RECORD OF DECISION

CTS PRINTEX CORPORATION SUPERFUND SITE

MOUNTAIN VIEW, CALIFORNIA

JUNE 28, 1991

U.S. ENVIRONMENTAL PROTECTION AGENCY

REGION 9

CONTENTS

CONTENTS cont'd

TABLES

FIGURES

I. DECLARATION

1.0 SITE NAME AND LOCATION

CTS Printex Corporation
1911, 1921, and 1931 Plymouth Street
and 1950 Colony Street
Mountain View, California 94043

2.0 STATEMENT AND PURPOSE

This Record of Decision ("ROD") presents the selected remedial action for the CTS Printex Superfund site in Mountain View, California. This document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. Section 9601 et seq., and in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Section 300 et seq., ("NCP"). The attached administrative record index (Attachment A) identifies the documents upon which the selection of the remedial action is based.

3.0 ASSESSMENT OF THE SITE

Actual or threatened release of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

4.0 DESCRIPTION OF THE REMEDY

The selected remedy for the CTS Printex site is groundwater extraction by seven extraction wells and discharging under permit to City of Mountain View wastewater treatment plant.

This remedial action addresses the principal risk remaining at the CTS Printex site by removing contaminants from ground water, thereby significantly reducing the toxicity, mobility or volume of hazardous substances in ground water. This response action will greatly reduce the possibility of contamination of existing potable water supplies and potential future water supplies.

5.0 DECLARATION

The selected remedy is protective of human health and the environment, complies with federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy utilizes permanent solutions and alternative treatment (or resource recovery) tech-

nologies to the maximum extent practicable and satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element.

Because of the considerable time required to achieve cleanup levels for the contaminants in the aquifer, a five-year review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, will be conducted at least once every five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

Daniel W. McGovern

Daniel W. McGovern
Regional Administrator, EPA Region IX

6.28.91
Date

II. RECORD OF DECISION

DECISION SUMMARY

This Decision Summary provides an overview of the problems posed by the CTS Printex Superfund site (the "Site" or the "facility"), the alternatives considered for remediating the Site, and the analysis of the remedial alternatives. This Decision Summary explains the rationale for the remedy selection and how the selected remedy satisfies the statutory requirements.

1.0 SITE DESCRIPTION

1.1 SITE NAME AND LOCATION

CTS Printex Corporation (CTS) manufactured printed circuit boards at its former facility in Mountain View from 1970 to 1985. The facility was located on Plymouth and Colony Streets east of Sierra Vista Avenue at 1904, 1940, and 1950 Colony Street and at 1905, 1911, 1921, and 1931 Plymouth Street (Figure 1 and 2). CTS leased this property from the owner, ADN Corporation.

1.2 REGIONAL TOPOGRAPHY

The Site is located on the northwest corner of the Santa Clara Valley between the south end of the San Francisco Bay and the Santa Cruz Mountains in the County of Santa Clara. The site is located 2.5 miles south of San Francisco Bay. The terrain at the Site is relatively flat except for surface drainage.

1.3 ADJACENT LAND USE

The land surrounding the Site is zoned for light industrial/ manufacturing, commercial, residential, and agricultural use. In general, the industrial land use is south and north-northwest of the facility, the commercial land use is north extending across from U.S. Highway 101, and the residential land use is west of the facility. In recent years, the surrounding area, especially north of U.S. Highway 101, has been progressively converted from a residential and agricultural area to a light industrial commercial area. Approximately 20 acres of land, north of the facility, is used for a commercial farming operation.

1.4 HISTORICAL LAND USE

According to Arthur D. Nearon of the ADN Corporation, prior to the construction of the buildings at 1904, 1940, and 1950 Colony Street and at 1905, 1911, 1921, and 1931 Plymouth Street, the Site consisted of an open field. The existing buildings are the original structures constructed on the Site in 1970. The only industrial activity known to occur on this property was the manufacturing of circuit boards.

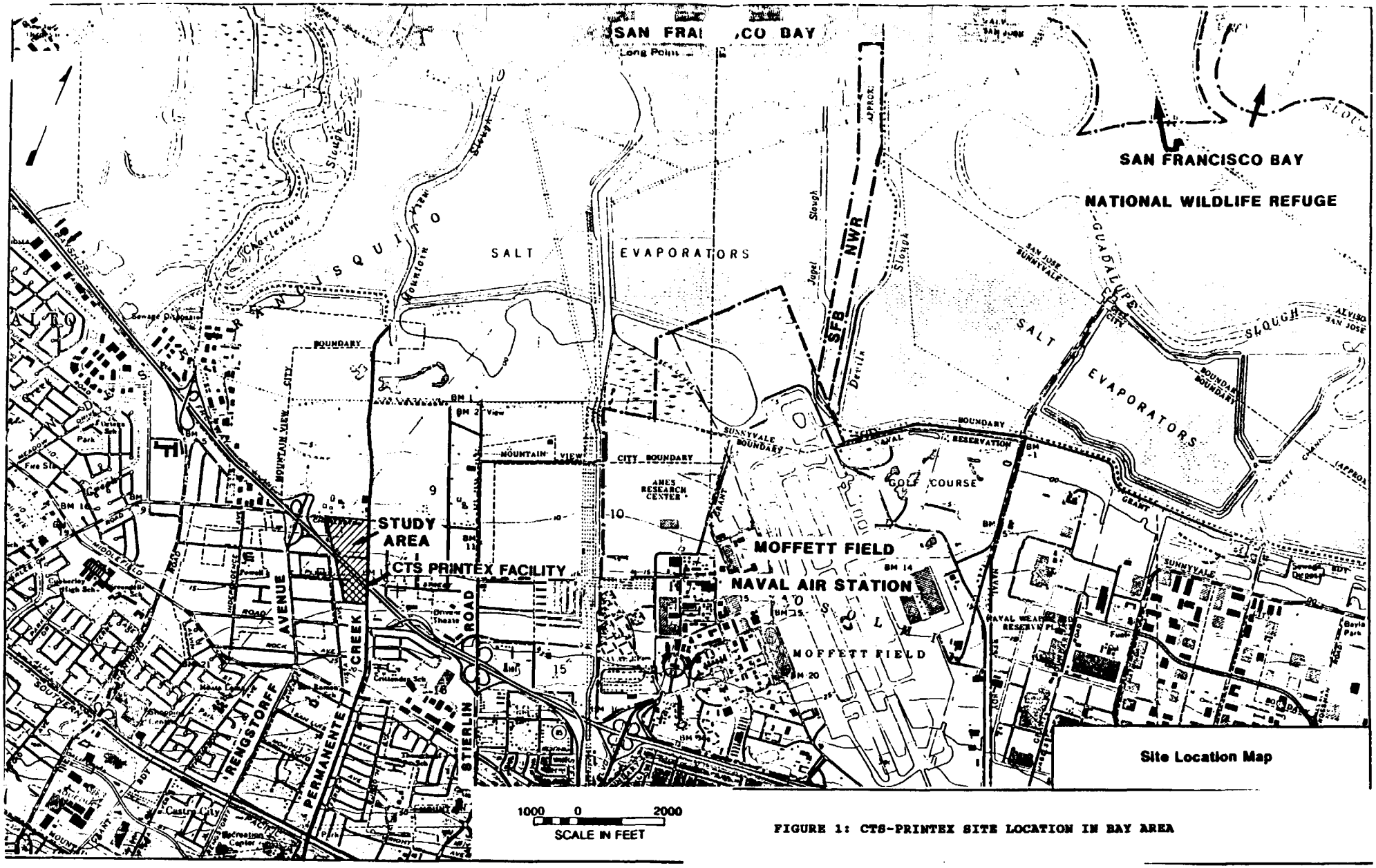


FIGURE 1: CTS-PRINTEX SITE LOCATION IN BAY AREA

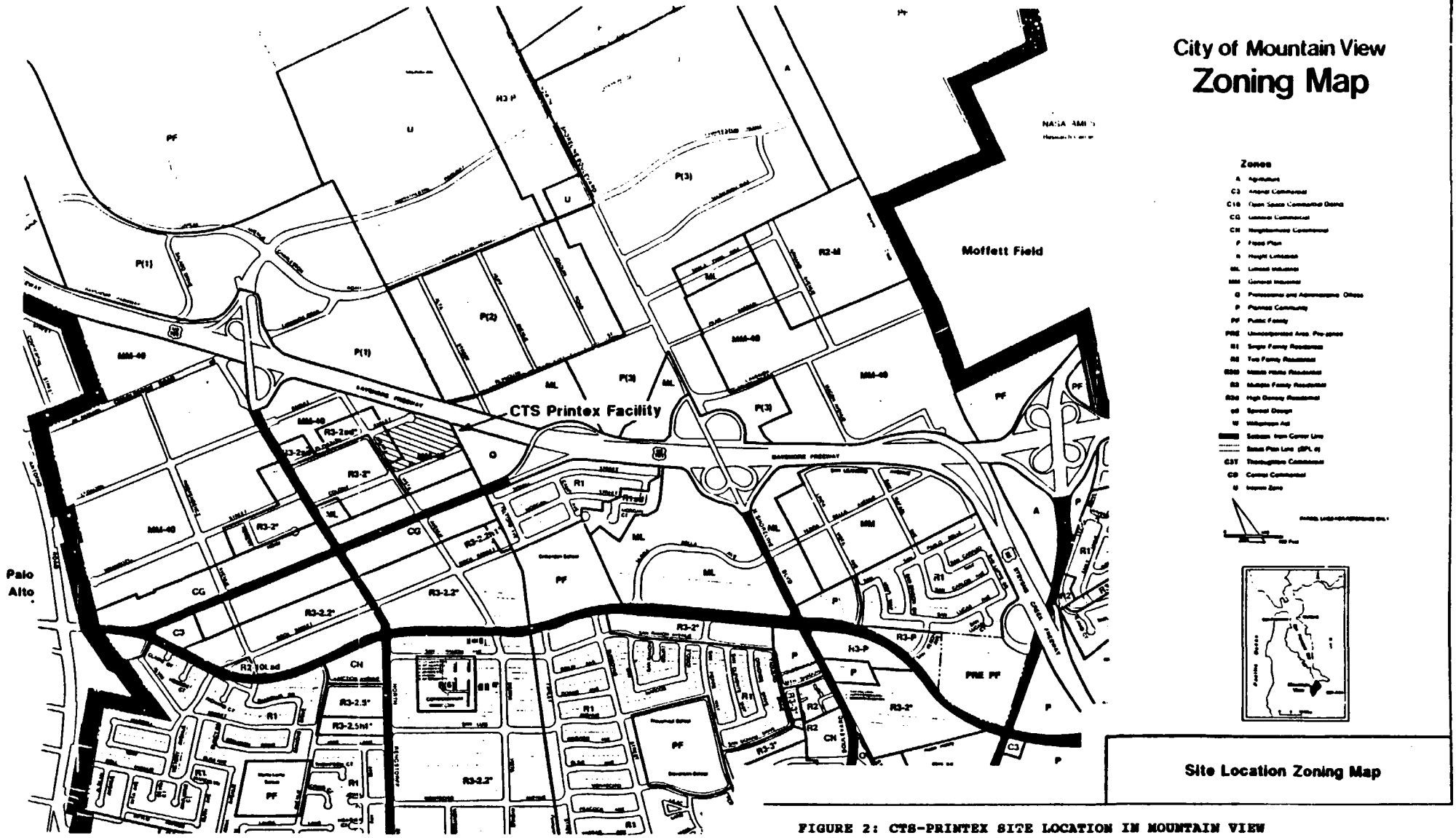


FIGURE 2: CTS-PRINTEX SITE LOCATION IN MOUNTAIN VIEW

Historical aerial photographs for adjacent Superfund sites show that historical land use near the Site was agricultural, dating back to 1937 and possibly further. The surrounding area was developed as an industrial area during the period from 1961 to 1973. Companies historically located in the vicinity of the CTS site were involved in a wide range of manufacturing activities, including the manufacturing of amusement park equipment, laser devices, printed circuit boards, electrical test equipment, and semiconductors.

1.5 HYDROGEOLOGY

Subsurface conditions at the Site are typical of the Santa Clara Valley. The two major water-yielding zones beneath the site consist of a shallow aquifer (75 feet thick) and a deep aquifer separated by an aquitard which is approximately 50 feet thick (Figure 3). Three shallow aquifer zones have been identified beneath the site. These zones are designated as the A,B, and intermediate aquifer zones. The A zone has its upper boundary at approximately 10 feet below ground surface (BGS), and lower boundary at approximately 20 feet BGS. The B zone lies between approximately 30 and 40 feet BGS. It is suspected that the A and B zones are hydraulically continuous. The intermediate zone lies between approximately 60 and 75 feet BGS. The deep aquifer occurs at approximately 100 to 150 feet BGS. Shallow groundwater flow in the A and B zone, beneath the site, is generally to the north. This flow regime is consistent with the northerly regional flow towards the San Francisco Bay.

1.6 SURFACE WATER

The surface water bodies in close proximity to the Site are the southern San Francisco Bay (South Bay) and Permanente Creek. The South Bay is relatively shallow, averaging less than six feet deep. The headwaters of Permanente Creek are approximately 12 miles south of the facility in the Santa Cruz mountain range. Permanente Creek is a perennial stream that travels a distance of 3.5 miles from the Site before reaching the Mountain View Slough which drains into the South Bay. The creek travels through a concrete lined box culvert until approximately 300 feet downstream of the Site where it then becomes an earthen lined ditch.

