.000		59.000		-79
		Carbon Adsorption	59.000		31.000		47
		Total Removal	33.000		31.000		6
TITANIUM	UG/L	Holding Tank	27.000		27.000		0
		Carbon Adsorption	27.000		26.000		4
		Total Removal	27.000		26.000		4
ZINC	UG/L	Holding Tank	70.000		82.000		-17
		Carbon Adsorption	82.000		62.000		24
		Total Removal	70.000		62.000		11
LITHIUM	UG/L	Holding Tank	600.000		700.000		-17
		Carbon Adsorption	700.000		100.000	U	86
		Total Removal	600.000		100.000	U	83

LOVE CANAL - EPISODE 1219 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
OSMIUM	UG/L	Holding Tank	100.000		1000.000	U	***
		Carbon Adsorption	1000.000	U	100.000		90
		Total Removal	100.000		100.000		0
POTASSIUM	UG/L	Holding Tank	10000.000		9400.000		6
		Carbon Adsorption	9400.000		8500.000		10
		Total Removal	10000.000		8500.000		15
SILICON	UG/L	Holding Tank	3300.000		3200.000		3
		Carbon Adsorption	3200.000		2800.000		13
		Total Removal	3300.000		2800.000		15
STRONTIUM	UG/L	Holding Tank	1500.000		1400.000		7
		Carbon Adsorption	1400.000		1300.000		7
		Total Removal	1500.000		1300.000		13
SULFUR	UG/L	Holding Tank	68000.000		70000.000		-3
		Carbon Adsorption	70000.000		62000.000		11
		Total Removal	68000.000		62000.000		9
CONVENTIONALS/NONCONVETIONALS							
BOD	MG/L	Holding Tank	120.000		110.000		8
		Carbon Adsorption	110.000		51.000		54
		Total Removal	120.000		51.000		57
O&G	MG/L	Holding Tank	21.000		21.000		0
		Carbon Adsorption	21.000		5.000	<	76
		Total Removal	21.000		5.000	<	76
TSS	MG/L	Holding Tank	31.000		35.000		-13
		Carbon Adsorption	35.000		10.000	<	71
		Total Removal	31.000		10.000	<	68
AMMONIA, AS N	MG/L	Holding Tank	1.600		1.200		25
		Carbon Adsorption	1.200		1.100		8
		Total Removal	1.600		1.100		31
COD	MG/L	Holding Tank	260.000		250.000		4
		Carbon Adsorption	250.000		100.000		60
		Total Removal	260.000		100.000		62
FLUORIDE	MG/L	Holding Tank	0.720		0.780		-8
		Carbon Adsorption	0.780		0.640		18
		Total Removal	0.720		0.640		11
NITROGEN, TOTAL KJELDAHL	MG/L	Holding Tank	2.100		2.700		-29
		Carbon Adsorption	2.700		1.100		59
		Total Removal	2.100		1.100		48

LOVE CANAL - EPISODE 1219 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
PHOSPHORUS, TOTAL AS P	MG/L	Holding Tank	0.380		0.300		21
		Carbon Adsorption	0.300		1.000		***
		Total Removal	0.380		1.000		***
SULFIDE, TOTAL (IODOMETRIC)	MG/L	Holding Tank	2.000		1.000	<	50
		Carbon Adsorption	1.000	<	12.000		***
		Total Removal	2.000		12.000		***
TDS	MG/L	Holding Tank	1300.000		1200.000		8
		Carbon Adsorption	1200.000		1100.000		8
		Total Removal	1300.000		1100.000		15
TOC	MG/L	Holding Tank	89.000		61.000		31
		Carbon Adsorption	61.000		14.000		77
		Total Removal	89.000		14.000		84

SECTION B-8
TREATABILITY OF CERCLA POLLUTANTS
NYANZA - EPISODE 1310

(ONE DAY SAMPLING EVENT)

NYANZA CHEMICAL - EPISODE 1310
SITE DESCRIPTION

The 35-acre Nyanza site is located on Megunko Road in the Town of Ashland, Middlesex County, Massachusetts, approximately 35 miles west of Boston. The site was the location of chemical dye manufacturing facilities for 61 years and is currently occupied by several small industrial enterprises. The current owners are MCL Development Corporation (MCL) and Edward Camille.

From 1917 to 1977, the site was occupied by several companies involved in the manufacture of textile dyes and dye intermediates. During that period, several types of chemical wastes were disposed in various on-site locations. These wastes included partially treated process wastewater; chemical sludge from the wastewater treatment process; solid process wastes (e.g., chemical precipitate and filter cakes) in drums; solvent recovery distillation residue in drums; and off-specification products. Process chemicals that could not be recycled or reused (e.g., phenol, nitrobenzene, and mercuric sulfate) were also disposed on-site. The most recent dye manufacturing company to occupy the site, Nyanza, Inc., acquired the property in 1965.

The first type of contamination linked to Nyanza was mercury, discovered in the Sudbury River in 1972 (CDM, 1982). From 1972 through 1977, the Massachusetts Departments of Public Health and Water Pollution Control (DPH and DWPC) cited Nyanza, Inc., for several contamination problems associated with dumping activities. In 1974, Camp, Dresser, and McKee (CDM), working for Nyanza, Inc., devised plans to control groundwater contamination on the Nyanza property; however, implementation did not occur. Nyanza, Inc., ceased business in 1978 due to financial difficulties.

Edward Camille, a private citizen, acquired the property from Nyanza, Inc., in 1978. In 1979, the Department of Environmental Quality Engineering (DEQE) stayed plans, on behalf of Mr. Camille, to complete the groundwater pollution control activities, pending further investigation by the newly established DEQE Division of Hazardous Waste.

Since 1972, several investigations have been prompted by contamination present at or originating from Nyanza. JBF Scientific Corporation conducted a 1972 Sudbury River investigation that revealed mercury contamination caused by uncontrolled sludge disposal at the Nyanza, Inc., property. The CDM groundwater pollution control program designed in 1974 for Nyanza, Inc., included a site investigation aimed at source identification. In 1979, Mr. Camille hired Connorstone Engineering, Inc., to complete the CDM pollution control program. In 1980, the DEQE released a Preliminary Site Assessment Report summarizing the site history and findings of previous investigations at the site (DEQE, October 1980).

In 1981, MCL acquired a portion of the property. MCL hired Connorstone Engineering, Inc., and Carr Research Laboratory, Inc., to characterize soil composition and locate sludge deposits.

The Nyanza site was included on the original National Priority List (NPL) of Superfund sites in 1982. A preliminary Remedial Action Master Plan (RAMP) was prepared for EPA by CDM in 1982. To expedite remediation, the RI/FS for Nyanza was divided into two phases, or "operable units." At that time, some sampling and analysis had been performed, and it became evident that site remediation would ultimately address two distinct problems: surficial deposits of sludges and sediments contaminated primarily by heavy metals, and groundwater contaminated primarily by organic chemicals. The surficial sludge and sediment problem was designated Phase I, or Operable Unit I, and primarily encompassed source identification and control. In 1984, EPA authorized NUS Corporation (NUS) to complete an RI/FS for Operable Unit I (NUS, March 1985).

A Record of Decision (ROD) for Operable Unit I was signed in September 1985. The ROD calls for excavation of nine localized areas of contamination; solidification of the excavated sludges, sediments, and soils; and placement of those materials on the "Hill" area in the southern part of the site. A diversion trench will also be constructed around the southern end of the capped area to divert surface water flow and lower the groundwater table within the capped area.

In 1986, EPA authorized CDM to conduct additional field investigations to define source locations and design the remedial action stipulated in the ROD. The design is currently underway, and remediation of some contaminated areas is in progress.

After further investigation, EPA elected to divide the remaining problems at Nyanza into two additional operable units. Operable Unit II addresses groundwater contamination and migration. This study is the focus of Nyanza II.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (C_{14} to C_{18}-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

[b] Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 µg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 µg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

R - Spike recovery limits met after rerun on ICP.

Treatment: Future
Wastewater Type: Groundwater

Pollutant	# Compounds Detected[1] PP : TCL : ITD	Conc ITD[2] Min-Max	Conc PP[2] Min-Max
Total Organics	9 : 9 : 10	164-18,378 ug/L	164-18,378 ug/L
Metals	7 : 17 : 30	12-821,000 ug/L	12-6000 ug/L

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

FIGURE B-8
NYANZA CHEMICAL - 1310
ONE DAY SAMPLING EVENT
REGION I ASHLAND, MA

NYANZA - EPISODE 1310
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
RAW WASTE

COMPOUND	UNITS	RAW WASTE CONCENTRATION	QUAL.
ORGANICS			
1,2,4-TRICHLOROBENZENE	UG/L	167.000	
1,2-DICHLOROBENZENE	UG/L	2592.000	
1,3-DICHLOROBENZENE	UG/L	185.000	
1,4-DICHLOROBENZENE	UG/L	1303.000	
ANILINE	UG/L	1223.000	
CHLOROBENZENE	UG/L	3646.000	
NITROBENZENE	UG/L	18378.000	
PHENOL	UG/L	689.000	
TRANS-1,2-DICHLOROETHENE	UG/L	164.000	
TRICHLOROETHENE	UG/L	3815.000	
INORGANICS			
ALUMINUM	UG/L	51400.000	
ARSENIC	UG/L	6.000	[]MD
BARIUM	UG/L	273.000	
BERYLLIUM	UG/L	19.000	
BORON	UG/L	1100.000	
CADMIUM	UG/L	12.000	
CALCIUM	UG/L	168000.000	
COBALT	UG/L	202.000	
COPPER	UG/L	375.000	
IRON	UG/L	93700.000	
MAGNESIUM	UG/L	43500.000	R

NYANZA - EPISODE 1310 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW WASTE CONCENTRATION	QUAL.
MANGANESE	UG/L	19100.000	
MERCURY	UG/L	6.000	
NICKEL	UG/L	162.000	
SODIUM	UG/L	821000.000	
TITANIUM	UG/L	722.000	
VANADIUM	UG/L	26.000	[]
YTTRIUM	UG/L	1830.000	
ZINC	UG/L	1170.000	
CERIUM	MG/L	6.300	
DYSPROSIUM	MG/L	0.400	
LANTHANUM	MG/L	2.100	
NEODYMIUM	MG/L	0.900	
OSMIUM	MG/L	0.200	
PHOSPHORUS	MG/L	1.500	
POTASSIUM	MG/L	2.100	
SILICON	MG/L	20.800	
STRONTIUM	MG/L	0.700	
SULFUR	MG/L	378.000	
YTTERBIUM	MG/L	0.100	
CONVENTIONALS/NONCONVENTIONALS			
TSS	MG/L	2500.000	
AMMONIA, AS N	MG/L	5.600	
CHLORIDE	MG/L	1100.000	
COD	MG/L	230.000	

NYANZA - EPISODE 1310 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW WASTE CONCENTRATION	QUAL.
FLASH POINT	25 C	55.000	
FLUORIDE	MG/L	3.900	
NITRATE + NITRITE, AS N	MG/L	0.067	
NITROGEN, TOTAL KJELDAHL	MG/L	6.600	
PHOSPHORUS, TOTAL AS P	MG/L	2.400	
SPECIFIC CONDUCTANCE	UMH/CM-25C	5200.000	
SULFATE	MG/L	1500.000	
TDS	MG/L	3500.000	
TOC	MG/L	77.000	

SECTION B-9
TREATABILITY OF CERCLA POLLUTANTS
REILLY TAR - EPISODE 1239

(FIVE DAY SAMPLING EVENT)

REILLY TAR - EPISODE 1239
SITE DESCRIPTION

The Reilly Tar and Chemical Company site occupies 80 acres of land located in St. Louis Park, Minnesota. The plant site, called the Republic Creosote Works, is located west of Gorham, Republic, and Louisiana Avenues, south of 32nd Street, east of Pennsylvania Avenue, and north of Walker Street. The City of St. Louis Park purchased the land from Reilly in 1972. The St. Louis Park Housing and Redevelopment Authority currently controls the site. The City is contiguous to the City of Minneapolis and exhibits a similar population density. Currently, the site is a park with a portion of it developed with condominiums. It is located in the midst of a residential area with some small industry.

From 1918 to 1972 the company operated a coal tar distillation facility and wood preserving plant. Its primary production was creosote. The chemical compounds associated with this process are polynuclear aromatic hydrocarbons (PAH) and phenolics. The release to the environment of these compounds occurred during the coal distillation process and from materials stored on the site. The materials were apparently dumped into a well, referred to as W-23, which penetrated to the Mt. Simon/Hinckley Aquifer, a depth of about 900 feet. The well was cleaned out by the Minnesota Pollution Control Agency (MPCA) to a depth of 866 feet. Coal tar was removed down to a depth of 740 feet. Wastes containing coal tar and its distillation by-products were discharged, as a matter of disposal practice, overland into ditches that emptied into a peat bog south of the site. This practice, according to Reilly, occurred from 1917 to 1939. In 1940 and 1941 Reilly installed a wastewater treatment plant and discharged the effluent into the bog south of the site. The values of both phenolics and oil and grease in the discharge water varied typically from 100 to 1,000 milligrams per liter. This discharge continued for the duration of Reilly's operation. The peat bog has retained contamination that was discharged over the years and, as is explained below, is now a major source of groundwater contamination.

In 1972, the plant was dismantled and the land sold to the City of St. Louis Park. In 1973, a storm water runoff collection system was built which fed into a lined pond on the site. The pond discharges into a drain which is routed to another pond off-site before it eventually discharges into Minnehaha Creek. The City of St. Louis Park (SLP) monitors the discharge into the creek. Construction of a block of condominiums on the northern part of the site began in 1976. At this time, no further construction is underway, although plans for new development of the site are pending by the Housing and Redevelopment Authority. All excavation of material has been inspected by the State and if contaminated, the soils were disposed of.

There are three conceptual operable units involved with the Reilly Tar Remedial response. These include: (1) restoration of drinking water supply to St. Louis Park, (2) containment or treatment of groundwater in contaminated aquifers, and (3) source control of the bog and contaminated soil at the site.

In August 1981, the MPCA was awarded a cooperative agreement to investigate Well W23, and to perform a feasibility study for restoration of drinking water.

During that study, the State removed coal tar deposits from Well W23 that were a source of groundwater contamination. The well itself is now clean although some residual contamination probably remains in the aquifers penetrated by the well.

Presently, there are two extraction wells that alternately pump contaminated groundwater to an on-site pretreatment facility. The wastestream is pumped to a sand filter (iron removal) prior to discharge to a granular activated carbon unit. Treated effluent from the carbon unit flows to a 1.5 million gallon holding tank where approximately 95 percent of the water is discharged to the drinking water supply for the City. The remaining 5 percent is discharged to the City's sewer system.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

SUMMARY OF ANALYTICAL METHODS (cont.)

Analytical Category and Fraction	Technique	EPA Method No.
Classicals (sludge samples)		
Ammonia, as N	Titrimetric, Distillation	350.2
Nitrogen, Kjeldahl, total	Titrimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Cyanide, total	Colorimetric	9010[b]
pH		9045[b]
Residue, total	Gravimetric	160.3
Residue, total volatile	Gravimetric	160.4
Sulfide, total	Monier-Williams	c
Flash point (ignitability)	Pensky-Martens Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

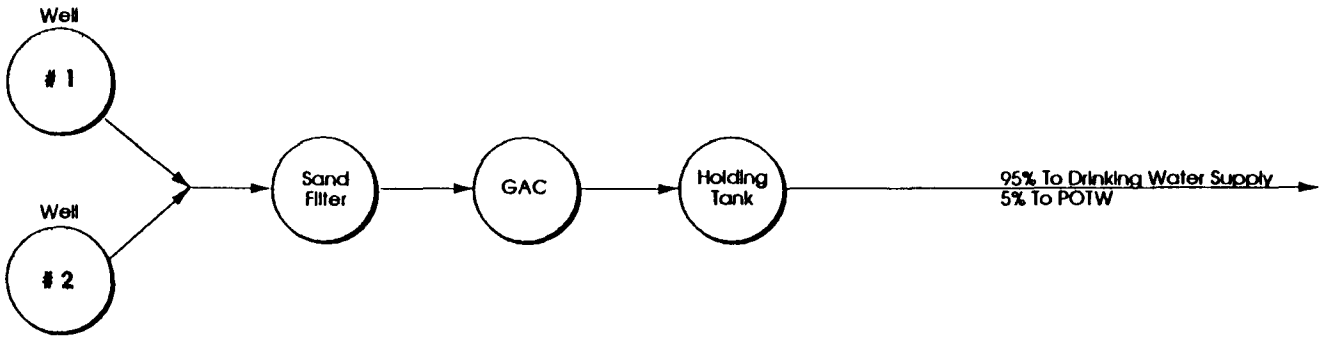
[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

b. Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

c. 49 CFR Part 425, Federal Register Vol. 52, No. 13, January 21, 1987

ANALYTICAL QUALIFIERS

NR	-	Not required by contract at this time.
Value	-	If the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit, put the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for Furnace).
U	-	Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).
E	-	Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.
S	-	Indicates value determined by Method of Standard Addition.
R	-	Indicates spike recovery is not within control limits.
*	-	Indicates duplicate analysis is not within control limits.
+	-	Indicates the correlation coefficient for Method of Standard Addition is less than 0.995.



Treatment: SF-GAC
Wastewater Type: Groundwater
Average Flow: 500 GPM (24 Hours/7Days)
95% To Drinking Water Supply
5% To POTW

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed SF[4]	% Mass Removed GAC[4]	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	2 : 2 :4	0 001 ppt-2262 ug/L	18-2262 ug/L	9,970 : 10,070	900 : 990	82 :81	50 :49	91 ; 90
Metals	1 : 7 : 13	7-89617 ug/L	7 ug/L	29 : 620,580	245 : 616,060	< 1 : < 1	< 1 : < 1	< 1 : < 1

NOTES:

1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. Taken from concentration average over a five day sampling event

3. Based on pollutant concentration averages

4. SF = Sand Filter
   GAC = Granular Activated Carbon

FIGURE B-9
REILLY TAR - 1239
FIVE DAY SAMPLING EVENT
REGION V ST. LOUIS PARK, MN

6098 01

REILLY TAR - EPISODE 1239
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
SAND FILTER + CARBON ADSORPTION

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
2,3,7,8-TCDF	PPT	Sand Filter	0.001	0.007	***
		Carbon Ads.	0.007	0.001	86
		Total Removal	0.001	0.001	0
BIPHENYL	UG/L	Sand Filter	11.667	17.400	-49
		Carbon Ads.	17.400	10.000	43
		Total Removal	11.667	10.000	14
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	Sand Filter	2261.670	394.600	83
		Carbon Ads.	394.600	192.170	51
		Total Removal	2261.670	192.170	92
N-OCTACOSANE (N-C28)	UG/L	Sand Filter	10.833	10.600	2
		Carbon Ads.	10.600	10.167	4
		Total Removal	10.833	10.167	6
TRANS-1,2-DICHLOROETHENE	UG/L	Sand Filter	17.833	19.400	-9
		Carbon Ads.	19.400	13.167	32
		Total Removal	17.833	13.167	26
INORGANICS					
BARIUM	UG/L	Sand Filter	174.833	170.200	3
		Carbon Ads.	170.200	171.333	-1
		Total Removal	174.833	171.333	2
BORON	UG/L	Sand Filter	224.000	225.200	-1
		Carbon Ads.	225.200	225.000	0
		Total Removal	224.000	225.000	0
CALCIUM	UG/L	Sand Filter	89616.667	89920.000	0
		Carbon Ads.	89920.000	89633.333	0
		Total Removal	89616.667	89633.333	0
IODINE	UG/L	Sand Filter	533.000	0.000	100
		Carbon Ads.	0.000	0.000	***
		Total Removal	533.000	0.000	100
IRON	UG/L	Sand Filter	595.833	49.000	92
		Carbon Ads.	49.000	149.333	***
		Total Removal	595.833	149.333	75
MAGNESIUM	UG/L	Sand Filter	31300.000	31560.000	-1
		Carbon Ads.	31560.000	31466.667	0
		Total Removal	31300.000	31466.667	-1

REILLY TAR - EPISODE 1239 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
MANGANESE	UG/L	Sand Filter	84.400	84.200	0
		Carbon Ads.	84.200	83.000	1
		Total Removal	84.400	83.000	2
SILICON	UG/L	Sand Filter	1267.000	1240.000	2
		Carbon Ads.	1240.000	1267.000	-2
		Total Removal	1267.000	1267.000	0
SODIUM	UG/L	Sand Filter	8256.667	8332.000	-1
		Carbon Ads.	8332.000	8351.667	0
		Total Removal	8256.667	8351.667	-1
STRONTIUM	UG/L	Sand Filter	200.000	200.000	0
		Carbon Ads.	200.000	200.000	0
		Total Removal	200.000	200.000	0
SULFUR	UG/L	Sand Filter	9550.000	8800.000	8
		Carbon Ads.	8800.000	9167.000	-4
		Total Removal	9550.000	9167.000	4
TIN	UG/L	Sand Filter	50.167	53.000	-6
		Carbon Ads.	53.000	55.167	-4
		Total Removal	50.167	55.167	-10
ZINC	UG/L	Sand Filter	6.667	20.240	***
		Carbon Ads.	20.240	56.000	***
		Total Removal	6.667	56.000	***
CONVENTIONALS/NONCONVENTIONALS					
AMMONIA, AS N	UG/L	Sand Filter	520.000	502.000	3
		Carbon Ads.	502.000	483.000	4
		Total Removal	520.000	483.000	7
CHLORIDE	UG/L	Sand Filter	10833.000	11600.000	-7
		Carbon Ads.	11600.000	15667.000	-35
		Total Removal	10833.000	15667.000	-45
FLASH POINT	25 C	Sand Filter	52.000	0.000	100
		Carbon Ads.	0.000	51.000	***
		Total Removal	52.000	51.000	2
FLUORIDE	UG/L	Sand Filter	253.000	256.000	-1
		Carbon Ads.	256.000	260.000	-2
		Total Removal	253.000	260.000	-3

REILLY TAR - EPISODE 1239 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
NITROGEN, TOTAL KJELDAHL	UG/L	Sand Filter	663.000	662.000	0
		Carbon Ads.	662.000	563.000	15
		Total Removal	663.000	563.000	15
PHOSPHORUS, TOTAL AS P	UG/L	Sand Filter	103.000	100.000	3
		Carbon Ads.	100.000	100.000	0
		Total Removal	103.000	100.000	3
SPECIFIC CONDUCTANCE	MPY	Sand Filter	615.000	612.000	0
		Carbon Ads.	612.000	613.333	0
		Total Removal	615.000	613.333	0
SULFATE	UG/L	Sand Filter	21667.000	26400.000	-22
		Carbon Ads.	26400.000	21500.000	19
		Total Removal	21667.000	21500.000	1
TDS	UG/L	Sand Filter	353333.000	348000.000	2
		Carbon Ads.	348000.000	346667.000	0
		Total Removal	353333.000	346667.000	2
TOC	UG/L	Sand Filter	4033.000	4020.000	0
		Carbon Ads.	4020.000	3233.000	20
		Total Removal	4033.000	3233.000	20

SECTION B-10
TREATABILITY OF CERCLA POLLUTANTS
STRINGFELLOW - EPISODE 1221

(ONE DAY SAMPLING EVENT)

STRINGFELLOW ACID PITS - EPISODE 1221
SITE DESCRIPTION

Stringfellow Acid Pit was operated by Stringfellow Quarry Co. from 1956 to 1972 as a hazardous waste disposal facility. The landfill disposal site was permitted by the Santa Ana Regional Water Quality Control Board (RWQCB). About 34 million gallons of wastes, mostly from metal finishing, electroplating, and DDT production, were deposited on approximately 17 acres of the site. In 1969 and 1978, excessive rainfall caused the ponds used for solar evaporation to overflow, spreading contamination into the nearby town of Glen Avon. In July 1980, the RWQCB advocated total removal of all solids and liquids but the funds were not available. In December 1980, RWQCB selected an interim plan that included installation of channels to divert surface water, a gravel drain and a network of wells for monitoring and extraction, and a clay core barrier dam downgradient to stop subsurface leachate migration.

California placed Stringfellow at the top of the California priority list. The State conducted a study in compliance with the National Oil and Hazardous Substances Pollution Contingency Plan (the National Contingency Plan or NCP) to obtain CERCLA funds. The results of the study indicated that on-site management was more cost effective than total removal.

On July 22, 1983, Lee Thomas, Assistant Administrator of the Office of Solid Waste and Emergency Response (OSWER), signed a Record of Decision (ROD) which endorsed the State's request for funds for both existing activities and proposed actions. The interim actions authorized in the ROD were:

- removal of DDT contaminated material
- operation of extraction wells upgradient of the clay barrier to protect the barrier
- fencing the entire site to prevent entry
- erosion control to prevent destruction of a clay cap

The state also requested EPA to lead a fast track Remedial Investigation/Feasibility Study (RI/FS) while the Department of Health Services completed the long-term RI/FS.

As a result of the fast track RI/FS, a pretreatment system was installed to treat the groundwater before its discharge to the Santa Ana Watershed Project Authority. The series of extraction wells transfer two groundwater streams from the contaminated canyon area to the field storage tanks. On-site groundwater (Stream A), known to contain metal compounds and organics, is transferred from the field storage tanks to one of four equalization tanks (each with a 12,000-gallon capacity) at the on-site treatment plant. Once equalization of Stream A occurs, Stream A proceeds to a 400-gallon capacity rapid mix tank where lime and caustic soda are added to aid precipitation and to control acidity/alkalinity, and polymer is added to aid floc formation. The chemically treated and mixed stream flows to two parallel-operating clarifiers.

The thickened sludge is pumped from the clarifiers to the sludge holding tanks, and the clarified effluent flows to two gravity sand filters operating in parallel. Each filter has a 7.6 square foot area, and the sand is about three feet deep. Wastewater from the sand filters is transferred to the 500-gallon Stream A filter effluent tank.

Groundwater from mid-canyon (Stream B), which contains mostly organic compounds, is transferred from the field storage tanks to one of three equalization tanks (12,000-gallon capacity each) located at the on-site treatment plant. Stream A effluent from the 500-gallon filter effluent tank is blended with Stream B before discharging to activated carbon adsorption vessels. The two carbon adsorption vessels each have a 10-ton capacity for granular activated carbon and are operated in series with a third vessel functioning as a transfer tank.

Effluent from the carbon adsorption vessels is transferred to one of four final effluent storage tanks (80,000-gallon total capacity), before it is discharged to the sewer at an average rate of 870,000 gallons per month. As necessary, effluent from these storage tanks is used as backwash and other plant utility water.

Sludge is pumped from the clarifiers to two 11,000-gallon sludge holding tanks. The sludge from the two sludge holding tanks is fed to two plate-and-frame filter presses. Depending on the pollutant content, the filtrate from the filter press operation can be recycled to either the Stream A influent equalization tanks, the Stream B influent equalization tanks, or the Stream A filter effluent tank. Usually, the filtrate is pumped to the Stream A equalization tanks. The sludge cake is discharged into containers and is hauled off-site by a contractor for disposal at a RCRA approved Class I disposal site as hazardous waste.

As part of the Stringfellow discharge permit, the effluent must be tested prior to any discharge. Currently, the facility is allowed to fill two storage tanks simultaneously, but is only required to test one tank.

The pretreatment system located at Stringfellow operates five days per week during the daylight hours.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

SUMMARY OF ANALYTICAL METHODS (cont.)

Analytical Category and Fraction	Technique	EPA Method No.
Classicals (sludge samples)		
Ammonia, as N	Titrimetric, Distillation	350.2
Nitrogen, Kjeldahl, total	Titrimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Cyanide, total	Colorimetric	9010[b]
pH		9045[b]
Residue, total	Gravimetric	160.3
Residue, total volatile	Gravimetric	160.4
Sulfide, total	Monier-Williams	c
Flash point (ignitability)	Pensky-Martens Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

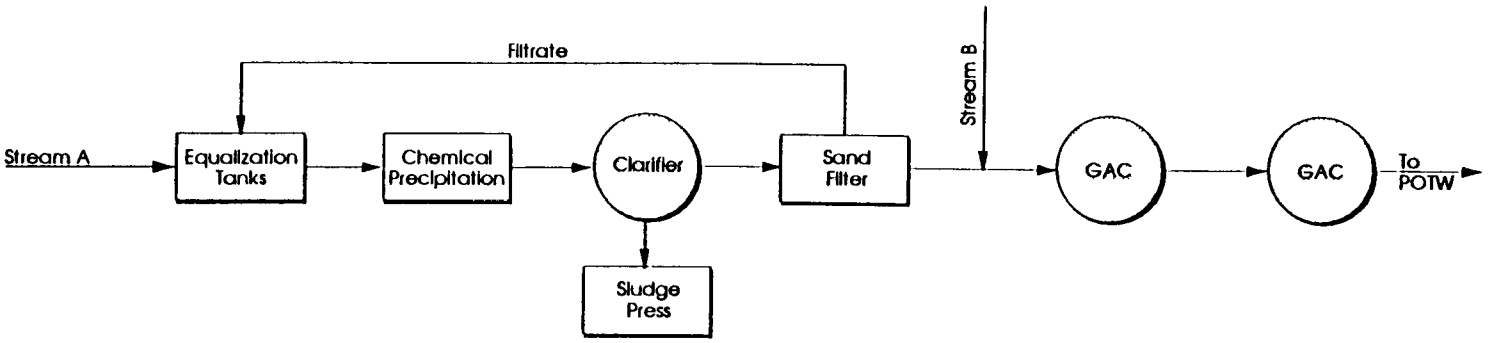
[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

b. Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

c. 49 CFR Part 425, Federal Register Vol. 52, No. 13, January 21, 1987

ANALYTICAL QUALIFIERS

NR	-	Not required by contract at this time.
Value	-	If the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit, put the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for Furnace).
U	-	Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).
E	-	Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.
S	-	Indicates value determined by Method of Standard Addition.
R	-	Indicates spike recovery is not within control limits.
*	-	Indicates duplicate analysis is not within control limits.
+	-	Indicates the correlation coefficient for Method of Standard Addition is less than 0.995.



