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REMEDIAL INVESTIGATION REPORT
ANGELES CHEMICAL COMPANY SITE
SANTA FE SPRINGS, CALIFORNIA
VOLUME I

Prepared for:

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GLOSSARY OF ACRONYMS

ACC	Angeles Chemical Company
AL	Action Level
AQMD	South Coast Air Quality Management District
ARARs	Applicable and Relevant and Appropriate Requirements
BGS	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulation
COC	Chain-of-Custody
CPT	Cone Penetrometer Test
DCA	Dichloroethane
DCE	Dichloroethene
DPW	Los Angeles County Department of Public Works
DQOs	Data Quality Objectives
DTSC	California Environmental Protection Agency Department of Toxic Substances Control
EC	Electrical Conductivity
EPA	Environmental Protection Agency
FS	Feasibility Study
HASP	Health and Safety Plan
ISEO	Imminent or Substantial Endangerment Order
LAC	Liquid Air Corporation
MCL	Maximum Contaminant Level
MEK	2-butanone, or methyl ethyl ketone

GLOSSARY OF ACRONYMS

MIBK	4-methyl-2-pentanone
MSL	Mean Sea Level
MW	Monitoring Well
O&M	Operation and Maintenance
OSHA	Occupational Safety and Health Administration
OVA	Organic Vapor Analyzer
PERC	Tetrachloroethene (also known as PCE)
PPP	Public Participation Plan
QAPP	Quality Assurance Program Plan
QC	Quality Control
RAP	Remedial Action Plan
RI	Remedial Investigation
SAP	Sampling and Analyses Plan
SCC	Southern California Chemical Corporation
SCS	SCS Engineers
TCA	Trichloroethane
TCE	Trichloroethene
TDS	Total Dissolved Solids
TPH	Total Petroleum Hydrocarbons
TRPH	Total Recoverable Petroleum Hydrocarbons
UST	Underground Storage Tank
VOC	Volatile Organic Compound

EXECUTIVE SUMMARY

BACKGROUND AND HISTORY

This Remedial Investigation Report (RI Report) has been prepared by SCS Engineers (SCS) on behalf of the Angeles Chemical Company (ACC) for submittal to the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). This report is submitted in response to DTSC's Imminent or Substantial Endangerment Order dated February 10, 1993 (Appendix A). The RI Report describes and documents investigations conducted in November 1993 through February 1994 at the ACC facility located at 8915 Sorenson Avenue in Santa Fe Springs, California. The scope of work for these investigations is outlined in the RI/Feasibility Study Workplan (SCS, May 1993). The purpose of the RI is to characterize the nature and extent of chemicals of concern on the site, and evaluate potential migration pathways.

ACC has operated a chemical repackaging plant on the present property since 1976. Thirty-four underground storage tanks (USTs), including one underground waste water tank are presently on site, predominantly on the southern half of the property. There are also nine aboveground tanks on site. Chemicals which have been stored and used on site include but are not limited to, acetone; methylene chloride; 1,1,1-trichloroethane (1,1,1-TCA); tetrachloroethene (PCE); 2-butanone (MEK); toluene; xylene; isobutyl acetate; butyl cellosolve; propanol; kerosene; diesel; and unleaded gasoline. There are five designated storage areas for palletized drums containing chemicals. Chemicals stored in drums and containers include those previously listed.

Previous soil investigations conducted on site in 1990 indicated elevated concentrations of up to 13 different volatile organic compounds (VOCs) in some samples. Shallow excavation around the south central spill drain and concrete catch basin revealed that subsurface piping originally leading from a former sump to the catch basin had been severed approximately 2 feet east of the concrete catch basin. This apparently had allowed runoff collected in the catch basin from the south central drain to discharge into soils through the break in the pipeline. Grab samples and exploratory borings in the immediate vicinity of the broken drain pipe revealed elevated concentrations of ethylbenzene, PCE, toluene, 1,1,1-TCA, trichloroethene (TCE), and xylenes.

In June 1990, one 60-foot boring was converted to a groundwater monitoring well (MW1) in a direction believed to be downgradient of the area of soil contamination near the spill drain. Elevated concentrations of VOCs were detected in groundwater samples from MW1, including benzene, 1,1-dichloroethane (1,1-DCA), 1,1-dichloroethene (1,1-DCE), ethylbenzene, PCE, TCE, and trans-1,2-DCE at concentrations above their respective maximum contaminant level (MCL).