1.7 WATER USE

Historical groundwater use in the area surrounding the Site includes private water-supply wells for homes and agriculture prior to the construction of public water connections and sewer connections in 1984. A review of data on active, abandoned and closed wells within the study area identified 72 wells in the area bounded by Permanente Creek, Rengstorff Avenue, Colony Street, and Charleston Road. Of the 72 wells, 48 were registered wells and 24 were unregistered wells. Of the 48 wells, 8 of the

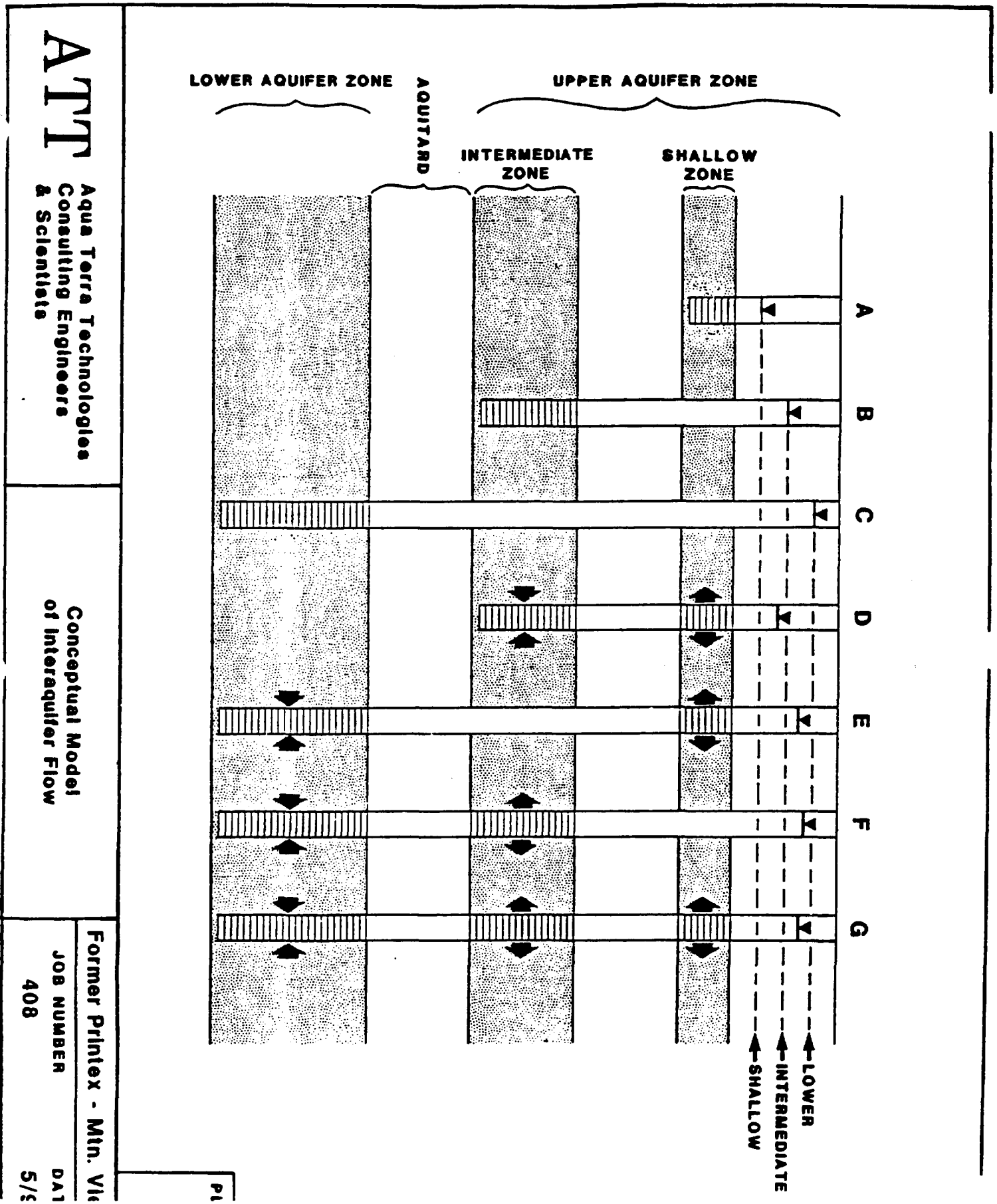


FIGURE 3: HYDROGEOLOGIC PROFILE

wells are active and only one well was considered to be a potential conduit. Of the 24 unregistered wells, documentation was obtained for only one well.

Existing or potential beneficial uses of the South Bay and/or Permanente Creek are wildlife and estuarine habitat; fish spawning and migration; shellfish harvesting; ocean, commercial, sport fishing; and industrial service supply.

1.8 SURFACE AND SUBSURFACE STRUCTURES

Described in this section and indicated on Figure 4 are the surface and subsurface structures at the Site. Surface and subsurface structures at the Site are as follows:

- Flammable Materials Storage Area: This storage area consisted of a small shed constructed of metal on a concrete base. No drains or berms were associated with this structure. Materials stored in this structure included lubricating oil, hydraulic oil, fluxes, and isopropanol.

- 1940 and 1950 Colony Street: This building housed the Printex administrative offices as well as sales, engineering, accounting, and purchasing offices. In addition, some manufacturing operations occurred in this building.

- 1904 Colony Street: This building was used for data processing and laminate storage. No hazardous materials are believed to have been stored in this building or on the surrounding grounds. The floors in this building were concrete with no berms or trenches.

- 1911 Plymouth Street: This building was referred to as the "wet floor building," and was the main site of both wet and dry manufacturing processes employed by CTS. Chemicals used in this building included phosphoric acid, hydrofluoric acid, methyl ethyl ketone, tin, and lead.

- 1921/1931 Plymouth Street: This building was used for manufacturing processes which included etching and solder leveling. This building was predominantly a dry process area and no chemicals were stored at this location.

- 1905 Plymouth Street: This warehouse was the main material and waste storage area for CTS. All materials used at the CTS facility were stored in this warehouse. The floor of the warehouse was concrete. The tilt-up concrete walls were sealed to the floor with mastic, and a small trench existed across the doorway.

- Industrial Wastewater Sump: This neutralization sump collected and neutralized all wastewater from the CTS facility

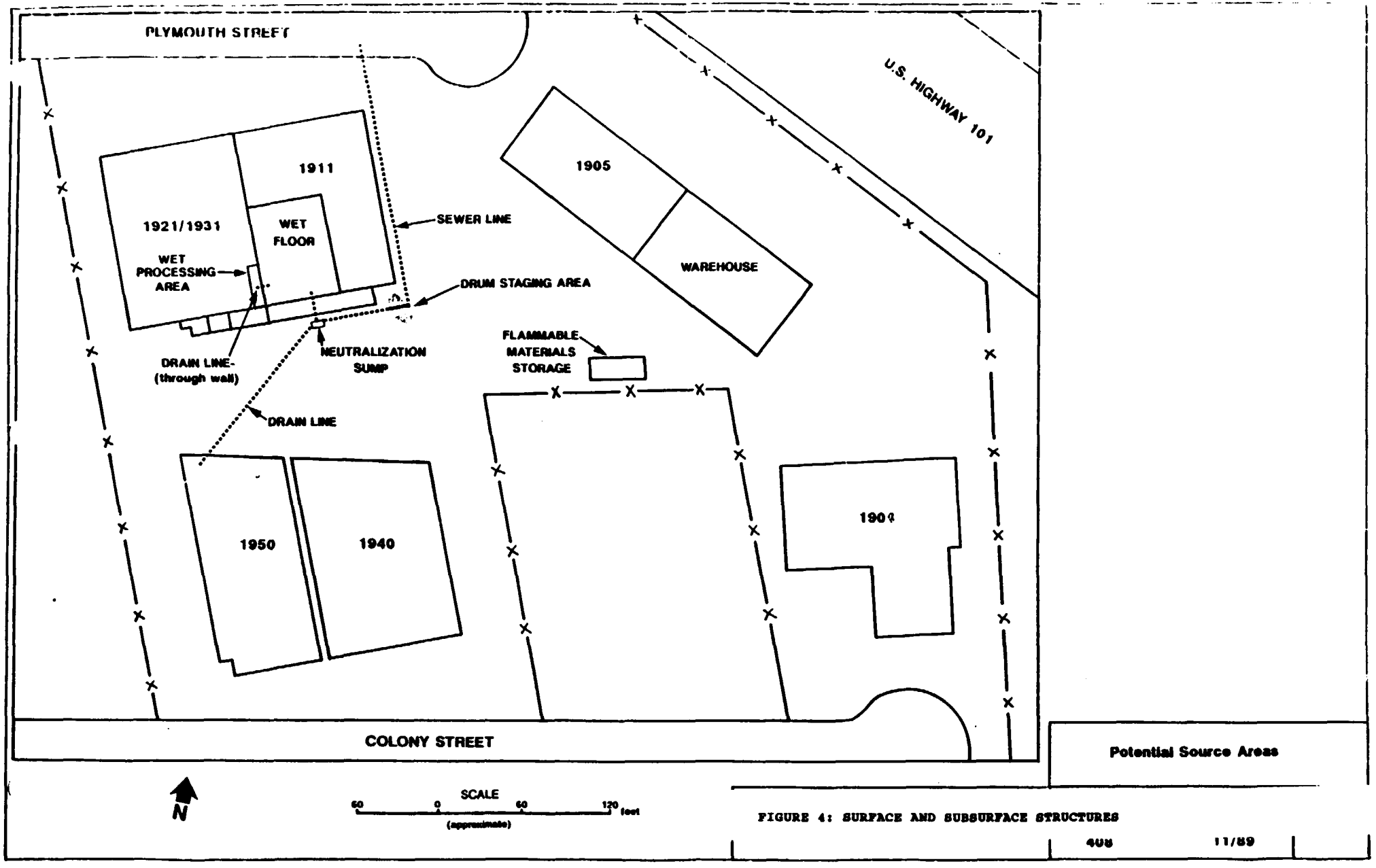


FIGURE 4: SURFACE AND SUBSURFACE STRUCTURES

408 11/89

before discharging to the sanitary sewer. The sump was installed in 1970 and was constructed of steel-reinforced concrete. The sump consisted of three discrete chambers with a total capacity of about 1,500 gallons.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 HISTORY OF SITE ACTIVITIES

Printex was incorporated in 1966 and operated a printed circuit board manufacturing facility at their former facility in Mountain View from 1970 to 1981. In 1981, Printex was acquired by CTS Corporation and was renamed CTS Printex, Inc.. CTS Printex manufactured printed circuit boards at its manufacturing facility located at 1904, 1940, and 1950 Colony Street and at 1905, 1911, and 1931 Plymouth Street from 1981 to 1985. Printed circuit board manufacturing processes which generated waste were primarily located within the buildings at 1911, 1921, and 1931 Plymouth Street (Figure 4).

2.2 HISTORY OF SITE INVESTIGATIONS

Site investigations were initiated by CTS in January 1985 prior to closing the facility. These investigations detected contamination, primarily metals and VOCs, in soil and ground water. In 1987, the Regional Water Quality Control Board (RWQCB) ordered CTS Printex to conduct a remedial investigation at the facility. Results from the remedial investigation are discussed in Section 5.0. Following investigations initiated at the CTS site, CTS implemented the interim actions described in Section 4.1.

2.3 HISTORY OF ENFORCEMENT ACTIONS

In December, 1984, CTS Printex conducted a meeting with representatives from the Department of Health Services (DHS), the RWQCB, and the Mountain View Fire Department (MVFD) to plan their voluntary site assessment in anticipation of closing the facility. Enforcement actions to date are as follows:

- October 1986: DHS Certified Closure of former CTS Facility
- March 1987: RWQCB Issued Clean-up Abatement Order No. 87-05
- April 1989: RWQCB Issued Clean-up Abatement Order No. 89-63
- February 1990: EPA Placed CTS on the National Priorities List
- November 1990: RWQCB Issued Clean-up Abatement Order No. 90-14

3.0 COMMUNITY RELATIONS

The RWQCB has maintained an aggressive Community Relations program for the Site. The RWQCB published a notice in the March 1991 issue of "The View," the city of Mountain View community newspaper, announcing the proposed final Remedial Action Plan (RAP) and announcing the opportunity for public comment at RWQCB Hearing of March 20, 1991 and at the community meeting on March 21 1991. A presentation of the final cleanup plan was made at the RWQCB Hearing but not at the community meeting since no local residents attended the meeting. The comment period for the proposed cleanup plan was from March 20, 1991 to April 19, 1991. No comments were received from the community regarding the proposed plan for the CTS site.

Fact Sheets were mailed to interested residents, local government officials, and media representatives. Fact Sheet 1, mailed in October, 1989, summarized the pollution problem, the results of investigations to date, and the interim remedial actions. Fact Sheet 2, mailed in March, 1991, described the cleanup alternatives evaluated, explained the proposed final RAP, announced opportunities for public comment at the Board Hearing of March 20, 1991 and the Public Meeting of March 21, 1991 in Mountain View and described the availability of further information at the information repository at the City of Mountain View Public Library.

4.0 SCOPE AND ROLE OF THE RESPONSE ACTION

4.1 SCOPE OF THE RESPONSE ACTION

The remedy selected for the Site addresses significant risks to human health and the environment which were not mitigated by previous interim remedial actions. Interim remedial actions at the CTS site included: 1) the destruction and removal of contaminated structures; 2) removal of residual metals sludges and process debris from the Site; 3) hydroblasting interior areas of structures exposed to contaminants; 4) excavation of neutralization sump and approximately 255 cubic yards of soil which was transported to a Class I hazardous waste landfill; 5) installation and operation of a groundwater extraction system which discharges to the sanitary sewer. The remedy selected for the Site requires that the existing groundwater extraction system continue operating until cleanup levels are achieved in the affected aquifer.

In accordance with a closure plan approved by DHS, CTS decontaminated the building at 1911 Plymouth ("wet floor building") and excavated the neutralization sump and floor area. The wet floor building was decontaminated by removing contaminated building materials and hydroblasting the interior of the building. Residual sludges and debris were removed from the building. The cement floor and 255 cubic yards of underlying soil was excavated from the wet floor building and backfilled with pea gravel. Excavation of the neutralization sump involved removal of ap-

proximately 40 cubic yards of material, including concrete and soil. All drain lines associated with the sump were exposed and inspected at this time. The locations and depth of excavation are indicated in Figure 5. The excavated areas were backfilled with pea gravel and resurfaced. Prior to backfilling excavated areas, DHS collected and analyzed samples from the excavated areas to ensure total organics in soils did not exceed 1 part per million (ppm). According to the Quarterly Monitoring Report dated April 15, 1991, the highest total concentration of VOCs discharged to the sanitary sewer is 803 ug/L. DHS certified official closure of the former CTS Printex facility in October 1986.

In November, 1986, CTS submitted an "Interim Remedial Plan" to the RWQCB proposing an immediate response action for mitigating downgradient, off-site migration of ground water containing volatile organic compounds (VOCs). The interim remedial response action included groundwater extraction and discharge under permit to the City of Mountain View sanitary sewer system. In July, 1987, CTS started extracting ground water from two shallow zone extraction wells (ES1W and ES2W) and two intermediate zone extraction wells (ED1W and ED2W). In December, 1988, CTS added two additional shallow zone extraction wells (ES3W and ES4W) and one intermediate zone extraction well (ED3W) to their extraction system. The location of these extraction wells are indicated on Figure 6. The extraction wells are currently pumping approximately 45 gallons per minute (gpm) and are discharging under permit to the sanitary sewer.

The remedy selected for the Site is to continue operation of the seven extraction wells until the cleanup levels described in Section 7.2 are achieved. The capture zone created by the existing extraction wells is effectively containing and remediating the groundwater plume emanating from the CTS site. Extracted ground water will continue to be discharged under permit to the City of Mountain View wastewater treatment plant. The City of Mountain View permits no more than 1 ppm of total organics in an effluent stream at any point of discharge to the sanitary sewer.

4.2 ROLE OF THE RESPONSE ACTION

The selected remedy addresses the primary risks posed by the contamination in ground water in the the Upper Aquifer Zone. These primary risks are: further lateral migration of the plume emanating from the Site; potential vertical migration of contaminated ground water into the Deep Aquifer Zone; ingestion and inhalation of contaminants in the ground water from the Upper Aquifer Zone; and inhalation of chemicals volatilized from contaminated ground water. The interim action addressed the principal threat by excavating contaminated material from the Site and transporting the material to a Class I hazardous waste landfill.