Treatment: CP-SF-GAC
Wastewater Type: Groundwater
Average Flow: 0 04 MGD (8 Hours/5 Days/Wk)
To 220 MGD POTW

	# Compounds Detected [1]	Conc ITD [2]	Conc PP [2]	Influent Loading	Discharge [4]	% Mass Removed CP [5]	% Mass Removed SF [5]	% Mass Removed GAC [5]
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	9 : 11 : 13	0.131ppt-14,116 ug/L	100-123 ug/L	1,830 : 3,240	8 : 17	39 : 57	< 1 : < 1	98 : 97
Metals	9 : 19 : 43	9-2,130,000 ug/L	44-103,000 ug/L	15,930 : 539,500	11 : 196,420	> 99 : 48	< 1 : < 1	33 : 9

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

3. Based on pollutant concentration averages

4. The flows for streams A and B are unavailable - overall removal can not be calculated

5. CP = Chemical Precipitation
   SF = Sand Filter
   GAC = Granular Activated Carbon

FIGURE B-10
STRINGFELLOW - 1221
ONE DAY SAMPLING EVENT
REGION IX GLEN AVON HEIGHTS, CA

STRINGFELLOW ACID PITS - EPISODE 1221
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
HOLDING TANK + CHEMICAL PRECIPITATION + SAND FILTER + CARBON ADSORPTION

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
ORGANICS							
1,2-DICHLOROBENZENE	UG/L	Holding Tank	3985.000		2658.000		33
		Metals Precipition	2658.000		1686.000		37
		Sand Filter	1686.000		1686.000		0
		Carbon Adsorption	897.000		10.000	U	99
1,3-DICHLOROBENZENE	UG/L	Holding Tank	123.000		100.000	U	19
		Metals Precipition	100.000	U	100.000	U	0
		Sand Filter	100.000	U	100.000	U	0
		Carbon Adsorption	100.000	U	10.000	U	90
1,4-DICHLOROBENZENE	UG/L	Holding Tank	1077.000		840.000		22
		Metals Precipition	840.000		485.000		42
		Sand Filter	485.000		476.000		2
		Carbon Adsorption	249.000		10.000	U	96
2,3,7,8-TCDF	PPB	Holding Tank	0.131		0.031	U	76
		Metals Precipition	0.031	U	0.022	U	29
		Sand Filter	0.022	U	0.018	U	18
		Carbon Adsorption	0.008	U	0.022		***
ACETONE	UG/L	Holding Tank	14116.000		9199.000		35
		Metals Precipition	9199.000		2256.000		75
		Sand Filter	2256.000		5000.000	U	***
		Carbon Adsorption	1211.000		50.000	U	96
BENZOIC ACID	UG/L	Holding Tank	1825.000		1244.000		32
		Metals Precipition	1244.000		819.000		34
		Sand Filter	819.000		736.000		10
		Carbon Adsorption	500.000	U	50.000	U	90
CHLOROBENZENE	UG/L	Holding Tank	1264.000		1000.000	U	21
		Metals Precipition	1000.000	U	600.000		40
		Sand Filter	600.000		1000.000	U	-67
		Carbon Adsorption	290.000		10.000	U	97
CHLOROFORM	UG/L	Holding Tank	1000.000	U	1000.000	U	0
		Metals Precipition	1000.000	U	544.000		46
		Sand Filter	544.000		1000.000	U	-84
		Carbon Adsorption	267.000		10.000	U	96

STRINGFELLOW ACID PITS - EPISODE 1221 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
HEXANOIC ACID	UG/L	Holding Tank	347.000		231.000		33
		Metals Precipition	231.000		100.000	U	57
		Sand Filter	100.000	U	100.000	U	0
		Carbon Adsorption	100.000	U	10.000	U	90
ISOPHORONE	UG/L	Holding Tank	1910.000		1388.000		27
		Metals Precipition	1388.000		1102.000		21
		Sand Filter	1102.000		1130.000		-3
		Carbon Adsorption	669.000		10.000	U	99
METHYLENE CHLORIDE	UG/L	Holding Tank	3571.000		2742.000		23
		Metals Precipition	2742.000		2729.000		0
		Sand Filter	2729.000		2706.000		1
		Carbon Adsorption	997.000		10.000	U	99
PHENOL	UG/L	Holding Tank	100.000	U	100.000	U	0
		Metals Precipition	100.000	U	265.000		***
		Sand Filter	265.000		215.000		19
		Carbon Adsorption	135.000		10.000	U	93
TRICHLOROETHENE	UG/L	Holding Tank	8020.000		4800.000		40
		Metals Precipition	4800.000		5429.000		-13
		Sand Filter	5429.000		5247.000		3
		Carbon Adsorption	1852.000		10.000	U	99
INORGANICS							
ALUMINUM	UG/L	Holding Tank	1350000.00		1340000.00		1
		Metals Precipition	1340000.00		2460.000		100
		Sand Filter	2460.000		2230.000		9
		Carbon Adsorption	1140.000		8.700	U	99
ARSENIC	UG/L	Holding Tank	760.000		560.000	M	26
		Metals Precipition	560.000	M	22.000	M	96
		Sand Filter	22.000	M	40.000	U RR	-82
		Carbon Adsorption	14.000	M	16.000	M	-14
BARIUM	UG/L	Holding Tank	9.300	U	9.300	U	0
		Metals Precipition	9.300	U	26.000	[]	***
		Sand Filter	26.000	[]	31.000	[]	-19
		Carbon Adsorption	24.000	[]	33.000	[]	-37

STRINGFELLOW ACID PITS - EPISODE 1221 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
BERYLLIUM	UG/L	Holding Tank	120.000		83.000		31
		Metals Precipition	83.000		5.000	U	94
		Sand Filter	5.000	U	5.000	U	0
		Carbon Adsorption	5.000	U	5.000	U	0
BORON	UG/L	Holding Tank	168000.000		128000.000		24
		Metals Precipition	128000.000		39800.000		69
		Sand Filter	39800.000		40400.000		-2
		Carbon Adsorption	27000.000		24700.000		9
CADMIUM	UG/L	Holding Tank	2820.000		1890.000		33
		Metals Precipition	1890.000		13.000		99
		Sand Filter	13.000		13.000		0
		Carbon Adsorption	4.800	[]	3.700	U	23
CALCIUM	UG/L	Holding Tank	389000.000		377000.000		3
		Metals Precipition	377000.000		545000.000		-45
		Sand Filter	545000.000		578000.000		-6
		Carbon Adsorption	531000.000		520000.000		2
CERIUM	UG/L	Holding Tank	19000.000		16200.000		15
		Metals Precipition	16200.000		12700.000		22
		Sand Filter	12700.000		12400.000		2
		Carbon Adsorption	11400.000		9630.000		16
CHROMIUM	UG/L	Holding Tank	103000.000		68700.000		33
		Metals Precipition	68700.000		34.000		100
		Sand Filter	34.000		28.000		18
		Carbon Adsorption	15.000		9.000	[]	40
COBALT	UG/L	Holding Tank	3130.000		2190.000		30
		Metals Precipition	2190.000		10.000	U	100
		Sand Filter	10.000	U	10.000	U	0
		Carbon Adsorption	10.000	U	10.000	U	0
COPPER	UG/L	Holding Tank	9370.000		6630.000		29
		Metals Precipition	6630.000		150.000		98
		Sand Filter	150.000		140.000		7
		Carbon Adsorption	68.000		5.700	U	92
DYSPROSIUM	UG/L	Holding Tank	960.000		603.000		37
		Metals Precipition	603.000		100.000	U	83
		Sand Filter	100.000	U	100.000	U	0
		Carbon Adsorption	100.000	U	100.000	U	0

STRINGFELLOW ACID PITS - EPISODE 1221 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL	
ERBIUM	UG/G	Holding Tank	410.000		296.000		28	
		Metals Precipition	296.000		100.000	U	66	
		Sand Filter	100.000	U	100.000	U	0	
		Carbon Adsorption	100.000	U	100.000	U	0	
GADOLIMIUM	UG/G	Holding Tank	700.000		500.000	U	29	
		Metals Precipition	500.000	U	500.000	U	0	
		Sand Filter	500.000	U	500.000	U	0	
		Carbon Adsorption	500.000	U	500.000	U	0	
GOLD	UG/G	Holding Tank	2900.000		2150.000		26	
		Metals Precipition	2150.000		1000.000	U	53	
		Sand Filter	1000.000	U	1000.000	U	0	
		Carbon Adsorption	1000.000	U	1000.000	U	0	
IRIDIUM	UG/G	Holding Tank	2800.000		2110.000		25	
		Metals Precipition	2110.000		1000.000	U	53	
		Sand Filter	1000.000	U	1000.000	U	0	
		Carbon Adsorption	1000.000	U	1000.000	U	0	
IRON	UG/L	Holding Tank	316000.000		213000.000		33	
		Metals Precipition	213000.000		71.000	[]	100	
		Sand Filter	71.000	[]	60.000	U	15	
		Carbon Adsorption	60.000	U	60.000	U	0	
LANTHANUM	UG/G	Holding Tank	1700.000		1130.000		34	
		Metals Precipition	1130.000		100.000	U	91	
		Sand Filter	100.000	U	100.000	U	0	
		Carbon Adsorption	100.000	U	100.000	U	0	
LANTHIUM	UG/L	Holding Tank	0.000		0.000			*
		Metals Precipition	0.000		0.000			*
		Sand Filter	0.000		0.000			*
		Carbon Adsorption	0.000		0.000			*
LEAD	UG/L	Holding Tank	1550.000		50.000	U	97	
		Metals Precipition	50.000	U	50.000	U	0	
		Sand Filter	50.000	U	50.000	U	0	
		Carbon Adsorption	50.000	U	50.000	U	0	
LITHIUM	UG/L	Holding Tank	2200.000		1560.000		29	
		Metals Precipition	1560.000		450.000		71	
		Sand Filter	450.000		403.000		10	
		Carbon Adsorption	255.000		228.000		11	

STRINGFELLOW ACID PITS - EPISODE 1221 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
MAGNESIUM	UG/L	Holding Tank	355000.000		304000.000		14
		Metals Precipition	304000.000		137000.000		55
		Sand Filter	137000.000		136000.000		1
		Carbon Adsorption	116000.000		111000.000		4
MANGANESE	UG/L	Holding Tank	284000.000		199000.000		30
		Metals Precipition	199000.000		4820.000		98
		Sand Filter	4820.000		4740.000		2
		Carbon Adsorption	2540.000		1530.000		40
MOLYBDENUM	UG/L	Holding Tank	541.000		154.000		72
		Metals Precipition	154.000		37.000		76
		Sand Filter	37.000		36.000		3
		Carbon Adsorption	32.000		32.000		0
NEODYMIUM	UG/G	Holding Tank	3300.000		2160.000		35
		Metals Precipition	2160.000		500.000	U	77
		Sand Filter	500.000	U	500.000	U	0
		Carbon Adsorption	500.000	U	500.000	U	0
NICKEL	UG/L	Holding Tank	18900.000		13000.000		31
		Metals Precipition	13000.000		27.000	[]	100
		Sand Filter	27.000	[]	29.000		-7
		Carbon Adsorption	14.000	[]	13.000	[]	7
PHOSPHORUS	UG/G	Holding Tank	7300.000		4560.000		38
		Metals Precipition	4560.000		1000.000	U	78
		Sand Filter	1000.000	U	1000.000	U	0
		Carbon Adsorption	1000.000	U	1000.000	U	0
POTASSIUM	UG/L	Holding Tank	24000.000		23800.000		1
		Metals Precipition	23800.000		20700.000		13
		Sand Filter	20700.000		20500.000		1
		Carbon Adsorption	12200.000		10100.000		17
PRASEODYMIUM	UG/G	Holding Tank	1600.000		1170.000		27
		Metals Precipition	1170.000		1000.000	U	15
		Sand Filter	1000.000	U	1000.000	U	0
		Carbon Adsorption	1000.000	U	1000.000	U	0
RUTHENIUM	UG/G	Holding Tank	4300.000		2950.000		31
		Metals Precipition	2950.000		1000.000	U	66
		Sand Filter	1000.000	U	1000.000	U	0
		Carbon Adsorption	1000.000	U	1000.000	U	0

STRINGFELLOW ACID PITS - EPISODE 1221 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
SAMARIUM	UG/G	Holding Tank	620.000		500.000	U	19
		Metals Precipition	500.000	U	500.000	U	0
		Sand Filter	500.000	U	500.000	U	0
		Carbon Adsorption	500.000	U	500.000	U	0
SCANDIUM	UG/G	Holding Tank	250.000		157.000		37
		Metals Precipition	157.000		100.000	U	36
		Sand Filter	100.000	U	100.000	U	0
		Carbon Adsorption	100.000	U	100.000	U	0
SILICON	UG/L	Holding Tank	13000.000		10100.000		22
		Metals Precipition	10100.000		179.000		98
		Sand Filter	179.000		129.000		28
		Carbon Adsorption	3530.000		3330.000		6
SILVER	UG/L	Holding Tank	44.000		11.000		75
		Metals Precipition	11.000		8.700	U	21
		Sand Filter	8.700	U	8.700	U	0
		Carbon Adsorption	8.700	U	8.700	U	0
SODIUM	UG/L	Holding Tank	942000.000		941000.000		0
		Metals Precipition	941000.000		943000.000		0
		Sand Filter	943000.000		943000.000		0
		Carbon Adsorption	814000.000		765000.000		6
STRONTIUM	UG/L	Holding Tank	1100.000		1130.000		-3
		Metals Precipition	1130.000		1080.000		4
		Sand Filter	1080.000		1100.000		-2
		Carbon Adsorption	923.000		1060.000		-15
SULFUR	UG/L	Holding Tank	2130000.00		2090000.00		2
		Metals Precipition	2090000.00		1490000.00		29
		Sand Filter	1490000.00		1600000.00		-7
		Carbon Adsorption	954000.000		807000.000		15
TITANIUM	UG/L	Holding Tank	384.000		270.000		30
		Metals Precipition	270.000		7.000		97
		Sand Filter	7.000		9.000		-29
		Carbon Adsorption	7.000		7.000		0
TUNGSTEN	UG/G	Holding Tank	1000.000		1000.000	U	0
		Metals Precipition	1000.000	U	1000.000	U	0
		Sand Filter	1000.000	U	1000.000	U	0
		Carbon Adsorption	1000.000	U	1000.000	U	0

STRINGFELLOW ACID PITS - EPISODE 1221 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
URANIUM	UG/G	Holding Tank	1300.000		1000.000	U	23
		Metals Precipition	1000.000	U	1000.000	U	0
		Sand Filter	1000.000	U	1000.000	U	0
		Carbon Adsorption	1000.000	U	1000.000	U	0
VANADIUM	UG/L	Holding Tank	1620.000		1060.000		35
		Metals Precipition	1060.000		2.700	U	100
		Sand Filter	2.700	U	2.700	U	0
		Carbon Adsorption	2.700	U	2.700	U	0
YTTERBIUM	UG/G	Holding Tank	140.000		100.000	U	29
		Metals Precipition	100.000	U	100.000	U	0
		Sand Filter	100.000	U	100.000	U	0
		Carbon Adsorption	100.000	U	100.000	U	0
YTTRIUM	UG/L	Holding Tank	3690.000		2640.000		28
		Metals Precipition	2640.000		5.000	U	100
		Sand Filter	5.000	U	5.000	U	0
		Carbon Adsorption	5.000	U	5.000	U	0
ZINC	UG/L	Holding Tank	47000.000		32200.000		31
		Metals Precipition	32200.000		22.000		100
		Sand Filter	22.000		18.000	[]	18
		Carbon Adsorption	16.000	[]	19.000	[]	-19
CONVENTIONALS/NONCONVENTIONALS							
AMMONIA, AS N	MG/KG	Holding Tank	0.840		38.000		***
		Metals Precipition	38.000		4.700		88
		Sand Filter	4.700		2.700		43
		Carbon Adsorption	2.700		7.400		***
BOD	MG/L	Holding Tank	35.000		550.000		***
		Metals Precipition	550.000		340.000		38
		Sand Filter	340.000		70.000		79
		Carbon Adsorption	380.000		270.000		29
CHLORIDE	MG/L	Holding Tank	390.000		290.000		26
		Metals Precipition	290.000		320.000		-10
		Sand Filter	320.000		290.000		9
		Carbon Adsorption	230.000		190.000		17

STRINGFELLOW ACID PITS - EPISODE 1221 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
COD	MG/L	Holding Tank	3900.000		3100.000		21
		Metals Precipition	3100.000		2600.000		16
		Sand Filter	2600.000		2600.000		0
		Carbon Adsorption	1400.000		740.000		47
CORROSIVITY	UMH/C	Holding Tank	36.000		0.000	NA	100
		Metals Precipition	0.000	NA	0.000	NA	***
		Sand Filter	0.000	NA	0.000	NA	***
		Carbon Adsorption	0.000	NA	0.000	NA	***
CYANIDE, TOTAL	MG/KG	Holding Tank	0.000	>*	0.000	>*	***
		Metals Precipition	0.000	>*	47.000		***
		Sand Filter	47.000		47.000		0
		Carbon Adsorption	25.000		20.000	<	20
FLUORIDE	MG/L	Holding Tank	250.000		180.000		28
		Metals Precipition	180.000		9.800		95
		Sand Filter	9.800		11.000		-12
		Carbon Adsorption	6.100		5.400		11
NITRATE + NITRITE, AS N	MG/KG	Holding Tank	86.000		78.000		9
		Metals Precipition	78.000		65.000		17
		Sand Filter	65.000		58.000		11
		Carbon Adsorption	50.000		56.000		-12
NITROGEN, TOTAL KJELDAHL	MG/KG	Holding Tank	8.900		20.000	**	***
		Metals Precipition	20.000	**	14.000		30
		Sand Filter	14.000		9.800		30
		Carbon Adsorption	3.600		2.600	**	28
OIL & GREASE, TOTAL	MG/L	Holding Tank	5.000	<	5.000	<	0
		Metals Precipition	5.000	<	35.000		***
		Sand Filter	35.000		13.000		63
		Carbon Adsorption	5.000	<	5.000	<	0
PHOSPHORUS, TOTAL AS P	MG/L	Holding Tank	11.000		7.000		36
		Metals Precipition	7.000		0.500		93
		Sand Filter	0.500		0.400		20
		Carbon Adsorption	0.250		0.100	<	60
SPECIFIC CONDUCTANCE	UMH/CM-25C	Holding Tank	16000.000		13000.000		19
		Metals Precipition	13000.000		8700.000		33
		Sand Filter	8700.000		8900.000		-2
		Carbon Adsorption	5700.000		5500.000		4

STRINGFELLOW ACID PITS - EPISODE 1221 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	QUAL.	EFFL. CONC.	QUAL.	PERCENT REMOVAL
SULFATE	MG/L	Holding Tank	17000.000		12000.000		29
		Metals Precipition	12000.000		4200.000		65
		Sand Filter	4200.000		4200.000		0
		Carbon Adsorption	2700.000		2500.000		7
SULFIDE, TOTAL	MG/KG	Holding Tank	28.000		0.000	NR	100
		Metals Precipition	0.000	NR	0.000	NR	***
		Sand Filter	0.000	NR	0.000	NR	***
		Carbon Adsorption	0.000	NR	0.000	NR	***
SULFIDE, TOTAL (MONIER-WILLIAMS)	MG/KG	Holding Tank	0.000		0.000		*
		Metals Precipition	0.000		0.000		*
		Sand Filter	0.000		0.000		*
		Carbon Adsorption	0.000		0.000		*
TDS	MG/L	Holding Tank	33000.000		24000.000		27
		Metals Precipition	24000.000		10000.000		58
		Sand Filter	10000.000		10000.000		0
		Carbon Adsorption	6200.000		5600.000		10
TOC	MG/L	Holding Tank	1300.000		1000.000		23
		Metals Precipition	1000.000		920.000		8
		Sand Filter	920.000		880.000		4
		Carbon Adsorption	510.000		310.000		39
TSS	MG/L	Holding Tank	19.000		310.000		***
		Metals Precipition	310.000		20.000		94
		Sand Filter	20.000		19.000		5
		Carbon Adsorption	13.000		2.800		78

SECTION B-11
TREATABILITY OF CERCLA POLLUTANTS
STRINGFELLOW - EPISODE 1240

(5-DAY SAMPLING EVENT)

STRINGFELLOW ACID PITS - EPISODE 1240
SITE DESCRIPTION

Stringfellow Acid Pit was operated by Stringfellow Quarry Co. from 1956 to 1972 as a hazardous waste disposal facility. The landfill disposal site was permitted by the Santa Ana Regional Water Quality Control Board (RWQCB). About 34 million gallons of wastes, mostly from metal finishing, electroplating, and DDT production, were deposited on approximately 17 acres of the site. In 1969 and 1978, excessive rainfall caused the ponds used for solar evaporation to overflow, spreading contamination into the nearby town of Glen Avon. In July 1980, the RWQCB advocated total removal of all solids and liquids but funds were not available. In December 1980, RWQCB selected an interim plan that included installation of channels to divert surface water, a gravel drain, and a network of wells for monitoring and extraction, and a clay core barrier dam downgradient to stop subsurface leachate migration.

California placed Stringfellow at the top of the California priority list. The State conducted a study in compliance with the National Oil and Hazardous Substances Pollution Contingency Plan (National Contingency Plan (NCP)) to obtain CERCLA funds. The results of the study indicated that on-site management was more cost effective than total removal.

On July 22, 1983, Lee Thomas, Assistant Administrator of the Office of Solid Waste and Emergency Response (OSWER), signed a Record of Decision (ROD) which endorsed the State's request for funds for both existing activities and proposed actions. The interim actions authorized in the ROD were:

- o removal of DDT contaminated material
- o operation of extraction wells upgradient of the clay barrier to protect the barrier
- o fencing the entire site to prevent entry
- o erosion control to prevent destruction of a clay cap

The State also requested EPA to lead a fast track Remedial Investigation/Feasibility Study (RI/FS) while the Department of Health Services completed the long-term RI/FS.

As a result of the fast track RI/FS, a pretreatment system was installed to treat the groundwater before its discharge to the Santa Ana Watershed Project Authority. The series of extraction wells transfer two groundwater streams from the contaminated canyon area to the field storage tanks. On-site groundwater (Stream A), known to contain metal compounds and organics, is transferred from the field storage tanks to one of four equalization tanks (each with a 12,000-gallon capacity) at the on-site treatment plant. Once equalization of Stream A occurs, Stream A proceeds to a 400-gallon capacity rapid mix tank where lime and caustic soda are added to aid precipitation and to control

acidity/alkalinity, and polymer is added to aid floc formation. The chemically treated and mixed stream flows to two parallel-operating clarifiers.

The thickened sludge is pumped from the clarifiers to the sludge holding tanks, and the clarified effluent flows to two gravity sand filters operating in parallel. Each filter has a 7.6 square foot area, and the sand is about three feet deep. Wastewater from the sand filters is transferred to the 500-gallon Stream A filter effluent tank.

Groundwater from mid-canyon (Stream B), which contains mostly organic compounds, is transferred from the field storage tanks to one of three equalization tanks (12,000-gallon capacity each) located at the on-site treatment plant. Stream A effluent from the 500-gallon filter effluent tank is blended with Stream B before discharging to activated carbon adsorption vessels. The two carbon adsorption vessels each have a 10-ton capacity for granular activated carbon and are operated in series with a third vessel functioning as a transfer tank.

Effluent from the carbon adsorption vessels is transferred to one of four final effluent storage tanks (80,000-gallon total capacity), before it is discharged to the sewer at an average rate of 870,000 gallons per month. As necessary, effluent from these storage tanks is used as backwash and other plant utility water.

Sludge is pumped from the clarifiers to two 11,000-gallon sludge holding tanks. The sludge from the two sludge holding tanks is fed to two plate-and-frame filter presses. Depending on the pollutant content, the filtrate from the filter press operation can be recycled to either the Stream A influent equalization tanks, the Stream B influent equalization tanks, or the Stream A filter effluent tank. Usually, the filtrate is pumped to the Stream A equalization tanks. The sludge cake is discharged into containers and is hauled off-site by a contractor for disposal at a RCRA approved Class I disposal site as hazardous waste.

As part of the Stringfellow discharge permit, the effluent must be tested prior to any discharge. Currently, the facility is allowed to fill two storage tanks simultaneously, but is only required to test one tank.

The pretreatment system located at Stringfellow operates five days per week during the daylight hours.

A one-day sampling episode was conducted by E.C. Jordan Co. at the Stringfellow site on November 3, 1987. The decision was made at that time to return for a supplemental five-day sampling episode if permission could be obtained. Upon receipt of permission, Jordan personnel conducted the sampling as outlined in this report.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

SUMMARY OF ANALYTICAL METHODS (cont.)

Analytical Category and Fraction	Technique	EPA Method No.
Classicals (sludge samples)		
Ammonia, as N	Titrimetric, Distillation	350.2
Nitrogen, Kjeldahl, total	Titrimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Cyanide, total	Colorimetric	9010[b]
pH		9045[b]
Residue, total	Gravimetric	160.3
Residue, total volatile	Gravimetric	160.4
Sulfide, total	Monier-Williams	c
Flash point (ignitability)	Pensky-Martens Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

b. Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

c. 49 CFR Part 425, Federal Register Vol. 52, No. 13, January 21, 1987

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 µg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 µg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

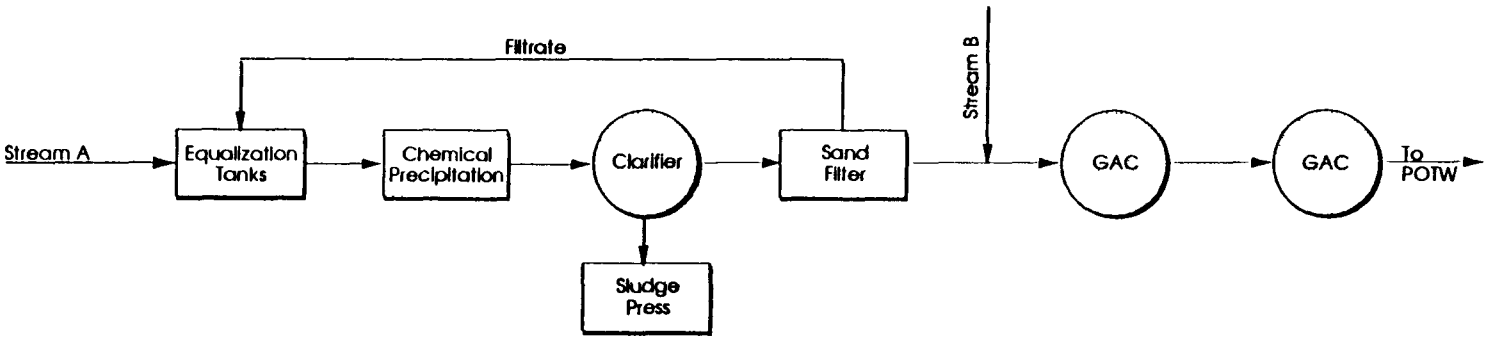
E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.