In 1992, shallow surface soil samples collected along railroad spur lines in the northwest portion of the ACC site indicated elevated concentrations of total petroleum hydrocarbons and VOCs, including PCE, 1,1,1-TCA, TCE, xylenes, toluene, ethylbenzene, MEK, 1,2-DCA, 1,1-DCE, and 4-methyl-2-pentanone (MIBK).

Much of the on-site and off-site soils data base was established during previous investigations; however, subsurface soil data were lacking in the northern portion of the site, and along the northern railroad spur. The RI augmented the on-site soils data base by collecting and analyzing soil samples from nine borings, five of which were used to install groundwater monitoring wells.

The primary focus for the RI was the groundwater investigation, where previously available on-site data were limited. Five groundwater monitoring wells were installed throughout the site in addition to original well MW1. Three new wells (MW2, MW3, and MW7) were installed in the regional Gaspur/Hollydale aquifer, and two wells (MW4 and MW6) were installed in a discontinuous perched aquifer located along the northern perimeter of the site. The MW-5 boring was dry, so it was not converted to a well.

NATURE AND EXTENT OF CHEMICALS - SOIL

The compounds detected in soil in the highest concentrations are acetone, MEK, MIBK, PCE, toluene, 1,1,1-TCA, and xylenes. Elevated concentrations of these compounds in shallow soils appear to be limited in areal extent to two separate and distinct areas: the immediate vicinity of the northeast railroad spur and the south central drain area. This suggests spillage along the northeast portion of the railroad spur, and leakage through a broken pipeline associated with the concrete catch basin. No significant impacts to the vadose zone were identified as resulting from the on-site USTs, or activities involving storage of chemicals on site. In addition, there is no evidence of chemicals entering the soil through cracks in the concrete and asphalt pavement on the site. ACC has in the past received citations as a result of regulatory agency site inspections. All such violations have reportedly been corrected without imposition of penalties, and none of the violations appear to have contributed to the contamination in the spill drain area.

A secondary source of chemicals in soil appears to be associated with probable deposition of these materials in soil during times of high groundwater level in the perched and Gaspur/Hollydale aquifers. This appears to have impacted soils at depths of approximately 20 feet below ground surface (bgs) near the top of the perched aquifer (along the northern portion of the site), and at depths between 30 and 40 feet bgs near the top of the Gaspur/Hollydale aquifer.

NATURE AND EXTENT OF CHEMICALS - GROUNDWATER

The highest concentrations of chemicals detected were found in the perched aquifer along the northern portion of the site (MW4 and MW6). Elevated concentrations of chemicals, including benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, ethylbenzene, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE and xylenes were detected. Exploratory borings indicated that the perched zone is discontinuous, being absent along the southern portion of the site.

All wells screened in the Gaspur/Hollydale aquifer exhibit elevated concentrations of chemicals including benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, ethylbenzene, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE and xylenes, although generally at lower concentrations than in the perched aquifer. Concentrations of individual chemicals dissolved in groundwater in downgradient wells MW1, MW2, and MW3 vary somewhat from well to well; however, overall concentrations are comparable between wells. Chemicals detected in upgradient well MW7 suggest a possible upgradient source. Free product was encountered in MW-1 in February 1994. No other well has exhibited the presence of free product. Water level data from the site indicate a south to southwesterly flow direction.

RISK EVALUATION

A risk evaluation report will be submitted under a separate cover following completion of the final RI report. The risk evaluation is used to provide an assessment of the potential threat to human health and the environment posed by any contaminated media (i.e., soil, groundwater, etc.) in the UST area, railroad spur area, drum storage area, and south central spill drain area, in the absence of any remedial action. The risk evaluation will provide the basis for remedial action.

FEASIBILITY STUDY

Following completion of the RI and risk evaluation reports, a feasibility study (FS) will be conducted. The FS serves as the mechanism for the development, screening, and detailed evaluation of potential remedial alternatives for each area and media of contamination. The FS report will be submitted under a separate cover.