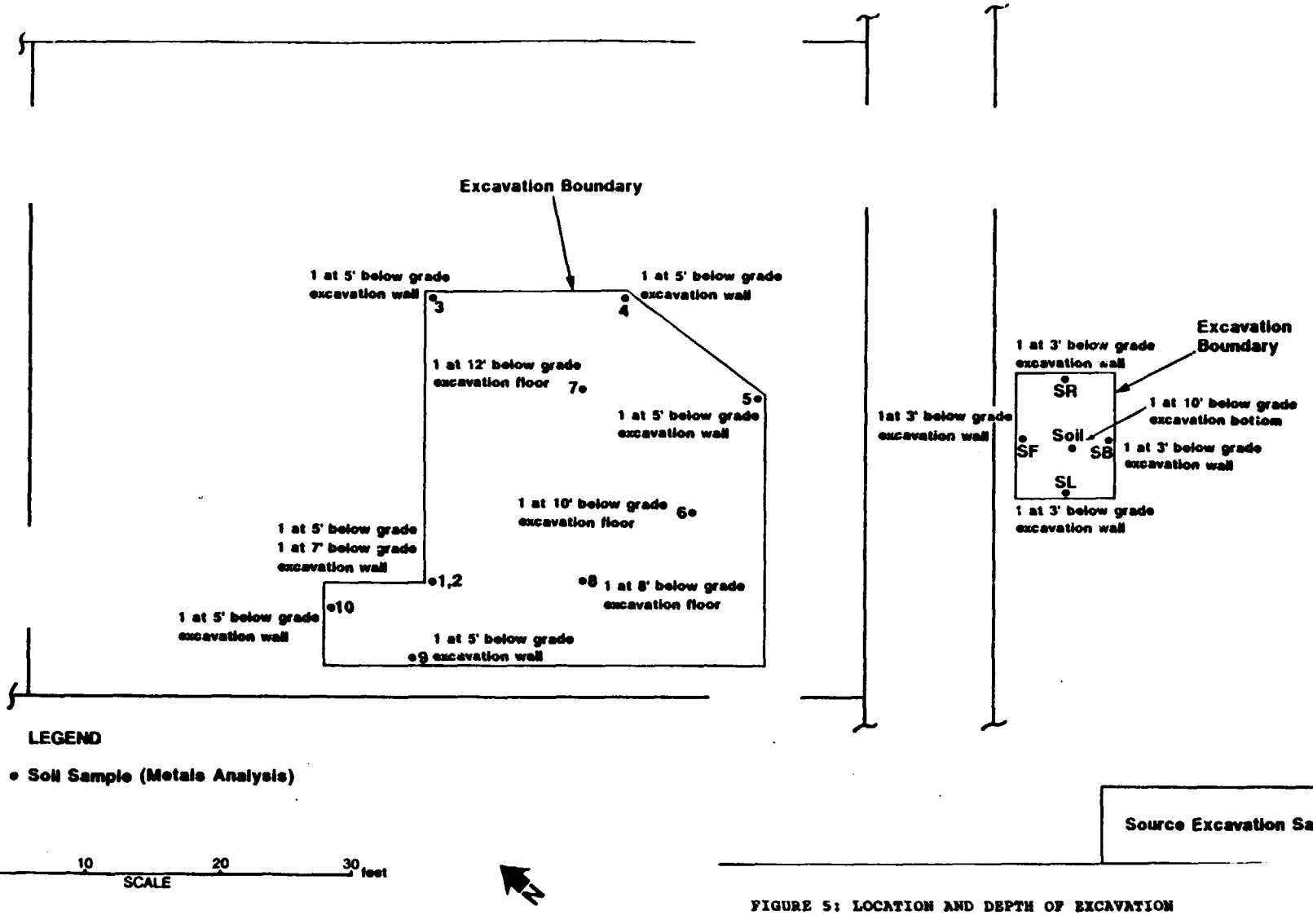


FIGURE 5: LOCATION AND DEPTH OF EXCAVATION

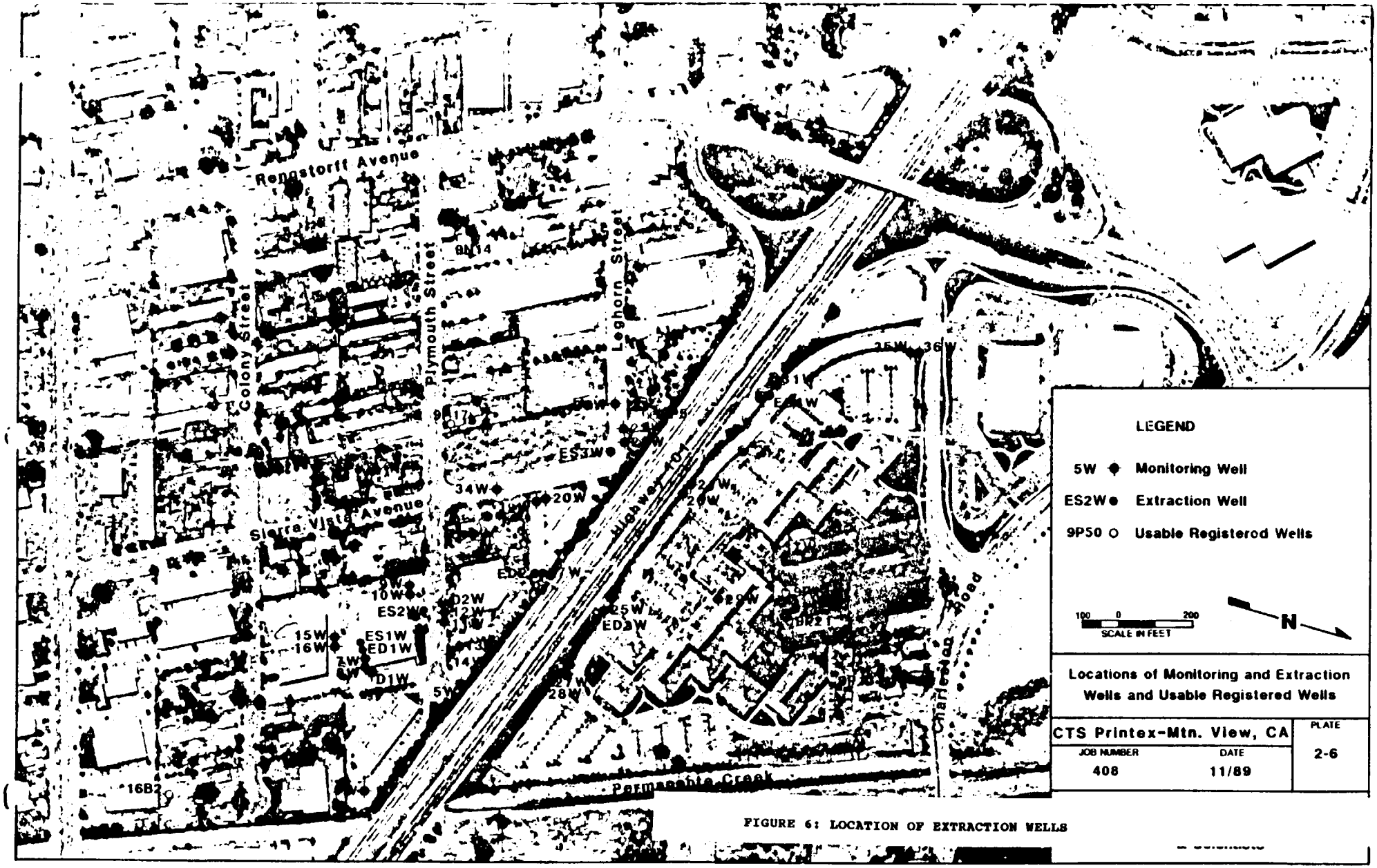


FIGURE 6: LOCATION OF EXTRACTION WELLS

The objective of the selected remedy is to remove and permanently destroy the contaminants from ground water or significantly reduce the toxicity, mobility or volume of hazardous substances in the ground water. This response action will greatly reduce the possibility of contamination of current and potential water supplies.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 SOURCES OF CONTAMINATION

Areas that were considered as potential contaminant sources at the facility were the following:

- The wet-floor located within the building at 1911/1921/1931 Plymouth Street. The wet-floor was constructed of reinforced concrete and was sloped to drain into the 1,500 gallon wastewater sump.

- The wastewater sump located immediately behind the 1911/1921/1931 Plymouth Street building. The sump received wastewater discharged from the wet-floor. The sump was a below grade, three compartment, reinforced concrete structure.

- The industrial sewer line connecting the wastewater sump with the City of Mountain View sanitary sewer. Beginning at the sump, the sewer line runs along the south and east sides of the 1911/1921/1931 Plymouth Street building.

- The drummed chemical staging area located immediately behind the 1911/1921/1931 Plymouth Street building. Drummed materials in use during daily operations were placed directly on the asphalt pavement.

- The warehouse located in the eastern half of the 1905 Plymouth Street Building. Drummed chemicals were stored within the warehouse on pallets and steel racks. The walls were sealed at the floor with a mastic sealant.

- The flammable materials storage area located behind the 1905 Plymouth Street building. The storage area consisted of a concrete pad enclosed by a chain link fence and canopy.

The location of these areas are indicated in Figure 4.

Field investigations described in Section 5.2.1, established that the wet-floor and the wastewater sump located at the 1911/1921/1931 Plymouth Street building were the sources of soil and groundwater contamination at the former CTS facility. For both the wet-floor and the wastewater sump, the release of contaminants was attributed to deterioration of the concrete.

5.2 DESCRIPTION OF CONTAMINATION

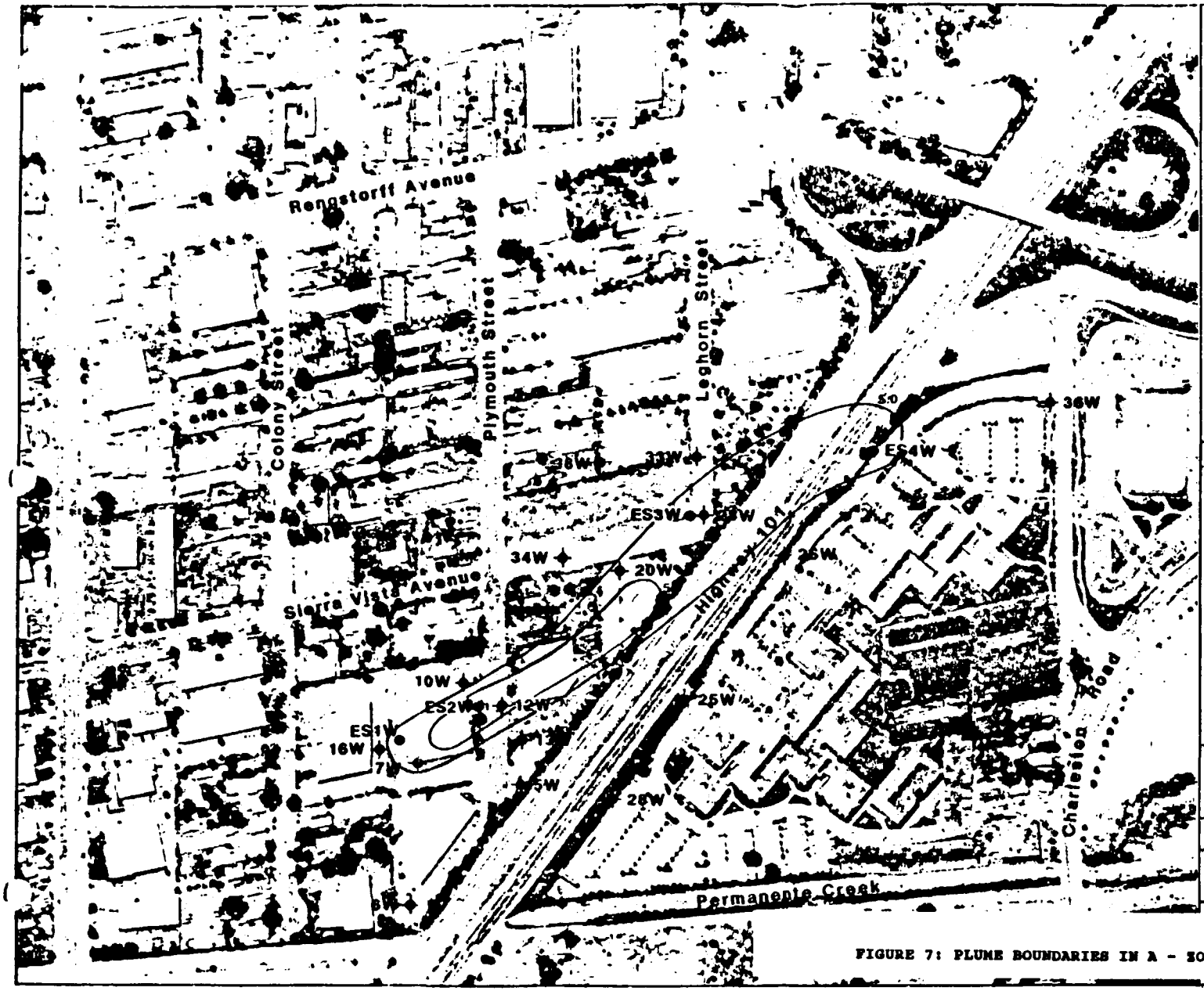
5.2.1 SOIL INVESTIGATIONS

From January 1985 to May 1987, CTS performed soil investigations to identify sources of contamination and to determine the extent of contamination. Nineteen (19) soil borings were drilled and 43 samples were analyzed to identify the sources of contamination. The results from these samples indicated that the wet-floor and the wastewater sump at 1911 Plymouth Street were the sources of contamination. Of the 19 soil borings, the highest concentration of contaminants were found in soil boring HB6 which is adjacent to the wastewater sump. The maximum concentration levels were 480 parts per billion (ppb) TCE, 69 ppb TCA, 69 ppb t-DCE, and 210 ppb toluene. Additional sampling efforts were focused on defining the aerial and vertical extent of contamination at the identified source locations to ensure complete excavation of contaminated materials. Ninety-two (92) soil samples were collected from beneath the wet-floor building and 4 samples were collected from beneath the wastewater sump. Samples were analyzed for copper, lead and VOCs. Prior to the excavation in September 1986, the highest levels of contamination detected beneath the wet floor were 22,000 parts per million (ppm) copper. 2,500 ppm lead, and 0.380 ppm TCE. Department of Health Services (DHS) certified closure of the former CTS facility in October 1986. DHS closure certification requires that the concentration of total VOCs is less than or equal to 1.0 ppm. A summary of the soil boring data is provided in Table 1.

5.2.2 GROUNDWATER INVESTIGATIONS

CTS has installed 38 monitoring and extraction wells to depths of down to 75 feet. Twenty (20) wells are screened in the A zone (10 - 20'), 16 wells are screened in the B zone (30 - 40'), and 2 wells are screened in the Intermediate zone (60 - 75'). The location of these wells are indicated in Figures 7 and 8. CTS submitted their first quarterly groundwater monitoring report in February 1987. The contaminants detected in the ground water are trichloroethene (TCE), 1,1,1-trichloroethane (TCA), 1,1-dichloroethene (DCE), cis/trans-1,2-dichloroethene (c/tDCE), 1,1 and 1,2-dichloroethane (DCA), copper, lead, and nickel. The plume boundaries in the A and B Zones are represented by the isocontours for TCE in Figures 7 and 8. Volatile organic compounds have not been detected in the deepest monitoring wells at concentrations above 1.0 ppb. The area of the defined chemically-affected groundwater plume is estimated to be 980,000 ft^2, for a rectangular area 1,400 feet downgradient from ES1W and 700 feet wide. The total shallow aquifer thickness is estimated to be 20 feet. A summary of the groundwater data collected from February 1987 to October 1989 is provided in Table 2.