Treatment: CP-SF-GAC
Wastewater Type: Groundwater
Average Flow: 0.04 MGD (8 Hours/5 Days/Wk)
To 220 MGD POTW

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading	Discharge[4]	% Mass Removed CP[5]	% Mass Removed SF[5]	% Mass Removed GAC[5]
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP.ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	20 : 25 : 32	87-19,420 ug/L	88-8,370 ug/L	2,090 : 4,540	108 : 195	50 : 63	7 ; < 1	83 : 82
Metals	8 : 18 : 42	12-6 337,143 ug/L	13-121,429 ug/L	18,010 : 1,024,440	11 : 218,960	> 99 : 68	3 : < 1	56 : 14

NOTES:

1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. Taken from concentration averages over a five day event

3. Based on pollutant concentration averages

4 The flows for streams A and B are unavailable - overall removal can not be calculated

5. CP = Chemical Precipitation
   SF = Sand Filter
   GAC = Granular activated Carbon

FIGURE B-11
STRINGFELLOW - 1240
FIVE DAY SAMPLING EVENT
REGION IX GLEN AVON HEIGHTS, CA

STRINGFELLOW ACID PITS - EPISODE 1240
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
HOLDING TANK + CHEMICAL PRECIPITATION + SAND FILTER + CARBON ADSORPTION

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
1,2,4-TRICHLOROBENZENE	UG/L	Holding Tank	91.429	84.400	8
		Metals Precipition	84.400	11.200	87
		Sand Filter	11.200	11.000	2
		Carbon Adsorption	12.000	10.000	17
1,2-DICHLOROBENZENE	UG/L	Holding Tank	3624.857	2655.400	27
		Metals Precipition	2655.400	2611.000	2
		Sand Filter	2611.000	2273.600	13
		Carbon Adsorption	1321.800	10.000	99
1,3-DICHLOROBENZENE	UG/L	Holding Tank	155.571	337.600	***
		Metals Precipition	337.600	83.400	75
		Sand Filter	83.400	69.200	17
		Carbon Adsorption	87.800	10.000	89
1,4-DICHLOROBENZENE	UG/L	Holding Tank	1432.000	1021.000	29
		Metals Precipition	1021.000	704.600	31
		Sand Filter	704.600	605.400	14
		Carbon Adsorption	352.200	10.000	97
2,4-DINITROPHENOL	UG/L	Holding Tank	435.714	415.000	5
		Metals Precipition	415.000	60.800	85
		Sand Filter	60.800	74.800	-23
		Carbon Adsorption	63.800	50.000	22
2-BUTANONE (MEK)	UG/L	Holding Tank	2817.143	1457.400	48
		Metals Precipition	1457.400	1179.000	19
		Sand Filter	1179.000	1105.000	6
		Carbon Adsorption	696.000	50.000	93
2-CHLOROPHENOL	UG/L	Holding Tank	87.571	82.000	6
		Metals Precipition	82.000	11.000	87
		Sand Filter	11.000	10.200	7
		Carbon Adsorption	12.000	9.000	25
2-METHYL-4,6-DINITROPHENOL	UG/L	Holding Tank	174.286	164.000	6
		Metals Precipition	164.000	24.400	85
		Sand Filter	24.400	29.400	-20
		Carbon Adsorption	24.200	18.000	26
2-NITROPHENOL	UG/L	Holding Tank	174.286	184.600	-6
		Metals Precipition	184.600	67.200	64
		Sand Filter	67.200	76.800	-14
		Carbon Adsorption	44.400	18.000	59

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
4-METHYL-2-PENTANONE	UG/L	Holding Tank	2767.000	1468.400	47
		Metals Precipition	1468.400	1070.000	27
		Sand Filter	1070.000	1009.200	6
		Carbon Adsorption	625.800	50.000	92
4-NITROPHENOL	UG/L	Holding Tank	446.857	410.000	8
		Metals Precipition	410.000	213.000	48
		Sand Filter	213.000	219.800	-3
		Carbon Adsorption	116.800	45.000	61
ACETONE	UG/L	Holding Tank	19420.000	6634.000	66
		Metals Precipition	6634.000	3110.200	53
		Sand Filter	3110.200	4964.000	-60
		Carbon Adsorption	1809.600	50.000	97
ACETOPHENONE	UG/L	Holding Tank	87.143	85.000	2
		Metals Precipition	85.000	19.600	77
		Sand Filter	19.600	24.400	-24
		Carbon Adsorption	14.000	10.000	29
BENZOIC ACID	UG/L	Holding Tank	904.714	867.000	4
		Metals Precipition	867.000	677.400	22
		Sand Filter	677.400	1023.200	-51
		Carbon Adsorption	522.800	45.000	91
BENZYL ALCOHOL	UG/L	Holding Tank	89.571	434.000	***
		Metals Precipition	434.000	26.000	94
		Sand Filter	26.000	24.600	5
		Carbon Adsorption	28.800	10.000	65
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	Holding Tank	105.429	125.600	-19
		Metals Precipition	125.600	50.800	60
		Sand Filter	50.800	59.200	-17
		Carbon Adsorption	48.800	37.800	23
BUTYL BENZYL PHTHALATE	UG/L	Holding Tank	1708.143	469.400	73
		Metals Precipition	469.400	34.600	93
		Sand Filter	34.600	76.600	***
		Carbon Adsorption	235.200	948.167	***
CHLOROBENZENE	UG/L	Holding Tank	1468.857	991.800	32
		Metals Precipition	991.800	657.200	34
		Sand Filter	657.200	620.000	6
		Carbon Adsorption	391.400	10.000	97
CHLOROFORM	UG/L	Holding Tank	945.286	578.200	39
		Metals Precipition	578.200	523.800	9
		Sand Filter	523.800	491.600	6
		Carbon Adsorption	316.600	10.000	97

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
DIMETHYL PHTHALATE	UG/L	Holding Tank	105.857	107.600	-2
		Metals Precipition	107.600	37.000	66
		Sand Filter	37.000	33.200	10
		Carbon Adsorption	24.600	10.000	59
HEXANOIC ACID	UG/L	Holding Tank	143.286	145.600	-2
		Metals Precipition	145.600	154.000	-6
		Sand Filter	154.000	97.000	37
		Carbon Adsorption	41.000	9.000	78
ISOPHORONE	UG/L	Holding Tank	1782.429	1544.400	13
		Metals Precipition	1544.400	1577.400	-2
		Sand Filter	1577.400	1495.600	5
		Carbon Adsorption	915.000	10.000	99
METHYLENE CHLORIDE	UG/L	Holding Tank	1860.714	1501.800	19
		Metals Precipition	1501.800	1227.800	18
		Sand Filter	1227.800	1226.400	0
		Carbon Adsorption	721.000	10.500	99
N,N-DIMETHYLFORMAMIDE	UG/L	Holding Tank	165.000	166.400	-1
		Metals Precipition	166.400	147.000	12
		Sand Filter	147.000	109.400	26
		Carbon Adsorption	68.000	15.500	77
N-DECANE (N-C10)	UG/L	Holding Tank	278.143	716.400	***
		Metals Precipition	716.400	244.400	66
		Sand Filter	244.400	222.600	9
		Carbon Adsorption	298.200	230.600	23
N-DODECANE (N-C12)	UG/L	Holding Tank	969.714	572.200	41
		Metals Precipition	572.200	527.400	8
		Sand Filter	527.400	1185.400	***
		Carbon Adsorption	830.200	388.000	53
NAPHTHALENE	UG/L	Holding Tank	117.571	101.600	14
		Metals Precipition	101.600	64.600	36
		Sand Filter	64.600	60.400	7
		Carbon Adsorption	36.600	10.000	73
P-DIOXANE	UG/L	Holding Tank	357.143	100.000	72
		Metals Precipition	100.000	111.600	-12
		Sand Filter	111.600	107.000	4
		Carbon Adsorption	100.000	119.833	-20
PHENOL	UG/L	Holding Tank	159.286	258.400	-62
		Metals Precipition	258.400	162.000	37
		Sand Filter	162.000	134.200	17
		Carbon Adsorption	58.400	10.000	83

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
TETRACHLOROETHENE	UG/L	Holding Tank	385.714	100.000	74
		Metals Precipition	100.000	94.000	6
		Sand Filter	94.000	93.000	1
		Carbon Adsorption	100.000	10.000	90
TOLUENE	UG/L	Holding Tank	631.714	252.200	60
		Metals Precipition	252.200	224.800	11
		Sand Filter	224.800	207.800	8
		Carbon Adsorption	130.800	10.000	92
TRICHLOROETHENE	UG/L	Holding Tank	8369.714	5264.200	37
		Metals Precipition	5264.200	3679.400	30
		Sand Filter	3679.400	3366.400	9
		Carbon Adsorption	2154.200	10.000	100
INORGANICS					
ALUMINUM	UG/L	Holding Tank	1994285.71	1534000.000	23
		Metals Precipition	1534000.00	5440.000	100
		Sand Filter	5440.000	5262.000	3
		Carbon Adsorption	3130.000	148.167	95
BARIUM	UG/L	Holding Tank	21.571	27.600	-28
		Metals Precipition	27.600	100.800	***
		Sand Filter	100.800	98.200	3
		Carbon Adsorption	85.200	76.500	10
BERYLLIUM	UG/L	Holding Tank	112.429	89.800	20
		Metals Precipition	89.800	2.000	98
		Sand Filter	2.000	2.000	0
		Carbon Adsorption	2.000	2.000	0
BORON	UG/L	Holding Tank	4215.714	3624.000	14
		Metals Precipition	3624.000	1212.000	67
		Sand Filter	1212.000	1204.000	1
		Carbon Adsorption	889.600	772.333	13
CADMIUM	UG/L	Holding Tank	2507.143	2006.000	20
		Metals Precipition	2006.000	6.200	100
		Sand Filter	6.200	7.200	-16
		Carbon Adsorption	5.600	5.000	11
CALCIUM	UG/L	Holding Tank	439428.571	453400.000	-3
		Metals Precipition	453400.000	879200.000	-94
		Sand Filter	879200.000	891800.000	-1
		Carbon Adsorption	706000.000	606666.667	14

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
CERIUM	UG/L	Holding Tank	14429.000	11180.000	23
		Metals Precipition	11180.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
CHROMIUM	UG/L	Holding Tank	121428.571	89940.000	26
		Metals Precipition	89940.000	45.600	100
		Sand Filter	45.600	45.000	1
		Carbon Adsorption	26.800	16.500	38
COBALT	UG/L	Holding Tank	3178.571	2540.000	20
		Metals Precipition	2540.000	25.000	99
		Sand Filter	25.000	25.000	0
		Carbon Adsorption	25.000	25.000	0
COPPER	UG/L	Holding Tank	9285.714	7064.000	24
		Metals Precipition	7064.000	274.800	96
		Sand Filter	274.800	250.000	9
		Carbon Adsorption	156.800	9.000	94
GALDOLINIUM	UG/L	Holding Tank	857.000	680.000	21
		Metals Precipition	680.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
GALLIUM	UG/L	Holding Tank	700.000	580.000	17
		Metals Precipition	580.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
GOLD	UG/L	Holding Tank	3371.000	2680.000	20
		Metals Precipition	2680.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
INDIUM	UG/L	Holding Tank	1100.000	1100.000	0
		Metals Precipition	1100.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
IODINE	UG/L	Holding Tank	6000.000	10000.000	-67
		Metals Precipition	10000.000	1500.000	85
		Sand Filter	1500.000	0.000	100
		Carbon Adsorption	0.000	0.000	***
IRIDIUM	UG/L	Holding Tank	3229.000	2440.000	24
		Metals Precipition	2440.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
IRON	UG/L	Holding Tank	302405.714	258200.000	15
		Metals Precipition	258200.000	113.400	100
		Sand Filter	113.400	102.200	10
		Carbon Adsorption	70.000	26.000	63
LANTHANUM	UG/L	Holding Tank	1771.000	1100.000	38
		Metals Precipition	1100.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
LEAD	UG/L	Holding Tank	223.143	230.600	-3
		Metals Precipition	230.600	50.400	78
		Sand Filter	50.400	50.000	1
		Carbon Adsorption	50.400	50.000	1
LITHIUM	UG/L	Holding Tank	1900.000	1480.000	22
		Metals Precipition	1480.000	280.000	81
		Sand Filter	280.000	280.000	0
		Carbon Adsorption	180.000	140.000	22
LUTETIUM	UG/L	Holding Tank	200.000	160.000	20
		Metals Precipition	160.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
MAGNESIUM	UG/L	Holding Tank	1242857.14	982800.000	21
		Metals Precipition	982800.000	109500.000	89
		Sand Filter	109500.000	107020.000	2
		Carbon Adsorption	114640.000	130666.667	-14
MANGANESE	UG/L	Holding Tank	341000.000	268200.000	21
		Metals Precipition	268200.000	2388.000	99
		Sand Filter	2388.000	2334.000	2
		Carbon Adsorption	1491.200	1858.333	-25
MOLYBDENUM	UG/L	Holding Tank	12.429	11.600	7
		Metals Precipition	11.600	10.000	14
		Sand Filter	10.000	10.000	0
		Carbon Adsorption	10.000	10.000	0
NEODYMIUM	UG/L	Holding Tank	1686.000	1380.000	18
		Metals Precipition	1380.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
NICKEL	UG/L	Holding Tank	17842.857	14280.000	20
		Metals Precipition	14280.000	22.000	100
		Sand Filter	22.000	22.000	0
		Carbon Adsorption	22.000	22.000	0

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
NIOBIUM	UG/L	Holding Tank	1543.000	1180.000	24
		Metals Precipition	1180.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
PHOSPHORUS	UG/L	Holding Tank	9300.000	6960.000	25
		Metals Precipition	6960.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
POTASSIUM	UG/L	Holding Tank	1586.000	1540.000	3
		Metals Precipition	1540.000	1580.000	-3
		Sand Filter	1580.000	1560.000	1
		Carbon Adsorption	1100.000	0.000	100
SCANDIUM	UG/L	Holding Tank	300.000	220.000	27
		Metals Precipition	220.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
SILICON	UG/L	Holding Tank	7214.000	5640.000	22
		Metals Precipition	5640.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	1420.000	1150.000	19
SILVER	UG/L	Holding Tank	12.571	6.000	52
		Metals Precipition	6.000	6.600	-10
		Sand Filter	6.600	11.600	-76
		Carbon Adsorption	6.000	6.000	0
SODIUM	UG/L	Holding Tank	866857.143	940800.000	-9
		Metals Precipition	940800.000	996000.000	-6
		Sand Filter	996000.000	1290000.000	-30
		Carbon Adsorption	856000.000	715833.333	16
STRONTIUM	UG/L	Holding Tank	1543.000	1460.000	5
		Metals Precipition	1460.000	1440.000	1
		Sand Filter	1440.000	1440.000	0
		Carbon Adsorption	1220.000	1167.000	4
SULFUR	UG/L	Holding Tank	6337143.00	5342000.000	16
		Metals Precipition	5342000.00	1746000.000	67
		Sand Filter	1746000.00	1760000.000	-1
		Carbon Adsorption	1238000.00	1063833.000	14
TANTALUM	UG/L	Holding Tank	700.000	550.000	21
		Metals Precipition	550.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
TIN	UG/L	Holding Tank	43.000	33.600	22
		Metals Precipition	33.600	30.000	11
		Sand Filter	30.000	30.000	0
		Carbon Adsorption	30.000	30.000	0
TITANIUM	UG/L	Holding Tank	120.714	91.000	25
		Metals Precipition	91.000	10.800	88
		Sand Filter	10.800	13.000	-20
		Carbon Adsorption	11.600	9.667	17
VANADIUM	UG/L	Holding Tank	1495.714	1024.600	31
		Metals Precipition	1024.600	13.000	99
		Sand Filter	13.000	13.000	0
		Carbon Adsorption	13.000	13.000	0
YTTERBIUM	UG/L	Holding Tank	400.000	300.000	25
		Metals Precipition	300.000	0.000	100
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	0.000	***
YTTRIUM	UG/L	Holding Tank	3911.429	3092.000	21
		Metals Precipition	3092.000	6.000	100
		Sand Filter	6.000	6.000	0
		Carbon Adsorption	5.000	5.000	0
ZINC	UG/L	Holding Tank	56042.857	43080.000	23
		Metals Precipition	43080.000	13.800	100
		Sand Filter	13.800	20.200	-46
		Carbon Adsorption	13.400	13.000	3
CONVENTIONALS/NONCONVENTIONALS					
AMMONIA, AS N	UG/L	Holding Tank	8886.000	7300.000	18
		Metals Precipition	7300.000	6480.000	11
		Sand Filter	6480.000	6260.000	3
		Carbon Adsorption	3580.000	2717.000	24
BOD	UG/L	Holding Tank	131571.000	93600.000	29
		Metals Precipition	93600.000	105400.000	-13
		Sand Filter	105400.000	101600.000	4
		Carbon Adsorption	546000.000	336667.000	38
CHLORIDE	UG/L	Holding Tank	351429.000	356000.000	-1
		Metals Precipition	356000.000	364000.000	-2
		Sand Filter	364000.000	342000.000	6
		Carbon Adsorption	276000.000	265000.000	4

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
COD	UG/L	Holding Tank	3928571.00	3040000.000	23
		Metals Precipition	3040000.00	2580000.000	15
		Sand Filter	2580000.00	2460000.000	5
		Carbon Adsorption	1680000.00	1100000.000	35
CORROSIVITY	MPY	Holding Tank	13.000	0.000	100
		Metals Precipition	0.000	0.000	***
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	10.000	***
CYANIDE, TOTAL	UG/L	Holding Tank	48.571	59.400	-22
		Metals Precipition	59.400	28.400	52
		Sand Filter	28.400	25.400	11
		Carbon Adsorption	20.600	20.000	3
FLASH POINT	25 C	Holding Tank	23.500	0.000	100
		Metals Precipition	0.000	0.000	***
		Sand Filter	0.000	0.000	***
		Carbon Adsorption	0.000	54.000	***
FLUORIDE	UG/L	Holding Tank	150243.000	148000.000	1
		Metals Precipition	148000.000	12680.000	91
		Sand Filter	12680.000	12600.000	1
		Carbon Adsorption	8280.000	6700.000	19
NITRATE + NITRITE, AS N	UG/L	Holding Tank	78000.000	70600.000	9
		Metals Precipition	70600.000	59600.000	16
		Sand Filter	59600.000	57000.000	4
		Carbon Adsorption	55000.000	45167.000	18
NITROGEN, TOTAL KJELDAHL	UG/L	Holding Tank	24857.000	17400.000	30
		Metals Precipition	17400.000	12600.000	28
		Sand Filter	12600.000	12800.000	-2
		Carbon Adsorption	9100.000	4917.000	46
PHOSPHORUS, TOTAL AS P	UG/L	Holding Tank	9143.000	6420.000	30
		Metals Precipition	6420.000	556.000	91
		Sand Filter	556.000	498.000	10
		Carbon Adsorption	310.000	185.000	40
SPECIFIC CONDUCTANCE	UMH/CM-25C	Holding Tank	17571.429	16000.000	9
		Metals Precipition	16000.000	10440.000	35
		Sand Filter	10440.000	10040.000	4
		Carbon Adsorption	7340.000	5683.333	23
SULFATE	UG/L	Holding Tank	19428571.0	15600000.000	20
		Metals Precipition	15600000.0	4040000.000	74
		Sand Filter	4040000.00	4300000.000	-6
		Carbon Adsorption	2880000.00	2700000.000	6

STRINGFELLOW ACID PITS - EPISODE 1240 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
SULFIDE, TOTAL (IODOMETRIC)	UG/L	Holding Tank	1057.000	2020.000	-91
		Metals Precipition	2020.000	600.000	70
		Sand Filter	600.000	600.000	0
		Carbon Adsorption	600.000	667.000	-11
TDS	UG/L	Holding Tank	29285714.0	24000000.000	18
		Metals Precipition	24000000.0	9700000.000	60
		Sand Filter	9700000.00	9700000.000	0
		Carbon Adsorption	6800000.00	5950000.000	13
TOC	UG/L	Holding Tank	1300000.00	1126000.000	13
		Metals Precipition	1126000.00	954000.000	15
		Sand Filter	954000.000	954000.000	0
		Carbon Adsorption	802000.000	520000.000	35
TSS	UG/L	Holding Tank	26286.000	200200.000	***
		Metals Precipition	200200.000	23600.000	88
		Sand Filter	23600.000	20200.000	14
		Carbon Adsorption	23800.000	5000.000	79

SECTION B-12
TREATABILITY OF CERCLA POLLUTANTS
STRINGFELLOW - EPISODE 1805

(FOUR DAY SAMPLING EVENT)

STRINGFELLOW ACID PITS - EPISODE 1805
SITE DESCRIPTION

Stringfellow Acid Pit was operated by Stringfellow Quarry Co. from 1956 to 1972 as a hazardous waste disposal facility. The landfill disposal site was permitted by the Santa Ana Regional Water Quality Control Board (RWQCB). About 34 million gallons of wastes, mostly from metal finishing, electroplating, and DDT production, were deposited on approximately 17 acres of the site. In 1969 and 1978, excessive rainfall caused the ponds used for solar evaporation to overflow, spreading contamination into the nearby town of Glen Avon. In July 1980, the RWQCB advocated total removal of all solids and liquids but the funds were not available. In December 1980, RWQCB selected an interim plan that included installation of channels to divert surface water, a gravel drain and a network of wells for monitoring and extraction, and a clay core barrier dam downgradient to stop subsurface leachate migration.

California placed Stringfellow at the top of the California priority list. The State conducted a study in compliance with the National Oil and Hazardous Substances Pollution Contingency Plan (the National Contingency Plan or NCP) to obtain CERCLA funds. The results of the study indicated that on-site management was more cost effective than total removal.

On July 22, 1983, Lee Thomas, Assistant Administrator of the Office of Solid Waste and Emergency Response (OSWER), signed a Record of Decision (ROD) which endorsed the State's request for funds for both existing activities and proposed actions. The interim actions authorized in the ROD were:

- o removal of DDT contaminated material
- o operation of extraction wells upgradient of the clay barrier to protect the barrier
- o fencing the entire site to prevent entry
- o erosion control to prevent destruction of a clay cap

The state also requested EPA to lead a fast track Remedial Investigation/Feasibility Study (RI/FS) while the Department of Health Services completed the long-term RI/FS.

As a result of the fast track RI/FS, a pretreatment system was installed to treat the groundwater before its discharge to the Santa Ana Watershed Project Authority. The series of extraction wells transfer two groundwater streams from the contaminated canyon area to the field storage tanks. On-site groundwater (Stream A), known to contain metal compounds and organics, is transferred from the field storage tanks to one of four equalization tanks (each with a 12,000-gallon capacity) at the on-site treatment plant. Once equalization of Stream A occurs, Stream A proceeds to a 400-gallon capacity rapid mix tank where lime and caustic soda are added to aid precipitation and to control acidity/alkalinity, and polymer is added to aid floc formation. The chemically treated and mixed stream flows to two parallel-operating clarifiers.

The thickened sludge is pumped from the clarifiers to the sludge holding tanks, and the clarified effluent flows to two gravity sand filters operating in parallel. Each filter has a 7.6 square foot area, and the sand is about three feet deep. Wastewater from the sand filters is transferred to the 500-gallon Stream A filter effluent tank.

Groundwater from mid-canyon (Stream B), which contains mostly organic compounds, is transferred from the field storage tanks to one of three equalization tanks (12,000-gallon capacity each) located at the on-site treatment plant. Stream A effluent from the 500-gallon filter effluent tank is blended with Stream B before discharging to activated carbon adsorption vessels. The two carbon adsorption vessels each have a 10-ton capacity for granular activated carbon and are operated in series with a third vessel functioning as a transfer tank.

Effluent from the carbon adsorption vessels is transferred to one of four final effluent storage tanks (80,000-gallon total capacity), before it is discharged to the sewer at an average rate of 870,000 gallons per month. As necessary, effluent from these storage tanks is used as backwash and other plant utility water.

Sludge is pumped from the clarifiers to two 11,000-gallon sludge holding tanks. The sludge from the two sludge holding tanks is fed to two plate-and-frame filter presses. Depending on the pollutant content, the filtrate from the filter press operation can be recycled to either the Stream A influent equalization tanks, the Stream B influent equalization tanks, or the Stream A filter effluent tank. Usually, the filtrate is pumped to the Stream A equalization tanks. The sludge cake is discharged into containers and is hauled off-site by a contractor for disposal at a RCRA approved Class I disposal site as hazardous waste.

As part of the Stringfellow discharge permit, the effluent must be tested prior to any discharge. Currently, the facility is allowed to fill two storage tanks simultaneously, but is only required to test one tank.

The pretreatment system located at Stringfellow operates five days per week during the daylight hours.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (C_{14} to C_{18}-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

SUMMARY OF ANALYTICAL METHODS (cont.)

Analytical Category and Fraction	Technique	EPA Method No.
Classicals (sludge samples)		
Ammonia, as N	Titrimetric, Distillation	350.2
Nitrogen, Kjeldahl, total	Titrimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Cyanide, total	Colorimetric	9010[b]
pH		9045[b]
Residue, total	Gravimetric	160.3
Residue, total volatile	Gravimetric	160.4
Sulfide, total	Monier-Williams	c
Flash point (ignitability)	Pensky-Martens Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

b. Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

c. 49 CFR Part 425, Federal Register Vol. 52, No. 13, January 21, 1987

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 µg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 µg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

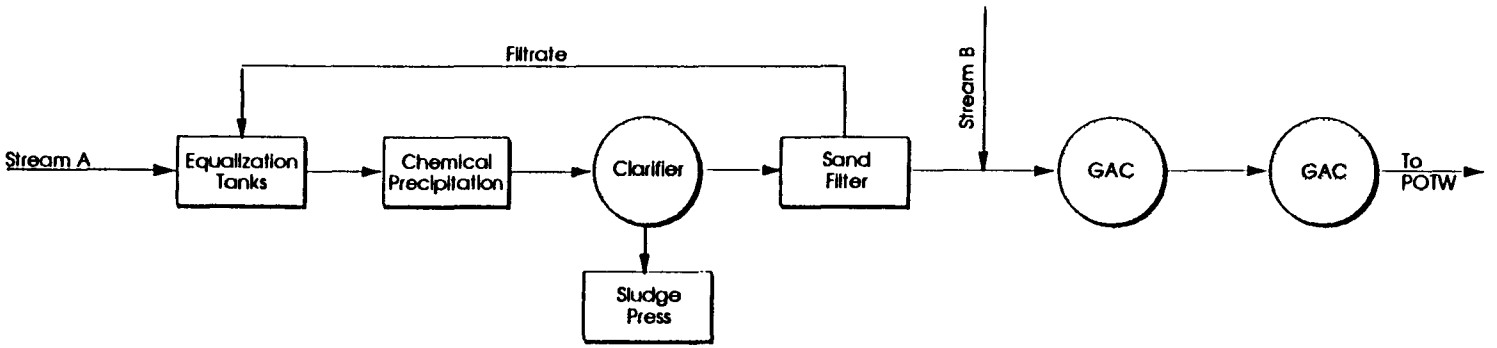
M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

R - Spike recovery limits met after rerun on ICP.



Treatment: CP-SF-GAC
Wastewater Type: Groundwater
Average Flow: 0.04 MGD (8 Hours/5 Days/Wk)
To 220 MGD POTW

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading	Discharge	% Mass Removed CP[5]	% Mass Removed SF[5]	% Mass Removed GAC[5]
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	15 : 20 : 27	0.028ppt -6,848 ug/L	12 - 6,848 ug/L	1,760 : 2,490	13 : 45	24 : 29	14 : 17	97 : 94
Metals	7 : 17 : 30	30 - 5,792,000 ug/L	114 - 112,600 ug/L	16,780 : 965,700	8 : 212,460	> 99 : 57	33 : < 1	58 : 5

NOTES:

1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. Taken from concentration averages over a four day sampling event

3. Based on pollutant concentration averages

4. The flows for streams A and B are unavailable - overall removal can not be calculated

5. CP = Chemical Precipitation
   SF = Sand Filter
   GAC = Granular Activated Carbon

FIGURE B-12
STRINGFELLOW - 1805
FOUR DAY SAMPLING EVENT
REGION IX GLEN AVON HEIGHTS, CA

STRINGFELLOW ACID PITS - EPISODE 1805
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
HOLDING TANK + CHEMICAL PRECIPITATION + SAND FILTER + CARBON ADSORPTION

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
1,2-DICHLOROBENZENE	UG/L	Holding Tank	4742.00	3258.50	31
		Metals Precipition	3258.50	2402.75	26
		Sand Filter	2402.75	2152.80	10
		Carbon Adsorbtion	987.75	10.00	99
1,2-DICHLOROETHANE	UG/L	Holding Tank	15.20	13.75	10
		Metals Precipition	13.75	10.25	25
		Sand Filter	10.25	10.00	2
		Carbon Adsorbtion	10.00	10.00	0
1,3-DICHLOROBENZENE	UG/L	Holding Tank	403.00	81.25	80
		Metals Precipition	81.25	62.25	23
		Sand Filter	62.25	48.20	23
		Carbon Adsorbtion	25.00	10.00	60
1,4-DICHLOROBENZENE	UG/L	Holding Tank	1451.20	831.25	43
		Metals Precipition	831.25	656.00	21
		Sand Filter	656.00	605.80	8
		Carbon Adsorbtion	254.25	10.00	96
1234678-HpCDD	PPT	Holding Tank	0.03	0.02	32
		Metals Precipition	0.02	0.02	-5
		Sand Filter	0.02	0.02	0
		Carbon Adsorbtion	0.03	0.02	24
2-BUTANONE (MEK)	UG/L	Holding Tank	1500.40	1351.25	10
		Metals Precipition	1351.25	1242.25	8
		Sand Filter	1242.25	1076.40	13
		Carbon Adsorbtion	647.50	50.00	92
2-HEXANONE	UG/L	Holding Tank	151.40	159.25	-5
		Metals Precipition	159.25	80.50	49
		Sand Filter	80.50	77.60	4
		Carbon Adsorbtion	50.00	50.00	0
4-METHYL-2-PENTANONE (MIBK)	UG/L	Holding Tank	1404.20	1255.25	11
		Metals Precipition	1255.25	738.00	41
		Sand Filter	738.00	613.00	17
		Carbon Adsorbtion	97.00	50.00	48
ACETONE	UG/L	Holding Tank	5006.60	5003.25	0
		Metals Precipition	5003.25	5343.50	-7
		Sand Filter	5343.50	4085.00	24
		Carbon Adsorbtion	1464.00	50.00	97

STRINGFELLOW ACID PITS - EPISODE 1805 (CONT.)
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
BENZENE	UG/L	Holding Tank	12.20	10.00	18
		Metals Precipition	10.00	10.00	0
		Sand Filter	10.00	10.00	0
		Carbon Adsorbtion	10.00	10.00	0
CHLOROBENZENE	UG/L	Holding Tank	1515.60	1230.00	19
		Metals Precipition	1230.00	878.00	29
		Sand Filter	878.00	737.20	16
		Carbon Adsorbtion	364.25	10.00	97
CHLOROFORM	UG/L	Holding Tank	970.00	777.75	20
		Metals Precipition	777.75	718.50	8
		Sand Filter	718.50	603.60	16
		Carbon Adsorbtion	346.75	10.00	97
ETHYLBENZENE	UG/L	Holding Tank	82.80	56.75	31
		Metals Precipition	56.75	37.00	35
		Sand Filter	37.00	30.20	18
		Carbon Adsorbtion	14.25	10.00	30
ISOBUTYL ALCOHOL	UG/L	Holding Tank	11.40	10.25	10
		Metals Precipition	10.25	10.00	2
		Sand Filter	10.00	10.00	0
		Carbon Adsorbtion	10.00	10.00	0
ISOPHORONE	UG/L	Holding Tank	1027.40	1298.25	**
		Metals Precipition	1298.25	1749.25	**
		Sand Filter	1749.25	1269.20	27
		Carbon Adsorbtion	904.50	10.00	99
M-XYLENE	UG/L	Holding Tank	49.00	36.00	27
		Metals Precipition	36.00	25.75	28
		Sand Filter	25.75	22.40	13
		Carbon Adsorbtion	11.00	10.00	9
METHYLENE CHLORIDE	UG/L	Holding Tank	2415.00	2046.25	15
		Metals Precipition	2046.25	1230.25	40
		Sand Filter	1230.25	1382.00	**
		Carbon Adsorbtion	665.75	10.00	98
NAPTHALENE	UG/L	Holding Tank	106.00	79.25	25
		Metals Precipition	79.25	53.75	32
		Sand Filter	53.75	47.60	11
		Carbon Adsorbtion	13.25	10.00	25
O- + P-XYLENE	UG/L	Holding Tank	28.80	20.50	29
		Metals Precipition	20.50	15.00	27
		Sand Filter	15.00	13.80	8
		Carbon Adsorbtion	10.00	10.00	0