CONCLUSIONS

This remedial investigation identified impacts to vadose zone soils and groundwater by VOCs. The predominant compounds detected in soil are acetone, MEK, MIBK, PCE, toluene, 1,1,1-TCA, TCE, and xylenes. Elevated concentrations of these compounds in shallow soils appear to be limited to the immediate vicinity of the northeast railroad spur and south central drain area.

Elevated concentrations of chemicals in groundwater were detected in wells screened within the perched and Gaspur/Hollydale aquifers. The highest concentrations of chemicals detected in groundwater were found in the perched aquifer along the northern portion of the site. Concentrations of individual chemicals dissolved in groundwater in downgradient Gaspur/Hollydale aquifer wells MW1, MW2, and MW3 vary somewhat from well to well; however, overall concentrations are comparable between wells. Free product was encountered in MW-1, which is immediately downgradient from the south central spill drain. Detection of relatively lower chemical concentrations in upgradient well MW7 suggests a possible upgradient off-site source.

REMEDIAL INVESTIGATION REPORT
ANGELES CHEMICAL COMPANY SITE
SANTA FE SPRINGS, CALIFORNIA

1.0 INTRODUCTION

This Remedial Investigation (RI) Report has been prepared by SCS Engineers (SCS) on behalf of the Angeles Chemical Company (ACC) for submittal to the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). This RI followed the scope of work outlined in the RI/Feasibility Study (RI/FS) Workplan (SCS RI/FS Workplan, May 1993). The RI/FS Workplan was submitted in response to DTSC's Imminent or Substantial Endangerment Order (ISEO) dated February 10, 1993 (see Appendix A) concerning the ACC site located at 8915 Sorenson Avenue, Santa Fe Springs, California (see Figure 1).

The RI/FS Workplan follows the outline presented in the U.S. Environmental Protection Agency's (EPA) "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA, October 1988", and the National Contingency Plan, 40 CFR Section 300 et seq.

In summary, the RI was conducted to achieve the following objectives:

- Assess nature and extent of chemicals of concern in media of interest (i.e., soil and groundwater) at the ACC facility,
- Identify existing and potential migration pathways,
- Provide adequate data to identify and evaluate appropriate remedial alternatives, to be determined in the FS.
- Collect information necessary to prepare a Remedial Action Plan (RAP).

1.1 REPORT ORGANIZATION

Section 1.0 presents introductory material; a statement of the purpose of the RI; and a description of general features, history, past operations, and previous investigations. Section 2.0 describes the components of the RI. Results of physical characterization of the site are presented in Section 3.0. Section 4.0 describes the nature and extent of chemicals detected in the soil and groundwater. Chemical fate and transport processes are discussed in Section 5.0. Section 6.0 presents an outline of the health risk evaluation. Summary and conclusions are presented in Section 7.0.

1.2 SITE SETTING AND HISTORY

The ACC facility is located at 8915 Sorenson Avenue, in the City of Santa Fe Springs, Los Angeles County, California. The site is fenced, occupies approximately 1.8 acres in a predominantly industrial area, and is bounded on the east by Sorenson Avenue, on the northwest by Liquid Air Corporation (LAC), on the north by Ferrostall Metals Corporation, and on the south by a Southern Pacific Railroad (SPRR) easement and McKesson Chemical Company (McKesson), a former bulk chemical repackaging facility.

The ACC facility lies at approximately 150 feet above mean sea level (MSL). The surface of the facility is paved with asphalt or concrete. Exceptions to this are small portions covered with gravel base along the railroad spur, along the western periphery of the site, and a narrow strip to the south adjoining the SPRR easement. Gravel base areas are located away from the UST area. Surface spillage for the central part of the site is towards one of two spill drains. Subsurface piping leads from both drains to the underground waste water tank (see Figure 2). General surface drainage is towards Sorensen Avenue and the southeast (office area) and towards an unlined drainage channel (Coyote Creek), south of the site.

A third spill drain, formerly located at the bottom of a subgrade loading ramp and immediately west of the canopy area between UST Nos. 24 and 25, was removed in 1981 when these two tanks were installed (see Figure 2). No soil contamination was noted by on-site workers during tank installation. Based upon information from ACC personnel, subsurface piping for this third drain ran to a subsurface concrete catch basin (dimensions approximately 2 ft. x 2 ft. x 2 ft.), from which a single subsurface pipeline (approximately 1 foot below ground surface) leads westward to the underground waste water tank. The entrance to this pipeline within the trap is fitted with a plug, which is removed when there is a spill to allow flow to the waste water tank.