In January 1988, the RWQCB and CTS agreed that the plume was adequately defined provided chemical concentrations in the wells marking the perimeter of the plume (33W, 34W, 35W, 36W, and 37W)



WELL DESIGNATION	CONC (ug/L)
5W	<1
6W	<1
7W	4.7
10W	<1
12W	80
13W	<1
16W	<1
20W	6.2
23W	5.7
25W	<1
26W	<1
28W	<1
33W	3.3
34W	<1
36W	<1
38W	<1
ES1W	<1
ES2W	92
ES3W	1.6
ES4W	19

DRINKING WATER ACTION LEVEL 5.0 ug/L

LEGEND

GROUNDWATER MONITORING WELL

GROUNDWATER EXTRACTION WELL

CONCENTRATION CONTOUR

5.0

100 0 200

SCALE IN FEET

N

Groundwater DCA Concentrations
10 to 20 Foot Zone, 1989

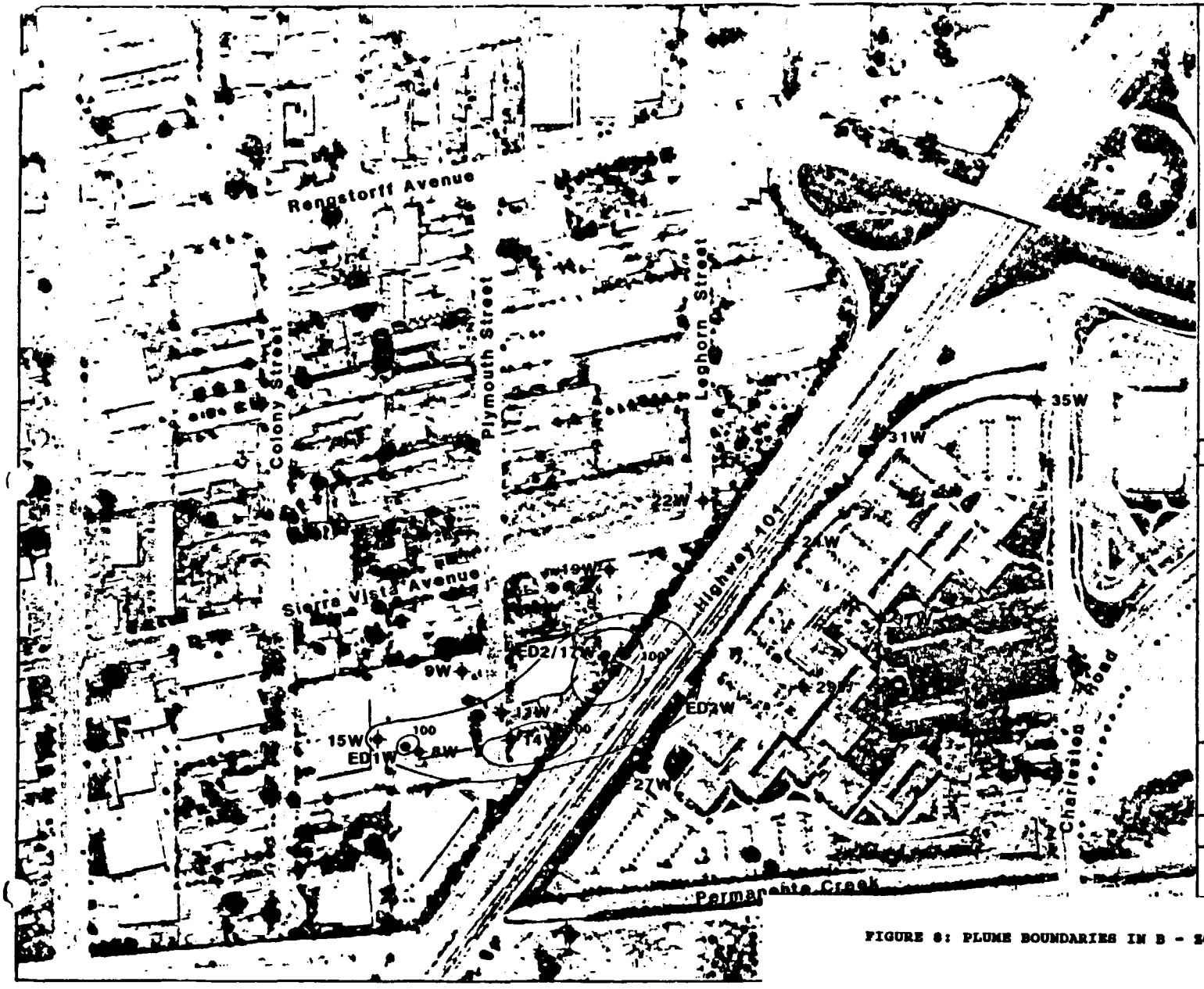
CTS Printex - Mtn. View, CA

PLATE 5-30

JOB NUMBER 408

DATE 5/90

FIGURE 7: PLUME BOUNDARIES IN A - ZONE



WELL DESIGNATION	C(...) (ug/L)
8W	49
9W	13
11W	21
14W	120
15W	16
19W	<1
21W	<1
22W	<1
27W	<1
29W	2.5
31W	<1
35W	<1
37W	<1
ED1W	400
ED2/17W	160 78
ED3W	15

DRINKING WATER ACTION LEVEL 5.0 ug/L

LEGEND

19W ◆ GROUNDWATER MONITORING WELL

ED1W ● GROUNDWATER EXTRACTION WELL

5.0 CONCENTRATION CONTOUR

Groundwater TCE Concentrations
30 to 40 Foot Zone, 1989

CTS Printex - Mtn. View, CA

JOB NUMBER	DATE	PLATE
408	5/90	5-32

FIGURE 8: PLUME BOUNDARIES IN B - ZONE

TABLE 1: SOIL DATA SUMMARY

Chemical	Upper Bound Arithmetic Mean[b]	Arithmetic Mean	Maximum Observed Concentration
1,1-dichloroethane (1,1-DCA)	12.42	7.77	24
1,2-dichloroethane (1,2-DCA)	4.98	3.77	5
1,1-dichloroethene (DCE)	5.57	4.39	7.3
trans-1,2-dichloroethene (t-DCE)	46.29	24.50	110
methylene chloride (MeCl)	7.09	3.00	8
tetrachloroethene (PCE)	24.40	10.77	82
toluene (TOL)	139.47	81.38	230
1,1,1-trichloroethane (TCA)	24.12	13.01	69
trichloroethene (TCE)	94.30	45.74	220
copper[a]	45.17	41.75	51
lead[c]	30.35	24.87	43

a. All concentrations in µg/Kg unless otherwise noted
b. 95 percent confidence limit of arithmetic mean
c. Concentrations in mg/Kg

TABLE 2: GROUNDWATER DATA SUMMARY

Chemical	Upper Bound 2 Arithmetic Mean[b]	Arithmetic Mean	Upper Bound 1 Geometric Mean[c]	Most Plausible Geometric Mean	Maximum Observed Concentration	N
benzene (BZ)	0.66	0.39	0.55	0.33	0.93	5
chloroform (CHL)	2.21	1.70	0.76	0.56	17	107
1,1-dichloroethane (1,1-DCA)	72.49	53.14	12.02	7.53	670	107
1,1-dichloroethene (DCE)	25.66	20.21	6.49	4.22	150	107
trans-1,2-dichloroethene (t-DCE)	63.24	48.06	10.12	6.26	400	107
1,1,1-trichloroethane (TCA)	81.45	59.91	15.49	9.78	580	107
trichloroethene (TCE)	140.04	113.49	25.94	14.83	610	107
copper	75.71	58.33	74.76	47.21	100	12
lead	5.00	2.33	2.03	1.27	17	12
nickel	22.02	14.58	16.85	10.10	40	12

a. All concentrations in µg/L
b. 95 percent confidence limit of arithmetic mean
c. 95 percent confidence limit of geometric mean

did not increase. Chemical concentrations did increase in wells 33W and 34W and CTS was required to install an additional monitoring well (38W) to define the western boundary of the plume. Chemical concentrations in 38W (TCE = 50 ppb) were higher than predicted by existing isocontours (Figure 7). In January 1991, CTS collected five groundwater samples using a HydroPunch™ to define the western plume boundary or identify another source of groundwater contamination. This last sampling effort verified that another source of contamination exists upgradient from the facility. However, CTS was unable to mark the distinct western boundaries of the plume. Based on the current understanding of the Site and the data collected with the Hydropunch™, the RWQCB and EPA agreed that adequate information exists to select a final remedy. CTS is required to install additional monitoring well(s) to better define the western boundary of the plume, monitor the influx of contaminants from any other sources, and monitor the progress of remediation. The RWQCB will continue investigating the source of the upgradient plume.

6.0 SUMMARY OF SITE RISKS

6.1 TOXICITY ASSESSMENT

The Risk Assessment prepared for the CTS-Printex Superfund site identified eleven chemicals of concern. The distribution of these contaminants and their respective concentrations in ground water and soil are described in Section 5. The eleven chemicals of concern which are detected in ground water and soils at the Site are as follows:

1,1-dichloroethane (1,1-DCA)
1,1-dichloroethylene (1,1-DCE)
1,2-dichloroethane (1,2-DCA)
trans-1,2-dichloroethene (t-DCE)
tetrachloroethylene (PCE)
toluene
1,1,1-trichloroethane (1,1,1-TCA)
trichloroethylene (TCE)
methylene chloride (MeCl)
chloroform (CHL)
benzene (BZ)

The rational for selecting the listed chemicals as indicator chemicals is as follows:

<u>1,1-Dichloroethane (1,1-DCA)</u>

- 1,1-DCA possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;

- 1,1-DCA is classified by EPA as a B2 carcinogen, therefore, it is a probable human carcinogen based on evidence from animal experiments.

- 1,1-DCA is reported to cause teratogenic effects based on evidence from animal experiments.

1,1-Dichloroethylene (1,1-DCE)

- 1,1-DCE possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;
- 1,1-DCE is identified by EPA as a possible human carcinogen (Group C) based on limited animal data.
- 1,1-DCE is reported to cause reproductive, teratogenic, and mutagenic effects based on evidence from animal experiments.

1,2-Dichloroethane (1,2-DCA)

- 1,2-DCA possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote is dispersion in ground water;
- 1,2-DCA is classified by EPA as a B2 carcinogen, therefore, it is a probable human carcinogen based on evidence from animal experiments.
- 1,2-DCA is reported to cause reproductive and mutagenic effects based on evidence from animal experiments.

Trans-1,2-Dichloroethylene (t-DCE)

- t-DCE possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;
- t-DCE is reported to cause mutagenic effects based on evidence from animal experiments.

1,1,2,2-Tetrachloroethylene (PCE)

- PCE possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;
- PCE is classified by EPA as a B2 carcinogen, therefore, it is a probable human carcinogen based on evidence from animal experiments.
- PCE is reported to cause reproductive, teratogenic, and mutagenic effects based on evidence from animal experiments.

Toluene

- RWQCB requests that this chemical be included as an

indicator chemical.

- Toluene is reported to cause reproductive, teratogenic, and mutagenic effects based on evidence from animal experiments.

1,1,1-Trichloroethane (1,1,1-TCA)

- 1,1,1-TCA possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;

- 1,1,1-TCA is reported to cause reproductive, teratogenic, and mutagenic effects based on evidence from animal experiments.

Trichloroethylene (TCE)

- TCE possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;

- TCE is classified by EPA as a B2 carcinogen, therefore, it is a probable human carcinogen based on evidence from animal experiments.

- TCE is reported to cause reproductive, teratogenic, and mutagenic effects based on evidence from animal experiments.

Methylene Chloride (MeCl)

- MeCl possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;

- MeCl is classified by EPA as a B2 carcinogen, therefore, it is a probable human carcinogen based on evidence from animal experiments.

- MeCl is reported to cause teratogenic and mutagenic effects based on evidence from animal experiments.

Chloroform

- Chloroform possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;

- Chloroform is classified by EPA as a B2 carcinogen, therefore, it is a probable human carcinogen based on evidence from animal experiments.

- Chloroform is reported to cause reproductive, teratogenic, and mutagenic effects based on evidence from animal experiments.

Benzene

- Benzene possesses physiochemical properties (relatively high water solubility and relatively low soil sorption) which tend to promote its dispersion in ground water;

- Benzene is classified by EPA as an A carcinogen, therefore, it is proven to be a human carcinogen.

- Benzene is reported to cause reproductive, teratogenic, and mutagenic effects based on evidence from animal experiments.

6.2 RISK CHARACTERIZATION

Exposure pathways were identified and evaluated for both the current land-use conditions and for hypothetical future land-use conditions. Assessment of potential risks under the current land-use scenario was conducted to determine the degree that chemical residues currently present in soil and groundwater may impact the health of humans who currently live or work within the boundaries of the CTS plume. Assessment of potential risks under the future land-use scenario was conducted with the assumption that the Site, including the location of the facility, will be converted into a typical residential area and the population will use the shallow aquifer ground water as a domestic potable water supply. The future land-use scenario also assumes that the soil beneath the former CTS facility will be disturbed due to future construction activity.

Through a process of identifying and evaluating all of the potential exposure pathways associated with the contamination at the Site, the complete exposure pathways are identified. A complete exposure pathway is one that has all the necessary components: a source and mechanism of chemical release; an environmental transport medium, a potential human exposure point, and a likely route of exposure. The exposure pathways which were determined to be potentially complete for current land use and future land use are as follows:

- Possible inhalation of indoor residential air containing indicator chemicals that may have volatilized from contaminated ground water and/or soil.

- Exposure to indicator chemicals due to construction activities disturbing subsurface soil involving both onsite workers and offsite adults and children; potential exposure pathways include injestion, dermal contact, inhalation of particulates, and inhalation of vapors.

- Exposure to indicator chemicals due to use (as potable water) of ground water extracted from wells (existing or future installations) screened in the shallow aquifer; potential exposure pathways include ingestion, dermal con-

tact, and inhalation of vapors (e.g., showering);

The risks associated with each of these exposure pathways were evaluated using toxicological data from the Integrated Risk Information System (IRIS) data base. The toxicological properties for the chemicals of concern applied in this evaluation are provided in Table 3.

To protect public health, concentrations of chemicals which have been determined to cause or are suspected to potentially cause cancer, based on animal studies, must be reduced. The levels must be low enough that ingestion of 2 liters of water containing the chemicals, every day for 30 years, can theoretically be expected to produce no more than 1 excess cancer incidence per ten thousand adults (10^{-4}) to 1 excess cancer incidence per one million adults (10^{-6}). EPA considers this Carcinogenic Risk Range to be an appropriate goal for cleanup actions. For chemicals which are not carcinogens, cleanup alternatives must reduce their total concentrations to a Hazard Index to 1 or lower. The Hazard Index is calculated by dividing the amount of each chemical that a person might be expected to consume over time (the Chronic Daily Intake) by the level for each chemical above which adverse health effects may occur (the Reference Dose). The sum of these ratios for all the chemicals of potential concern is the Hazard Index. A hazard index of 1 or less means that no adverse health effects should occur from drinking water.