STRINGFELLOW ACID PITS - EPISODE 1805 (CONT.)
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
OCDD	PPT	Holding Tank	0.03	0.09	**
		Metals Precipition	0.09	0.11	**
		Sand Filter	0.11	0.07	36
		Carbon Adsorbtion	0.03	0.07	**
P-DIOXANE	UG/L	Holding Tank	215.00	3898.00	**
		Metals Precipition	3898.00	155.25	96
		Sand Filter	155.25	152.00	2
		Carbon Adsorbtion	84.00	83.00	1
TETRACHLOROETHENE	UG/L	Holding Tank	199.60	127.50	36
		Metals Precipition	127.50	83.00	35
		Sand Filter	83.00	65.00	22
		Carbon Adsorbtion	29.50	10.00	66
TOLUENE	UG/L	Holding Tank	442.80	315.25	29
		Metals Precipition	315.25	192.25	39
		Sand Filter	192.25	155.20	19
		Carbon Adsorbtion	74.00	10.00	86
TOTAL HpCDD	PPT	Holding Tank	0.03	0.00	**
		Metals Precipition	0.00	0.00	**
		Sand Filter	0.00	0.00	**
		Carbon Adsorbtion	0.00	0.00	**
TRANS-1,2-DICHLOROETHENE	UG/L	Holding Tank	30.40	24.00	21
		Metals Precipition	24.00	15.75	34
		Sand Filter	15.75	14.80	6
		Carbon Adsorbtion	11.00	10.00	9
TRICHLOROETHENE	UG/L	Holding Tank	6847.80	5360.00	22
		Metals Precipition	5360.00	3654.00	32
		Sand Filter	3654.00	2977.20	19
		Carbon Adsorbtion	1772.25	10.00	99
VINYL ACETATE	UG/L	Holding Tank	50.00	52.25	-4
		Metals Precipition	52.25	57.50	**
		Sand Filter	57.50	54.20	6
		Carbon Adsorbtion	50.00	50.00	0
INORGANICS					
ALUMINUM	UG/L	Holding Tank	1898000.00	1570000.00	17
		Metals Precipition	1570000.00	8987.50	99
		Sand Filter	8987.50	5580.00	38
		Carbon Adsorbtion	4802.50	68.00	99

STRINGFELLOW ACID PITS - EPISODE 1805 (CONT.)
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
BARIUM	UG/L	Holding Tank	30.00	30.00	0
		Metals Precipition	30.00	25.75	14
		Sand Filter	25.75	27.80	-8
		Carbon Adsorbtion	48.75	44.60	9
BERYLLIUM	UG/L	Holding Tank	114.00	92.50	19
		Metals Precipition	92.50	2.00	98
		Sand Filter	2.00	2.00	0
		Carbon Adsorbtion	2.00	2.00	0
BORON	UG/L	Holding Tank	3034.00	2707.50	11
		Metals Precipition	2707.50	931.00	66
		Sand Filter	931.00	950.20	-2
		Carbon Adsorbtion	716.50	686.20	4
CADMIUM	UG/L	Holding Tank	2826.00	2330.00	18
		Metals Precipition	2330.00	4.75	**
		Sand Filter	4.75	4.20	12
		Carbon Adsorbtion	3.50	3.00	14
CALCIUM	UG/L	Holding Tank	449800.00	473250.00	-5
		Metals Precipition	473250.00	684250.00	**
		Sand Filter	684250.00	763000.00	**
		Carbon Adsorbtion	535250.00	511600.00	4
CERIUM	UG/L	Holding Tank	15200.00	12750.00	16
		Metals Precipition	12750.00	0.00	**
		Sand Filter	0.00	0.00	**
		Carbon Adsorbtion	0.00	0.00	**
CHROMIUM	UG/L	Holding Tank	112600.00	91550.00	19
		Metals Precipition	91550.00	50.00	**
		Sand Filter	50.00	29.40	41
		Carbon Adsorbtion	24.50	12.00	51
COBALT	UG/L	Holding Tank	3380.00	2765.00	18
		Metals Precipition	2765.00	9.00	**
		Sand Filter	9.00	9.00	0
		Carbon Adsorbtion	9.00	9.00	0
COPPER	UG/L	Holding Tank	8502.00	7095.00	17
		Metals Precipition	7095.00	315.00	96
		Sand Filter	315.00	198.80	37
		Carbon Adsorbtion	114.25	8.20	93
GADOLINIUM	UG/L	Holding Tank	600.00	0.00	**
		Metals Precipition	0.00	0.00	**
		Sand Filter	0.00	0.00	**
		Carbon Adsorbtion	0.00	0.00	**

STRINGFELLOW ACID PITS - EPISODE 1805 (CONT.)
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
GOLD	UG/L	Holding Tank	3000.00	2250.00	25
		Metals Precipition	2250.00	0.00	**
		Sand Filter	0.00	0.00	**
		Carbon Adsorbtion	0.00	0.00	**
IRON	UG/L	Holding Tank	387400.00	310000.00	20
		Metals Precipition	310000.00	147.25	**
		Sand Filter	147.25	70.40	52
		Carbon Adsorbtion	357.75	23.00	94
LANTHANUM	UG/L	Holding Tank	2000.00	2000.00	0
		Metals Precipition	2000.00	0.00	**
		Sand Filter	0.00	0.00	**
		Carbon Adsorbtion	0.00	0.00	**
LEAD	UG/L	Holding Tank	532.00	492.50	7
		Metals Precipition	492.50	41.00	92
		Sand Filter	41.00	41.00	0
		Carbon Adsorbtion	41.00	41.00	0
LITHIUM	UG/L	Holding Tank	2000.00	1500.00	25
		Metals Precipition	1500.00	125.00	92
		Sand Filter	125.00	180.00	**
		Carbon Adsorbtion	50.00	20.00	60
MAGNESIUM	UG/L	Holding Tank	1156000.00	957750.00	17
		Metals Precipition	957750.00	38000.00	96
		Sand Filter	38000.00	45700.00	**
		Carbon Adsorbtion	103250.00	105060.00	-2
MANGANESE	UG/L	Holding Tank	328600.00	266500.00	19
		Metals Precipition	266500.00	1058.75	**
		Sand Filter	1058.75	1117.80	-6
		Carbon Adsorbtion	1058.25	1108.00	-5
MOLYBDENUM	UG/L	Holding Tank	100.00	100.00	0
		Metals Precipition	100.00	13.00	87
		Sand Filter	13.00	12.40	5
		Carbon Adsorbtion	12.00	15.60	**
NICKEL	UG/L	Holding Tank	19520.00	16150.00	17
		Metals Precipition	16150.00	11.00	**
		Sand Filter	11.00	10.20	7
		Carbon Adsorbtion	14.25	13.40	6
PHOSPHORUS	UG/L	Holding Tank	7200.00	7000.00	3
		Metals Precipition	7000.00	500.00	93
		Sand Filter	500.00	240.00	52
		Carbon Adsorbtion	0.00	0.00	**

STRINGFELLOW ACID PITS - EPISODE 1805 (CONT.)
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
POTASSIUM	UG/L	Holding Tank	24200.00	23500.00	3
		Metals Precipition	23500.00	24900.00	-6
		Sand Filter	24900.00	24920.00	0
		Carbon Adsorbtion	13675.00	13480.00	1
SILICON	UG/L	Holding Tank	30400.00	26250.00	14
		Metals Precipition	26250.00	225.00	99
		Sand Filter	225.00	580.00	**
		Carbon Adsorbtion	9500.00	7660.00	19
SODIUM	UG/L	Holding Tank	821000.00	895000.00	-9
		Metals Precipition	895000.00	1662500.00	**
		Sand Filter	1662500.00	1656000.00	0
		Carbon Adsorbtion	895000.00	881800.00	1
STRONTIUM	UG/L	Holding Tank	2000.00	2000.00	0
		Metals Precipition	2000.00	825.00	59
		Sand Filter	825.00	1120.00	**
		Carbon Adsorbtion	875.00	860.00	2
SULFUR	UG/L	Holding Tank	5792000.00	4950000.00	15
		Metals Precipition	4950000.00	1655000.00	67
		Sand Filter	1655000.00	1712000.00	-3
		Carbon Adsorbtion	1000000.00	925200.00	7
TITANIUM	UG/L	Holding Tank	118.00	85.00	28
		Metals Precipition	85.00	4.25	95
		Sand Filter	4.25	4.20	1
		Carbon Adsorbtion	18.00	3.40	81
VANADIUM	UG/L	Holding Tank	1584.00	1040.00	34
		Metals Precipition	1040.00	10.50	99
		Sand Filter	10.50	10.20	3
		Carbon Adsorbtion	10.25	10.40	-1
YTTRIUM	UG/L	Holding Tank	4594.00	3767.50	18
		Metals Precipition	3767.50	4.25	**
		Sand Filter	4.25	4.20	1
		Carbon Adsorbtion	3.25	3.00	8
ZINC	UG/L	Holding Tank	49200.00	40675.00	17
		Metals Precipition	40675.00	11.75	**
		Sand Filter	11.75	8.00	32
		Carbon Adsorbtion	20.25	12.00	41

CONVENTIONALS/NONCONVENTIONALS

STRINGFELLOW ACID PITS - EPISODE 1805 (CONT.)
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
AMMONIA, AS N	UG/L	Holding Tank	8600.00	8400.00	2
		Metals Precipition	8400.00	7050.00	16
		Sand Filter	7050.00	6780.00	4
		Carbon Adsorbtion	3400.00	3420.00	-1
BOD-5 DAY (CARBONACEOUS)	UG/L	Holding Tank	30600.00	13.25	**
		Metals Precipition	13.25	325000.00	**
		Sand Filter	325000.00	126800.00	61
		Carbon Adsorbtion	1367500.00	706000.00	48
CHEMICAL OXYGEN DEMAND	UG/L	Holding Tank	4340000.00	3900000.00	10
		Metals Precipition	3900000.00	3125000.00	20
		Sand Filter	3125000.00	2980000.00	5
		Carbon Adsorbtion	1475000.00	1140000.00	23
CHLORIDE	UG/L	Holding Tank	512000.00	460000.00	10
		Metals Precipition	460000.00	395000.00	14
		Sand Filter	395000.00	412000.00	-4
		Carbon Adsorbtion	255000.00	266000.00	-4
CHLORINE	UG/L	Holding Tank	0.00	0.00	**
		Metals Precipition	0.00	0.00	**
		Sand Filter	0.00	0.00	**
		Carbon Adsorbtion	0.00	0.00	**
CORROSIVITY	MPY	Holding Tank	13.20	14.00	-6
		Metals Precipition	14.00	0.00	**
		Sand Filter	0.00	4.00	**
		Carbon Adsorbtion	2500.00	2.00	**
CYANIDE, TOTAL	UG/L	Holding Tank	33.40	47.75	**
		Metals Precipition	47.75	40.00	16
		Sand Filter	40.00	43.60	-9
		Carbon Adsorbtion	21.25	20.00	6
FLASH POINT	25 DEG C	Holding Tank	13.00	16.25	**
		Metals Precipition	16.25	0.00	**
		Sand Filter	0.00	26.00	**
		Carbon Adsorbtion	16.25	13.00	20
FLOURIDE	UG/L	Holding Tank	308.00	295.00	4
		Metals Precipition	295.00	6250.00	**
		Sand Filter	6250.00	8460.00	**
		Carbon Adsorbtion	3730.00	5180.00	**
NITRATE + NITRITE, AS N	UG/L	Holding Tank	61000.00	82250.00	**
		Metals Precipition	82250.00	76000.00	8
		Sand Filter	76000.00	55000.00	28
		Carbon Adsorbtion	51750.00	52000.00	0

STRINGFELLOW ACID PITS - EPISODE 1805 (CONT.)
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
NITROGEN, TOTAL KJELDEHL	UG/L	Holding Tank	9760.00	8250.00	15
		Metals Precipition	8250.00	7325.00	11
		Sand Filter	7325.00	0.00	**
		Carbon Adsorbtion	2425.00	10780.00	**
NITROGENM TOTAL KJELDEHL	UG/L	Holding Tank	0.00	0.00	**
		Metals Precipition	0.00	0.00	**
		Sand Filter	0.00	7640.00	**
		Carbon Adsorbtion	0.00	0.00	**
OIL & GREASE, TOTAL RECOVERABLE	UG/L	Holding Tank	6940.00	7375.00	-6
		Metals Precipition	7375.00	18750.00	**
		Sand Filter	18750.00	30080.00	**
		Carbon Adsorbtion	5525.00	5400.00	2
PHOSPHORUS, TOTAL AS P	UG/L	Holding Tank	9540.00	7975.00	16
		Metals Precipition	7975.00	758.00	90
		Sand Filter	758.00	606.00	20
		Carbon Adsorbtion	453.00	250.00	45
RESIDUE, FILTERABLE	UG/L	Holding Tank	30000000.0	26000000.00	13
		Metals Precipition	26000000.0	9550000.00	63
		Sand Filter	9550000.00	9360000.00	2
		Carbon Adsorbtion	5875000.00	5500000.00	6
RESIDUE, NON-FILTERABLE	UG/L	Holding Tank	30520.00	182500.00	**
		Metals Precipition	182500.00	43250.00	76
		Sand Filter	43250.00	35000.00	19
		Carbon Adsorbtion	51750.00	4400.00	91
SPECIFIC CONDUCTANCE	UMH/CM-25C	Holding Tank	16000.00	15250.00	5
		Metals Precipition	15250.00	9450.00	38
		Sand Filter	9450.00	9100.00	4
		Carbon Adsorbtion	6475.00	6120.00	5
SULFATE	UG/L	Holding Tank	16604200.0	18000000.00	-8
		Metals Precipition	18000000.0	3750000.00	79
		Sand Filter	3750000.00	3740000.00	0
		Carbon Adsorbtion	2400000.00	2460000.00	-2
TOTAL ORGANIC CARBON	UG/L	Holding Tank	1040000.00	1175000.00	**
		Metals Precipition	1175000.00	977500.00	17
		Sand Filter	977500.00	936000.00	4
		Carbon Adsorbtion	392500.00	396000.00	-1

SECTION B-13
TREATABILITY OF CERCLA POLLUTANTS
SYLVESTER - EPISODE 1325

(FIVE DAY SAMPLING EVENT)

SYLVESTER - EPISODE 1325
SITE DESCRIPTION

The Gilson Road hazardous waste dump site is located in the City of Nashua, New Hampshire, off Route 111, in the south easterly corner of that community. The 6-acre site had been used as a sand borrow pit for an undetermined number of years. During the late 1960s, the operator of the pit began an unapproved and illegal waste disposal operation, apparently intending to fill the excavation. Household refuse, demolition materials, chemical sludges, and hazardous liquid chemicals all were dumped at the site at various times. The household refuse and demolition material were usually buried, while the sludges and hazardous liquids were either mixed with the trash or were allowed to percolate into the ground adjacent to the old sand pit. Some hazardous liquids were also stored in steel drums which were either buried or placed on the ground surface.

The illegal dumping at the site was first discovered in late 1970. After several court appearances, and court actions, an injunction was issued in 1976 which ordered the removal of all materials from the site. This injunction was ignored by the operator.

The first indication that the illegal dumping had included hazardous wastes came in November 1978 when State personnel observed drums being stored at the site. A court order was issued in October 1979 prohibiting all further disposal of hazardous wastes on the site.

It is impossible to estimate the total quantities of waste materials discarded at the site. However, it has been documented that over 800,000 gallons of hazardous waste were discarded there during a ten month period in 1979.

In 1981, initial investigations showed that there were high concentrations of heavy metals and volatile and extractable organics in the groundwater under the site. The contamination formed a plume in the groundwater which was moving from the site toward Lyle Reed Brook at the rate of 0.8 to 1.6 feet per day.

The Gilson Road hazardous waste site has received remedial action under the Comprehensive Emergency Response, Compensation, and Liability Act (CERCLA) since November, 1981. EPA used CERCLA emergency funds to install a ground water interception and recirculation system. This system was operated until October, 1982 when a slurry wall was completed. The State of New Hampshire developed a remedial investigation and feasibility study in January, 1982 and a supplemental study providing costs associated with various groundwater treatment rates in July, 1982. A Record of Decision was signed in July, 1982 which approved the installation of the slurry wall and pilot studies.

Upon completion of the slurry wall, a pilot treatment plant was constructed and operated for several months. The data from this pilot study resulted in a recommendation to construct a treatment plant capable of removing 90 percent of the hazardous constituents within the slurry wall. This design was based on evaluating the present and potential hazards to human health and environmental targets previously identified in the risk assessment portion of the feasibility

study and supplement. A subsequent design modified to reduce operation and maintenance costs, but still capable of 90 percent removal is presently operating at the site.

The treatment system includes chemical precipitation, filtration, and air stripping before the waste stream splits. Approximately 250 gpm is reinjected through recharge trenches inside the slurry wall and the remaining flow (~ 50 gpm) receives biological treatment before reinjection to the groundwater through trenches outside the slurry wall.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

SUMMARY OF ANALYTICAL METHODS (cont.)

Analytical Category and Fraction	Technique	EPA Method No.
Classicals (sludge samples)		
Ammonia, as N	Titrimetric, Distillation	350.2
Nitrogen, Kjeldahl, total	Titrimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Cyanide, total	Colorimetric	9010[b]
pH		9045[b]
Residue, total	Gravimetric	160.3
Residue, total volatile	Gravimetric	160.4
Sulfide, total	Monier-Williams	c
Flash point (ignitability)	Pensky-Martens Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

b. Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

c. 49 CFR Part 425, Federal Register Vol. 52, No. 13, January 21, 1987

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 μg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 μg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

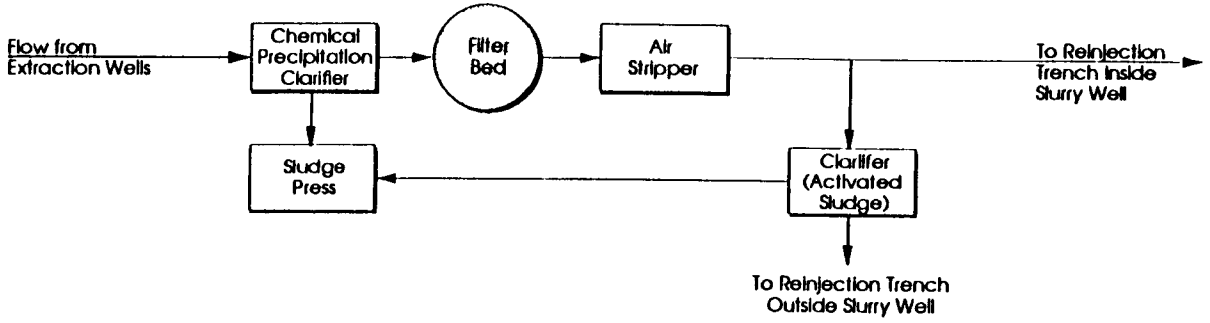
M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

R - Spike recovery limits met after rerun on ICP.



Treatment: CP - SF - AS - BT
Wastewater Type: Groundwater
Average Flow: 400,000 GPD (7Days/Wk, 24 Hrs/Day)
Reinjected Treated Water
Sludge Temporarily Disposed at On-Site Landfill

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed CP[4]	% Mass Removed SF[4]	% Mass Removed AS[4]	% Mass Removed BT[4]	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD	PP : ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	17 : 23 : 28	11-9,178 ug/L	13-9,178 ug/L	19,580; 23,050	37 : 175	21 ; 19	6 ; 7	94 : 88	96 : 92	> 99 : 99
Metals	6 : 14 : 18	8-78,716 ug/L	8-5,224 ug/L	7,766; 224,246	45 : 34,450	96 : 22	15 : < 1	< 1 : < 1	86 : 81	99 : 85

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. Taken from concentration averages over a five day sampling event

3. Based on pollutant concentration averages

4. CP = Chemical Precipitation
   SF = Sand Filtration
   AS = Air Stripping
   BT = Biological Treatment

FIGURE B-13
SYLVESTER - 1325
REGION II NASHUA, NH

SYLVESTER SITE - EPISODE 1325
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
CHEMICAL PRECIPITATION + SAND FILTER + AIR STRIPPER + BIOLOGICAL TREATMENT

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
1,1,1-TRICHLOROETHANE	UG/L	Chemical Precip.	935.500	617.200	34
		Sand Filter	617.200	602.400	2
		Air Stripping	602.400	38.000	94
		Biological Treatment	38.000	10.000	74
		Total Removal	935.500	10.000	99
1,1-DICHLOROETHANE	UG/L	Chemical Precip.	269.333	209.600	22
		Sand Filter	209.600	212.800	-2
		Air Stripping	212.800	17.200	92
		Biological Treatment	17.200	10.000	42
		Total Removal	269.333	10.000	96
1,2-DICHLOROBENZENE	UG/L	Chemical Precip.	390.833	426.400	-9
		Sand Filter	426.400	430.600	-1
		Air Stripping	430.600	22.600	95
		Biological Treatment	22.600	10.000	56
		Total Removal	390.833	10.000	97
2,4-DIMETHYLPHENOL	UG/L	Chemical Precip.	34.167	33.600	2
		Sand Filter	33.600	39.400	-17
		Air Stripping	39.400	32.400	18
		Biological Treatment	32.400	10.000	69
		Total Removal	34.167	10.000	71
4-METHYL-2-PENTANONE	UG/L	Chemical Precip.	1106.167	915.800	17
		Sand Filter	915.800	599.200	35
		Air Stripping	599.200	80.200	87
		Biological Treatment	80.200	50.000	38
		Total Removal	1106.167	50.000	95
ACETONE	UG/L	Chemical Precip.	527.000	582.200	-10
		Sand Filter	582.200	590.200	-1
		Air Stripping	590.200	145.200	75
		Biological Treatment	145.200	50.000	66
		Total Removal	527.000	50.000	91
ALPHA-PICOLINE	UG/L	Chemical Precip.	52.833	60.200	-14
		Sand Filter	60.200	55.000	9
		Air Stripping	55.000	50.000	9
		Biological Treatment	50.000	50.000	0
		Total Removal	52.833	50.000	5
ALPHA-TERPINEOL	UG/L	Chemical Precip.	11.500	11.000	4
		Sand Filter	11.000	12.000	-9
		Air Stripping	12.000	10.000	17
		Biological Treatment	10.000	10.000	0
		Total Removal	11.500	10.000	13

SYLVESTER SITE - EPISODE 1325 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
BENZENE	UG/L	Chemical Precip.	314.500	241.200	23
		Sand Filter	241.200	245.600	-2
		Air Stripping	245.600	18.400	93
		Biological Treatment	18.400	10.000	46
		Total Removal	314.500	10.000	97
BENZOIC ACID	UG/L	Chemical Precip.	55.333	72.600	-31
		Sand Filter	72.600	80.000	-10
		Air Stripping	80.000	59.800	25
		Biological Treatment	59.800	50.000	16
		Total Removal	55.333	50.000	10
BIS(2-CHLOROETHYL)ETHER	UG/L	Chemical Precip.	19.000	21.200	-12
		Sand Filter	21.200	18.200	14
		Air Stripping	18.200	10.000	45
		Biological Treatment	10.000	10.000	0
		Total Removal	19.000	10.000	47
CHLOROBENZENE	UG/L	Chemical Precip.	224.333	189.600	15
		Sand Filter	189.600	186.000	2
		Air Stripping	186.000	13.800	93
		Biological Treatment	13.800	10.000	28
		Total Removal	224.333	10.000	96
CHLOROFORM	UG/L	Chemical Precip.	438.333	359.400	18
		Sand Filter	359.400	368.400	-3
		Air Stripping	368.400	23.000	94
		Biological Treatment	23.000	10.000	57
		Total Removal	438.333	10.000	98
ETHYLBENZENE	UG/L	Chemical Precip.	287.000	419.000	-46
		Sand Filter	419.000	345.000	18
		Air Stripping	345.000	10.000	97
		Biological Treatment	10.000	10.000	0
		Total Removal	287.000	10.000	97
ISOPHORONE	UG/L	Chemical Precip.	13.167	12.600	4
		Sand Filter	12.600	13.200	-5
		Air Stripping	13.200	11.000	17
		Biological Treatment	11.000	10.000	9
		Total Removal	13.167	10.000	24
METHYLENE CHLORIDE	UG/L	Chemical Precip.	329.333	249.600	24
		Sand Filter	249.600	271.600	-9
		Air Stripping	271.600	25.200	91
		Biological Treatment	25.200	10.000	60
		Total Removal	329.333	10.000	97

SYLVESTER SITE - EPISODE 1325 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
N,N-DIMETHYLFORMAMIDE	UG/L	Chemical Precip.	68.000	78.400	-15
		Sand Filter	78.400	76.800	2
		Air Stripping	76.800	78.400	-2
		Biological Treatment	78.400	10.000	87
		Total Removal	68.000	10.000	85
NAPHTHALENE	UG/L	Chemical Precip.	24.667	24.000	3
		Sand Filter	24.000	24.000	0
		Air Stripping	24.000	10.000	58
		Biological Treatment	10.000	10.000	0
		Total Removal	24.667	10.000	59
O-CRESOL	UG/L	Chemical Precip.	13.167	11.600	12
		Sand Filter	11.600	12.000	-3
		Air Stripping	12.000	11.600	3
		Biological Treatment	11.600	10.000	14
		Total Removal	13.167	10.000	24
P-CRESOL	UG/L	Chemical Precip.	29.167	48.200	-65
		Sand Filter	48.200	52.400	-9
		Air Stripping	52.400	42.200	19
		Biological Treatment	42.200	10.000	76
		Total Removal	29.167	10.000	66
P-CYMENE	UG/L	Chemical Precip.	20.833	14.200	32
		Sand Filter	14.200	13.200	7
		Air Stripping	13.200	10.000	24
		Biological Treatment	10.000	10.000	0
		Total Removal	20.833	10.000	52
P-DIOXANE	UG/L	Chemical Precip.	522.167	459.400	12
		Sand Filter	459.400	457.400	0
		Air Stripping	457.400	471.600	-3
		Biological Treatment	471.600	367.500	22
		Total Removal	522.167	367.500	30
PHENOL	UG/L	Chemical Precip.	206.667	125.800	39
		Sand Filter	125.800	49.600	61
		Air Stripping	49.600	42.600	14
		Biological Treatment	42.600	10.000	77
		Total Removal	206.667	10.000	95
STYRENE	UG/L	Chemical Precip.	240.000	242.600	-1
		Sand Filter	242.600	248.600	-2
		Air Stripping	248.600	15.600	94
		Biological Treatment	15.600	10.000	36
		Total Removal	240.000	10.000	96

SYLVESTER SITE - EPISODE 1325 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
TETRACHLOROETHENE	UG/L	Chemical Precip.	231.833	150.200	35
		Sand Filter	150.200	145.600	3
		Air Stripping	145.600	17.000	88
		Biological Treatment	17.000	10.000	41
		Total Removal	231.833	10.000	96
TOLUENE	UG/L	Chemical Precip.	9178.333	7006.400	24
		Sand Filter	7006.400	6397.000	9
		Air Stripping	6397.000	270.600	96
		Biological Treatment	270.600	10.000	96
		Total Removal	9178.333	10.000	100
TRANS-1,2-DICHLOROETHENE	UG/L	Chemical Precip.	1516.500	1299.600	14
		Sand Filter	1299.600	1320.200	-2
		Air Stripping	1320.200	60.600	95
		Biological Treatment	60.600	10.000	83
		Total Removal	1516.500	10.000	99
TRICHLOROETHENE	UG/L	Chemical Precip.	505.667	393.000	22
		Sand Filter	393.000	388.600	1
		Air Stripping	388.600	25.200	94
		Biological Treatment	25.200	10.000	60
		Total Removal	505.667	10.000	98
INORGANICS					
ALUMINUM	UG/L	Chemical Precip.	110.000	94.000	15
		Sand Filter	94.000	92.800	1
		Air Stripping	92.800	111.800	-20
		Biological Treatment	111.800	119.333	-7
		Total Removal	110.000	119.333	-8
ARSENIC	UG/L	Chemical Precip.	559.833	114.200	80
		Sand Filter	114.200	123.000	-8
		Air Stripping	123.000	132.200	-7
		Biological Treatment	132.200	104.500	21
		Total Removal	559.833	104.500	81
BARIUM	UG/L	Chemical Precip.	43.500	13.400	69
		Sand Filter	13.400	13.200	1
		Air Stripping	13.200	16.200	-23
		Biological Treatment	16.200	17.833	-10
		Total Removal	43.500	17.833	59
BORON	UG/L	Chemical Precip.	156.333	119.200	24
		Sand Filter	119.200	124.400	-4
		Air Stripping	124.400	153.600	-23
		Biological Treatment	153.600	135.833	12
		Total Removal	156.333	135.833	13