Historic land use was reviewed by studying available aerial photographs obtained from the Fairchild Aerial Photography Collection at Whittier College. From 1927 to the time ACC developed the facility in January 1976, the site was undeveloped and may have been used for agricultural purposes. Railroad tracks are visible along the southern property boundary as early as 1927. Activities in the area included primarily agriculture both on the property and to the north, and oil production to the south. Industrial activities expanded into the general area in the mid 1960s. Interviews with ACC personnel indicate no permanent facilities existed prior to ACC construction in January 1976. Southern Pacific Transportation Company previously owned the property.

ACC has conducted chemical repackaging operations on the present property since 1976. Chemicals handled by ACC are transported to and from the facility by ACC or contract carriers. Chemicals are stored at the facility for the purpose of repackaging them into containers of various sizes for resale to its customers. Thirty-four USTs are presently on site, predominantly along the southern and central portions of the property, including an underground waste water tank. Chemicals stored in USTs and used on site include, but are not limited to, acetone, methyl ethyl ketone (MEK), toluene, xylene, isobutyl acetate, butyl cellosolve, propanol, kerosene, diesel, and unleaded gasoline. Table 4 indicates the capacity and current contents of these USTs. Chlorinated solvents are not stored in these USTs.

There are presently nine aboveground tanks on site. Figure 3 illustrates aboveground tank locations. Four are compartmented steel tanks oriented horizontally near the western corner of the site. These tanks contain propyl acetate, denatured alcohol, mineral spirits, and propyl alcohol. Five vertical steel transfer tanks are located in the central canopy area, two by the drumming station, and three by the small container filling area. Transfer tanks are used as temporary chemical holding tanks during filling of containers, and are not used for storage. Table 5 provides a listing of aboveground tank use, contents, and capacities.

There are five designated storage areas for palletized drums containing chemicals. One storage area is located along the southern fenceline, one is located immediately east of the central canopy area, and the three remaining storage areas are located in the northern portion of the site. Two palletized small package or container storage areas are located immediately east of the canopy area, and along the eastern boundary of the site. There are three empty drum/container storage areas on site. One is located in the northeast corner of the site, and the other two are located in the southwest corner of the site. Figure 3 illustrates the various storage areas. Chemicals stored in drums and containers include those previously listed. Materials stored above ground also include methylene chloride, and 1,1,1-trichloroethane (1,1,1-TCA). Other chemicals, including PCE, have been stored above ground on site in the past.

Three buildings are currently present at the facility, two contain offices and one a laboratory. A canopy covers a central portion of the site, under which the packaging production line exists. Railroad spurs are located along the northern and western boundaries of the site.

The ACC laboratory is used for quality assurance/quality control. Samples are periodically collected from different batches of chemical mixtures and analyzed for specific gravity and refractive index. Samples are then retained for 90 days as a check against individual chemical batches in distribution. At the end of each holding period, the sample is disposed into a drum of like product, and eventually sold as part of another production run. Thus, no wastes are generated from laboratory sample analyses. The laboratory has no floor drains, sinks, or other conduits which may contribute to contamination.

1.2.1 Previous On-site Investigations

Figure 2 indicates the sampling locations for all investigations at the ACC facility, prior to the RI. Data from previous investigations were used to assist in identifying areas requiring additional investigation. Copies of original laboratory reports, chain-of-custody documentation, and boring logs/well construction details for previous investigations are provided in Appendix E.

In late 1985, the Los Angeles Department of Public Works (DPW) requested tank integrity testing and sampling of subsurface soils at the facility as an UST permitting requirement. Tank integrity tests and inventory records were initiated in 1985. Integrity testing (using the Horner EZ method) is conducted on a continuing basis by certified site personnel. Approximately two tanks are tested per month. Inventory records are also maintained daily using stick measurements. Integrity testing and inventory records do not indicate the USTs are leaking. All USTs are equipped with cathodic protection.