To assess the potential risk associated with migration of indicator chemicals from ground water into residential air, a study including a combination of field measurements and analytical modeling was conducted at the Site. Soil vapor emission rates were determined and estimates of indoor air VOC concentrations were calculated using a steady-state, single-compartment model and the concentration of contaminants in the ground water. Construction parameters conservatively representative of homes around the site were considered in deriving both hypothetical, average-case and maximum-case indoor air concentration estimates. Chemical flux rates were modeled for homes with slab floor foundations and for homes with crawl spaces. Indoor air concentrations were determined for benzene; chloroform; 1,1-DCA; 1,1-DCE; TCE (carcinogens); t-1,2-DCE; and 1,1,1-TCA (noncarcinogens). Using the assumption that an adult human receptor residing in the house for 24 hours in a day for 40 years and that the determined indoor vapor concentrations do not decrease or increase, the excess cancer risks and noncancer risks were evaluated. The highest excess cancer risk was for scenarios considered for the off-site residences living in a house built with a crawl space; the carcinogenic risks range were found to be 1.12×10^{-5} to 2.9×10^{-5} and the noncarcinogenic risks were found to be less than 1.0. The carcinogenic and noncarcinogenic risks for an off-site resident living in a house with crawl space are described in Table 4.

TABLE 3: TOXICOLOGICAL PROPERTIES FOR INDICATOR CHEMICALS

Chemical[a]	Carc/ Non-Carc.[b]	(R)eprod. (T)eratog. (M)utag.[c]	Rat Oral$_d$ LD_{50} (mg/Kg)	Rat Inhal. LC_{LO}[e] (mg/m^3)	RfD_s[f] (mg/Kg/day)	RfD[g] (mg/Kg/day)	SF[h] (mg/Kg/day)$^{-1}$	UR[i]
BZ	A	R T M	3.31e+3[j]	3.25e+4[k]	-----[l]	-------	2.9e-2 O	8.3e-7 O
					------	-------	2.9e-2 I	8.3e-6 I
CHL	B2	R T M	9.08e+2	2.80e+4[m]	1e-2 O	1e-2 O	6.1e-3 O	1.7e-7 O
					------	-------	8.1e-2 I	2.3e-5 I
1,1-DCA	B2	- T -	7.25e+2	---	1e+0 O	1e-1 O	9.1e-2 O	--------
					1e+0 I	1e-1 I	--------	--------
1,2-DCA	B2	R - M	6.70e+2	4.12e+3	------	-------	9.1e-2 O	2.6e-6 O
					------	-------	9.1e-2 I	2.6e-5 I
1,1-DCE	C	R T M	-------	-------	9e-3 O	9e-3 O	6e-1 O	1.7e-5 O
					------	------	1.2e+0 I	5e-5 I
t-1,2-DCE	NC	- - M	2.12e+3[m]	7.50e+4[m]	------	2e-2 O	--------	--------
					------	------	--------	--------
MeCl	B2	- T M	2.14e+3	8.80e+4[k]	6e-2 O	6e-2 O	7.5e-3 O	2.1e-7 O
					9e-1 I	9e-1 I	1.4e-2 I	4.7e-7 I
PCE	B2	R T M	3.01e+3	2.76e+4	1e-1 O	1e-2 O	5.1e-2 O	--------
					------	------	3.3e-3 I	9.5e-7 I
TOL	NC	R T M	5.00e+3	1.53e+4	4e-1 O	3e-1 O	-------	--------
					6e-1 I	6e-1 I	-------	--------
1,1,1-TCA	NC	R T M	1.03e+4	1.00e+5[k]	9e-1 O	9e-2 O	-------	--------
					3e+0 I	3e-1 I	-------	--------
TCE	B2	R T M	3.70e+3	4.36e+4	------	------	1.1e-2 O	3.3e-7 O
					------	------	1.7e-2 I	1.7e-6 I

a. BZ = benzene, CHL = chloroform, 1,1-DCA = 1,1-dichloroethane, 1,2-DCA = 1,2-dichloroethane, 1,1-dichloroethene, t-1,2-DCE = trans-1,2-dichloroethene, MeCl = methylene chloride, PCE = tetrachloroethene, TOL = toluene, 1,1,1-TCA = 1,1,1-trichloroethane, TCE = trichloroethene

Chemicals of Concern: Toxicological Properties
Former Printex Facility
Mountain View, CA (continued)

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a. BZ = benzene, CHL = chloroform, 1,1-DCA = 1,1-dichloroethane, 1,2-DCA = 1,2-dichloroethane, DCE = 1,1-dichloroethene, t-DCE = trans-1,2-dichloroethene, MeCl = methylene chloride, PCE = tetrachloroethene, TOL = toluene, TCA = 1,1,1-trichloroethane, TCE = trichloroethene
b. Carcinogenic classification (EPA, 1986a); A = human carcinogen, B1 = probable human carcinogen, limited human evidence, B2 = probable human carcinogen, inadequate human evidence, sufficient animal evidence, C = posible human carcinogen, no human evidence, limited animal evidence, NC = noncarcinogen
c. Reproductive (R), teratogenic (T), or mutagenic (M) effects reported (NIOSH, 1986)
d. Lethal dose fifty - a calculated dose which causes the death of 50% of the exposed experimental population
e. Lethal concentration low - the lowest concentration in air, other than the lethal concentration fifty, which has been reported to cause death in the exposed experimental population
f. Reference dose for subchronic exposure (EPA, 1989b)
g. Reference dose for chronic exposure (EPA, 1989b)
h. Slope factor for Inhalation (I) exposure or Oral (O) exposure (EPA, 1989b)
i. Unit risk for Inhalation exposure $(\mu g/m^3)^{-1}$ or Oral exposure $(\mu g/L)^{-1}$ from IRIS (EPA, 1989c)
j. Notation for 3.31×10^3
k. Lethal concentration fifty - a calculated concentration in air which causes the death of 50% of the exposed experimental population
l. No available data
m. Data for the mouse

TABLE 4: CARCINOGENIC AND NONCARCINOGENIC RISKS FOR CONTAMINANTS IN RESIDENTIAL AIR

	Slope Factor (Inhalation)	Reference Dose	MDD[1]	LD[1]	Risk[1]	MDD[2]	LD[2]	Risk[2]	MDD[3]	LD[3]	Risk[3]	MDD[4]	LD[4]	Risk[4]
Carcinogens														
Benzene	2.9×10^{-2}		1.92×10^{-7}	1.11×10^{-7}	3.22×10^{-9}	1.47×10^{-7}	8.4×10^{-8}	2.44×10^{-9}	3.85×10^{-7}	2.20×10^{-7}	6.38×10^{-9}	2.96×10^{-7}	1.69×10^{-7}	4.90×10^{-9}
Chloroform	8.1×10^{-2}		1.92×10^{-7}	1.11×10^{-7}	8.99×10^{-9}	1.49×10^{-7}	8.51×10^{-8}	6.89×10^{-9}	3.88×10^{-7}	2.22×10^{-7}	1.79×10^{-8}	2.99×10^{-7}	1.71×10^{-7}	1.38×10^{-8}
1,1-DCA	1.0×10^{-1}	1.0×10^{-1}	3.45×10^{-6}	1.97×10^{-6}	1.97×10^{-7}	2.69×10^{-6}	1.54×10^{-6}	1.54×10^{-7}	6.9×10^{-7}	3.94×10^{-6}	3.94×10^{-7}	5.35×10^{-6}	3.05×10^{-6}	3.05×10^{-7}
1,1-DCE	1.2×10^{0}		1.72×10^{-5}	9.83×10^{-6}	1.18×10^{-5}	1.32×10^{-5}	7.54×10^{-6}	9.05×10^{-6}	3.45×10^{-5}	1.97×10^{-5}	2.36×10^{-5}	2.64×10^{-5}	1.51×10^{-5}	1.81×10^{-5}
TCE	3.0×10^{-1}		1.52×70^{-5}	8.68×10^{-6}	2.6×10^{-6}	1.18×10^{-5}	6.74×10^{-6}	2.02×10^{-6}	3.05×10^{-5}	1.74×10^{-5}	5.22×10^{-6}	2.33×10^{-5}	1.33×10^{-5}	3.99×10^{-6}
				ΣRisk	1.45×10^{-5}		ΣRisk	1.12×10^{-5}		ΣRisk	2.9×10^{-5}		ΣRisk	2.2×10^{-5}
Non-Carcinogens														
t-1,2-DCE		Oral Only	4.92×10^{-6}			3.79×10^{-6}			9.82×10^{-6}			7.56×10^{-6}		
1,1,1-TCA		3.0×10^{-1}	1.43×10^{-5}		4.77×10^{-5}	1.11×10^{-5}		3.7×10^{-5}	2.86×10^{-5}		9.5×10^{-5}	2.19×10^{-5}		7.3×10^{-5}

Units

Slope Factor (Inhalation)$(mg/Kg\text{-}day)^{-1}$ (USEPA, 1989)
Maximum Daily Dose (MDD) mg/Kg-day
Lifetime Dose (LD) mg/Kg-day
Risk Unitless

Risk Scenarios

Risk[1] is based on 65% of the crawl space vapors being transmitted to living space and maximum plausible ventilation rate of 0.5 per hour
Risk[2] is based on 50% of the crawl space vapors being transmitted to living space and maximum plausible ventilation rate of 0.5 per hour
Risk[3] is based on 65% of the crawl space vapors being transmitted to living space and average ventilation rate of 1 per hour
Risk[4] is based on 50% of the crawl space vapors being transmitted to living space and average ventilation rate of 1 per hour

To assess the potential risks associated with disturbance of the subsurface soil at 1911/1921/1931 Plymouth Street a worst-case "box" model was applied, assuming the total vapor emissions from a three month construction period were bounded within a defined space, 55 x 55 x 7 meters. Assuming two rectangular excavations around the building of about 1.5 x 10 x 110 meters and a resulting soil pile of approximately 2,000 meters^3, the emission rate was calculated using a dispersion model. Assumptions included bare soil, mean annual wind speed of 2.41 m/sec, threshold wind velocity based on a particle size of 0.25 mm, and roughness for a plowed field. The resulting air concentrations were 70 ug/m^3 for receptors that are 100 meters from the source and 1.0 mg/m^3 for receptors closer than 100 meters to the source. In the assessment of the dose-response, adsorption rates for ingestion and inhalation exposures were assumed to be 100 percent. Adsorption for dermal contact was considered 100 percent, but was adjusted for a soil matrix effect. The potential receptors were assumed to be 70 Kg onsite and offsite adults and 10 Kg offsite children. Exposure periods included five days per week for workers and seven days per week for offsite receptors. The highest carcinogenic and noncarcinogenic risks were found for adult workers within 100 meters of the source; the carcinogenic risks were found to range from 4.23×10^{-8} to 5.46×10^{-8} and the noncarcinogenic hazard indices were found to range from 1.79×10^{-4} to 3.41×10^{-4} (Table 5).

For determining the average-case carcinogenic and noncarcinogenic risks associated with the hypothetical use of ground water from the shallow aquifer, domestic usage of shallow aquifer water combined with other less significant exposure pathways (e.g., volatilization of VOCs from soil into ambient air, volatilization from ground water into indoor air, and leaching of VOCs from the soil into ground water) were assumed. Risks were evaluated considering that the concentration of contaminants in the ground water were the geometric mean, with an upper bound calculated as the 95 percent confidence limit of the geometric mean. The highest carcinogenic and noncarcinogenic health risks were found for residential children based on the upper 95 percent confidence limit of the geometric mean; the carcinogenic risks were found to range from 6.78×10^{-4} to 4.7×10^{-3} and the noncarcinogenic hazard indices were found to range from 0.204 to 1.57 (Table 6).

6.3 PRESENCE OF SENSITIVE HUMAN POPULATIONS

The City of Mountain View has a residential population of approximately 61,000, of which 90% live upgradient of the CTS site. The land surrounding the facility is zoned for light industrial/manufacturing, commercial, residential, and agricultural land use. In recent years, the off-site area, especially north of U.S. Highway 101, has been progressively converted from a residential and agricultural area to a light industrial commercial area. There are no schools, hospitals, or convalescent homes located within the boundaries of the contaminant plume.

TABLE 5: CARCINOGENIC AND NONCARCINOGENIC RISKS FROM SOIL CONTAMINATION

1 Soil

	Noncarcinogenic Effects[a]			Carcinogenic Risk[b]		
	Onsite Adult Workers	Offsite Adult Residents	Offsite Child Residents	Onsite Adult Workers	Offsite Adult Residents	Offsite Child Residents
Ingestion[c]	2.35×10^{-5}	2.35×10^{-5}	3.28×10^{-4}	4.59×10^{-11}	6.96×10^{-11}	9.75×10^{-10}
Dermal Contact[c]	8.19×10^{-5}	1.27×10^{-5}	2.52×10^{-4}	1.60×10^{-10}	3.76×10^{-11}	7.49×10^{-10}
Vapor Inhalation[d]	2.36×10^{-4}	7.05×10^{-5}	1.23×10^{-4}	5.44×10^{-8}	2.46×10^{-8}	4.58×10^{-8}
TOTAL	3.41×10^{-4}	1.07×10^{-4}	7.03×10^{-4}	5.46×10^{-8}	2.47×10^{-8}	4.75×10^{-8}

a. Ratio of Maximum Daily Dose (MDD) to Reference Dose (RfD)
b. Lifetime Average Daily Dose (LD) multiplied by Slope Factor (SF)
c. Maximum Observed Concentration
d. Upper Limit Arithmetic Mean

TABLE 6: CARCINOGENIC AND NONCARCINOGENIC RISKS FROM DOMESTIC USE OF SHALLOW AQUIFER

	Noncarcinogenic Effects[a]			Carcinogenic Risk[b]		
	Onsite Adult Workers	Offsite Adult Residents	Offsite Child Residents	Onsite Adult Workers	Offsite Adult Residents	Offsite Child Residents
Ingestion	2.25×10^{-1}	2.25×10^{-1}	7.86×10^{-1}	4.43×10^{-4}	6.72×10^{-4}	2.35×10^{-3}
Other Activities[c]	2.25×10^{-1}	2.25×10^{-1}	7.86×10^{-1}	4.43×10^{-4}	6.72×10^{-4}	2.35×10^{-3}
TOTAL	4.50×10^{-1}	4.50×10^{-1}	1.57×10^{-0}	8.86×10^{-4}	1.34×10^{-3}	4.70×10^{-3}

a. Ratio of Maximum Daily Dose (MDD) to Reference Dose (RfD)
b. Lifetime Average Daily Dose (LD) multiplied by Slope Factor (SF)
c. Exposure via inhalation and dermal contact during other household activities involving water was considered approximately equivalent to that from ingestion

Currently, the shallow aquifer is not known to be used for residential, commercial, or agriculture purposes.

6.4 PRESENCE OF SENSITIVE ECOLOGICAL SYSTEMS

The San Francisco Bay Wildlife Refuge is located approximately four miles north of the facility and comprises approximately 19,000 acres (Figure 2). In 1988, the Refuge was authorized to acquire an additional 20,000 acres. The habitat is primarily salt marsh with some mud flats, salt ponds, upland, and open water areas. The Refuge is the habitat of five endangered species: California clapper rail, Peregrine falcon, California least tern, California brown pelican, and the salt marsh harvest mouse. The San Francisco Bay Wildlife Refuge is not affected by the Site.