SYLVESTER SITE - EPISODE 1325 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
CALCIUM	UG/L	Chemical Precip.	78716.667	59360.000	25
		Sand Filter	59360.000	59380.000	0
		Air Stripping	59380.000	61460.000	-4
		Biological Treatment	61460.000	72816.667	-18
		Total Removal	78716.667	72816.667	7
CHROMIUM	UG/L	Chemical Precip.	14.167	11.600	18
		Sand Filter	11.600	10.400	10
		Air Stripping	10.400	11.400	-10
		Biological Treatment	11.400	10.167	11
		Total Removal	14.167	10.167	28
COPPER	UG/L	Chemical Precip.	85.833	71.200	17
		Sand Filter	71.200	17.600	75
		Air Stripping	17.600	94.600	***
		Biological Treatment	94.600	24.167	74
		Total Removal	85.833	24.167	72
IODINE	UG/L	Chemical Precip.	783.000	340.000	57
		Sand Filter	340.000	500.000	-47
		Air Stripping	500.000	480.000	4
		Biological Treatment	480.000	417.000	13
		Total Removal	783.000	417.000	47
IRON	UG/L	Chemical Precip.	20333.333	253.400	99
		Sand Filter	253.400	233.600	8
		Air Stripping	233.600	928.600	***
		Biological Treatment	928.600	148.000	84
		Total Removal	20333.333	148.000	99
MAGNESIUM	UG/L	Chemical Precip.	6698.333	3014.000	55
		Sand Filter	3014.000	2964.000	2
		Air Stripping	2964.000	3352.000	-13
		Biological Treatment	3352.000	3355.000	0
		Total Removal	6698.333	3355.000	50
MANGANESE	UG/L	Chemical Precip.	5656.667	45.000	99
		Sand Filter	45.000	42.400	6
		Air Stripping	42.400	220.200	***
		Biological Treatment	220.200	29.833	86
		Total Removal	5656.667	29.833	99
NICKEL	UG/L	Chemical Precip.	5224.500	28.800	99
		Sand Filter	28.800	31.200	-8
		Air Stripping	31.200	35.000	-12
		Biological Treatment	35.000	38.000	-9
		Total Removal	5224.500	38.000	99

SYLVESTER SITE - EPISODE 1325 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
SILICON	UG/L	Chemical Precip.	7383.000	4180.000	43
		Sand Filter	4180.000	4140.000	1
		Air Stripping	4140.000	4260.000	-3
		Biological Treatment	4260.000	4050.000	5
		Total Removal	7383.000	4050.000	45
SILVER	UG/L	Chemical Precip.	8.167	6.200	24
		Sand Filter	6.200	6.000	3
		Air Stripping	6.000	6.000	0
		Biological Treatment	6.000	6.000	0
		Total Removal	8.167	6.000	27
SODIUM	UG/L	Chemical Precip.	25251.667	31080.000	-23
		Sand Filter	31080.000	31160.000	0
		Air Stripping	31160.000	32100.000	-3
		Biological Treatment	32100.000	38400.000	-20
		Total Removal	25251.667	38400.000	-52
STRONTIUM	UG/L	Chemical Precip.	400.000	200.000	50
		Sand Filter	200.000	200.000	0
		Air Stripping	200.000	200.000	0
		Biological Treatment	200.000	200.000	0
		Total Removal	400.000	200.000	50
SULFUR	UG/L	Chemical Precip.	19417.000	34780.000	-79
		Sand Filter	34780.000	34620.000	0
		Air Stripping	34620.000	34260.000	1
		Biological Treatment	34260.000	37200.000	-9
		Total Removal	19417.000	37200.000	-92
ZINC	UG/L	Chemical Precip.	24.667	24.400	1
		Sand Filter	24.400	30.000	-23
		Air Stripping	30.000	22.200	26
		Biological Treatment	22.200	24.333	-10
		Total Removal	24.667	24.333	1
CONVENTIONALS/NONCONVENTIONALS					
AMMONIA, AS N	UG/L	Chemical Precip.	2367.000	2440.000	-3
		Sand Filter	2440.000	2340.000	4
		Air Stripping	2340.000	1660.000	29
		Biological Treatment	1660.000	100.000	94
		Total Removal	2367.000	100.000	96
BOD	UG/L	Chemical Precip.	39333.000	27000.000	31
		Sand Filter	27000.000	44200.000	-64
		Air Stripping	44200.000	13400.000	70
		Biological Treatment	13400.000	6700.000	50
		Total Removal	39333.000	6700.000	83

SYLVESTER SITE - EPISODE 1325 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
CHLORIDE	UG/L	Chemical Precip.	88167.000	62200.000	29
		Sand Filter	62200.000	75400.000	-21
		Air Stripping	75400.000	76200.000	-1
		Biological Treatment	76200.000	73500.000	4
		Total Removal	88167.000	73500.000	17
COD	UG/L	Chemical Precip.	121333.000	95400.000	21
		Sand Filter	95400.000	93400.000	2
		Air Stripping	93400.000	63600.000	32
		Biological Treatment	63600.000	38667.000	39
		Total Removal	121333.000	38667.000	68
FLUORIDE	UG/L	Chemical Precip.	303.000	212.000	30
		Sand Filter	212.000	276.000	-30
		Air Stripping	276.000	284.000	-3
		Biological Treatment	284.000	264.000	7
		Total Removal	303.000	264.000	13
NITRATE + NITRITE, AS N	UG/L	Chemical Precip.	250042.000	605.000	100
		Sand Filter	605.000	54.000	91
		Air Stripping	54.000	53.000	2
		Biological Treatment	53.000	4750.000	***
		Total Removal	250042.000	4750.000	98
NITROGEN, TOTAL KJELDAHL	UG/L	Chemical Precip.	3433.000	3940.000	-15
		Sand Filter	3940.000	3840.000	3
		Air Stripping	3840.000	3620.000	6
		Biological Treatment	3620.000	1343.000	63
		Total Removal	3433.000	1343.000	61
PHOSPHORUS, TOTAL AS P	UG/L	Chemical Precip.	350.000	108.000	69
		Sand Filter	108.000	144.000	-33
		Air Stripping	144.000	146.000	-1
		Biological Treatment	146.000	550.000	***
		Total Removal	350.000	550.000	-57
SPECIFIC CONDUCTANCE	UMH/CM-25C	Chemical Precip.	608.333	526.000	14
		Sand Filter	526.000	524.000	0
		Air Stripping	524.000	526.000	0
		Biological Treatment	526.000	573.333	-9
		Total Removal	608.333	573.333	6
SULFATE	UG/L	Chemical Precip.	66333.000	99200.000	-50
		Sand Filter	99200.000	102600.000	-3
		Air Stripping	102600.000	105800.000	-3
		Biological Treatment	105800.000	116667.000	-10
		Total Removal	66333.000	116667.000	-76

SYLVESTER SITE - EPISODE 1325 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
TDS	UG/L	Chemical Precip.	458333.000	316000.000	31
		Sand Filter	316000.000	388000.000	-23
		Air Stripping	388000.000	418000.000	-8
		Biological Treatment	418000.000	438333.000	-5
		Total Removal	458333.000	438333.000	4
TOC	UG/L	Chemical Precip.	35000.000	29200.000	17
		Sand Filter	29200.000	28200.000	3
		Air Stripping	28200.000	25000.000	11
		Biological Treatment	25000.000	14667.000	41
		Total Removal	35000.000	14667.000	58
TSS	UG/L	Chemical Precip.	42833.000	4000.000	91
		Sand Filter	4000.000	4000.000	0
		Air Stripping	4000.000	4920.000	-23
		Biological Treatment	4920.000	6000.000	-22
		Total Removal	42833.000	6000.000	86

SECTION B-14
TREATABILITY OF CERCLA POLLUTANTS
TIME OIL - EPISODE 1804

(FIVE DAY SAMPLING EVENT)

TIME OIL - EPISODE 1804
SITE DESCRIPTION

The Time Oil Site's history includes waste oil recycling processes and paint and lacquer thinner manufacturing. The City of Tacoma maintains a treatment system for a production well (Well 12A) near the Time Oil Site. Studies associated with Well 12A resulted in the development of the present treatment system at the Time Oil Site. Operation of the Well 12A treatment system by the City of Tacoma continues on a seasonal basis to protect the wellfield.

Because the remedial investigation completed in late 1982 identified a general source area only and not a specific site, EPA authorized in December 1982 a study of historical solvent use and disposal practices in the suspect area. Records of past investigations by the Tacoma/Pierce County Health Department, Tacoma Water Division and the State Department of Ecology were reviewed and interviews were conducted with owners of numerous businesses in the area. A follow-up study focused on the historical uses and disposal of 1,1,2,2-tetrachloroethane in the vicinity of Well 12A. These studies reduced both the number and location of potential sources of the contamination.

In mid-May 1983, EPA authorized a supplemental remedial investigation to define further the extent of groundwater contamination and to attempt to locate the source. Four monitoring wells were installed and these, as well as the previously installed monitoring wells, were sampled several times between July and November. One of the new wells (near the Time Oil, Fleetline and Burlington Northern property) showed levels of trichloroethylene, 1,1,2,2-tetrachloroethane and 1,2-trans-dichloroethylene in the low parts per million (ppm) range; substantially higher than detected in other wells.

With the apparent source area narrowed down substantially, EPA obtained air and near surface soil samples along the Burlington Northern railroad spur adjacent to the Time Oil plant. Air sampling results showed very low levels of contaminants, but soil samples were very high in trichloroethylene and 1,1,2,2,-tetrachloroethane.

Research into the past ownership and activities on these properties indicated that waste oil and solvent reclamation processes were used and that some of the spent filter cake was used to build the railroad spur. The use of the Time Oil site for oil recycling and related operations dates back to 1927 when William Palin began operations under the name of Palin and Son. In 1933, the business name was changed to National Oil and Paint. The two main activities of the businesses were waste oil recycling and paint and lacquer thinner manufacturing.

The waste oil recycling process consisted of collecting waste oil in a large tank, adding chemicals such as sulfuric acid, and pressurizing and heating the contents of the vessel. This process resulted in the formation for a tar-like sludge on the bottom of the tank which was removed and disposed of. Absorbents and clay materials were also added to the oil. The sludge was filtered from the oil, and the resulting filter cake was disposed of or stored in various piles on the site. Some of this sludge was also used for fill around the site.

The paint and lacquer thinner manufacturing involved the use of many solvents that were stored on the site in barrels which may have leaked their contents into the soil.

Prior to purchase of the property by Time Oil, Inc., in 1964, the remaining barrels and drums of solvent were removed from the site. After Time Oil purchased the property, operations continued under the name National Oil and Paint until 1972. During this period, National Oil was involved only in waste oil recycling. Waste sludges and filter cakes were not known to be stored on the site during this period.

In 1972, Time Oil leased the facilities to Golden Penn, Inc. Golden Penn operated on the site until 1976, before going out of business as a result of a destructive fire. In 1975 and 1976, Golden Penn was ordered by the State of Washington to clean up the site by removing some of the filter cake and spilled oil from the ground.

In 1976, Time Oil resumed operation at the site. Since then their operation has been limited to canning oil brought to the site in bulk containers. In 1982, the Burlington Northern Railroad spur was extended by Time Oil to its present length so that oil could be delivered by tanker car. During the construction of the spur, some of the filter cake or sludge material stored on the site was used in the roadbed.

During the remedial investigation, the extent of soil and groundwater contamination near the Time Oil plant was explored by means of surface soil samples, shallow and deep soil borings and monitoring wells.

Chemical data for 1,1,2,2-tetrachloroethane and tetrachloroethylene taken from soil borings along the spur and along a North-South line and data for trichloroethylene shows these compounds are the ones of primary interest because they are the contaminants at Well 12A. Many others, not found at Well 12A, were also detected at much lower concentrations.

Along the east-west line of borings, high values of soil contamination are located along the spur adjacent to the western Time Oil building and continuing for a distance of at least 150 feet west of that building. Measured concentrations of the contaminants is greater than 3,000 parts per billion (ppb) of soil to depths of about 25 feet. Highest concentrations were found near the surface at levels up to 1000 parts per million (ppm) of soil.

Along the north-south soil boring line, soil contamination concentrations to about 3,000 ppb of soil were measured to a depth of about 20 feet on the north end of the Fleetline property.

Continuity between this near surface soil contamination and that in the aquifer was established. The total quantity of solvents contained in the soil from the ground surface to the groundwater level was grossly estimated at about 1500 lbs.

Groundwater contamination was found along the east-west line of borings in the same boreholes as the major soil contamination, Levels ranged up to about

11,000 ppb of water. Along the north-south line of borings, levels up to 863,000 ppb were measured under the Fleetline property. This southward displacement of the highest aquifer contamination is likely to have resulted from the previous pumping action of the wellfield.

Prior to startup of the Well 12A treatment system in July 1983, Well 12A had been shutdown since mid 1981, except for brief periods of operation for water sampling. However, other wells in the wellfield had been being operated on demand.

The approximate contours of 1,1,2,2-tetrachloroethane that existed at the time of startup of the treatment system shows the highest concentrations existed near the Time Oil site with decreasing concentrations toward the wellfield. The translation of the plume is toward operating wells (9A & 2B). After pumping began at Well 12A, the contamination levels increased at Well 12A and decreased at the other production wells as the plume was preferentially drawn to Well 12A. At the end of the pumping season in early November, the 1,1,2,2-tetrachloroethane concentration at Well 12A was about 45 ppb, a decrease from the mid August level of about 60 ppb. Following shutdown of the 12A treatment system in November, the plume contours returned more nearly to their original locations, and the concentration at Well 12A was reduced to about 5 ppb.

A liquid phase carbon adsorption system is used at the Time Oil facility to pump and treat contaminated groundwater. Treated groundwater is discharged to a stormwater sewer system. Sampling was conducted during the same week as sampling at the Well 12A site.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

[b] Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

ANALYTICAL QUALIFIERS

S — This qualifier indicates that the response of a specific PCDD/PCDF isomer has exceeded the normal dynamic range of the mass spectrometer detection system. The corresponding signal is saturated and the reported analyte concentration is a "minimum estimate" regardless of whether or not the ion-abundance ratio or the retention time criteria are met. When the S qualifier is associated with the reporting of "totals", its use is to warn the data user of the existence of one (not necessarily from a specific isomer) or more saturated signals for a given class of compounds.

I — This flag identifies a labeled compound (e.g., internal standard) for which the ion-abundance ratio or retention time criteria were not met due to the possible presence of coeluting interferences. The concentration of unlabeled analytes (computed relatively to the labeled standard in question) may be underestimated while the percent recoveries of the flagged labeled standard may be higher than reality.

Note that this qualifier may also be used if several unexpected signals are found to elute in the vicinity of the labeled standards, even though the former's identification criteria are met.

Q — A "Q" qualifier is used to warn the data user of the existence of a "quantitative interference" as defined in Section IV of Triangle Laboratories User Manual. The reported concentrations and percent recoveries may be questionable.

N — Carbon-labeled internal standard characterized by a signal-to-noise ratio of less than 10:1 will be flagged by using the qualifier "N". This qualifier will be used for samples that underwent an authorized re-extraction and analysis as a result of poor recoveries and for which a matrix effect was found to be responsible for the poor recoveries.

B — This flag is used when the analyte is found in the associated laboratory method blank sample as well as in the field sample. The flag is to warn the Data User of the possible/probable blank contamination.

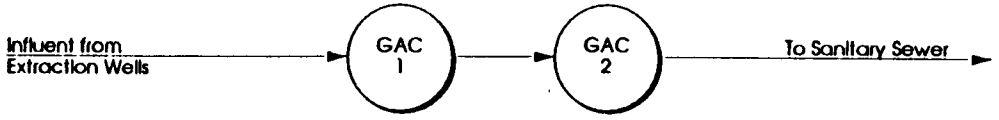
L — This flag identifies detected analytes for which the reported concentrations are below the working calibration curve of the GC/MS system.

E — This data qualifier is used to warn the data user of the presence of signals in the polychlorinated diphenylether channels that may interfere with the determination of polychlorinated dibenzofurans.

RO — When the ion-abundance ratio for carbon-labeled standards is outside the acceptable range, an "RO" flag will be used to indicate the presence of potential interference(s).

PR — When used for a specific analyte, the "PR" flag warns the Data User of the existence of a poorly resolved chromatographic signal preventing positive identification of the specific analyte.

X — Other specific flags and footnotes may be required to properly define the results. If used, they will be fully described in the Case Narrative. If more than one is necessary, a different letter (e.g., Y, Z ..) will be used.



Treatment: Granular Activated Carbon
Wastewater Type: Groundwater
Average Flow: 150 GPM
Stormwater Sewer System

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed GAC[1]	% Mass Removed GAC[4]	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	8 : 8 : 8	17 - 1,243 ug/L	17 - 1,243 ug/L	3,720 : 3,720	250 : 250	96 : 96	< 1 : < 1	93 : 93
Metals	1 : 8 : 12	3 - 21,620 ug/L	18 ug/L	12 : 43,130	9 : 47,380	30 : < 1	< 1 : < 1	25 : < 1

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. Taken from concentration averages over a five day sampling event

3. Based on pollutant concentration averages

FIGURE B-14
TIME OIL - 1804
FIVE DAY SAMPLING EVENT
REGION X TACOMA, WA

TIME OIL - EPISODE 1804
(Four Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
GRANULAR ACTIVATED CARBON

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
1,1,2,2-TETRACHLOROETHANE	UG/L	Activated Carbon 1	3481.00	10.00	**
		Activated Carbon 2	10.00	84.67	**
		Total Removal	3481.00	84.67	98
1,1,2-TRICHLOROETHANE	UG/L	Activated Carbon 1	17.00	10.00	41
		Activated Carbon 2	10.00	10.00	0
		Total Removal	17.00	10.00	41
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	Activated Carbon 1	116.60	132.60	**
		Activated Carbon 2	132.60	206.17	**
		Total Removal	116.60	206.17	**
TETRACHLOROETHENE	UG/L	Activated Carbon 1	168.40	10.00	94
		Activated Carbon 2	10.00	15.00	**
		Total Removal	168.40	15.00	91
TOLUENE	UG/L	Activated Carbon 1	19.20	10.00	48
		Activated Carbon 2	10.00	10.00	0
		Total Removal	19.20	10.00	48
TRANS-1,2-DICHLOROETHENE	UG/L	Activated Carbon 1	601.20	10.00	98
		Activated Carbon 2	10.00	10.00	0
		Total Removal	601.20	10.00	98
TRICHLOROETHENE	UG/L	Activated Carbon 1	1242.60	10.00	99
		Activated Carbon 2	10.00	30.67	**
		Total Removal	1242.60	30.67	98
VINYL CHLORIDE	UG/L	Activated Carbon 1	22.40	10.00	55
		Activated Carbon 2	10.00	10.00	0
		Total Removal	22.40	10.00	55
INORGANICS					
BARIUM	UG/L	Activated Carbon 1	6.60	9.60	**
		Activated Carbon 2	9.60	13.17	**
		Total Removal	6.60	13.17	**
BORON	UG/L	Activated Carbon 1	20.80	18.80	10
		Activated Carbon 2	18.80	19.83	-5
		Total Removal	20.80	19.83	5
CALCIUM	UG/L	Activated Carbon 1	21620.00	21360.00	1
		Activated Carbon 2	21360.00	21416.67	0
		Total Removal	21620.00	21416.67	1

TIME OIL - EPISODE 1804 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
IRON	UG/L	Activated Carbon 1	253.80	27.00	89
		Activated Carbon 2	27.00	39.67	**
		Total Removal	253.80	39.67	84
MAGNESIUM	UG/L	Activated Carbon 1	13920.00	13800.00	1
		Activated Carbon 2	13800.00	13816.67	0
		Total Removal	13920.00	13816.67	1
MANGANESE	UG/L	Activated Carbon 1	664.20	656.40	1
		Activated Carbon 2	656.40	660.83	-1
		Total Removal	664.20	660.83	1
OIL & GREASE, TOTAL RECOVERABLE	UG/L	Activated Carbon 1	8860.00	14040.00	**
		Activated Carbon 2	14040.00	7783.00	45
		Total Removal	8860.00	7783.00	12
POTASSIUM	UG/L	Activated Carbon 1	2440.00	2420.00	1
		Activated Carbon 2	2420.00	2517.00	-4
		Total Removal	2440.00	2517.00	-3
SILICON	UG/L	Activated Carbon 1	8460.00	8240.00	3
		Activated Carbon 2	8240.00	8333.00	-1
		Total Removal	8460.00	8333.00	2
SODIUM	UG/L	Activated Carbon 1	12200.00	12000.00	2
		Activated Carbon 2	12000.00	12050.00	0
		Total Removal	12200.00	12050.00	1
SULFUR	UG/L	Activated Carbon 1	6120.00	7120.00	**
		Activated Carbon 2	7120.00	5533.00	22
		Total Removal	6120.00	5533.00	10
TITANIUM	UG/L	Activated Carbon 1	3.00	3.40	**
		Activated Carbon 2	3.40	3.50	-3
		Total Removal	3.00	3.50	**
ZINC	UG/L	Activated Carbon 1	18.20	12.80	30
		Activated Carbon 2	12.80	14.33	**
		Total Removal	18.20	14.33	21
CONVENTIONALS/NONCONVENTIONALS					
CHLORIDE	UG/L	Activated Carbon 1	16400.00	16400.00	0
		Activated Carbon 2	16400.00	16333.00	0
		Total Removal	16400.00	16333.00	0
NITRATE + NITRITE, AS N	UG/L	Activated Carbon 1	3340.00	2340.00	30
		Activated Carbon 2	2340.00	1517.00	35
		Total Removal	3340.00	1517.00	55

TIME OIL - EPISODE 1804 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
NITROGEN, TOTAL KJELDEHL	UG/L	Activated Carbon 1	156.00	100.00	36
		Activated Carbon 2	100.00	100.00	0
		Total Removal	156.00	100.00	36
RESIDUE, FILTERABLE	UG/L	Activated Carbon 1	180000.00	170000.00	6
		Activated Carbon 2	170000.00	161667.00	5
		Total Removal	180000.00	161667.00	10
SPECIFIC CONDUCTANCE	UMH/CM-25C	Activated Carbon 1	264.00	270.00	-2
		Activated Carbon 2	270.00	265.00	2
		Total Removal	264.00	265.00	0
SULFATE	UG/L	Activated Carbon 1	19000.00	20000.00	-5
		Activated Carbon 2	20000.00	18000.00	10
		Total Removal	19000.00	18000.00	5
TOTAL ORGANIC CARBON	UG/L	Activated Carbon 1	2180.00	1020.00	53
		Activated Carbon 2	1020.00	7683.00	**
		Total Removal	2180.00	7683.00	**

SECTION B-15
TREATABILITY OF CERCLA POLLUTANTS
TYSON'S DUMP SITE - EPISODE 1568

(FIVE DAY SAMPLING EVENT)

TYSON'S DUMP - EPISODE 1568
SITE DESCRIPTION

Tyson's Dump Site is an abandoned septic waste and chemical waste disposal site reported to have operated from 1960 to 1970 within a sandstone quarry. The site is located in Upper Merion Township, Montgomery County, Pennsylvania. Several formerly unlined lagoons were used to store various industrial municipal, and chemical wastes. Spills and overflows reportedly occurred during the period of operation, thus allowing for the dispersal of wastes throughout the site. Surface water run-off and seeps contributed to off-site migration of the wastes toward the Schuylkill River. The approximately 4-acre plot, which constitutes a series of formerly unlined lagoons, is bordered on the east and west by unnamed tributaries to the Schuylkill River, a steep quarry high-wall to the south, and a Conrail railroad switching yard to the north. North of the Conrail tracks is the Schuylkill River floodplain. The area of the former lagoon lies above the 100-year floodplain.

The Tyson's Site was owned and operated by companies owned by Franklin P. Tyson and Fast Pollution Treatment, Inc. (FPTI). The stock of FPTI was owned by the current owner of the land, General Devices, Inc. (GDI) and by Franklin P. Tyson. The site was used by Tyson and FPTI for disposal of liquid septic tank waste and sludges and chemical wastes which were hauled to the site in bulk tank trucks.

The Pennsylvania Department of Environmental Resources (PADER) ordered GDI to close the facility in 1973. Although some ponded water was removed in 1973, GDI did not arrange for removal and off-site disposal of contaminated soils.

In January 1983, EPA investigated an anonymous citizen complaint about conditions at Tyson's and subsequently determined that immediate removal measures were required. These measures included the construction of a leachate collection and treatment system, drainage controls and cover over the site, and the erection of a fence around the lagoon area.

Between January 1983 and August of 1984, EPA and its contractors conducted a series of investigations primarily in what is now referred to as the On-Site Area. The On-Site Area is defined here as that area south of the railroad tracks and within or immediately adjacent to the security fence erected during the emergency response measures. In December 1984, EPA issued its Record of Decision (ROD) for the On-Site Area which recommended the following remedial actions:

- Excavation and off-site disposal of contaminated soils and wastes to a permitted Resource Conservation and Recovery Act (RCRA) landfill.

- Upgrading the existing air-stripping facility to treat leachate, shallow groundwater and surface run-on encountered during excavation.

- Excavation and off-site disposal of contaminated sediments within the tributary which receives effluent from the existing air stripper.

Following issuance of the ROD, EPA began remedial design for the selected alternative in January 1985. this design included additional borings throughout the lagoon area to define the volume of material to be excavated. From August 1985 through November 1985, EPA performed additional borings and magnetometer surveys throughout the lagoon area to better delineate the areas to be excavated.

In the fall of 1985, CIBA-GEIGY Corporation agreed to conduct a further investigation of the Off-Site Area, the need for which was described in the December 1984 EPA ROD. The Off-Site Area is defined here as that area outside of the security fence including the deep aquifer (bedrock aquifer). EPA subdivided the Off-Site Area into five sub-areas or "operable units." The Off-Site Operable Units included the following:

- Deep Aquifer (Operable Unit 1)
- Hillside Area (Operable Unit 2)
- Railroad Area (Operable Unit 3)
- Floodplain/Wetlands (Operable Unit 4)
- Seep Area (Operable Unit 5)

On May 27, 1986, an Administrative Consent Order (ACO) was signed between EPA and Ciba-Geigy Corporation for the Off-Site Operable Unit Remedial Investigation/Feasibility Study (RI/FS).

In November 1986, Ciba-Geigy Corporation initiated an on-site pilot study using an innovative vacuum extraction technology process. Due to zoning restrictions, the pilot study operated for only a short duration (less than 10 days). However, in May 1987, the pilot study was recommended and operated for more than three weeks.

In December 1986, Ciba-Geigy submitted a draft Off-Site Operable Unit RI Report to EPA. This report indicated that much of the site-related contamination had migrated off-site into the deep aquifer toward the Schuylkill River.

On March 24, 1987, a second addendum to the Off-site RI/FS Work Plan was submitted to EPA by Ciba-Geigy Corporation. This addendum included a detailed investigation of the Schuylkill River and the installation of wells on the north side of the river.

In June and July 1987, four responsible parties, Ciba-Geigy Corporation, Smith-Kline Beckman, Wyeth Laboratories, and Essex Group submitted a proposal to EPA for clean-up of the on-site lagoon areas, upgrading of the leachate collection system and clean-up of the tributary sediments. Additionally, the parties proposed to initiate groundwater remediation measures since the information contained in the draft Off-Site Operable Units RI report indicated that much of the contamination formerly in the lagoon areas was now in the aquifer system, downgradient of the site, and was discharging to the Schuylkill River.

The parties' proposal was based on a Comprehensive Feasibility Study (CFS) submitted to the Agency on June 15, 1987. The CFS was developed independently

by Ciba-Geigy Corporation and was not formally commented on by EPA. The CFS incorporated the results of the innovative vacuum extraction process for clean-up of the lagoon soils, preliminary results of the Off-Site RI and additional studies for the installation of groundwater recovery wells. Some of the results of the CFS indicated that the contaminants in the bedrock underlying the lagoons would be a source of continuing contamination of the backfilled soil. The study raised the possibility that the remedy selected in the ROD would be of limited effectiveness without the installation of a barrier, which would limit upward movement of contamination from the underlying bedrock.

On July 29, 1987, Ciba-Geigy Corporation submitted the final draft Operable Units RI report to EPA. This report concluded that much of the site contamination, specifically the dense non-aqueous phase liquids (DNAPLS), were in the underlying bedrock and aquifer. The report also found that a dissolved portion of the DNAPLs was discharging into the Schuylkill River.

The leachate collection and treatment system constructed in 1983 is scheduled to operate through 1988, and will then be dismantled. The air-stripping treatment system was installed to remove volatile organic compounds from the collected leachate. The plant is effective in removing many volatile organic compounds, however, its efficiency for reducing some organic compounds, particularly xylenes and 1,2,3 trichloropropane, is lower.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals and Elements		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfide, total (iodometric)	Titrimetric	376.1

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March, 1983.

[a] Analytical methods for ITD/RCRA Sampling Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 μg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 μg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

R - Spike recovery limits met after rerun on ICP.