In April 1986, SCS submitted a workplan for subsurface investigation to DPW. Following receipt of comments from DPW, a modified workplan was resubmitted in March 1989. In January 1990 the first site investigation was conducted. Eight exploratory borings (BH1 to BH8, see Figure 2) were drilled on site at depths ranging from 20 to 50 feet bgs, and soil samples were collected at 5-foot depth intervals. Soil samples analyzed for VOCs using EPA Method 8240 indicated 11 different volatile compounds including benzene, 1,1-DCA, 1,1-DCE, ethylbenzene, MEK, MIBK, PCE, toluene, 1,1,1-TCA, TCE, and xylenes (see Table 1). Not all 11 compounds were detected in every boring. Samples from Boring BH-8 were non-detect for all these compounds. Concentrations of volatile compounds were relatively higher in boreholes BH5 and BH6, in the vicinity of the south central spill drain (see Figure 2).

Shallow excavation around the south central spill drain and catch basin was conducted in April 1990 to investigate the source of elevated VOC concentrations in boring BH-5 from the January 1990 investigation. The excavation revealed that subsurface piping originally leading from the former sump to the catch basin had been severed approximately 2 feet east of the catch basin. This had allowed runoff which collected in the catch basin to discharge into soils through the break in the pipeline. The piping is approximately 1 foot below ground surface. Figure 2 presents the drain system location and Figure 4 illustrates the severed pipe. Soils near the break were discolored, and hydrocarbon odors and organic vapor analyzer (OVA) readings ranging from 400 to 700 parts per million (ppm) were noted during excavation. Grab samples S-1 and S-2, collected approximately 2 to 3 feet bgs near the pipeline break, contained elevated concentrations of ethylbenzene, PCE, toluene, 1,1,1-TCA, TCE, and xylenes (see Table 2). Excavation did not extend beyond approximately 3 feet bgs due to the proximity of USTs.

A second site investigation was conducted in June 1990, consisting of seven exploratory borings (BH 9 to BH14 and MW-1) at depths ranging from 20.5 to 60 feet bgs. One 60-foot boring was converted to a groundwater monitoring well (MW1). Soil samples were collected at 5-foot depth intervals. Analytical results using EPA Method 8240 indicated 13 different volatile compounds, the 11 indicated in the previous boring episode, as well as acetone and methylene chloride (see Table 2). Not all 13 compounds were detected in every boring.

A ground water monitoring well was installed at MW-1, and VOCs were detected in a groundwater sample from this well. Benzene, 1,1-DCA, 1,1-DCE, PCE, TCE, and trans-1,2-DCE were detected at concentrations above their respective drinking water maximum contaminant levels (MCLs) (see Table 2). In addition, toluene, 1,1,1-TCA, and xylenes were detected at concentrations below their respective MCL or state recommended action level (AL). No free product was encountered during this sampling episode.

In October 1992, seven near-surface soil samples were collected along the northeast portion of the railroad spur lines in the northern portion of the site. Analytical data indicated elevated concentrations of total recoverable petroleum hydrocarbons (TRPH) using EPA Method 418.1. In addition, elevated concentrations of VOCs were detected using EPA Method 8240, predominantly PCE, 1,1,1-TCA, xylenes, and toluene. A summary of the results of this investigation can be found in Table 3.

1.2.2 Previous Off-site Investigations

Environmental investigations have previously been conducted at the following five facilities near the ACC site (see Figure 5):

- McKesson Chemical Company (McKesson)
  9005 Sorensen Avenue, Santa Fe Springs
  Former bulk chemical repackaging facility

- Liquid Air Company (LAC)
  8832 Dice Road, Santa Fe Springs
  Manufactures acetylene gas with water and calcium carbide

- Diversey Wyandotte Corporation (Diversey)
  8021 Dice Road, Santa Fe Springs
  Manufactures cleaners and defoaming agents

- T-Chem Corporation
  9028 Dice Road, Santa Fe Springs
  Manufactures and packs soap and household cleaning products

- Southern California Chemical Corporation (SCC)
  8851 Dice Road, Santa Fe Springs
  Manufactures inorganic chemicals for plating, electronics, etc.

A summary of data obtained from environmental studies relating to these facilities and other environmentally significant sites in the surrounding area is presented in the following narrative.