CTS reviewed the California Natural Diversity Database in order to identify endangered and threatened species near the Site. No endangered or threatened species, special plant, special animals or protected communities were identified at the former Printex facility. The nearest endangered species entries were: 1) a non-specific one-mile radius entry based on the 1982 observation of a pair of Burrowing Owls, in the vicinity of Mayfield and Charleston slough, in Palo Alto (approximately 1.8 miles from the former Printex boundary); and 2) a non-specific point entry based on the 1985 siting of two pairs of breeding Saltmarsh Common

Yellowthroat in the vicinity of Charleston slough and Bayshore Freeway, northeast of Palo Alto (approximately 1.1 miles from the former Printex boundary). No endangered species, special animals, or special plants were identified within 1.0 mile from the boundary of the Site.

6.5 CONCLUSION

Actual or threatened releases of hazardous substances from the CTS Superfund site, if not addressed by implementing the response action selected in this ROD may present an imminent and substantial endangerment to the public health, welfare or environment. Based on the fact that a variety of the VOCs detected at the Site pose significant health risks as either carcinogens or noncarcinogens, and complete exposure pathways exist, EPA has determined that remediation is warranted.

7.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

Under Section 121(d)(1) of CERCLA, 42 U.S.C. § 9621, remedial actions must attain a degree of clean-up which assures protection of human health and the environment. Additionally, remedial actions that leave any hazardous substance, pollutant, or contaminant on-site must meet a level or standard of control that at least attains standards, requirements, limitations, or criteria that are "applicable or relevant and appropriate" under the cir-

cumstances of the release. These requirements, known as "ARARs", may be waived in certain instances, as stated in Section 121(d)(4) of CERCLA, 42 U.S.C. § 9621(d)(4).

"Applicable" requirements are those clean-up standards, standards of control and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant or contaminant, remedial action, location, or other circumstance at a CERCLA site. "Relevant and appropriate" requirements are clean-up standards, standards of control and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. For example, requirements may be relevant and appropriate if they would be "applicable" but for jurisdictional restrictions associated with the requirement. See the National Contingency Plan, 40 C.F.R. Section 300.6, 1986).

The determination of which requirements are "relevant and appropriate" is somewhat flexible. EPA and the State may look to the type of remedial actions contemplated, the hazardous substances present, the waste characteristics, the physical characteristics of the site, and other appropriate factors. It is possible for only part of a requirement to be considered relevant and appropriate. Additionally, only substantive requirements need be followed. If no ARAR covers a particular situation, or if an ARAR is not sufficient to protect human health or the environment, then non-promulgated standards, criteria, guidance, and advisories must be used to provide a protective remedy.

7.1 TYPES OF ARARS

There are three types of ARARs. The first type includes "contaminant specific" requirements. These ARARs set limits on concentrations of specific hazardous substance, pollutants, and contaminants in the environment. Examples of this type of ARAR are ambient water quality criteria and drinking water standards. The second type of ARAR includes location-specific requirements that set restrictions on certain types of activities based on site characteristics. These include restriction on activities in wetlands, floodplains, and historic sites. The third type of ARAR includes action-specific requirements. These are technology-based restrictions which are triggered by the type of action under consideration. Examples of action-specific ARARs are Resource Conservation and Recovery Act ("RCRA") regulations for waste treatment, storage, and disposal.

ARARs must be identified on a site-specific basis from information about specific chemicals at the site, specific features of the site location, and actions that are being considered as remedies.

7.2 CHEMICAL-SPECIFIC ARARS

Section 1412 of the Safe Drinking Water Act, 42 U.S.C. Section 300g-1

Under the authority of Section 1412 of the Safe Drinking Water Act, Maximum Contaminant Levels Goals (MCLGs) that are set at levels above zero, shall be attained by remedial actions for ground or surface water that are current or potential sources of drinking water, where the MCLGs are relevant and appropriate under the circumstances of the release based on the factors in 40 CFR §300.400 (g)(2).

The appropriate cleanup level for each indicator chemical (except toluene) in ground water is the MCLG (if not equal to zero), the federal MCL, or the State MCL, whichever is most stringent. The MCLGs and MCLs for the indicator chemicals identified at the Site are shown in Table 7.

California Department of Health Services Drinking Water Action Levels (DWALS)

California Department of Health Services (DHS) DWALS are health-based concentration limits set by the DHS to limit public exposure to substances not yet regulated by promulgated standards. They are advisory standards that as well head treatment for public water supplies. The DWAL for toluene is 100 ppb.

California's Resolution 68-16

California's "Statement of Policy With Respect to Maintaining High Quality of Waters in California," Resolution 68-16, affects remedial standards. The policy requires maintenance of existing water quality unless it is demonstrated that a change will benefit the people of the State, will not unreasonably affect present or potential uses, and will not result in water quality less than that prescribed by other State policies.

7.3 ACTION SPECIFIC ARARS

City of Mountain View Industrial Waste Ordinance and the Federal Clean Water Act Pretreatment Standards (40 CFR 403.5)

Substantive requirements of the City of Mountain View Industrial Waste Ordinance and the Federal Clean Water Act Pretreatment Standards (40 CFR 403.5) are ARARs for discharges of ground water to the local sanitary sewer system. The Clean Water Act allows

CLEANUP LEVELS FOR GROUND WATER

Chemical	U.S. EPA MCLG (ppb)	U.S. EPA MCL (ppb)	California MCL (ppb)
1,1-DCA	--	--	5
1,1-DCE	7	7	6
1,2-DCA	0	5	0.5
t-DCE	100	100	10
PCE	0	5	5
1,1,1-TCA	200	200	200
TCE	0	5	5
Toluene	1000	1000	100(2)
Benzene	0	5	1
Chloroform	--	100	--
MeCl	0	5	--

(1) MCL for cis-1,2-DCE
(2) DHS action level

TABLE 7: CHEMICAL SPECIFIC ARARS

municipalities to determine the pretreatment standards for discharges to Publicly Owned Treatment Works (POTWs) within its jurisdiction.

7.4 LOCATION-SPECIFIC ARARS

There are no location-specific ARARs associated with the Site.

8.0 DESCRIPTION OF ALTERNATIVES

The analysis of remedial technologies, presented in the feasibility study report, resulted in the development of three alternatives for site remediation. These alternatives are summarized below.

Alternative 1 - No Action

The No Action alternative serves as a baseline for comparing other remedial alternatives. Under the No Action alternative, no additional remedial technologies would be implemented and operation of presently implemented remedial actions would cease.

Alternative 2 - Institutional Actions

The Institutional Action alternative involves restricting well permits for the installation of wells with a sanitary seal not less than 100 feet below ground surface, stopping current groundwater extraction activities, and monitoring only selected wells in the area affected by groundwater contamination. Well permit restrictions are promulgated by the Santa Clara Valley Water District (SCVWD) in Ordinance 90-1 to prevent the use of shallow groundwater in the region. According to this ordinance, water wells may not be screened at depths shallower than 50 feet. Current policy of the SCVWD does not allow permits for drinking water wells in the shallow groundwater aquifer.

Alternative 3 - Extraction and Discharge to the Sanitary Sewer

This alternative involves continued operation of the existing groundwater extraction system. The system is comprised of seven extraction wells drawing approximately 48 gpm and discharging untreated water to sanitary sewer for treatment at the POTW. This alternative does not include treatment prior to discarge to the POTW. The City of Mountain View permits total organics equal to or less than 1 ppm at a point of discharge. This alternative provides passive air stripping created by passing water through the sewer collection system and through the sewage treatment plant. The RWQCB and the City of Palo Alto require that groundwater use is reevaluated prior to renewing the POTW discharge permit in January, 1992. Groundwater extraction will continue until the cleanup standards listed in Table 7 are acheived. Potential modifications which may be applied to this alternative to increase effectiveness are described in Section 9 under the "Long-Term Effectiveness" criterion.

9.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

This section provides an explanation of the criteria used to select the remedy, and analyses of the remedial action alternatives in light of those criteria, highlighting the advantages and disadvantages of each of the alternatives.

Criteria

The alternatives were evaluated using nine component criteria. These criteria, which are listed below, are derived from requirements contained in the National Contingency Plan (NCP), 40 C.F.R. § 300 et seq. and CERCLA Sections 121(b) and 121(c).

- Overall Protection of Human Health and the Environment;
- Compliance with ARARs;
- Reduction of Toxicity, Mobility, or Volume Through Treatment;
- Long-Term Effectiveness and Permanence;
- Short-Term Effectiveness;
- Implementability;
- Cost;
- Support Agency Acceptance;
- Community Acceptance.

OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

Alternative 1 and 2 neither reduce nor eliminate the risks associated with contamination of the shallow aquifer at the Site. The carcinogenic risk for adult residents would range from 1.34×10^{-3} to 1.93×10^{-4} and the noncarcinogenic hazard index would range from 5.84×10^{-2} to 4.5×10^{-2}. This carcinogenic risk level is unacceptable.

Alternative 3 provides protection of human health and the environment by reducing the volume of contamination in the Shallow Aquifer and thereby reducing all risks associated with presence of VOCs in the ground water. The calculated health risk after the remedial objectives are achieved will be within EPA's target risk range, 10^{-4} to 10^{-6}, and the noncarcinogenic hazard index will be less than 1.0.

COMPLIANCE WITH ARARs

Alternatives 1 and 2 do not comply with the chemical specific ARARs set forth in Section 7 of this report. Alternative 3 would attain all pertinent ARARs set forth in Section 7.

REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternatives 1 and 2 do not reduce toxicity, mobility, or volume through treatment.

Alternative 3 provides reduction of toxicity, mobility, and volume by reducing the concentration of contaminants in the Shallow Aquifer and by containing the contaminant plume within the capture zone created by the extraction wells. Alternative 3 does not include treatment other than the volatilization and degradation of VOCs at the POTW. This treatment does not provide complete destruction of chlorinated hydrocarbons.

LONG-TERM EFFECTIVENESS AND PERMANENCE

Alternatives 1 and 2 do not provide any effective measure for remediating groundwater contamination. Therefore, risks associated with presence of this contamination remain unaffected. Alternatives 1 and 2 do not provide long-term effectiveness or permanence.

Alternative 3 includes groundwater extraction which is intended to reduce the level of contamination in the Shallow Aquifer below the cleanup levels listed in Table 7. Thus, potential risks to the community currently posed by the site in its present condition are minimized. To ensure that the magnitude of residual risks are minimized, the performance of the groundwater extraction system will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include:

a) discontinuing operation of extraction wells in areas where cleanup standards have been attained;

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and encourage adsorbed contaminants to partition into ground water;

d) installation of additional extraction wells.

Treatment by POTW provided by Alternative 3 is reliable for the complete or near-complete removal of VOCs from the extracted ground water. Treatment residuals are expected to be low, based on the high volatility of the VOCs. Therefore, Alternative 3 provides long-term effectiveness and permanence.

SHORT-TERM EFFECTIVENESS

Alternatives 1 and 2 do not include the implementation of any remedial action, therefore, there are no risks associated with the implementation of a remedy. The risks associated with the contamination of the Shallow Aquifer would remain at the Site.

Alternative 3 will create minimal short-term impact to the health of the workers and the community because the groundwater extraction system is already in place at the Site.

IMPLEMENTABILITY

There are no technical concerns regarding the implementability of Alternatives 1 and 2.

Alternative 3 involves operating the existing groundwater extraction system without implementing any additional wells. Additional monitoring well(s) will be installed to monitor the Shallow Aquifer upgradient of the Site. However, there are no technical considerations that prohibit the installation of these wells.

COST

There are no costs associated with Alternative 1.

The capital cost for Alternative 2 is $13,450 in 1991 dollars. Operation and maintenance costs associated with monitoring and deed restrictions are $71,580 per year and the present worth is estimated to be $1,098,000.

The capital cost for Alternative 3 is $61,000 in 1991 dollars. Operation and maintenance costs associated with monitoring and sewer disposal fees are estimated to be $104,700 per year and the present worth is estimated to be $786,000.

The present worth of Alternative 2 is greater than Alternative 3 because the present worth for Alternative 2 is calculated over a 19 year period and the present worth for Alternative 3 is calculated over a 15 year period.

SUPPORT AGENCY ACCEPTANCE

The Feasibility Study and the Proposed Plan Fact Sheet were reviewed by California Regional Water, Quality Control Board (RWQCB). The RWQCB concurs with Alternative 3, EPA's preferred alternative.

COMMUNITY ACCEPTANCE

The Proposed Plan was presented to the community of Mountain View in a fact sheet and at a public meeting. No technical comments were submitted regarding the alternatives. Other comments received are addressed in the Response Summary.

THE SELECTED REMEDY

The selected remedy for the Site is Alternative 3. Alternative 3 consists of continuing the current groundwater extraction system. Extracted water will be discharged under permit to the sanitary

sewer. The current groundwater extraction system consists of 7 extraction wells; 4 A-zone wells and 3 B-zone wells. The flow rate of the system is approximately 45 gallons per minute (gpm). Alternative 3 is required to achieve the cleanup standards listed in Table 7. By returning the shallow aquifer to drinking water quality, the risks associated with future domestic use will achieve EPA's target risk range of 10^{-4} to 10^{-6} for the chemicals of concern, thereby eliminating the most significant exposure pathway. Extracted ground water will continue to be discharged under permit to the sanitary sewer. According to the Quarterly Monitoring Report dated April 15, 1991, the highest total concentration of VOCs discharged to the sanitary sewer is 803 ug/L. The City of Mountain View permits a total concentration of organics equal to or less than 1 ppm at a point of discharge. The capital cost for Alternative 3 is $61,000 in 1991 dollars. Operation and maintenance costs associated with monitoring and sewer disposal fees are estimated to be $104,700 per year and the present worth is estimated to be $786,000.

The goal of this remedial action is to restore ground water to its beneficial use, which is, at this site, a potential drinking water source. Based on information obtained during the remedial investigation and on a careful analysis of all remedial alternatives, EPA and the RWQCB believe that the selected remedy will achieve this goal. It may become apparent, during operation of the ground water extraction system and its modifications, that contaminant levels have ceased to decline and are remaining constant at levels higher than the remediation over some portion of the contaminated plume. In such a case, the system performance standards and/or the remedy may be re-evaluated.

The selected remedy will include ground water extraction for an estimated period of 5 to 19 years, during which the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

a) at individual wells where cleanup goals have been attained, pumping may be discontinued;

b) alternating pumping at wells to eliminate stagnation points;

c) pulse pumping to allow aquifer equilibration and to allow adsorbed contaminants to partition into ground water; and

d) installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

To ensure that cleanup levels continue to be maintained, the aquifer will be monitored at those wells where pumping has ceased.

10.0 STATUTORY DETERMINATIONS

The selected remedy will reduce the concentration of contaminants in the Upper Aquifer to levels which are protective of human health and the environment by extracting contaminated ground water and discharging untreated water to the sanitary sewer. By removing the contaminants from the Upper Aquifer, the carcinogenic and noncarcinogenic risks attributed to ingesting ground water containing contaminants at the levels described in Section 5.2.2 are reduced to within EPA's target risk range. Therefore, the only exposure pathway posing a potential carcinogenic risk greater than 1×10^{-4} is controlled. The risk associated with the exposure pathway created by discharging contaminated water into the sanitary sewer is less than 1×10^{-6}.