Treatment: Air Stripping
Wastewater Type: Groundwater
Average Flow: 43,000 GPD (24 Hours/2 Days/WK)
Surface Water Discharge

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP : ITD	(LBS/YR) PP : ITD	PP : ITD
Total Organics	7 : 8 : 12	11-5,668 ug/L	11-70,571 ug/L	22 : 520	7 ; 164	68 : 68
Metals	3 : 10 : 15	2-22,357 ug/L	2-289 ug/L	27 : 6,670	45 : 6,920	< 1 : < 1

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

3. Based on pollutant concentration averages

FIGURE B-15
TYSON'S DUMP - 1568
FIVE DAY SAMPLING EVENT
REGION III KING OF PRUSSIA, PA

TYSON'S DUMP - EPISODE 1568
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
TOTAL REMOVAL BY AIR STRIPPER

COMPOUND	UNITS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS				
1,2,3-TRICHLOROBENZENE	UG/L	20.429	10.000	51
1,2,3-TRICHLOROPROPANE	UG/L	5667.857	1767.000	69
1,2,4-TRICHLOROBENZENE	UG/L	70.571	10.000	86
1,2-DICHLOROBENZENE	UG/L	70.143	10.000	86
1,4-DICHLOROBENZENE	UG/L	13.429	10.000	26
2,4-DIMETHYLPHENOL	UG/L	28.429	17.571	38
ANILINE	UG/L	20.143	15.857	21
O-+P-XYLENE	UG/L	55.571	10.000	82
O-CRESOL	UG/L	11.286	10.286	9
PHENOL	UG/L	10.857	10.000	8
TETRACHLOROETHENE	UG/L	34.571	10.000	71
TRICHLOROETHENE	UG/L	19.857	10.000	50
INORGANICS				
ALUMINUM	UG/L	235.143	847.429	***
ARSENIC	UG/L	2.400	3.329	-39

TYSON'S DUMP - EPISODE 1568 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
BARIUM	UG/L	258.857	267.429	-3
BORON	UG/L	74.286	75.714	-2
CALCIUM	UG/L	22357.143	22571.429	-1
COPPER	UG/L	22.429	23.857	-6
IRON	UG/L	5130.000	4842.857	6
MAGNESIUM	UG/L	11685.714	11928.571	-2
MANGANESE	PPT	649.857	640.714	1
SODIUM	UG/L	21000.000	20942.857	0
TITANIUM	UG/L	5.286	12.286	***
ZINC	UG/L	288.714	488.286	-69
PHOSPHORUS	MG/L	2.429	3.129	-29
SILICON	MG/L	4.600	5.329	-16
SULFUR	MG/L	8.757	9.300	-6
CONVENTIONALS/NONCONVENTIONALS				
BOD	MG/L	11.114	8.243	26
TSS	MG/L	15.857	16.029	-1

TYSON'S DUMP - EPISODE 1568 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
AMMONIA, AS N	MG/L	0.364	0.377	-4
CHLORIDE	MG/L	97.000	41.571	57
COD	MG/L	47.571	41.857	12
FLASH POINT	25 C	59.500	58.000	3
FLUORIDE	MG/L	0.234	0.240	-3
NITRATE + NITRITE, AS N	MG/L	0.893	0.874	2
NITROGEN, TOTAL KJELDAHL	MG/L	0.959	1.001	-4
PHOSPHORUS, TOTAL AS P	MG/L	0.163	0.376	***
SPECIFIC CONDUCTANCE	UMH/CM-25C	341.429	280.000	18
SULFATE	MG/L	26.000	27.429	-5
TDS	MG/L	231.429	238.571	-3
TOC	MG/L	13.857	11.143	20

SECTION B-16
TREATABILITY OF CERCLA POLLUTANTS
UNITED CHROME - EPISODE 1738

(FOUR DAY SAMPLING EVENT)

UNITED CHROME - EPISODE 1738
SITE DESCRIPTION

The United Chrome Products (UCP) site is a former industrial hard chrome plating facility located at 2000 Airport Road in the Airport Research Industrial Park complex, approximately 3.5 miles south of the city of Corvallis, Oregon. The UCP site consists of a single building on approximately 1.5 acres of level ground and is bounded by the Corvallis Airport. The city of Corvallis owns the UCP site and all surrounding property.

UCP began electroplating operations in 1956. A dry well disposal pit was created in the same year and was reportedly used until 1975 to dispose of floor drippings, washings, and product rinsate from a sump within the building. Liquids were reportedly neutralized with sodium hydroxide and/or soda ash prior to disposal in the dry well. The specific composition of water discharged is unknown; however, the nature of the facility indicates that spent plating bath solutions, spent stripping and cleaning bath solutions, and sludges from plating baths may have been disposed in the dry well. Quantities of waste discharges are unknown, but have been estimated at 1,000 gallons per year. Use of the dry well reportedly ceased in 1975. The amount and disposition of wastes produced since then is unknown.

In November 1984, UCP announced that it would shut down and cease all operations, and in May 1985, the equipment and contents of the building were sold. The building is currently vacant, and the city of Corvallis has indicated that it presently has no plans for alternative use of the site area and building, or for demolition of the facility.

Environmental investigations at UCP conducted by the Oregon Department of Environmental Quality (ODEQ) and EPA took place between November 1982 and December 1984. In July 1983, the site was scored using the Hazard Ranking System and subsequently included on the National Priorities List. Investigations indicated considerable chromium contamination in the soil beneath and near the building and in both the upper and lower aquifers as a result of leaching from the drywell and plating tanks. Investigations also indicated contamination of approximately 2.4 million gallons of groundwater in the upper unconfined and lower confined aquifers. Total chromium concentrations in the upper aquifer are as high as 1.5 percent near the former plating tanks, but range from 142 to 689 milligrams per liter (mg/l) in the surrounding monitoring wells. Total chromium concentrations in the lower aquifer are generally an order of magnitude lower; however, the primary drinking water standard of 0.05 mg/ has been exceeded in numerous deep well samples.

An immediate removal action initiated in July 1985 and completed in October 1985 stabilized the site after the company vacated the building. Perimeter fencing was installed, and spent plating solution, drums, and containers were removed from the site. All hazardous substance source materials are believed to have been removed from the site with the exception of residual sludges in plating tanks.

EPA completed a Feasibility Study (FS) addressing site cleanup alternatives in August 1985. A Record-of-Decision (ROD) was issued by EPA Region X in September 1986 recommending limited excavation of contaminated soil from the dry well and plating tank areas, and unconfined and confined aquifer groundwater extraction, treatment, and surface discharge. Installation of two percolation barriers in the excavated area was recommended to flush contaminated soil in the unsaturated zone above the shallow groundwater table. The ROD recommended that the drainage ditch within the contaminated area be culverted to protect the local surface drainage ditch system from contamination. The objective of the selected alternative is to remove contamination in the confined aquifer and control the migration of further contamination from the upper unconfined zone. The cleanup criteria in the confined aquifer is the drinking water standard of 0.05 mg/ for chromium, because this aquifer is considered a drinking water source in direct hydraulic connection with the local drinking water supply wells. The cleanup criteria for the unconfined aquifer is also 0.05 mg/. The site boundary is considered the point of compliance at which these criteria must be met.

UCP site remediation is currently in progress. Extracted groundwater is being treated on-site. Groundwater is pumped to an influent holding tank and then transferred to a sectioned tank. Metals are reduced chemically in the first section. Groundwater then flows to a section where the pH is raised to between 9 and 10 to cause the formation of metal hydroxides and a polymer flocculant solution is added. Groundwater then flows to the final section for settling and clarification. After settling and clarification, the groundwater flows from the sectioned tank through polishing filters (not operating during sample episode) to one of the two holding tanks where total chromium and pH are monitored to determine whether the water meets discharge standards. If treated water does not meet discharge standards, it is recirculated through the treatment system. Adequately treated water is discharged as a batch from the holding tank to an on-site sewer which connects to the Corvallis wastewater treatment plant.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

SUMMARY OF ANALYTICAL METHODS (cont.)

Analytical Category and Fraction	Technique	EPA Method No.
Classicals (sludge samples)		
Ammonia, as N	Titrimetric, Distillation	350.2
Nitrogen, Kjeldahl, total	Titrimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Cyanide, total	Colorimetric	9010[b]
pH		9045[b]
Residue, total	Gravimetric	160.3
Residue, total volatile	Gravimetric	160.4
Sulfide, total	Monier-Williams	c
Flash point (ignitability)	Pensky-Martens Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

b. Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

c. 49 CFR Part 425, Federal Register Vol. 52, No. 13, January 21, 1987

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 µg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 µg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

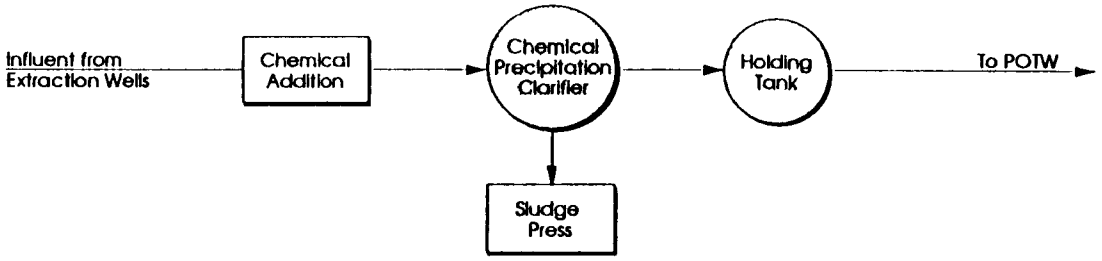
M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

R - Spike recovery limits met after rerun on ICP.



Treatment: CP - HT
Wastewater Type: Groundwater
Average Flow: 50,000 GPD (8 Hours/5 Days)
To 8 8 MGD POTW

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed CP[4]	% Mass Removed HT[4]	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	1 : 3 : 8	0 37ppt - 542 ug/L	82 ug/L	9 : 77	6 : 89	< 1 : < 1	43 : 3	33 : < 1
Metals	6 : 16 : 33	12 - 487,600 ug/L	12 - 1,226 ug/L	133,130 : 229,340	640 : 621,690	> 99	3 : < 1	> 99 : < 1

NOTES:

1 PP = Priority Pollutant
TCL = Compound from Target Compound I ist
ITD = Industrial Technology Division Analyte

2 Taken from concentration averages over a five day sampling event

3. Based on pollutant concentration averages

4 CP = Chemical Precipitation
HT = Holding Tnak

FIGURE B-16
UNITED CHROME - 1738
FIVE DAY SAMPLING EVENT
REGION X CORVALLIS, OR

UNITED CHROME - EPISODE 1738
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
CHEMICAL PRECIPITATION + HOLDING TANK

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
2-BUTANONE (MEK)	UG/L	Chemical Reduction	542.20	557.00	-3
		Chemical Prec.	557.00	671.50	**
		Holding Tank	671.50	691.00	-3
		Total Removal	542.20	691.00	**
3-CHLOROPROPENE	UG/L	Chemical Reduction	13.80	13.00	6
		Chemical Prec.	13.00	10.00	23
		Holding Tank	10.00	13.00	**
		Total Removal	13.80	13.00	6
ACETONE	UG/L	Chemical Reduction	56.00	69.50	**
		Chemical Prec.	69.50	59.75	14
		Holding Tank	59.75	53.00	11
		Total Removal	56.00	53.00	5
METHYLENE CHLORIDE	UG/L	Chemical Reduction	82.00	47.75	42
		Chemical Prec.	47.75	92.50	**
		Holding Tank	92.50	52.33	43
		Total Removal	82.00	52.33	36
OCDD	PPT	Chemical Reduction	0.37	0.00	**
		Chemical Prec.	0.00	0.00	**
		Holding Tank	0.00	0.43	**
		Total Removal	0.37	0.43	**
P-DIOXANE	UG/L	Chemical Reduction	13.20	12.00	9
		Chemical Prec.	12.00	10.75	10
		Holding Tank	10.75	11.00	-2
		Total Removal	13.20	11.00	17
PESTICIDES					
2,4,5-T	PPT	Chemical Reduction	136.00	0.00	**
		Chemical Prec.	0.00	0.00	**
		Holding Tank	0.00	22.67	**
		Total Removal	136.00	22.67	83
2,4-D	PPT	Chemical Reduction	150.00	0.00	**
		Chemical Prec.	0.00	0.00	**
		Holding Tank	0.00	45.33	**
		Total Removal	150.00	45.33	70
INORGANICS					
ALUMINUM	UG/L	Chemical Reduction	8370.00	6111.25	27
		Chemical Prec.	6111.25	5726.25	6
		Holding Tank	5726.25	35.00	99
		Total Removal	8370.00	35.00	**

UNITED CHROME - EPISODE 1738 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ARSENIC	UG/L	Chemical Reduction	12.80	13.40	-5
		Chemical Prec.	13.40	9.63	28
		Holding Tank	9.63	20.00	**
		Total Removal	12.80	20.00	**
BARIUM	UG/L	Chemical Reduction	48.00	32.25	33
		Chemical Prec.	32.25	9.00	72
		Holding Tank	9.00	9.00	0
		Total Removal	48.00	9.00	81
BERYLLIUM	UG/L	Chemical Reduction	12.40	7.50	40
		Chemical Prec.	7.50	1.00	87
		Holding Tank	1.00	1.00	0
		Total Removal	12.40	1.00	92
BORON	UG/L	Chemical Reduction	384.40	186.00	52
		Chemical Prec.	186.00	163.50	12
		Holding Tank	163.50	52.67	68
		Total Removal	384.40	52.67	86
CALCIUM	UG/L	Chemical Reduction	487600.00	330250.00	32
		Chemical Prec.	330250.00	183500.00	44
		Holding Tank	183500.00	190333.33	-4
		Total Removal	487600.00	190333.33	61
CHROMIUM	UG/L	Chemical Reduction	1226.00	758.50	38
		Chemical Prec.	758.50	6030.00	**
		Holding Tank	6030.00	5830.00	3
		Total Removal	1226.00	5830.00	**
COBALT	UG/L	Chemical Reduction	60.60	35.50	41
		Chemical Prec.	35.50	20.00	44
		Holding Tank	20.00	20.00	0
		Total Removal	60.60	20.00	67
COPPER	UG/L	Chemical Reduction	752.00	559.50	26
		Chemical Prec.	559.50	6.00	99
		Holding Tank	6.00	6.00	0
		Total Removal	752.00	6.00	99
GADOLINIUM	MG/L	Chemical Reduction	0.54	0.40	26
		Chemical Prec.	0.40	0.00	**
		Holding Tank	0.00	0.00	**
		Total Removal	0.54	0.00	**
GALLIUM	MG/L	Chemical Reduction	0.60	0.40	33
		Chemical Prec.	0.40	0.03	94
		Holding Tank	0.03	0.00	**
		Total Removal	0.60	0.00	**

UNITED CHROME - EPISODE 1738 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
GERMANIUM	MG/L	Chemical Reduction	0.32	0.23	30
		Chemical Prec.	0.23	0.00	**
		Holding Tank	0.00	0.00	**
		Total Removal	0.32	0.00	**
IRIDIUM	MG/L	Chemical Reduction	0.24	0.18	27
		Chemical Prec.	0.18	0.00	**
		Holding Tank	0.00	0.00	**
		Total Removal	0.24	0.00	**
IRON	UG/L	Chemical Reduction	55.60	458.50	**
		Chemical Prec.	458.50	31.75	93
		Holding Tank	31.75	25.00	21
		Total Removal	55.60	25.00	55
MAGNESIUM	UG/L	Chemical Reduction	154000.00	83500.00	46
		Chemical Prec.	83500.00	7152.50	91
		Holding Tank	7152.50	7723.33	-8
		Total Removal	154000.00	7723.33	95
MANGANESE	UG/L	Chemical Reduction	1098.00	660.50	40
		Chemical Prec.	660.50	2.50	**
		Holding Tank	2.50	4.00	**
		Total Removal	1098.00	4.00	**
MOLYBDENUM	UG/L	Chemical Reduction	49.40	30.75	38
		Chemical Prec.	30.75	10.00	67
		Holding Tank	10.00	10.00	0
		Total Removal	49.40	10.00	80
NEODYMIUM	MG/L	Chemical Reduction	0.40	0.23	44
		Chemical Prec.	0.23	0.00	**
		Holding Tank	0.00	0.00	**
		Total Removal	0.40	0.00	**
NICKEL	UG/L	Chemical Reduction	134.00	87.50	35
		Chemical Prec.	87.50	30.00	66
		Holding Tank	30.00	30.00	0
		Total Removal	134.00	30.00	78
OSMIUM	MG/L	Chemical Reduction	1.10	0.70	36
		Chemical Prec.	0.70	0.00	**
		Holding Tank	0.00	0.00	**
		Total Removal	1.10	0.00	**
POTASSIUM	MG/L	Chemical Reduction	14.48	15.78	-9
		Chemical Prec.	15.78	12.58	20
		Holding Tank	12.58	15.70	**
		Total Removal	14.48	15.70	-8

UNITED CHROME - EPISODE 1738 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
SAMARIUM	MG/L	Chemical Reduction	0.78	0.25	68
		Chemical Prec.	0.25	0.00	**
		Holding Tank	0.00	0.00	**
		Total Removal	0.78	0.00	**
SILICON	MG/L	Chemical Reduction	9.02	7.05	22
		Chemical Prec.	7.05	3.05	57
		Holding Tank	3.05	3.07	-1
		Total Removal	9.02	3.07	66
SODIUM	UG/L	Chemical Reduction	178800.00	3190.00	98
		Chemical Prec.	3190.00	3237.50	-1
		Holding Tank	3237.50	3210.00	1
		Total Removal	178800.00	3210.00	98
STRONTIUM	MG/L	Chemical Reduction	12.42	10.25	17
		Chemical Prec.	10.25	5.40	47
		Holding Tank	5.40	6.97	**
		Total Removal	12.42	6.97	44
SULFUR	MG/L	Chemical Reduction	12.54	2237.50	**
		Chemical Prec.	2237.50	1787.50	20
		Holding Tank	1787.50	2290.00	**
		Total Removal	12.54	2290.00	**
TANTALUM	MG/L	Chemical Reduction	2.74	1.78	35
		Chemical Prec.	1.78	0.00	**
		Holding Tank	0.00	0.00	**
		Total Removal	2.74	0.00	**
TIN	UG/L	Chemical Reduction	30.00	30.00	0
		Chemical Prec.	30.00	32.00	-7
		Holding Tank	32.00	30.00	6
		Total Removal	30.00	30.00	0
TITANIUM	UG/L	Chemical Reduction	312.00	178.00	43
		Chemical Prec.	178.00	6.25	96
		Holding Tank	6.25	6.67	-7
		Total Removal	312.00	6.67	98
URANIUM	MG/L	Chemical Reduction	0.64	0.18	73
		Chemical Prec.	0.18	0.00	**
		Holding Tank	0.00	0.00	**
		Total Removal	0.64	0.00	**
VANADIUM	UG/L	Chemical Reduction	33.20	30.25	9
		Chemical Prec.	30.25	15.00	50
		Holding Tank	15.00	15.00	0
		Total Removal	33.20	15.00	55

UNITED CHROME - EPISODE 1738 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
YTTRIUM	UG/L	Chemical Reduction	28.20	21.00	26
		Chemical Prec.	21.00	3.00	86
		Holding Tank	3.00	3.00	0
		Total Removal	28.20	3.00	89
ZINC	UG/L	Chemical Reduction	139.20	126.75	9
		Chemical Prec.	126.75	15.50	88
		Holding Tank	15.50	18.00	**
		Total Removal	139.20	18.00	87
CONVENTIONALS/NONCONVENTIONALS					
AMMONIA, AS N	MG/L	Chemical Reduction	0.16	0.30	**
		Chemical Prec.	0.30	0.19	36
		Holding Tank	0.19	0.19	-3
		Total Removal	0.16	0.19	**
BOD-5 DAY (CARBONACEOUS)	MG/L	Chemical Reduction	1446.00	9.78	99
		Chemical Prec.	9.78	12.13	**
		Holding Tank	12.13	35.00	**
		Total Removal	1446.00	35.00	98
CHEMICAL OXYGEN DEMAND	MG/L	Chemical Reduction	73.00	117.50	**
		Chemical Prec.	117.50	20.50	83
		Holding Tank	20.50	21.33	-4
		Total Removal	73.00	21.33	71
CHLORIDE	MG/L	Chemical Reduction	472.00	472.50	0
		Chemical Prec.	472.50	385.00	19
		Holding Tank	385.00	390.00	-1
		Total Removal	472.00	390.00	17
FLASH POINT	25 DEG C	Chemical Reduction	0.00	0.00	**
		Chemical Prec.	0.00	0.00	**
		Holding Tank	0.00	21.67	**
		Total Removal	0.00	21.67	**
FLOURIDE	MG/L	Chemical Reduction	8.72	8.53	2
		Chemical Prec.	8.53	8.90	-4
		Holding Tank	8.90	8.37	6
		Total Removal	8.72	8.37	4
NITRATE + NITRITE, AS N	MG/L	Chemical Reduction	3.70	3.50	5
		Chemical Prec.	3.50	3.10	11
		Holding Tank	3.10	2.93	5
		Total Removal	3.70	2.93	21
NITROGEN, TOTAL KJEDEHL	MG/L	Chemical Reduction	0.00	0.00	**
		Chemical Prec.	0.00	0.00	**
		Holding Tank	0.00	1.08	**
		Total Removal	0.00	1.08	**

UNITED CHROME - EPISODE 1738 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
NITROGEN, TOTAL KJELDEHL	MG/L	Chemical Reduction	0.25	0.77	**
		Chemical Prec.	0.77	0.67	13
		Holding Tank	0.67	0.00	**
		Total Removal	0.25	0.00	**
RESIDUE, FILTERABLE	MG/L	Chemical Reduction	4080.00	9975.00	**
		Chemical Prec.	9975.00	9975.00	0
		Holding Tank	9975.00	10000.00	0
		Total Removal	4080.00	10000.00	**
RESIDUE, NON-FILTERABLE	MG/L	Chemical Reduction	24.60	2675.00	**
		Chemical Prec.	2675.00	8.70	**
		Holding Tank	8.70	8.53	2
		Total Removal	24.60	8.53	65
SPECIFIC CONDUCTANCE	UMH/CM-25C	Chemical Reduction	5880.00	11750.00	**
		Chemical Prec.	11750.00	12000.00	-2
		Holding Tank	12000.00	11666.67	3
		Total Removal	5880.00	11666.67	**
SULFATE	MG/L	Chemical Reduction	75.00	6450.00	**
		Chemical Prec.	6450.00	6400.00	1
		Holding Tank	6400.00	6166.67	4
		Total Removal	75.00	6166.67	**
SULFIDE, TOTAL (IODOMETRIC)	MG/L	Chemical Reduction	1.00	15.28	**
		Chemical Prec.	15.28	7.78	49
		Holding Tank	7.78	4.77	39
		Total Removal	1.00	4.77	**
TOTAL ORGANIC CARBON	MG/L	Chemical Reduction	6.64	15.00	**
		Chemical Prec.	15.00	6.40	57
		Holding Tank	6.40	6.00	6
		Total Removal	6.64	6.00	10

SECTION B-17
TREATABILITY OF CERCLA POLLUTANTS
VERONA WELL FIELDS - EPISODE 1223

(FIVE DAY SAMPLING EVENT)

VERONA - EPISODE 1223
SITE DESCRIPTION

The Verona Well Field is located approximately 1/2 mile northeast of Battle Creek, Michigan. The well field incorporates property on both sides of the Battle Creek River, consisting of three wells west of the river (in Bailey Park), and 27 wells, with a major pumping/water treatment station, east of the river. The area north and east of the well field is essentially rural. Land use to the south and west is light to heavy industrial, with a residential area directly south, and the Grand Trunk Western Railroad (Grand Trunk) marshaling yard adjoining the well field on the east.

The Verona Well Field provides potable water to 35,000 residents of Battle Creek, and part or all of the water supply requirements for two major food processing industries and a variety of other commercial and industrial establishments. A review of the monthly pumping data indicates that the City requires an average supply of water equal to approximately 10 million gallons/day (MGD) with additional supplies needed to meet a peak demand equalling 19 MGD.

During August 1981, while conducting routine testing of private water supplies, the Calhoun County Health Department discovered that the water supply from the Verona Well Field was slightly contaminated with volatile organic compounds (VOCs). Follow-up testing by the Calhoun County Health Department and the Michigan Department of Public Health (MDPH) revealed that ten of the City's 30 wells contained detectable levels of volatile compounds. The MDPH then began weekly sampling of the well field.

During that same period, the MDPH began sampling private residential wells in the area to the south of the well field. To date, approximately 80 private wells have been found to contain varying concentrations of contaminants. Several of the private wells have total VOC contamination levels on the order of 1,000 parts per billion (ppb); the private well with the highest reported level had a dichloroethylene concentration of 3,900 ppb.

The Verona Well Field was listed as a National Priorities List site in July 1982. Since then several studies, investigations, and activities have been conducted in the area.

The Michigan Department of Natural Resources (MDNR) investigated potential sources of the contamination, and identified the Thomas Solvent Company facilities, the Grand Trunk marshaling yard, and the Raymond Road Landfill as possible sources of the volatile hydrocarbons. The EPA Technical Assistance Team (TAT) conducted a groundwater survey during the spring of 1982, and further concluded that the source of contamination was most likely in the vicinity of the Thomas Solvent facilities. The U.S. Geological Survey (USGS) initiated a hydrological investigation under contract with the City of Battle Creek in 1982. The study examined the geology and groundwater flow patterns in the vicinity of the Verona Well Field. The USGS has prepared a groundwater flow model (1985) to evaluate the effects of pumping Verona wells on groundwater flow. EPA began Phase I of a remedial investigation (RI) in November 1983.

The purpose of the RI was to identify the sources of contamination to the well field.

By January 1984, all but six of the City's 30 water supply wells in the Verona Well Field were contaminated with VOCs from the advancing groundwater plume. Under these conditions, it was apparent that there would not be a sufficient supply of uncontaminated water to meet the City's peak demand in the summer of 1984. In response, EPA initiated a focused feasibility study (FFS) in February 1984 to address the water supply problem, while the remedial investigation on the sources of contamination proceeded.

The FFS resulted in a Record-of-Decision by Region V, EPA in May 1984 that recommended the installation of three new water supply production wells, and the use of selected existing Verona wells to form a blocking well system to halt the spread of contamination to the northernmost Verona wells. The purge water from the blocking wells would be treated by an air stripper to be constructed at the well field.

Blocking well operations were initiated in May 1984, with temporary carbon adsorption beds providing treatment until the air stripper could be constructed. Construction of the air stripper was completed in August 1984. Since operation of the barrier wells began, the advance of the contaminant plume has been halted. In its Record-of-Decision, EPA determined that the barrier system should be maintained for a period of five years to insure adequate supplies of uncontaminated water until final remedial measures are implemented.

The results of the Phase I remedial investigation were published in technical memorandum in November 1984. The results confirmed that the Thomas Solvent facilities are major sources of groundwater contamination, and also identified an unknown source of perchloroethylene (PCE) from a location east of the well field.

Phase II of EPA's remedial investigation was initiated in July 1984 to characterize in greater detail the extent of VOC contamination at the Thomas Solvent facilities, and to investigate the source of the eastern plume of PCE.

The Thomas Solvent Company operations at the Raymond Road facility consisted of the packaging and distribution of liquid solvent commercial products, with the exception of minor amounts of reclaimed acetone. The generators of the reclaimed acetone hauled by Thomas are unknown, and since this activity represented a minor portion of Thomas Solvent business (less than 5 percent), enforcement efforts have been directed at Thomas as owner/operator.

In February 1985, EPA determined that source control measures at the Verona Well Field site should be carried out in separate operable units. Source control at the Thomas Raymond Road facility was identified as the first operable unit that should be conducted at the Verona Well Field site because of the relative magnitude of contamination at the facility. The groundwater beneath and surrounding the facility is contaminated at levels exceeding 100,000 ppb VOCs. This is approximately 100 times more concentrated than levels in the majority of the plume.

Presently, contaminated groundwater from the Thomas Raymond Road facility is pumped from several on-site extraction wells to the pretreatment facility at the Verona Well Field site. This wastestream is discharged to two of three activated carbon adsorption vessels before blending with groundwater from the blocking well system. The blended streams collect in a wet well prior to being pumped through an air stripping unit. Final discharge is to the Battle Creek River.

- Personnel from MDNR have noted that desorption of several compounds from the granular activated carbon units occurs periodically. These compounds are not air-stripped efficiently and have on occasion been found by MDNR in the final effluent.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl^4 to Cl^8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

[b] Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - If the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit, put the value in brackets (i.e., [10]). Indicate the analytical method used with P (for ICP/Flame AA) or F (for Furnace).

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

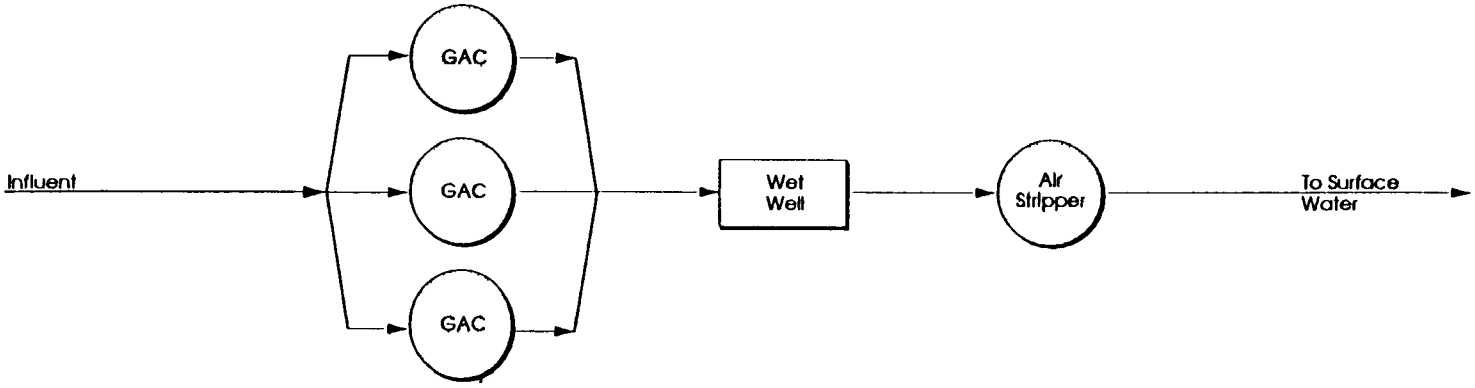
E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

S - Indicates value determined by Method of Standard Addition.

R - Indicates spike recovery is not within control limits.

* - Indicates duplicate analysis is not within control limits.

+ - Indicates the correlation coefficient for Method of Standard Addition is less than 0.995.