McKesson Chemical Company 9005 Sorenson Avenue--

McKesson Chemical Company (McKesson) operated a bulk chemical repackaging facility at the site from 1976 to 1986. Forty-four aboveground storage tanks (now removed) were situated throughout the site, contained within 2- to 3-foot-high concrete containment berms and internal dike walls. Twenty-three USTs are presently on site, predominantly located adjacent to a former aboveground solvent storage area in the north central portion of the site. Railroad spurs are located along the northern and western boundaries of the site. Loading platforms and underground distribution lines were associated with the offloading of chemicals delivered via rail spurs. A drum storage area was designated for the on-site storage of hazardous waste although, according to a report by McKesson (HLA, RI Report, 1992), it was never used (see Figure 6).

Harding Lawson Associates (HLA) conducted an RI in 1990 and 1991. The RI identified impacts to vadose zone soils and groundwater by VOCs. The predominant compounds detected in both soil and groundwater were 1,1,1-TCA, PCE, TCE, and methylene chloride (DCM). The highest concentrations of these compounds in soils were in the vicinity of the former aboveground solvent storage area. Other impacted soils were identified along the subsurface distribution lines connecting the northern railroad spur to the UST area (HLA, RI Report 1992).

HLA concluded that soil contaminants detected in the vicinity of the McKesson aboveground solvent-storage area were probably the result of vertical migration of liquid-phase solvents through the vadose zone, accompanied by lateral spreading along zones of high permeability. Contaminants detected at depths of 40 to 45 feet bgs away from the solvent storage area appear to be the result of deposition of VOCs from groundwater.

Two groundwater plumes exhibiting elevated concentrations of VOCs were postulated during the McKesson RI. An on-site plume, characterized by elevated concentrations of chlorinated hydrocarbons, including 1,1,1-TCA, PCE, TCE. 1,1-dichloroethene, and DCM, was detected. Maximum concentrations of these compounds were detected immediately downgradient of the aboveground solvent-storage area. At the time of the McKesson RI Report, the lateral extent of the on-site plume had not been completely assessed. HLA installed cluster wells screened at different depths in the aquifer. Vertically, HLA concluded that elevated concentrations of contaminants appeared restricted to the upper part of the aquifer, based upon laboratory results.

In addition, based upon available data, HLA suggested there may be an off-site plume, characterized by elevated concentrations of MEK, MIBK, benzene, toluene, ethylbenzene, xylenes (BTEX), and chlorinated hydrocarbons, crossing the extreme northwest corner of the McKesson site and the extreme southwest corner of the ACC site.

Elevated levels of the following constituents were detected in groundwater in some wells or CPT/HydroPunch locations at the McKesson site (HLA, RI Report 1992). Maximum detected concentrations are indicated:

- 1,1,1-TCA (110,000 ug/l).
- Methylene Chloride (100,000 ug/l).
- PCE (44,000 ug/l).
- TCE (11,000 ug/l).
- 1,1-DCE (50,000 ug/l).
- 1,2-DCE (2,600 ug/l).
- Cis-1,2-DCE (3,000 ug/l).
- Trans-1,2-DCE (< 500 ug/l).
- 1,1-DCA (1,100 ug/l).
- 1,2-DCA (1,000 ug/l).
- Benzene (> 100 ug/l).
- Toluene (3,000 ug/l).
- Ethylbenzene (< 500 ug/l).
- Total Xylenes (1,300 ug/l).
- Acetone (6,800 ug/l).
- 4-Methyl-2-Pentanone (MIBK) (1,200 ug/l).
- 2-Butanone (MEK) (5,300 ug/l).
- Chloroform (< 500 ug/l).
- Dichloroflurometh ane (200 ug/l).
- Trichlorofluoromethane (100 ug/l).
- 1,1,2-Trichloro-1,2,2-Trifluoroethane (260 ug/l).
- Trichloro-trifluoroethane (200 ug/l).
- Vinyl chloride (78 ug/l).

Since the McKesson site is downgradient to the ACC facility, it does not appear that contamination from the McKesson site is impacting the ACC site.

McKesson initiated a pilot in-situ vapor extraction remediation study for contaminated on-site soil in March 1994. To our knowledge, the program is on-going as of the date of this RI report.