The selected remedy is required to achieve chemical specific ARARs for all the contaminants identified in the Upper Aquifer. The chemical-specific ARARs for this Site are listed in Table 7. The action-specific ARAR for this Site is to comply with the City of Mountain View discharge requirement for the sanitary sewer.

The selected remedy effectively reduces the primary risk associated with the Site and does not create unacceptable short-term risks. Therefore, the selected remedy provides the most cost effective risk reduction for the Site.

Because of the considerable time required to achieve health-based levels, a five-year review, pursuant to CERCLA Section 121, 42 U.S.C. Section 9621, will be conducted at least once every five years after initiation of the remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

The remedy selected in this ROD is consistent with the alternative selected in the proposed plan.

II. RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY
CTS CORPORATION
FINAL SITE CLEANUP REQUIREMENTS

Introduction/Summary

This responsiveness summary responds to comments and questions received during the 30-day public comment period regarding the proposed final remedy for the former CTS Printex Corporation site. The remedy is presented in the Tentative Site Cleanup Requirements (SCR), Remedial Investigation and Feasibility Study (RI/FS), and the Regional Board Proposed Plan Fact Sheet for the former CTS Printex site. The final public comment period on the SCR, RI/FS, and proposed plan was from March 20, 1991 to April 19, 1991. The Board held an initial public hearing on the SCR on March 20, 1991 at which time CTS commented on the Tentative Order. These comments are repeated below. A community meeting was held in Mountain View on March 21, 1991; there were no comments received at this meeting.

Four comment letters on the SCR were received from CTS Corporation, EPA, the Santa Clara Valley Water District, and the Regional Water Quality Control Plant for the City of Palo Alto. In response to these comments, no changes were made to the cleanup standards or methods of achieving those standards. The only significant change was the addition of specific items needed before cleanup measures can be discontinued (Provision 2.i.). Other changes were either typographical or minor procedural text changes for clarification.

Responses to Specific Comments

<u>City of Palo Alto</u>

There were two comments from the Regional Water Quality Control Plant for the City of Palo Alto. The first comment concerned the discharge of ground water to the city sewer and how most of it would volatilize in the sewer system or at the facility, and the risk associated with this volatilization. In the Baseline Public Health Evaluation, CTS evaluated total volatilization of the current discharge as a worst case scenario, and found that the risk (i.e., 6.6 x 10 -6) is within acceptable levels. The second comment was a request that extracted ground water be considered for possible reuse in the vicinity of the site. This is also a concern for the Board and the SCR includes a task to evaluate the use of the groundwater rather then discharging it to the sewer.

Responsiveness Summary
CTS Corporation
Final Site Cleanup Requirements

CTS Corporation

CTS submitted extensive (eight pages) of detailed comments on the SCR. Many of these were typographical and procedural (i.e., the appropriate current name for the company), and they have been changed in the current Tentative Order. All comments have been incorporated into the Final SCR except as noted below. The numbers correspond to CTS's comments.

2.E. Did not change site history because this was not indicated in the RI/FS.

3.F. The Responsiveness Summary will be made a part of the record for the Final Tentative Order.

4.E.2. Did not change because additional upgradient well(s) will be needed and are required by the Order.

5.B.3. Did not add the last sentence that begins with "In that..." The Board may issue an Order for CS Services but this does not relieve CTS Corporation of its responsibility to clean up chemicals originating from its site.

6.B. Since toluene was found in soil at the site, the proposed wording that toluene is probably not associated with site activities will not be added.

10. Long term monitoring will be required, but the time frame and specific wells will be determined at an appropriate future date, based upon either responsible party or Board initiative, or during the required five-year review.

13.A. This is standard wording in all final cleanup orders, and the proposed wording is too limiting.

15.A. "Pollutant" is a more general term and is more appropriate for cleanup orders.

15.C. CTS is responsible for all contamination associated with its site and must demonstrate to the Board that all the contamination from the site is cleaned up as required by the Board-adopted order. Provision 2.i. has been added to define the conditions under which remediation may cease.

16.A.1. Retained the word "additional" so that the five-year evaluation covers only investigations since the RI/FS.

16.A.2. Changed "polluted" to "contaminated."

16.A.3. Did not change "and /or soil remediation" because it is possible that there may be an undiscovered source, and/or cleanup standards may change.

17.C. Staff believes that it is appropriate to retain these information requests at quarterly intervals. This would be consistent with other South Bay sites.

17.D. The annual report can be part of the fourth quarter report due January 15, 1992.

17.E. Resubmission of these reports is only necessary when site conditions or standards change.

US Environmental Protection Agency

Each of EPA's comments are addressed separately below.

Finding 5:

Castro Paint is not being named as a potential responsible party because the hydropunch sample taken at the corner of their property did not exhibit any VOCs and the soil data at their site had very had low levels of TCE.

Finding 9:

Board staff expanded Finding 21 describing remedial actions to include soil remediation.

Finding 10:

The plume is defined according to the hydropunch data collected by CTS in early 1991 in the vicinity of wells 34W and 38W. This data showed non-detect levels in groundwater north and west of these wells, thus defining the plume.

Responsiveness Summary
CTS Corporation
Final Site Cleanup Requirements

Finding 14:

The chemicals of concern do represent all of the contaminants present in the aquifer.

Finding 15:

There is no evidence that Permanente Creek is effected by the activities associated with the former CTS Printex facility. Potential impacts from this site are much lower than aquatic toxicity criteria.

Finding 16:

See response to City of Palo Alto comment #2. The risk has been found to be at acceptable levels. Other exposure pathways include inhalation of VOCs through domestic use of ground water.

Finding 22:

The only alternative considered for soil was 'no action' since no risk was associated with it.

Permanente Creek is currently being sampled by Teledyne-Spectra Physics. There is a clean monitoring well located between the creek and the CTS Printex facility plume. For these reasons, staff feels that it is not necessary to monitor the creek.

Finding 23:

The cost numbers will be adjusted so that they include past, present, and future.

Finding 24:

"Significant quantities" will no longer be extracted when either cleanup standards are met or conditions for an ARAR waiver are met. In either case, a decision will be made by the Board and EPA through the public hearing process.

Santa Clara Valley Water District

Staff acknowledge that the District's ordinance only requires a sanitary seal that extends 50 feet and ending at least 5 feet into a significant aquitard. There will also be a deed restriction placed on the site, restricting installation of drinking water wells.

REGIONAL WATER QUALITY CONTROL PLANT
2501 Embarcadero Way
Palo Alto, CA 94303

TELEPHONE: 415/329-2598

OPERATED BY THE CITY OF PALO ALTO

SERVING: EAST PALO ALTO - LOS ALTOS - LOS ALTOS HILLS - MOUNTAIN VIEW - PALO ALTO - STANFORD

Mr. Tom Benz
Regional Water Quality Control Board
San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, CA 94612

March 28, 1991

Dear Mr. Benz:

The purpose of this letter is to provide comments on the proposed clean-up plan for the CTS Printex Superfund Site. Equally important we are forwarding new criteria for the issuance of contaminated groundwater sewer discharge permits. As the attached policy indicates we will no longer issue such permits, or increase flow limitations in existing permits, unless documentation is provided from the applicant demonstrating that all alternatives for use of the water (irrigation, industrial processes, etc.) have been explored in the vicinity (not just on-site) of the extraction wells and that none are practical. Needless to say the reason for this new policy is the large cutback in potable water use which all of our partner cities are facing.

Our comments are:

1. Alternative 3, the recommended alternative, (page 5 of March 1991 fact sheet) indicates that the extracted groundwater would be "sent untreated to the City of Mountain View sewage treatment facility, where it is treated ...." We do not believe that a substantial portion of the chlorinated hydrocarbons of the type from CTS are "treated" at our facility. The literature suggests that almost all of it is merely volatilized, either in the sewer collection system or at the plant. The CTS risk assessment should be revised accordingly.

2. Alternative 3 should be revised to indicate that the applicant must demonstrate that use of the water in the vicinity of the extraction wells is not practical before a sewer use permit would be issued. A temporary or conditional permit may be possible to allow completion of the use evaluation or to allow discharge at certain times.

T.L No: 7189 8188

Thank you for your agency's consideration of these comments.

Sincerely,

Phil Bobel, Manager
Environmental Compliance Division

Enclosure

cc: Mark Harris, City of Mountain View

CTS Corporation
Corporate Offices
905 West Boulevard North
Elkhart, Indiana 46514
Telephone 219-293-7511
TWX 810-294-2167
FAX 219-293-6146

April 1, 1991

CTS

Mr. Stephen I. Morse, Chief
South Bay Toxics Division
California Regional Water
Quality Control Board
San Francisco Bay Region
1800 Harrison Street, Suite 700
Oakland, CA 94612

CALIFORNIA REGIONAL WATER
APR 0 5 1991
QUALITY CONTROL BOARD

Subject: Tentative Site Cleanup Requirements
for CTS Printex, Inc.

Dear Mr. Morse:

Attached are CTS Corporation's comments relative to the subject Order. CTS has sought to collate our comments to include singular word changes, typographical errors, grammatical errors, as well as those items or issues that CTS considers substantive.

Please review and note the changes recommended in the attached. CTS would like the opportunity to discuss any changes, as recommended in the attached, that are not acceptable to you or your staff, prior to the Board's May meeting. If all the changes recommended herein are acceptable to you, I shall look forward to receiving a copy of the final draft Order soon after the end of the comment period.

Please contact me if you have any questions, or if further clarification of any aspect of the attached is required.

Best regards,

CTS CORPORATION

Marvin E. Gobles, P.E.
Manager
Plant Engineering Services

MEG/law

Attachment

FILE: 491.01

COMMENTS ON DRAFT ORDER FORWARDED BY LETTER
FROM STEPHEN I. MORSE DATED MARCH 7, 1991

1. EXECUTIVE OFFICER SUMMARY REPORT, DISCUSSION SECTION.

Midway through the first paragraph is the following sentence:

"DHS certified that the buildings and soil under the wet floor no longer contained hazardous waste and certified the site for closure."

The intent of closure under RCRA is to assure that a facility regulated under Parts 264 or 265, at the time of closure, is returned to a condition such that the facility no longer presents any potential threat to human health or the environment. Secondly, DHS does not "certify" closure, but accepts closure certification from the owner/operator and an independent registered professional engineer. Thus, the above sentence should be revised as follows:

"It was determined that all soils that posed a potential threat to human health or the environment had been removed, and the buildings rendered in a clean condition. Thus, in accordance with DHS regulations and the approved Closure Plan for the site, DHS accepted closure, and the site was returned to the owner for remodeling and re-leasing to a new tenant."

2. TENTATIVE ORDER, PAGE 1

A. Top of page, change "CTS PRINTEX CORPORATION" to "CTS CORPORATION".
B. Item 1, Site Location and Description, 1st paragraph.
   1. Line 1. Change "CTS PRINTEX CORPORATION (CTS)" to "CTS PRINTEX (PRINTEX)".
   2. Line 4. Change "CTS" to "PRINTEX".
   3. Line 5. Change "CTS" to "CTS CORPORATION, PARENT CORPORATION FOR THE FORMER PRINTEX FACILITY".
C. Item 1, Site Location and Description, 2nd paragraph, Line 1. Change "CTS" to "PRINTEX".
D. Item 1, Site Location and Description, 3rd paragraph, Line 2. Change "the CTS" to "CTS CORPORATION".
E. Item 2, Site History, 1st paragraph, Line 3. Other types of manufacturing were known to occur at the site. Thus, the last sentence should be deleted.
F. Item 2, Site History, 2nd paragraph.
   1. Line 2. After the words "the site", add the words "since 1970".
   2. Line 2. After the words "CTS CORPORATION", add the phrase "from Anglo Energy, Inc.".
   3. Line 4. Add the word "late" in front of "1981".
   4. Line 5. Add the word "early" in front of "1985".

G. Item 2, Site History, 3rd paragraph.
   1. Line 1. Change "the CTS" to "PRINTEX".
   2. Line 2. Change "Chemicals (metals and volatile organic compounds (VOCs))" to "Metals and Volatile Organic Compounds (VOCs)".
   3. Line 3. Change "Two probable sources of these" to "Two sources of metals and VOCs".
   4. Line 4. Delete "Chemicals are" and substitute "were". Add the words "which was" after the word "sump".
   5. Line 5. Change "Chemicals" to "Metals". Change "include copper, lead," to "were copper and lead,".

3. TENTATIVE ORDER, PAGE 2.

A. Item 2, Site History, 3rd paragraph, Line 6. Add the words "while VOCs detected were" in front of "trichloroethene (TCE)".
B. Item 3, National Priority List "Superfund". Change "CTS" to "PRINTEX" on lines 1 and 2.
C. Item 4, Administrative Orders and Permits.
   1. Line 1. Add the words "and permits" after "administrative orders".
   2. Line 2. Change "CTS" to "PRINTEX".
D. Item 5, Potentially Responsible Party.
   1. Line 6. Change "CTS" to "PRINTEX".
   2. General comment. CTS has only reviewed a draft PRP document dated December 15, 1989, which identified Versatronex Corporation and Applied Typographics Systems as former occupants of the site. Did the final document clarify their PRP status? Were previous owners (Anglo Energy, Inc.) included?
E. Item 7, Community Involvement, 1st paragraph, Line 2. Change "CTS" to "PRINTEX".
F. Item 7, Community Involvement, 2nd paragraph, Line 8. Question: Will the Responsiveness Summary be attached and made a part of the final Order? If so, it should be stated.
G. Item 8, Summary of Site Characteristics, History of Site Investigation, Line 2. Change "CTS former facility", to "former Printex facility".

4. TENTATIVE ORDER, PAGE 3.

A. Item 8, Summary of Site Characteristics, History of Site Investigation, Line 4. Delete "in late 1989".
B. Item 9, Source Investigation, Line 1. Change "The potential sources that were investigated are" to "the potential sources investigated were".

C. Item 9, Source Investigation, Line 4. Change "city" to "City".
D. Item 9, Source Investigation, Line 13. Change "pollution" to "contamination".
E. Item 10, Groundwater Investigation, 2nd paragraph.
   1. Line 3. Change "Chemicals" to "VOCs".
   2. Line 10. Delete last sentence. The need for additional monitoring wells has not been demonstrated, thus should not be presupposed.
F. Item 11, Regional Hydrogeology, 3rd paragraph, Line 2. Change "CTS" to "The former Printex Facility".

5. TENTATIVE ORDER, PAGE 4.

A. Item 11, Regional Hydrogeology, 2nd paragraph, Line 4. Change "CTS" to "former Printex".
B. Item 13, Other Source Investigation.
   1. 1st paragraph, Line 2. Change "CTS" to "PRINTEX".
   2. 2nd paragraph, Line 2. Same as above.
   3. 4th paragraph. Change this paragraph to read as follows:
      "Further investigations may be needed to determine whether CS is a source of chemical contamination of groundwater. If CS is determined to be a source, then the Board may order CS to determine the extent of the release from its site. In that event, CTS' obligation under this Order may be adjusted in accordance with Section B. SPECIFICATIONS, Item 4, of this Order."
   4. 5th paragraph, Line 2. Delete word "possibly".
   5. 5th paragraph, Line 3. Change "CTS" to "PRINTEX".