Treatment: GAC - AS
Wastewater Type: Groundwater
Average Flow: 2,000 GPM (24 Hours/7 Days)
Surface Water Discharge

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed GAC[4]	% Mass Removed WW[4]	% Mass Removed AS[4]	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP.ITD	PP : ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	10 : 13 : 17	0.004ppt-1,884 ug/L	11-532 ug/L	21,715 : 44,700	2,130 : 4,800	74 : 64	62 : 69	3 : 4	89 : 90
Metals	3 : 11 : 18	6-103,200 ug/L	6-10 ug/L	238 : 1,697,865	206 : 1,490,590	10 : 11	1 : < 1	3 : 2	13 : 12

NOTES:

1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. Taken from concentration averages over a five day sampling event

3. Based on pollutant concentration averages

4. GAC = Granular Activated Carbon
   WW = Wet Well
   AS = Air Stripping

FIGURE B-17
VERONA WELL FIELDS - 1223
FIVE DAY SAMPLING EVENT
REGION V BATTLE CREEK, MI

VERONA WELL FIELDS - EPISODE 1223
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
CARBON ADSORPTION+AIR STRIPPING

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
1,1,1-TRICHLOROETHANE	UG/L	Carbon Ads.	363.600	89.800	75
		Holding Tank	89.800	20.833	77
		Air Stripping	20.833	10.000	52
		Total Removal	363.600	10.000	97
1,2-DICHLOROETHANE	UG/L	Carbon Ads.	38.800	64.200	-65
		Holding Tank	64.200	12.167	81
		Air Stripping	12.167	10.000	18
		Total Removal	38.800	10.000	74
2,3,7,8-TCDF	UG/L	Carbon Ads.	0.000	0.000	25
		Holding Tank	0.000	0.000	0
		Air Stripping	0.000	0.000	-67
		Total Removal	0.000	0.000	-25
2,4-DIAMINOTOLUENE	UG/L	Carbon Ads.	112.000	102.200	9
		Holding Tank	102.200	101.167	1
		Air Stripping	101.167	104.500	-3
		Total Removal	112.000	104.500	7
2-BUTANONE (MEK)	UG/L	Carbon Ads.	396.200	54.200	86
		Holding Tank	54.200	50.000	8
		Air Stripping	50.000	50.000	0
		Total Removal	396.200	50.000	87
ACETONE	UG/L	Carbon Ads.	1883.600	912.800	52
		Holding Tank	912.800	74.667	92
		Air Stripping	74.667	55.333	26
		Total Removal	1883.600	55.333	97
ACROLEIN	UG/L	Carbon Ads.	63.000	50.000	21
		Holding Tank	50.000	50.000	0
		Air Stripping	50.000	50.000	0
		Total Removal	63.000	50.000	21
BENZENE	UG/L	Carbon Ads.	25.200	10.000	60
		Holding Tank	10.000	10.000	0
		Air Stripping	10.000	10.000	0
		Total Removal	25.200	10.000	60
BENZYL ALCOHOL	UG/L	Carbon Ads.	35.200	17.800	49
		Holding Tank	17.800	17.500	2
		Air Stripping	17.500	21.000	-20
		Total Removal	35.200	21.000	40

VERONA WELL FIELDS - EPISODE 1223 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
BIPHENYL	UG/L	Carbon Ads.	12.000	10.000	17
		Holding Tank	10.000	10.000	0
		Air Stripping	10.000	10.000	0
		Total Removal	12.000	10.000	17
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	Carbon Ads.	59.400	46.400	22
		Holding Tank	46.400	71.200	-53
		Air Stripping	71.200	129.700	-82
		Total Removal	59.400	129.700	***
HEXACHLOROETHANE	UG/L	Carbon Ads.	10.600	12.000	-13
		Holding Tank	12.000	11.500	4
		Air Stripping	11.500	10.833	6
		Total Removal	10.600	10.833	-2
METHYLENE CHLORIDE	UG/L	Carbon Ads.	18.600	14.000	25
		Holding Tank	14.000	10.000	29
		Air Stripping	10.000	10.000	0
		Total Removal	18.600	10.000	46
TETRACHLOROETHENE	UG/L	Carbon Ads.	451.400	10.000	98
		Holding Tank	10.000	10.000	0
		Air Stripping	10.000	10.000	0
		Total Removal	451.400	10.000	98
TOLUENE	UG/L	Carbon Ads.	532.400	10.000	98
		Holding Tank	10.000	10.000	0
		Air Stripping	10.000	10.000	0
		Total Removal	532.400	10.000	98
TRANS-1,2-DICHLOROETHENE	UG/L	Carbon Ads.	178.600	334.600	-87
		Holding Tank	334.600	73.000	78
		Air Stripping	73.000	21.000	71
		Total Removal	178.600	21.000	88
TRICHLOROETHENE	UG/L	Carbon Ads.	685.200	31.600	95
		Holding Tank	31.600	10.000	68
		Air Stripping	10.000	10.000	0
		Total Removal	685.200	10.000	99
INORGANICS					
BARIUM	UG/L	Carbon Ads.	128.800	132.400	-3
		Holding Tank	132.400	100.167	24
		Air Stripping	100.167	96.833	3
		Total Removal	128.800	96.833	25

VERONA WELL FIELDS - EPISODE 1223 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
BORON	UG/L	Carbon Ads.	484.800	357.600	26
		Holding Tank	357.600	616.667	-72
		Air Stripping	616.667	573.000	7
		Total Removal	484.800	573.000	-18
CADMIUM	UG/L	Carbon Ads.	6.240	5.500	12
		Holding Tank	5.500	4.850	12
		Air Stripping	4.850	4.367	10
		Total Removal	6.240	4.367	30
CALCIUM	UG/L	Carbon Ads.	103200.000	101460.000	2
		Holding Tank	101460.000	97166.667	4
		Air Stripping	97166.667	95866.667	1
		Total Removal	103200.000	95866.667	7
CHROMIUM	UG/L	Carbon Ads.	10.250	11.600	-13
		Holding Tank	11.600	11.983	-3
		Air Stripping	11.983	11.833	1
		Total Removal	10.250	11.833	-15
COBALT	UG/L	Carbon Ads.	10.840	9.680	11
		Holding Tank	9.680	10.233	-6
		Air Stripping	10.233	10.633	-4
		Total Removal	10.840	10.633	2
IRON	UG/L	Carbon Ads.	661.800	2486.000	***
		Holding Tank	2486.000	1075.000	57
		Air Stripping	1075.000	384.500	64
		Total Removal	661.800	384.500	42
MAGNESIUM	UG/L	Carbon Ads.	27680.000	27300.000	1
		Holding Tank	27300.000	26333.333	4
		Air Stripping	26333.333	26150.000	1
		Total Removal	27680.000	26150.000	6
MANGANESE	UG/L	Carbon Ads.	164.500	164.800	0
		Holding Tank	164.800	130.500	21
		Air Stripping	130.500	114.000	13
		Total Removal	164.500	114.000	31
MOLYBDENUM	UG/L	Carbon Ads.	17.000	18.600	-9
		Holding Tank	18.600	11.333	39
		Air Stripping	11.333	14.167	-25
		Total Removal	17.000	14.167	17
SILICON	UG/L	Carbon Ads.	800.000	800.000	0
		Holding Tank	800.000	750.000	6
		Air Stripping	750.000	917.000	-22
		Total Removal	800.000	917.000	-15

VERONA WELL FIELDS - EPISODE 1223 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
SODIUM	UG/L	Carbon Ads.	15820.000	15640.000	1
		Holding Tank	15640.000	14716.667	6
		Air Stripping	14716.667	14633.333	1
		Total Removal	15820.000	14633.333	8
STRONTIUM	UG/L	Carbon Ads.	80.000	80.000	0
		Holding Tank	80.000	83.000	-4
		Air Stripping	83.000	100.000	-20
		Total Removal	80.000	100.000	-25
SULFUR	UG/L	Carbon Ads.	35680.000	15600.000	56
		Holding Tank	15600.000	24517.000	-57
		Air Stripping	24517.000	23317.000	5
		Total Removal	35680.000	23317.000	35
TIN	UG/L	Carbon Ads.	47.800	43.600	9
		Holding Tank	43.600	43.000	1
		Air Stripping	43.000	38.167	11
		Total Removal	47.800	38.167	20
TITANIUM	UG/L	Carbon Ads.	9.400	9.800	-4
		Holding Tank	9.800	10.333	-5
		Air Stripping	10.333	10.500	-2
		Total Removal	9.400	10.500	-12
VANADIUM	UG/L	Carbon Ads.	6.800	6.800	0
		Holding Tank	6.800	7.167	-5
		Air Stripping	7.167	7.333	-2
		Total Removal	6.800	7.333	-8
ZINC	UG/L	Carbon Ads.	9.440	6.200	34
		Holding Tank	6.200	6.200	0
		Air Stripping	6.200	6.200	0
		Total Removal	9.440	6.200	34
CONVENTIONALS/NONCONVENTIONALS					
BOD5	UG/L	Carbon Ads.	9940.000	7060.000	29
		Holding Tank	7060.000	6000.000	15
		Air Stripping	6000.000	6000.000	0
		Total Removal	9940.000	6000.000	40
CHLORIDE	UG/L	Carbon Ads.	38250.000	39500.000	-3
		Holding Tank	39500.000	36000.000	9
		Air Stripping	36000.000	35800.000	1
		Total Removal	38250.000	35800.000	6

VERONA WELL FIELDS - EPISODE 1223 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
COD	UG/L	Carbon Ads.	30800.000	25000.000	19
		Holding Tank	25000.000	25000.000	0
		Air Stripping	25000.000	25000.000	0
		Total Removal	30800.000	25000.000	19
FLASH POINT	UG/L	Carbon Ads.	57000.000	0.000	100
		Holding Tank	0.000	0.000	***
		Air Stripping	0.000	35000.000	***
		Total Removal	57000.000	35000.000	39
NITRATE + NITRITE, AS N	UG/L	Carbon Ads.	16882.000	20049.000	-19
		Holding Tank	20049.000	15947.000	20
		Air Stripping	15947.000	14132.000	11
		Total Removal	16882.000	14132.000	16
NITROGEN, TOTAL KJELDAHL	UG/L	Carbon Ads.	104.000	100.000	4
		Holding Tank	100.000	128.000	-28
		Air Stripping	128.000	272.000	***
		Total Removal	104.000	272.000	***
OIL & GREASE, TOTAL RECOVERABLE	UG/L	Carbon Ads.	5000.000	5000.000	0
		Holding Tank	5000.000	5333.000	-7
		Air Stripping	5333.000	5050.000	5
		Total Removal	5000.000	5050.000	-1
SPECIFIC CONDUCTANCE	UMH/CM-25C	Carbon Ads.	652.500	517.500	21
		Holding Tank	517.500	636.000	-23
		Air Stripping	636.000	530.000	17
		Total Removal	652.500	530.000	19
SULFATE	UG/L	Carbon Ads.	42200.000	41400.000	2
		Holding Tank	41400.000	65667.000	-59
		Air Stripping	65667.000	67167.000	-2
		Total Removal	42200.000	67167.000	-59
SULFIDE, TOTAL (IODOMETRIC)	UG/L	Carbon Ads.	1000.000	1420.000	-42
		Holding Tank	1420.000	1000.000	30
		Air Stripping	1000.000	1000.000	0
		Total Removal	1000.000	1000.000	0
TOC	UG/L	Carbon Ads.	7120.000	4580.000	36
		Holding Tank	4580.000	2400.000	48
		Air Stripping	2400.000	1417.000	41
		Total Removal	7120.000	1417.000	80
TSS	UG/L	Carbon Ads.	428000.000	424000.000	1
		Holding Tank	424000.000	431667.000	-2
		Air Stripping	431667.000	421667.000	2
		Total Removal	428000.000	421667.000	1

SECTION B-18
TREATABILITY OF CERCLA POLLUTANTS
WELL 12A - EPISODE 1808

(FIVE DAY SAMPLING EVENT)

WELL 12A - EPISODE 1808
SITE DESCRIPTION

The Well 12A site in Tacoma, Washington is a production well with treatment consisting of an air stripping system discharging treated water to either Commencement Bay or to the City's water system. During the remedial investigation, 11 monitoring wells were installed. By measuring groundwater elevation in the wells, it was determined that the natural (undisturbed by well field pumping) groundwater flow direction was from west to east with a relatively flat gradient and therefore, a low flow velocity. The study also determined that the major source of contamination was generally northeast of Well 12A. A specific source was not identified. Under these conditions, with the wellfield shut down most of the year, the contaminant plume moves slowly away from the production wells. However, under the influence of production well pumping action, the natural gradient is reversed and the contamination is drawn towards the operating wells.

One conclusion of the Remedial Investigation was that operation of Well 12A would intercept the contamination drawn from the source area even if other production wells were pumping. In effect, Well 12A would provide a barrier to the spread of contamination and protect the rest of the wellfield. If Well 12A were not operated to provide a barrier, other operating wells would draw the contaminant plume and would be lost for use.

To avoid the potential loss of the wellfield during the approaching summer peak water demand period, U.S. Environmental Protection Agency (EPA), in January 1983, authorized a focused feasibility study to determine a cost-effective treatment system for the output of Well 12A. Treatment of the wellwater was necessary to achieve a quality that would permit discharge to Commencement Bay, or would permit its use in the City water system.

The initial remedial measure for Well 12A treatment was determined to be an air stripping system consisting of five packed towers operating in parallel at a total flow rate of 3,500 gallons per minute (gpm) and discharging treated water to either Commencement Bay or the the City's water system depending on measured quality and the City's needs. The decision level used to determine whether the treated well water would be used in the City water system or discharged to the bay was the 10^{-6} level of hazard at the tap (after dilution in the system).

Construction of this treatment system was authorized in late March 1983, and it was started up in mid-July and operated by the City until early November. Treatment performance was better than anticipated and effluent solvent concentrations did not reach the design levels. Treated water was therefore suitable for use in the City's water system during the full pumping season.

Operation of the Well 12A treatment system by the City of Tacoma will continue on a seasonal basis to protect the wellfield.

Research into the past ownership and activities on these properties indicated that waste oil and solvent reclamation processes were used and that some of the

spent filter cake was used to build the railroad spur. The use of the Time Oil site for oil recycling and related operations dates back to 1927 when William Palin began operations under the name of Palin and Son. In 1933, the business name was changed to National Oil and Paint. The two main activities of the businesses were waste oil recycling and paint and lacquer thinner manufacturing.

The waste oil recycling process consisted of collecting waste oil in a large tank, adding chemicals such as sulfuric acid, and pressurizing and heating the contents of the vessel. This process resulted in the formation of a tar-like sludge on the bottom of the tank which was removed and disposed of. Absorbents and clay materials were also added to the oil. The sludge was filtered from the oil, and the resulting filter cake was disposed of or stored in various piles on the site. Some of this sludge was also used for fill around the site.

The paint and lacquer thinner manufacturing involved the use of many solvents that were stored on the site in barrels which may have leaked their contents into the soil.

Prior to purchase of the property by Time Oil, Inc., in 1964, the remaining barrels and drums of solvent were removed from the site. After Time Oil purchased the property, operations continued under the name National Oil and Paint until 1972. During this period, National Oil was involved only in waste oil recycling. Waste sludges and filter cakes were not known to be stored on the site during this period.

In 1972, Time Oil leased the facilities to Golden Penn, Inc. Golden Penn operated on the site until 1976, before going out of business as a result of a destructive fire. In 1975 and 1976, Golden Penn was ordered by the State of Washington to clean up the site by removing some of the filter cake and spilled oil from the ground.

In 1976, Time Oil resumed operation at the site. Since then their operation has been limited to canning oil brought to the site in bulk containers. In 1982, the Burlington Northern Railroad spur was extended by Time Oil to its present length so that oil could be delivered by tanker car. During the construction of the spur, some of the filter cake or sludge material stored on the site was used in the roadbed.

During the remedial investigation, the extent of soil and groundwater contamination near the Time Oil plant was explored by means of surface soil samples, shallow and deep soil borings and monitoring wells.

Chemical data for 1,1,2,2-tetrachloroethane and tetrachloroethylene taken from soil borings along the spur and along a north-south line and data for trichloroethylene shows these compounds are the ones of primary interest because they are the contaminants at Well 12A. Many others, not found at Well 12A, were also detected at much lower concentrations.

Along the east-west line of borings, high values of soil contamination are located along the spur adjacent to the western Time Oil building and continuing

for a distance of at least 150 feet west of that building. Measured concentrations of the contaminants is greater than 3,000 parts per billion (ppb) of soil to depths of about 25 feet. Highest concentrations were found near the surface at levels up to about 1,000 parts per million (ppm).

Along the north-south soil boring line, soil contamination concentrations to about 3,000 ppb of soil were measured to a depth of about 20 feet on the north end of the Fleetline property.

Continuity between this near surface soil contamination and that in the aquifer was established. The total quantity of solvents contained in the soil from the ground surface to the groundwater level was grossly estimated at about 1,500 pounds.

Groundwater contamination was found along the east-west line of borings in the same boreholes as the major soil contamination. Levels ranged up to about 11,000 ppb of water. Along the north-south line of borings, levels up to 863,000 ppb were measured under the Fleetline property. This southward displacement of the highest aquifer contamination is likely to have resulted from the previous pumping action of the wellfield.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS GCMS	613M[a] (Cl_4 to Cl_8-10L) 8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

[b] Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 μg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 μg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

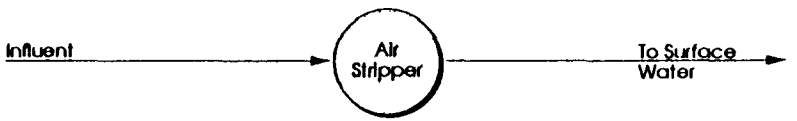
M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

R - Spike recovery limits met after rerun on ICP.



Treatment: Air Stripping
Wastewater Type: Groundwater
Average Flow: 3,500 GPM (24 Hours/7 Days)
Surface Water Discharge

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP : ITD	(LBS/YR) PP : ITD	PP : ITD
Total Organics	4 : 4 : 7	0.084 - 142 ug/L	11 - 142 ug/L	3,740 : 3,740	4,120 : 4,120	< 1 : < 1
Metals	1 : 8 : 10	6 - 24,360 ug/L	52 ug/L	790 : 1,243,560	122 : 1,246,260	85 : < 1

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. Taken from concentration averages over a five day sampling event

3. Based on pollutant concentration averages

FIGURE B-18
WELL 12A - 1808
FIVE DAY SAMPLING EVENT
REGION X TACOMA, WA

6098 01

WELL 12A - EPISODE 1808
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
AIR STRIPPER

COMPOUND	UNITS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS				
1,1,2,2-TETRACHLOROETHANE	UG/L	31.200	10.000	68
1,2,3,4,6,7,8-HpCDD	PPT	0.084	0.007	92
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	141.600	239.333	-69
OCDD	PPT	0.520	0.040	92
TOTAL HpCDD	PPT	0.120	0.040	67
TRANS-1,2-DICHLOROETHENE	UG/L	11.400	10.000	12
TRICHLOROETHENE	UG/L	60.000	10.000	83
INORGANICS				
BARIUM	UG/L	5.600	5.000	11
CALCIUM	UG/L	24360.000	24716.667	-1
COPPER	UG/L	51.600	8.000	84
IRON	UG/L	16.000	13.000	19
MAGNESIUM	UG/L	20500.000	20566.667	0
MANGANESE	UG/L	25.400	2.000	92
POTASSIUM	MG/L	2.720	2.850	-5
SILICON	MG/L	8.700	8.883	-2

WELL 12A - EPISODE 1808 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
SODIUM	UG/L	16980.000	17133.333	-1
SULFUR	MG/L	7.860	7.217	8
CONVENTIONALS/NONCONVENTIONALS				
CHLORIDE	MG/L	37.800	38.500	-2
NITRATE + NITRITE, AS N	MG/L	2.080	2.117	-2
OIL & GREASE, TOTAL RECOVERABLE	MG/L	8.800	17.317	-97
RESIDUE, FILTERABLE	MG/L	232.000	223.333	4
SPECIFIC CONDUCTANCE	UMH/CM-25C	366.000	363.333	1
SULFATE	MG/L	21.000	22.167	-6
TOTAL ORGANIC CARBON	MG/L	5.800	4.967	14

SECTION B-19
TREATABILITY OF CERCLA POLLUTANTS
WESTERN PROCESSING - EPISODE 1739

(FIVE DAY SAMPLING EVENT)

WESTERN PROCESSING - EPISODE 1739
SITE DESCRIPTION

The Western Processing site is located at 7215 South 196th Street in Kent, King County, Washington. From 1953 to 1961, the site was leased and used as a U.S. Army Nike Anti-Aircraft Artillery facility. In 1961, the property was sold to Western Processing Company, Inc. (Western Processing). Originally, Western Processing was a reprocessor of animal by-products and brewer's yeast. In the 1960s, the business expanded to recycling, reclaiming, treating, and disposing of many industrial wastes, including waste oils, electroplating wastes, waste pickle liquor, battery acids, steel mill flue dust, pesticides, spent solvents, and zinc dross.

Discharges from Western Processing were monitored and regulated by the Washington Department of Ecology (WDOE) until 1981. U.S. Environmental Protection Agency (EPA) inspected the site in March 1981 to determine compliance with the new RCRA regulations and in September 1982, EPA initiated an investigation. Western Processing had violated many EPA hazardous waste management regulations. Approximately 100 of the 129 priority pollutants were detected in the soil or groundwater on and off the Western Processing Site, or in the adjacent Mill Creek.

After soil and groundwater sample analyses were completed in April 1983, confirming widespread site contamination, EPA ordered cessation of site operations. Western Processing could not comply with EPA's specifications to clean up the site, so EPA conducted emergency cleanup operations funded by Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The emergency response activities included removal of wastes (drums, liquids, and solids) for off-site disposal, reorganization of the remaining on-site drums, and excavation of contaminated soil from the reaction pond area.

A Record-of-Decision was signed in 1984. In July 1984, further site cleanup activities were initiated as a result of the agreement reached between EPA, WDOE, and the potentially responsible parties (PRPs) for the Phase I remedial action program. These surface cleanup activities were completed in November 1984 under the direction of Chemical Waste Management, Inc. (consultant for the PRPs).

The selected alternative for the Phase II remedial action program included installation of a slurry wall around the site to a depth of 42 to 46 feet below ground and pumping and treating the groundwater from the shallow aquifer directly below the site and contaminated groundwater from deeper in the aquifer that has migrated off-site. More than 200 well points, laid out in a grid across the site, will be used to extract groundwater from below the site. Extraction wells located off-site will be used to pump contaminated groundwater from deeper in the aquifer. The on-site well points and off-site pumping wells are divided into six different cells so that the pumping zones and the pumping rate from each cell can be controlled. Interspersed amongst the on-site well points are infiltration drains that will be used to recycle clean water through the unsaturated zone and flush contamination from the shallow soils. The

groundwater was pumped initially at a rate of 100 gallons per minute (gpm) and routed through an on-site pretreatment plant designed by Chemical Waste Management, Inc. (and subcontractors HDR and Canoni). The pumping system and pretreatment plant are designed to pump and treat the groundwater at a rate of up to 200 gpm. Pretreated groundwater is discharged directly into the city sewer system for additional treatment by activated sludge at the Renton wastewater treatment plant.

Negotiations were initiated in 1986 between EPA, WDOE and the POTW authority of Metropolitan Seattle (Metro) to discuss the feasibility of discharging contaminated water from the Western Processing site. Initially, Metro was reluctant to accept the wastewater because of concerns about liability. In April 1987, EPA entered a Consent Decree to expedite the Phase II clean-up effort. Chemical Waste Management, Inc., submitted a contract to Metro for discharge from the site in the summer of 1987. After Metro received written indemnification assurance from EPA and WDOE regarding environmental consequences associated with accepting the contaminated wastewater, Metro developed initial local limits for acceptable loading from the site.

The Western Processing pretreatment plant operates 24 hours per day, and will operate for a minimum of seven years. The pretreatment plant process includes sequentially: air stripping with carbon adsorption and hot gas regeneration systems to control volatile emissions; phenol oxidation; metals reduction; pH adjustment; flocculation; inclined-plate clarification; and sludge thickening. A stand-by granulated carbon adsorption system to treat the groundwater is also in place. The sludge generated from the pretreatment plant is disposed at the Arlington, Oregon, hazardous waste landfill.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

SUMMARY OF ANALYTICAL METHODS (cont.)

Analytical Category and Fraction	Technique	EPA Method No.
Classicals (sludge samples)		
Ammonia, as N	Titrimetric, Distillation	350.2
Nitrogen, Kjeldahl, total	Titrimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Cyanide, total	Colorimetric	9010[b]
pH		9045[b]
Residue, total	Gravimetric	160.3
Residue, total volatile	Gravimetric	160.4
Sulfide, total	Monier-Williams	c
Flash point (ignitability)	Pensky-Martens Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

b. Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

c. 49 CFR Part 425, Federal Register Vol. 52, No. 13, January 21, 1987

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 µg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 µg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

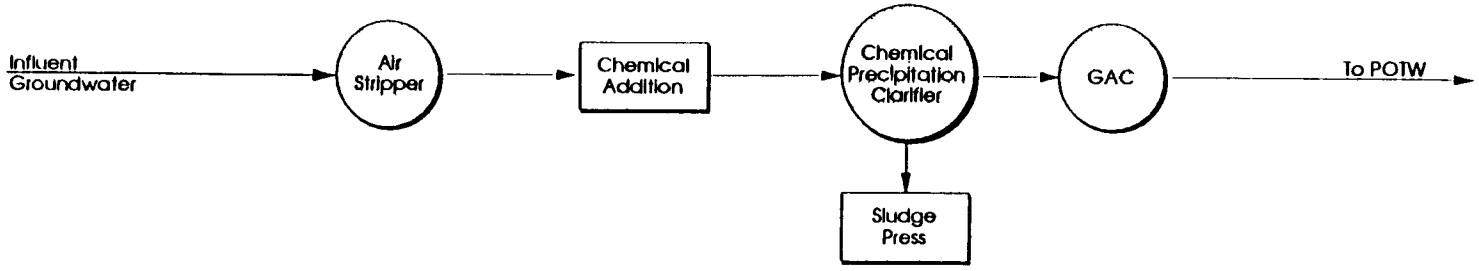
M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

R - Spike recovery limits met after rerun on ICP.



Treatment: AS - CP - GAC
Wastewater Type: Groundwater
Average Flow: 100 GPM (24 Hours/7 Days)
To 42 MGD POTW

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]	Influent Loading[3]	Discharge	% Mass Removed AS[4]	% Mass Removed CP[4]	% Mass Removed GAC[4]	% Mass Removed Overall
Pollutant	PP : TCL : ITD	Min-Max	Min-Max	(LBS/YR) PP:ITD	(LBS/YR) PP:ITD	PP : ITD	PP : ITD	PP : ITD	PP : ITD
Total Organics	19 : 17 : 34	0.12ppt - 1,804 ug/L	14 - 1,804 ug/L	2,740 : 3,270	100 : 240	90 : 79	35 : 46	40 : 44	46 : 93
Metals	8 : 17 : 25	2 - 341 667 ug/L	2 - 35 533 ug/L	17,200 : 413,390	70 : 327,220	< 1 : 5	99 : 5	69 : 12	> 99 : 21

NOTES:

1 PP = Priority Pollutant
TCL = Compound from Target Compound List
ITD = Industrial Technology Division Analyte

2. Taken from concentration averages over a five day sampling event

3. Based on pollutant concentration averages

4. AS = Air Stripper
CP = Chemical Precipitation
GAC = Granular Activated Carbon

FIGURE B-19
WESTERN PROCESSING - 1739
FIVE DAY SAMPLING EVENT
REGION X KENT, WA

WESTERN PROCESSING - EPISODE 1739
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
AIR STRIPPER + CHEMICAL ADDITION + CHEMICAL PRECIPITATION + ACTIVATED CARBON

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ORGANICS					
1,1,1-TRICHLOROETHANE	UG/L	Air Stripping	527.83	55.20	90
		Chemical Addition	55.20	10.00	82
		Chemical Prec.	10.00	10.60	-6
		Activated Carbon	10.60	10.00	6
		Total Removal	527.83	10.00	98
1,1-DICHLOROETHANE	UG/L	Air Stripping	65.50	10.00	85
		Chemical Addition	10.00	53.80	**
		Chemical Prec.	53.80	10.00	81
		Activated Carbon	10.00	10.00	0
		Total Removal	65.50	10.00	85
1,1-DICHLOROETHENE	UG/L	Air Stripping	43.67	27.80	36
		Chemical Addition	27.80	40.20	**
		Chemical Prec.	40.20	10.00	75
		Activated Carbon	10.00	10.00	0
		Total Removal	43.67	10.00	77
1,2-DICHLOROBENZENE	UG/L	Air Stripping	14.17	10.00	29
		Chemical Addition	10.00	10.00	0
		Chemical Prec.	10.00	10.00	0
		Activated Carbon	10.00	10.00	0
		Total Removal	14.17	10.00	29
1,2-DICHLOROETHANE	UG/L	Air Stripping	16.17	10.00	38
		Chemical Addition	10.00	14.80	**
		Chemical Prec.	14.80	11.20	24
		Activated Carbon	11.20	10.00	11
		Total Removal	16.17	10.00	38
2,4-DICHLOROPHENOL	UG/L	Air Stripping	66.67	106.60	**
		Chemical Addition	106.60	44.40	58
		Chemical Prec.	44.40	45.40	-2
		Activated Carbon	45.40	10.00	78
		Total Removal	66.67	10.00	85
2,4-DIMETHYLPHENOL	UG/L	Air Stripping	131.17	69.00	47
		Chemical Addition	69.00	33.80	51
		Chemical Prec.	33.80	44.60	**
		Activated Carbon	44.60	10.00	78
		Total Removal	131.17	10.00	92
2-NITROPHENOL	UG/L	Air Stripping	159.83	10.00	94
		Chemical Addition	10.00	10.00	0
		Chemical Prec.	10.00	10.00	0
		Activated Carbon	10.00	10.00	0
		Total Removal	159.83	10.00	94