Liquid Air Corporation--

Liquid Air Corporation (LAC) is located along the northwest boundary of the ACC site. LAC operates a manufacturing plant for industrial gases. Acetylene is one of the main products manufactured at this site. The product is produced by reacting calcium carbide with water. The process by-product, hydrated lime, was dewatered in two lime settling excavations (sludge pits) located on the eastern boundary of the site, immediately north of the ACC site. The sludge material was harvested and shipped as "dry lime."

In March 1988, IT Corporation collected samples of lime from an area of one of the sludge pits, which had previously experienced a spill of green pigment paint residue, believed to have contaminated approximately 85 cubic yards of pit material. Analysis using EPA Method 8240 indicated concentrations of VOCs ranging up to 90 ppb acetone, 55 ppb carbon disulfide, 46 ppb MEK, 40 ppb 1,1,1-TCA, 86 ppb toluene, and 30 ppb total xylenes.

In September 1988, two 7,500-gallon diesel USTs and product dispensers were removed. Soil samples collected beneath the dispensers indicated elevated TRPH concentrations ranging from 805 to 6,930 mg/kg using EPA Method 418.1. A site investigation by Aquascience Engineers (ASE) in November 1988 concluded that diesel contamination was vertically and laterally restricted to a relatively small volume of soil directly beneath the product dispensers (ASE, 1990a).

In August 1989, ASE excavated approximately 90 cubic yards of paint residue contaminated lime from a portion of one of the sludge pits. The contaminated lime was treated using aboveground vapor extraction. The treated lime was moved back to the sludge pit in December 1989 (ASE, 1990b).

In August and November 1989, ASE excavated approximately 25 cubic yards of diesel contaminated soil (soil above 100 mg/kg TRPH), which was placed on pads for bio-degradation treatment. The treated soil was used to backfill the dispenser excavation in April 1990. The County of Los Angeles, Department of Public Works, approved the final closure report (ASE, 1990c) in December 1992.

Prior to late 1993, one extensive sludge pit, approximately 25 feet, deep existed along the northern boundary of the ACC site. The base of this pit was located at the same approximate depth as that of the perched aquifer at the ACC site. Depth to groundwater beneath the pit was estimated at 60 to 70 feet bgs, based upon the County of Los Angeles, Department of Hydrologic Records (ASE, 1990b). This may indicate the perched aquifer did not originally exist in this area. Water accumulating in the sludge pit (particularly during the heavy rainstorms of 1992) is likely to have acted to recharge the perched aquifer. The sludge pit was backfilled in late 1993 and capped with concrete.

LAC has an industrial National Pollutant Discharge Elimination System (NPDES) permit (No. CA0058335) allowing them to discharge waste water from hydrostatic testing of cylinders and wash water for paint spray booths into unlined Coyote Creek, which follows the railroad tracks along the southern side of the LAC and ACC sites. In November 1977, the Regional Water Quality Control Board (RWQCB) issued a letter noting violations of the permit due to concentrations of total dissolved solids (TDS) in excess of 5,000 mg/l, and a pH of 11.9 below the LAC discharge point.

It does not appear that contamination from LAC is impacting soils in the south central spill drain area at the ACC site, but LAC may be impacting soils and groundwater on the northern portion of the ACC site as discussed in section 4.2 below.

Southern California Chemical Corporation (SCC)--

SCC is located west of the ACC site on the north side of the drainage channel that flows to the east, along the southern boundary of the ACC site. SCC has operated a liquid hazardous waste treatment facility at 8851 Dice Road since 1958. SCC presently operates as a Hazardous Waste Facility under Resource Conservation and Recovery Act (RCRA) permit No. 91-3-TS-002. In addition, SCC operates under a Conditional Use Permit issued by the City of Santa Fe Springs. The facility operates a number of waste management units and manufacturing and operational processes, including reactors, settling tanks, holding tanks, wastewater treatment tanks, multi-stage clarifiers, process and storm drain sumps, drum storage areas, and drum and truck washing areas.