6. TENTATIVE ORDER, PAGE 5.

A. Item 14, Summary of Site Risk, 1st paragraph, Line 4. Delete "CTS".
B. Item 14, Summary of Site Risk, 4th paragraph. Add a sentence to the end of the paragraph as follows: "It is more likely that the source of toluene in air is from activities other than those associated with the former Printex site."

7. TENTATIVE ORDER, PAGE 6.

A. Item 15, Risk Characterization, 4th paragraph, Line 2. Change "CTS" to "PRINTEX".
B. Item 16, Risk Characterization for each Pathway, 7th paragraph, Line 4. Change "CTS" to "PRINTEX".

8. TENTATIVE ORDER, PAGE 7.

   A. Item 19, Cleanup Alternatives, 3rd paragraph (Soil), Line 1. Change "assume" to "assumes".
   B. Item 19, Cleanup Alternatives, 3rd paragraph, Line 3. Change "existing" to "exists".
   C. Item 19, Cleanup Alternatives, 4th paragraph (groundwater), Line 1. Delete "CTS".

9. TENTATIVE ORDER, PAGE 8.

   A. 3rd paragraph, Line 3. Insert the word "be" so that the sentence reads, "The extraction element of the alternative is assumed to be the existing system."

10. TENTATIVE ORDER, PAGE 9.

   A. Item 22, Final Cleanup Plan, paragraph d. Long-term monitoring. The approximated time frame for long-term monitoring offered in this paragraph is disputedly too long, but CTS doesn't believe it prudent to offer any approximation at this time anyway, thus asks that the phrase "(for approximately 15 years)" be removed. Additionally, to correlate with comments provided for page 14 of the TENTATIVE ORDER, CTS requests that the term "may" be substituted for the term "will".

11. TENTATIVE ORDER, PAGE 10.

   A. Item 23, Summary of Evaluation Criteria for the Alternatives.
      1. Alternative 2: Institutional Action. Change "CTS" to "PRINTEX".
      2. Alternative 3: Extraction/Treatment/Discharge. Change "BASIS FOR ACCPTANCE" to "BASIS FOR ACCEPTANCE".
      3. Alternative 3: Extraction/Treatment/Discharge. Paragraph on Implementability, Line 2. Change "CTS" to "PRINTEX".
      4. Alternative 3: Extraction/Treatment/Discharge. Paragraph on Cost, Line 3. Change "$398,000" to "$466,000" and change "$852,000" to "$725,000".

12. TENTATIVE ORDER, PAGE 11.

   A. Item 23, last sentence. Change "consider" to "considered".
   B. Item 24, Cleanup Standards, 2nd paragraph, Line 5. Delete "the" prior to "CTS".
   C. Item 24, 2nd paragraph, Line 7. Change "impracticable" to "impractical".

D. Item 25, Evaluation of Final Plan, Line 2. Delete "by the CTS".

13. TENTATIVE ORDER, PAGE 12.

A. Item 27, Future Changes to Cleanup Standards, Last paragraph. As a general comment, CTS is discouraged by the lack of finality to the cleanup agreement, and the inability of the board to commit to a final document. However, based on the abundance of data and known technical facts related to this site, CTS is confident of the measures taken to define and remediate the release associated with the former Printex site, and does not believe the measure contemplated by this paragraph will ever require implementation. However, it is suggested that Line 5 be re-worded as follows:

...."previously described herein unless: (1) conditions on the site, recently discovered by the Board and directly related to the activities of Printex, are discovered"...

B. Item 29, Lead Agency, Line 8. Last word is "thereunder" (one word in lieu of 2).

C. Item 33, Line 1. Change "CTS" to "PRINTEX".

14. TENTATIVE ORDER, PAGE 13.

A. Item 37, Line 2. Change "sate" to "state".

15. TENTATIVE ORDER, PAGE 14.

A. B.SPECIFICATIONS, Item 2, Line 4. Change "pollutant" to "contaminant".

B. B.SPECIFICATIONS, Item 3. Change "CTS" to "PRINTEX".

C. B.SPECIFICATIONS, Item 4. Revise the first sentence to read as follows: "Final cleanup standards for all onsite and off-site wells shall not be greater than the levels as provided in Finding 22, unless the discharger can demonstrate that the cause of its inability to attain final cleanup standards is created by a contaminant source(s) other than the former Printex facility. In that event, this Order will then be modified to increase the levels of cleanup standards for the affected discharger and the Board may take all other appropriate actions against the additional discharger(s) including an Order compelling said discharger to assume responsibility for all further contaminant cleanup and long-term monitoring."

D. C.PROVISIONS, Item 2, Lines 3 and 4. Change "The primarily responsible discharger" to "CTS Corporation".

E. C.PROVISIONS, Item 2.b. Task 2, Line 7. Revise the last sentence to read as follows: "The report shall also

evaluate the effects of operation of existing extraction wells on groundwater levels and effectiveness of the well cycling program to avoid creating stagnation zones, and determine if monitoring well(s) should be added or deleted.

16. TENTATIVE ORDER, PAGE 15.

A. C.PROVISIONS, Item 2.c. Task 3.
   1. Line 2. Remove the word "additional".
   2. Line 8. Remove the words "polluted soil".
   3. Line 10. Remove the words "and/or soil remediation".

B. C.PROVISIONS, Item 2.e., last line. Change finding "21" to "20".

C. C.PROVISIONS, Item 2.f. Task 6, Line 5. End the sentence following the words "drinking water".

D. C.PROVISIONS, Item 2.g. Change completion date from August 15, 1990 to August 15, 1991.

17. TENTATIVE ORDER, PAGE 16.

A. C.PROVISIONS, Item 2.g. Task 8, Line 3. Change "39W" to "34W". Also, delete the word "possible".

B. C.PROVISIONS, Item 5, 1st paragraph. Delete the last sentence. CTS is neither privy to that information, nor is it necessary to determine adequacy of remediation efforts.

C. C.PROVISIONS, Item 5, 2nd paragraph, Line 2. The sentence starting on line 2 requests information that would be more meaningful if reported on an annual, rather than a quarterly, basis. The information requested will not significantly change from one quarter to the next, but places an extensive reporting burden upon CTS for which there is little justification. CTS requests that the requirement be moved to C.PROVISIONS, Item 6.

D. C.PROVISIONS, Item 6. For consistency with the self-monitoring program, the annual report is to be combined with the fourth quarter report. Thus, Item 6 should be revised as follows: "On an annual basis, or as required by the Executive Officer, the status report shall include, but need not be limited to, an evaluation of the cleanup measures. A summary of monitoring and sampling data shall also be included in the annual report. For purposes of reporting, the annual report shall be combined with the fourth quarter report."

E. C.PROVISIONS, Item 7. Resubmission of reports already found acceptable to the Executive Officer should not be necessary. Delete.

F. C.PROVISIONS, Items 12, 13, and 14. It should be noted that these items are largely site-based requirements, and are not within the control of CTS. However, CTS will advise ADN Corporation of the requirements applicable to the site.

ATT

LETTER OF TRANSMITTAL

Date: April 19, 1991

To: Mr. Steven Ritchie
Executive Director
San Francisco Bay Region
California Regional Water Quality Control Board
2101 Webster, 4th Floor
Oakland, CA 94612

From: Terrance E. Carter
Project Manager

Subject: Response to Comments
Former CTS Printex Facility
Mountain View, CA

Aqua Terra Technologies
Consulting Engineers
& Scientists

2950 Buskirk Avenue
Suite 120
Walnut Creek, CA
94596
415 934-4884

Transmitted herewith are copies of the response to comments from the Regional Water Quality Control Plant - Palo Alto letter dated March 28, 1991.

Please note that new policy issued by Palo Alto requires that, at the time of permit renewal. CTS must document options for water reuse. This requirement parallels Section C PROVISIONS, 2. a. of the Tentative Board Order for Printex. Since the permit renewal will occur in January, 1992, and the RWQCB requirement is tentatively scheduled for October, 1991, on behalf of CTS Corporation, we respectively request the requirement for this documentation specified in the order be changed to January, 1992.

cc: Tom Benz, RWQCB
John F. Nolan, Sheppard, Mullin, Richter & Hampton
Phil Bobel, Palo Alto Treatment Plant
Russ Frazer, City of Mountain View
Marv Gobles, CTS Corporation
Sean Hogan, EPA
Walter Baum, California DHS
Thomas I. Iwamura, SCVWD

ATT

RESPONSE TO COMMENTS

April 19, 1991

Comments were received from the Palo Alto Regional Water Quality Control Plant during the response period in reference to the Proposed Cleanup Plan for the former CTS Printex site.

PALO ALTO REGIONAL WATER QUALITY CONTROL PLANT - LETTER DATED MARCH 28, 1991

Comment 1: Treatment of VOCs at the City of Mountain View Sewage Treatment Facility.

Response: Volatization of VOCs in water discharged to the sanitary sewer system from the former Printex facility is the primary mechanism for "treatment". Accordingly, ATT concurs with the comment that VOCs are not "treated" at the sewage treatment plant since a substantial portion of the VOCs discharged to the sewage treatment plant volatize prior to reaching the plant and a minimal portion volatize at the plant.

Sections 6.5, 6.6 and Tables 12 of the Baseline Public Health Evaluation (BPHE) provide an evaluation of risk to human receptors associated with inhalation (by volatization) and dermal exposure to the VOCs in groundwater. Noncarcinogenic effects based on possible exposure were less than one (Hazard Index <1) and would not be expected to have a significant impact to human receptors. Carcinogenic risks based on possible exposure of VOCs by inhalation and dermal contact for workers (risk = $6.6e^{-6}$) is well below the risk level for workers ($1.0e^{-5}$).

Comment 2: Requirement demonstrating water reuse options.

Response: Section C. PROVISIONS, 2. a. of the Tentative Site Requirements for the CTS Corporation issued by the RWQCB, requires parallel documentation of efforts to reuse extracted groundwater. The requirement will be addressed in January, 1992, at the time of renewal of the discharge permits.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105

April 17, 1991

MEMORANDUM

TO: Tom Benz, RWQCB Project Manager

FROM: Sean P. Hogan, EPA Project Manager

SUBJECT: Transmittal of EPA Comments on the Draft Tentative Order for CTS Corporation and ADN Corporation, Mountain View, California

Contained in this memo are EPA's comments on the Draft Tentative Order for CTS Corporation and ADN Corporation in Mountain View, California. The comments contained in this memo are mostly concerned with the definition of the contaminant plume emanating from the former CTS facility and the selected alternative for soil remediation.

If you have any questions regarding the comments in this memo, please contact me at (415) 744-2233. Thank you.

COMMENTS

Page 2, Finding 5:

Carl Sox is identified as a potentially responsible party (PRP) due to being a potential source of contamination. However, Castro Paint, who is still considered a potential source in Finding 13, is not identified as a PRP. Please explain why Castro Paint is not identified as a PRP.

Page 3, Finding 9:

EPA suggests that the source control measures described in this finding are discussed in a separate finding called "Interim Actions." The discussion regarding soil excavation and sump removal should also state what the cleanup levels were for the excavation. Interim actions addressing groundwater contamination would also be discussed under this finding.

Page 3, Finding 10:

This discussion should include some narrative description of the lateral and vertical extent of the plume boundaries. Also, it is unclear if the RWQCB has established that the contamination discovered in well 38W is attributed to a separate plume or a plume that has merged with the plume emanating from the former CTS facility. If there is a defined separation between the two plumes, the known boundaries of the adjacent plume should be described. An illustration may be appropriate to eliminate confusion.

Page 5, Finding 14:

Are the contaminants identified as "chemicals of concern" representative of all chemicals in the aquifer with respective State or federal cleanup standards? If the listed chemicals of concern do not represent all of the contaminants present with assigned cleanup levels, EPA suggests that Table 1 is supplemented with the additional chemicals and their respective cleanup levels.

For completeness, the discussion regarding toxicity assessment of contaminants should describe what are acceptable risk levels for noncarcinogens.

Page 5, Finding 15:

The last sentence on this page is unclear: "Studies of the area have concluded that acute and chronic toxicity values for aquatic organisms are greater than current or predicted concentrations of volatile organic compounds in Permanente Creek and the southern portion of San Francisco Bay." Is this good or bad?

Page 6, Finding 16:

Is discharge to the sanitary sewer considered a potentially significant exposure pathway?

In the second paragraph under "Future Carcinogenic Risks," please define what other exposure pathways were considered for the carcinogenic risk calculation.

Page 9, Finding 22:

It is unclear how an alternative could be selected for soil when Finding 17 states that remedial alternatives were not developed for soil due to the insignificant risks. Although the no action alternative is selected for the soils, maybe it would be more clear if the text used for Finding 17 is also used for Finding 22.

Will sampling of Permanente Creek be required as part of the long-term monitoring plan? Please include more detail about the long-term monitoring plan or reference another source.

Santa Clara Valley Water District

5750 ALMADEN EXPRESSWAY
SAN JOSE, CALIFORNIA 95118
TELEPHONE (408) 265-2600
FACSIMILE (408) 266-0271

AN AFFIRMATIVE ACTION EMPLOYER

April 19, 1991

Mr. Tom Benz
Regional Water Quality Control Board
2101 Webster Street, Suite 500
Oakland, CA 94612

Dear Mr. Benz:

Subject: Comments on CTS Printex Site located at 1911 Plymouth Street, Mountain View

We are in general concurrence with your cleanup plans for the CTS Printex site located at 1911 Plymouth Street, Mountain View, California.

On page 5 of the March 1991, Fact Sheet No. 2, under "Regional Board Cleanup Standards for the CTS Printex Site," it is stated that the shallow groundwater zones affected by the contamination at the Printex site are currently not used as a water supply and local ordinances prohibit such practice. We would like to clarify this statement in reference to the prohibition. In this area where the local ordinances outline an area of upper aquifer zone and lower aquifer zone, the ordinance does not prohibit the construction of wells in either zone.

In the two aquifer zone the upper zone aquifers are those that occur at depths less than 100 feet and the lower zone aquifers are those that occur at depths greater than 150 feet.

Any water supply well constructed in the upper aquifer zone would require a sanitary seal that extends to a minimum depth of 50 feet and ending at least 5 feet into a significant aquitard. As the two uppermost contaminated aquifers at the site occur at depths less than 50 feet, the local ordinances require that these contaminated aquifers be sealed off. This does not preclude that upper aquifer zone aquifers deeper than 50 feet cannot be used as a source of supply, providing that such a well does not tap both the upper and lower zone aquifers. Any well constructed to tap the lower aquifer zone in the two aquifer zone will require a sanitary seal extending to a minimum depth of 150 feet (through the major aquitard).

Please call Tom Iwamura or myself if you have any question.

Sincerely,

David J. Chesterman
Supervising Engineer
Groundwater Protection Division

Page 10, Finding 23:

It is stated that "costs associated with groundwater extraction facilities have already been incurred by CTS Corporation in implementing current remedial actions at the site." Do the costs provided in the Order include the incurred costs? EPA requires that all costs, past, present, and future, must be considered for the comparison anaysis.

Page 11, Finding 24:

It is stated that groundwater extraction shall continue as long as significant quantities of chemicals are being removed through groundwater extraction. Please define "significant quantities."