WESTERN PROCESSING - EPISODE 1739 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
4-METHYL-2-PENTANONE (MIBK)	UG/L	Air Stripping	68.33	50.00	27
		Chemical Addition	50.00	94.00	**
		Chemical Prec.	94.00	71.00	24
		Activated Carbon	71.00	50.00	30
		Total Removal	68.33	50.00	27
4-NITROPHENOL	UG/L	Air Stripping	230.67	50.00	78
		Chemical Addition	50.00	50.00	0
		Chemical Prec.	50.00	50.00	0
		Activated Carbon	50.00	50.00	0
		Total Removal	230.67	50.00	78
BENZENE	UG/L	Air Stripping	26.50	17.40	34
		Chemical Addition	17.40	21.80	**
		Chemical Prec.	21.80	10.80	50
		Activated Carbon	10.80	10.67	1
		Total Removal	26.50	10.67	60
BENZOIC ACID	UG/L	Air Stripping	73.83	56.80	23
		Chemical Addition	56.80	50.00	12
		Chemical Prec.	50.00	50.00	0
		Activated Carbon	50.00	50.00	0
		Total Removal	73.83	50.00	32
CHLOROFORM	UG/L	Air Stripping	406.33	56.00	86
		Chemical Addition	56.00	88.60	**
		Chemical Prec.	88.60	19.00	79
		Activated Carbon	19.00	10.00	47
		Total Removal	406.33	10.00	98
ISOPHORONE	UG/L	Air Stripping	15.50	12.20	21
		Chemical Addition	12.20	10.00	18
		Chemical Prec.	10.00	10.00	0
		Activated Carbon	10.00	10.00	0
		Total Removal	15.50	10.00	35
M-XYLENE	UG/L	Air Stripping	18.00	32.00	**
		Chemical Addition	32.00	12.60	61
		Chemical Prec.	12.60	10.00	21
		Activated Carbon	10.00	10.00	0
		Total Removal	18.00	10.00	44
METHYLENE CHLORIDE	UG/L	Air Stripping	83.50	21.80	74
		Chemical Addition	21.80	39.80	**
		Chemical Prec.	39.80	27.40	31
		Activated Carbon	27.40	10.00	64
		Total Removal	83.50	10.00	88
N,N-DIMETHYLFORMAMIDE	UG/L	Air Stripping	91.83	77.80	15
		Chemical Addition	77.80	38.80	50
		Chemical Prec.	38.80	38.80	0
		Activated Carbon	38.80	18.83	51
		Total Removal	91.83	18.83	79

WESTERN PROCESSING - EPISODE 1739 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
N-DODECANE (N-C12)	UG/L	Air Stripping	41.17	24.60	40
		Chemical Addition	24.60	24.40	1
		Chemical Prec.	24.40	23.20	5
		Activated Carbon	23.20	10.00	57
		Total Removal	41.17	10.00	76
O- + P-XYLENE	UG/L	Air Stripping	12.00	10.00	17
		Chemical Addition	10.00	10.00	0
		Chemical Prec.	10.00	10.00	0
		Activated Carbon	10.00	10.00	0
		Total Removal	12.00	10.00	17
O-CRESOL	UG/L	Air Stripping	165.83	82.60	50
		Chemical Addition	82.60	10.00	88
		Chemical Prec.	10.00	10.00	0
		Activated Carbon	10.00	10.00	0
		Total Removal	165.83	10.00	94
OCDD	UG/L	Air Stripping	0.00	0.00	17
		Chemical Addition	0.00	0.00	**
		Chemical Prec.	0.00	0.00	25
		Activated Carbon	0.00	0.00	40
		Total Removal	0.00	0.00	25
P-CRESOL	UG/L	Air Stripping	70.67	44.80	37
		Chemical Addition	44.80	10.00	78
		Chemical Prec.	10.00	10.00	0
		Activated Carbon	10.00	10.00	0
		Total Removal	70.67	10.00	86
P-DIOXANE	UG/L	Air Stripping	140.50	102.60	27
		Chemical Addition	102.60	159.80	**
		Chemical Prec.	159.80	150.60	6
		Activated Carbon	150.60	131.83	12
		Total Removal	140.50	131.83	6
PHENOL	UG/L	Air Stripping	1441.83	17.80	99
		Chemical Addition	17.80	10.00	44
		Chemical Prec.	10.00	10.00	0
		Activated Carbon	10.00	10.00	0
		Total Removal	1441.83	10.00	99
TETRACHLOROETHENE	UG/L	Air Stripping	147.00	10.00	93
		Chemical Addition	10.00	10.00	0
		Chemical Prec.	10.00	11.00	**
		Activated Carbon	11.00	10.00	9
		Total Removal	147.00	10.00	93
TOLUENE	UG/L	Air Stripping	56.83	26.80	53
		Chemical Addition	26.80	41.00	**
		Chemical Prec.	41.00	11.80	71
		Activated Carbon	11.80	10.00	15
		Total Removal	56.83	10.00	82

WESTERN PROCESSING - EPISODE 1739 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
TRANS-1,2-DICHLOROETHENE	UG/L	Air Stripping	797.83	22.80	97
		Chemical Addition	22.80	12.80	44
		Chemical Prec.	12.80	15.20	**
		Activated Carbon	15.20	10.00	34
		Total Removal	797.83	10.00	99
TRICHLOROETHENE	UG/L	Air Stripping	1804.33	54.00	97
		Chemical Addition	54.00	114.40	**
		Chemical Prec.	114.40	60.00	48
		Activated Carbon	60.00	10.00	83
		Total Removal	1804.33	10.00	99
VINYL CHLORIDE	UG/L	Air Stripping	230.00	10.00	96
		Chemical Addition	10.00	10.00	0
		Chemical Prec.	10.00	10.00	0
		Activated Carbon	10.00	10.00	0
		Total Removal	230.00	10.00	96
PESTICIDES					
2,4,5-T	UG/L	Air Stripping	1.10	1.06	4
		Chemical Addition	1.06	1.40	**
		Chemical Prec.	1.40	0.10	93
		Activated Carbon	0.10	0.10	0
		Total Removal	1.10	0.10	91
2,4,5-TP (SILVEX)	UG/L	Air Stripping	1.55	1.60	-3
		Chemical Addition	1.60	1.50	6
		Chemical Prec.	1.50	0.10	93
		Activated Carbon	0.10	0.10	0
		Total Removal	1.55	0.10	94
2,4-D	UG/L	Air Stripping	430.00	360.00	16
		Chemical Addition	360.00	390.00	-8
		Chemical Prec.	390.00	0.10	**
		Activated Carbon	0.10	0.10	0
		Total Removal	430.00	0.10	**
PHOSPHAMIDON	UG/L	Air Stripping	8.50	8.00	6
		Chemical Addition	8.00	3.00	63
		Chemical Prec.	3.00	8.20	**
		Activated Carbon	8.20	3.00	63
		Total Removal	8.50	3.00	65
TEPP	UG/L	Air Stripping	79.00	94.00	**
		Chemical Addition	94.00	65.00	31
		Chemical Prec.	65.00	64.00	2
		Activated Carbon	64.00	14.00	78
		Total Removal	79.00	14.00	82
INORGANICS					

WESTERN PROCESSING - EPISODE 1739 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
ALUMINUM	UG/L	Air Stripping	53466.67	23420.00	56
		Chemical Addition	23420.00	8276.00	65
		Chemical Prec.	8276.00	229.00	97
		Activated Carbon	229.00	136.67	40
		Total Removal	53466.67	136.67	**
ANTIMONY	UG/L	Air Stripping	4.03	18.40	**
		Chemical Addition	18.40	3.20	83
		Chemical Prec.	3.20	11.20	**
		Activated Carbon	11.20	10.00	11
		Total Removal	4.03	10.00	**
ARSENIC	UG/L	Air Stripping	10.90	12.54	**
		Chemical Addition	12.54	7.38	41
		Chemical Prec.	7.38	2.00	73
		Activated Carbon	2.00	3.15	**
		Total Removal	10.90	3.15	71
BARIUM	UG/L	Air Stripping	48.17	69.40	**
		Chemical Addition	69.40	25.60	63
		Chemical Prec.	25.60	9.80	62
		Activated Carbon	9.80	11.67	**
		Total Removal	48.17	11.67	76
BERYLLIUM	UG/L	Air Stripping	1.83	2.60	**
		Chemical Addition	2.60	0.80	69
		Chemical Prec.	0.80	1.00	**
		Activated Carbon	1.00	1.00	0
		Total Removal	1.83	1.00	45
BORON	UG/L	Air Stripping	2231.67	2302.00	-3
		Chemical Addition	2302.00	1794.00	22
		Chemical Prec.	1794.00	2246.00	**
		Activated Carbon	2246.00	1820.00	19
		Total Removal	2231.67	1820.00	18
CADMIUM	UG/L	Air Stripping	275.83	403.40	**
		Chemical Addition	403.40	128.20	68
		Chemical Prec.	128.20	4.60	96
		Activated Carbon	4.60	4.00	13
		Total Removal	275.83	4.00	99
CALCIUM	UG/L	Air Stripping	94100.00	99840.00	-6
		Chemical Addition	99840.00	71340.00	29
		Chemical Prec.	71340.00	82920.00	**
		Activated Carbon	82920.00	61800.00	25
		Total Removal	94100.00	61800.00	34
CHROMIUM	UG/L	Air Stripping	1204.00	1440.00	**
		Chemical Addition	1440.00	521.00	64
		Chemical Prec.	521.00	12.60	98
		Activated Carbon	12.60	13.00	-3
		Total Removal	1204.00	13.00	99

WESTERN PROCESSING - EPISODE 1739 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
COBALT	UG/L	Air Stripping	85.33	137.00	**
		Chemical Addition	137.00	45.80	67
		Chemical Prec.	45.80	20.00	56
		Activated Carbon	20.00	20.00	0
		Total Removal	85.33	20.00	77
COPPER	UG/L	Air Stripping	364.50	440.60	**
		Chemical Addition	440.60	175.60	60
		Chemical Prec.	175.60	44.40	75
		Activated Carbon	44.40	9.00	80
		Total Removal	364.50	9.00	98
IRON	UG/L	Air Stripping	110000.00	129800.00	**
		Chemical Addition	129800.00	44008.00	66
		Chemical Prec.	44008.00	371.20	99
		Activated Carbon	371.20	614.50	**
		Total Removal	110000.00	614.50	99
MAGNESIUM	UG/L	Air Stripping	41383.33	44120.00	-7
		Chemical Addition	44120.00	32740.00	26
		Chemical Prec.	32740.00	39480.00	**
		Activated Carbon	39480.00	34216.67	13
		Total Removal	41383.33	34216.67	17
MANGANESE	UG/L	Air Stripping	8593.33	13320.00	**
		Chemical Addition	13320.00	4928.00	63
		Chemical Prec.	4928.00	2278.00	54
		Activated Carbon	2278.00	1471.67	35
		Total Removal	8593.33	1471.67	83
MOLYBDENUM	UG/L	Air Stripping	14.83	15.40	-4
		Chemical Addition	15.40	10.60	31
		Chemical Prec.	10.60	13.20	**
		Activated Carbon	13.20	14.83	**
		Total Removal	14.83	14.83	0
NICKEL	UG/L	Air Stripping	1933.33	2954.00	**
		Chemical Addition	2954.00	993.20	66
		Chemical Prec.	993.20	217.40	78
		Activated Carbon	217.40	60.33	72
		Total Removal	1933.33	60.33	97
PHOSPHORUS	UG/L	Air Stripping	1733.00	2160.00	**
		Chemical Addition	2160.00	840.00	61
		Chemical Prec.	840.00	0.00	**
		Activated Carbon	0.00	2450.00	**
		Total Removal	1733.00	2450.00	**
POTASSIUM	UG/L	Air Stripping	30700.00	31780.00	-4
		Chemical Addition	31780.00	24060.00	24
		Chemical Prec.	24060.00	30400.00	**
		Activated Carbon	30400.00	26167.00	14
		Total Removal	30700.00	26167.00	15

WESTERN PROCESSING - EPISODE 1739 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
SILICON	UG/L	Air Stripping	15200.00	19960.00	**
		Chemical Addition	19960.00	7280.00	64
		Chemical Prec.	7280.00	2340.00	68
		Activated Carbon	2340.00	5133.00	**
		Total Removal	15200.00	5133.00	66
SODIUM	UG/L	Air Stripping	341666.67	292680.00	14
		Chemical Addition	292680.00	387000.00	**
		Chemical Prec.	387000.00	484600.00	**
		Activated Carbon	484600.00	466333.33	4
		Total Removal	341666.67	466333.33	**
STRONTIUM	UG/L	Air Stripping	633.00	720.00	**
		Chemical Addition	720.00	500.00	31
		Chemical Prec.	500.00	520.00	-4
		Activated Carbon	520.00	400.00	23
		Total Removal	633.00	400.00	37
SULFUR	UG/L	Air Stripping	205667.00	173200.00	16
		Chemical Addition	173200.00	164000.00	5
		Chemical Prec.	164000.00	203000.00	**
		Activated Carbon	203000.00	147167.00	28
		Total Removal	205667.00	147167.00	28
TITANIUM	UG/L	Air Stripping	12.33	20.80	**
		Chemical Addition	20.80	9.40	55
		Chemical Prec.	9.40	3.60	62
		Activated Carbon	3.60	13.17	**
		Total Removal	12.33	13.17	-7
YTTRIUM	UG/L	Air Stripping	20.17	26.80	**
		Chemical Addition	26.80	10.00	63
		Chemical Prec.	10.00	2.60	74
		Activated Carbon	2.60	2.50	4
		Total Removal	20.17	2.50	88
ZINC	UG/L	Air Stripping	35533.33	54660.00	**
		Chemical Addition	54660.00	16346.00	70
		Chemical Prec.	16346.00	220.40	99
		Activated Carbon	220.40	59.67	73
		Total Removal	35533.33	59.67	**
CONVENTIONALS/NONCONVENTIONALS					
AMMONIA, AS N	UG/L	Air Stripping	21667.00	22800.00	-5
		Chemical Addition	22800.00	18200.00	20
		Chemical Prec.	18200.00	22400.00	**
		Activated Carbon	22400.00	19333.00	14
		Total Removal	21667.00	19333.00	11

WESTERN PROCESSING - EPISODE 1739 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
BOD-5 DAY (CARBONACEOUS)	UG/L	Air Stripping	200000.00	85600.00	57
		Chemical Addition	85600.00	64000.00	25
		Chemical Prec.	64000.00	84800.00	**
		Activated Carbon	84800.00	88333.00	-4
		Total Removal	200000.00	88333.00	56
CHEMICAL OXYGEN DEMAND	UG/L	Air Stripping	351667.00	330000.00	6
		Chemical Addition	330000.00	244000.00	26
		Chemical Prec.	244000.00	288000.00	**
		Activated Carbon	288000.00	186667.00	35
		Total Removal	351667.00	186667.00	47
CHLORIDE	UG/L	Air Stripping	423333.00	454000.00	-7
		Chemical Addition	454000.00	334000.00	26
		Chemical Prec.	334000.00	450000.00	**
		Activated Carbon	450000.00	354167.00	21
		Total Removal	423333.00	354167.00	16
CORROSIVITY	MPY	Air Stripping	1.83	0.00	**
		Chemical Addition	0.00	0.00	**
		Chemical Prec.	0.00	0.00	**
		Activated Carbon	0.00	0.00	**
		Total Removal	1.83	0.00	**
CYANIDE, TOTAL	UG/L	Air Stripping	24.33	28.20	**
		Chemical Addition	28.20	40.80	**
		Chemical Prec.	40.80	43.20	-6
		Activated Carbon	43.20	25.00	42
		Total Removal	24.33	25.00	-3
FLASH POINT	25 DEG C	Air Stripping	10.83	0.00	**
		Chemical Addition	0.00	0.00	**
		Chemical Prec.	0.00	0.00	**
		Activated Carbon	0.00	0.00	**
		Total Removal	10.83	0.00	**
FLOURIDE	UG/L	Air Stripping	16500.00	15200.00	8
		Chemical Addition	15200.00	14600.00	4
		Chemical Prec.	14600.00	20800.00	**
		Activated Carbon	20800.00	15333.00	26
		Total Removal	16500.00	15333.00	7
NITRATE + NITRITE, AS N	UG/L	Air Stripping	19833.00	19800.00	0
		Chemical Addition	19800.00	15600.00	21
		Chemical Prec.	15600.00	19200.00	**
		Activated Carbon	19200.00	11000.00	43
		Total Removal	19833.00	11000.00	45
NITROGEN, TOTAL KJELDEHL	UG/L	Air Stripping	24667.00	21400.00	13
		Chemical Addition	21400.00	17600.00	18
		Chemical Prec.	17600.00	21800.00	**
		Activated Carbon	21800.00	14167.00	35
		Total Removal	24667.00	14167.00	43

WESTERN PROCESSING - EPISODE 1739 (CONT.)
(Five Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	UNIT PROCESS	INFL. CONC.	EFFL. CONC.	PERCENT REMOVAL
OIL & GREASE, TOTAL RECOVERABLE	UG/L	Air Stripping	5000.00	5980.00	**
		Chemical Addition	5980.00	5180.00	13
		Chemical Prec.	5180.00	14140.00	**
		Activated Carbon	14140.00	5100.00	64
		Total Removal	5000.00	5100.00	-2
PHOSPHORUS, TOTAL AS P	UG/L	Air Stripping	1717.00	1820.00	-6
		Chemical Addition	1820.00	678.00	63
		Chemical Prec.	678.00	103.00	85
		Activated Carbon	103.00	2167.00	**
		Total Removal	1717.00	2167.00	**
RESIDUE, FILTERABLE	UG/L	Air Stripping	1783333.00	1800000.00	-1
		Chemical Addition	1800000.00	1520000.00	16
		Chemical Prec.	1520000.00	1900000.00	**
		Activated Carbon	1900000.00	1683333.00	11
		Total Removal	1783333.00	1683333.00	6
RESIDUE, NON-FILTERABLE	UG/L	Air Stripping	266667.00	456000.00	**
		Chemical Addition	456000.00	218800.00	52
		Chemical Prec.	218800.00	5120.00	98
		Activated Carbon	5120.00	5200.00	-2
		Total Removal	266667.00	5200.00	98
SPECIFIC CONDUCTANCE	UMH/CM-25C	Air Stripping	2716.67	2800.00	-3
		Chemical Addition	2800.00	2440.00	13
		Chemical Prec.	2440.00	3120.00	**
		Activated Carbon	3120.00	2816.67	10
		Total Removal	2716.67	2816.67	-4
SULFATE	UG/L	Air Stripping	626667.00	552000.00	12
		Chemical Addition	552000.00	492000.00	11
		Chemical Prec.	492000.00	608000.00	**
		Activated Carbon	608000.00	433333.00	29
		Total Removal	626667.00	433333.00	31
SULFIDE, TOTAL (IODOMETRIC)	UG/L	Air Stripping	1000.00	1000.00	0
		Chemical Addition	1000.00	1000.00	0
		Chemical Prec.	1000.00	1000.00	0
		Activated Carbon	1000.00	1000.00	0
		Total Removal	1000.00	1000.00	0
TOTAL ORGANIC CARBON	UG/L	Air Stripping	91333.00	87400.00	4
		Chemical Addition	87400.00	70400.00	19
		Chemical Prec.	70400.00	84600.00	**
		Activated Carbon	84600.00	68667.00	19
		Total Removal	91333.00	68667.00	25

SECTION B-20
TREATABILITY OF CERCLA POLLUTANTS
WHITEHOUSE OIL - EPISODE 1241

(ONE DAY SAMPLING EVENT)

WHITEHOUSE OIL - EPISODE 1241
SITE DESCRIPTION

The community of Whitehouse, Florida is located within 0.25 miles east and southeast of the site. Two major east-west highways, U.S. Highway 90 and Interstate 10, are approximately 0.5 miles south of the site. A low-density residential area is located west and northwest of the site, and several miles northwest of the site is the Cecil Field U.S. Naval Air Station. The area north and northeast of the site is largely undeveloped land comprised of pine forests and cypress swamp.

The Whitehouse Waste Oil Pits occupy approximately seven acres on an upland area. The northern and western sides of the site border a swamp system through which the Northeast Tributary runs. The stream originates from a 220-acre cypress swamp located approximately 0.5 miles upstream from the site. The southern side of the site is bordered by open grassland, with the exception of the southwestern corner, which is a private residence.

The site consists of seven unlined pits where waste oil sludge, acid, and contaminated waste oil from an oil reclaiming process were disposed. Allied Petroleum constructed the pits to dispose of waste oil sludge and acid from its oil reclaiming process. The first pits were constructed in 1958, and by 1968 the company had constructed and filled seven pits. Allied Petroleum then went bankrupt, and most of the property transferred to the City of Jacksonville for nonpayment of taxes. After they were abandoned by Allied Petroleum, the pits remained an "open dump" for several years. It is reasonable to assume that indiscriminate dumping occurred during that time.

The waste oil recovery process used by Allied Petro Products was the Acid-Clay Process. This process forms, as by-products, a waste-acid tar and spent acidic clays which are corrosive. The seven unlined pits contained an estimated 127,000 cubic yards of waste. Stabilization activities have increased the volume of contaminated material to an estimated 240,000 cubic yards.

Major contaminants at the site include hexavalent chromium, arsenic, lead, phenols, benzene, and polynuclear aromatic hydrocarbons (PAH) (fluoranthene, phenanthrene, pyrene).

Improvements made to the site by the City of Jacksonville in 1980 and the initial remedial measures (IRM) done under cooperative agreement with the State have significantly reduced the hazards at the site and ensured that no large-scale spills would occur again. Erosion continues to be a problem at the site. Testing by the State indicated that heavy rains and eroding dike walls have allowed pollutants to slowly seep into surface water. As expected, soil samples from beneath the clay cap of the pits show gross contamination by heavy metals and low levels of a few organic compounds. The only soils beyond the pits which are badly contaminated are the soils in the swamp or floodplain north of the pits, between the pits and the northeast tributary.

The quality of surface water was tested at five sampling stations in the drainage basin. These samples show that the surface water quality in McGirt's Creek significantly improved since 1977. This improvement is directly related to the work done by the local, state, and federal agencies which prevented further large scale contamination. However, the effect of the pits is still evident since the surface water contains heavy metals and a lowered pH. The water quality of the creek is also threatened by the seepage which has polluted the soil in the flood plain north of the pits.

Areas of potential groundwater contamination were located by conductivity tests. Thirty-six wells at a variety of depths were installed to sample groundwater. The shallow groundwater (7 to 15 feet) between the pits and the northeast tributary is grossly contaminated by heavy metals and organic compounds. Only low levels of organic compounds were detected across the northeast tributary and beyond the south drainage ditch. Thus, shallow groundwater contamination seems to be localized close to the site.

Vertical migration has reached into the aquitard (35 - 60 feet). The deeper wells (100 to 125 feet) close to the site show low levels of heavy metals and organic compounds. This is of special concern since these wells are in the same aquifer used by many residents. All the residential wells near the site that were downgradient of the pits were tested during the remedial investigation. No contamination from the pits was detected in any of the wells. The State will continue to monitor quality of the residential wells.

The eventual receptor for surface runoff is McGirt's creek which empties into the St. John's River approximately ten miles downstream. Neither of these bodies of water supply drinking water, but are areas of environmental concern.

As late as 1983 (prior to completion of the IRM), seepage of contaminated leachate through the dike walls was observed. State bioassays using a weak concentration of the leachate showed it to be very toxic. Direct contact with leachate and leachate contaminated surface water is a concern.

The domestic water supply aquifer beneath the site is protected by a fairly consistent aquitard. Sampling has shown contamination in the shallow aquifer and evidence of contamination moving down into the aquitard (permeability about 10^{-5} centimeters/second). Groundwater degradation is an immediate concern and a reason for taking preventative action.

Although the IRM was constructed as an attempt to reinforce the dike walls and prevent further spread of contamination, this measure is not adequate for long-term containment of the waste. To compound site problems, erosion caused by motorcycles, dirt buggies, heavy rainfall, and hurricanes pose additional risks to all population groups surrounding the site.

Monitoring Wells MW-5 and MW-9, and RW-1 (4-inch pump test well) are being considered in future remediation efforts as representative wells to be used as extraction wells for a pump and treat system. These wells would be recommended sample points for an EPA-ITD sampling effort.

SUMMARY OF ANALYTICAL METHODS

Analytical Category and Fraction	Technique	EPA Method No.
Organics		
Volatiles	GCMS	1624C[a]
Semivolatiles	GCMS	1625C[a]
Pesticides/Herbicides	GC	1618[a]
Dioxins/Furans	GCMS	613M[a] (Cl_4 to Cl_8-10L)
	GCMS	8280[a] (high resolution MS)
Metals		
Mercury	CVAA	245.5
Antimony	Furnace AA	204.2
Arsenic	Furnace AA	206.2
Selenium	Furnace AA	270.2
Silver	Furnace AA	272.2
Thallium	Furnace AA	279.2
All Others	Digestion, ICP	200.7M
Classicals (liquid samples)		
Residue, filterable	Gravimetric	160.1
Residue, non-filterable	Gravimetric	160.2
Cyanide, total	Distillation	335.2
Fluoride	Potentiometric	340.2
Ammonia, as N	Distillation	350.2
Nitrogen, Kjeldahl total	Colorimetric	351.3
Nitrate-Nitrite as N	Colorimetric	353.3
Total phosphorus, as P	Colorimetric	365.2
BOD 5-day (carbonaceous)	Probe	405.1
Chemical oxygen demand	Titrimetric	410.1
Oil and grease, Total Recoverable	Gravimetric	413.1
Total Organic Carbon	Combustion	415.1
Sulfate	Turbidimetric	375.4
Sulfide, total (iodometric)	Titrimetric	376.1
Specific conductance	Potentiometric	120.1
Chloride	Colorimetric	325.2
Chloride	Titrimetric	325.3
Flash point (ignitability)	Pensley Martens-Closed Cup	1010[b]
Corrosivity	Steel Coupon	1110[b]

Unless otherwise indicated, methods are contained in Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020, Revised March 1983.

[a] Analytical methods for ITD/RCRA Industry Studies, U.S. EPA Office of Water Regulations and Standards, Industrial Technology Division, Sample Control Center.

[b] Test Methods for Evaluating Solid Waste, EPA SW-846, Revised April, 1984.

ANALYTICAL QUALIFIERS

NR - Not required by contract at this time.

Value - B indicates the result is a value greater than or equal to the instrument detection limit, but less than the contract required detection limit (i.e., 10B). The contract required detection limit was raised to 100 µg/L for boron to compensate for contamination from borosilicate glassware. The boron IDL, however, remains at 10 µg/L.

U - Indicates element was analyzed for but not detected. Report with the detection limit value (e.g., 10U).

E - Indicates a value estimated or not reported due to the presence of interference. Explanatory note included on cover page.

M - Slope and Correlation Coefficient met (using MSA)

MM - Slope and Correlation Coefficient met on sample dilution.

RR - Slope and Correlation Coefficient not met on sample dilution for Furnace analysis OR Spike Recovery limits not met for ICP analysis after dilution and rerun.

D - Analysis of Duplicate of Spiked Sample failed required RPD.

Treatment: Future
Wastewater Type: Groundwater

	# Compounds Detected[1]	Conc ITD[2]	Conc PP[2]
Pollutant	PP : TCL : ITD	Min-Max	Min-Max
Total Organics	2 : 6 : 11	20-4,850,000 ug/L	64-364 ug/L
Metals	9 : 19 : 29	4-852,500 ug/L	4-6,375 ug/L

NOTES:
1. PP = Priority Pollutant
   TCL = Compound from Target Compound List
   ITD = Industrial Technology Division Analyte

2. From samples collected from a one day sampling event

FIGURE B-20
WHITEHOUSE OIL PITS - 1241
ONE DAY SAMPLING EVENT
REGION IV WHITEHOUSE, FL

WHITEHOUSE OIL PITS - EPISODE 1241
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS
AVERAGE RAW WASTE CONCENTRATION

COMPOUND	UNITS	RAW WASTE CONCENTRATION
ORGANICS		
1,3-DICHLORO-2-PROPANOL	UG/L	23.000
2,4-DIMETHYLPHENOL	UG/L	64.000
ACETONE	UG/L	985.000
ANILINE	UG/L	25.500
BENZOIC ACID	UG/L	141.500
BENZYL ALCOHOL	UG/L	19.500
HEXANOIC ACID	UG/L	83.500
O-TOLUIDINE	UG/L	37.000
P-CRESOL	UG/L	64.500
P-DIOXANE	UG/L	955.000
PHENOL	UG/L	364.000
INORGANICS		
ALUMINUM	UG/L	437500.000
BARIUM	UG/L	54.000
BERYLLIUM	UG/L	6.000
BORON	UG/L	330.500
CADMIUM	UG/L	9.000
CALCIUM	UG/L	43900.000
CHROMIUM	UG/L	6375.000
COBALT	UG/L	27.000
COPPER	UG/L	8.000
IRON	UG/L	99600.000

WHITEHOUSE OIL PITS - EPISODE 1241 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW WASTE CONCENTRATION
LEAD	UG/L	69.000
MAGNESIUM	UG/L	15450.000
MANGANESE	UG/L	1200.000
NICKEL	UG/L	1335.000
SELENIUM	UG/L	3.900
SILVER	UG/L	7.500
SODIUM	UG/L	40300.000
TITANIUM	UG/L	143.000
VANADIUM	UG/L	119.000
YTTRIUM	UG/L	26.000
ZINC	UG/L	2220.000
LANTHANUM	MG/L	0.100
LITHIUM	MG/L	0.100
PHOSPHORUS	MG/L	12.000
POTASSIUM	MG/L	3.000
SILICON	MG/L	34.500
STRONTIUM	MG/L	0.250
SULFUR	MG/L	852.500
ZIRCONIUM	MG/L	0.100
CONVENTIONALS/NONCONVENTIONALS		
BOD	MG/L	46.500
TSS	MG/L	135.000
AMMONIA, AS N	MG/L	9.100
CHLORIDE	MG/L	110.000

WHITEHOUSE OIL PITS - EPISODE 1241 (CONT.)
(One Day Sampling Event)

TREATABILITY OF CERCLA POLLUTANTS

COMPOUND	UNITS	RAW WASTE CONCENTRATION
COD	MG/L	1400.000
CORROSIVITY	MPY	92.000
NITRATE + NITRITE, AS N	MG/L	0.051
NITROGEN, TOTAL KJELDAHL	MG/L	17.000
PHOSPHORUS, TOTAL AS P	MG/L	12.000
SPECIFIC CONDUCTANCE	UMH/CM-25C	3800.000
SULFATE	MG/L	4300.000
SULFIDE, TOTAL (IODOMETRIC)	MG/L	24.000
TDS	MG/L	4850.000
TOC	MG/L	485.000

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