SCC receives a variety of aqueous hazardous wastes and recyclable materials from generators primarily in the electronics and aerospace industries. Some of the wastes include spent etchants, solder strippers, pickling acids, plating solutions, conditioners, and brighteners. These solutions variably contain copper, iron, ammonium bifluoride, tin, chromium, nickel, trace heavy metals, sulfates, chlorides, and hydroxides. In turn, SCC is a manufacturer of patented and proprietary inorganic chemicals for electronic and printed circuitry, plating, water treatment, and agricultural uses. Chemicals historically manufactured on site included copper sulfate solution; copper oxides; copper chlorides; ferric chlorides; and other proprietary formulations that included ammoniacal and other etchants. Chemicals reportedly used on site as of 1985 included ammonia, iron, copper chemicals, hydrochloric acid, sulfuric acid, and other inorganic compounds.

An investigation was conducted in 1985/1986 by J.H. Kleinfelder and Associates in response to requests by the California RWQCB and the former California Department of Health Services (DHS) to monitor an on-site wastewater pond (40 feet by 40 feet in area). The investigation was expanded after elevated levels of organics and inorganics were detected. A total of 19 soil borings were drilled to depths ranging from 15 to 110 feet bgs, and 13 groundwater monitoring wells were installed as part of the investigation. According to a 1986 report by Kleinfelder (Kleinfelder, 1986a), SCC has a history of hazardous waste discharge, spillage, and leakage dating from approximately 1957. Elevated levels of the following constituents were detected in some wells at SCC. The following indicates maximum detected concentrations:

- TCE (550 ug/l).
- Toluene (8,300 ug/l).

- Xylenes (10,000 ug/l).
- Ethylbenzene (3,000 ug/l).
- PCE (1.2 ug/l).
- 1,1-DCE (100 ug/l).
- 1,1-DCA (100 ug/l).

No sources for the organics were identified during the Kleinfelder investigation.

During August 1990 through April 1991, Camp Dresser & McKee, Inc. (CDM) conducted an RCRA Facility Investigation at the SCC site (CDM Report, 1991).

Soil investigation indicated a leaking diesel UST. TPH concentrations ranged from 1,200 to 3,900 mg/kg at 10 feet bgs, from 1,400 to 17,000 mg/kg from 10 to 20 feet bgs, and from 28 to 9,900 mg/kg in the 20 to 30 feet bgs interval. Benzene, toluene, ethylbenzene, and xylene (BTEX) concentrations were generally low with toluene detected most frequently.

Groundwater monitoring essentially identified three contaminant plumes in what CDM refers to as the Hollydale aquifer. One plume, consisting primarily of site-specific metal parameters is aligned in a northeast direction along the west central portion of the site. The second plume, consisting of purgeable aromatics, is aligned along the northwest boundary of the site. The third plume consists of TCE and related parameters along the west central portion of the site.

SCC has an industrial wastewater discharge permit (No. 10342) with the Los Angeles County Sanitation District, permitting them to discharge effluent into unlined Coyote Creek, which follows the railroad tracks along the southern side of the ACC site. In June 1975, the Los Angeles County Engineer, Planning and Pollution Control Division investigated reported industrial wastes being discharged from the SCC site into Coyote Creek. In a report from the County, it was noted that a copper solution settling pond had overflowed, a pipeline used to transfer copper solution leaked, and a ferric process area had overflowed. A notice of violation was issued ordering SCC to initiate a clean up and contain any further spillage.

Since SCC is not upgradient of ACC, it does not appear that contamination from SCC is impacting the ACC site.

Diversey Wyandotte Corporation--

Diversey is located west of the ACC site, west of Dice Road, and south of the drainage channel, approximately 0.20 miles southwest of the ACC site. The facility has reportedly (Kleinfelder, 1986b) been operating under various names since 1951, and as of 1985 was producing a range of products including cleaners and defoaming agents. From 1954 through 1970, acids, alkalis, ethyl alcohol, and isopropyl alcohol were reportedly disposed of in on-site injection wells. From 1980 through 1984, the injection well waste stream from the facility reportedly consisted of acids, alkalis, methylene chloride, chromium, and phenolic and crysilic acids. A subsurface investigation was conducted in 1985 by J.H. Kleinfelder and Associates in response to concerns in a Preliminary Assessment prepared by the DHS in April 1984.

Nine soil borings were drilled by Kleinfelder to depths ranging from 30 to 78 feet bgs, and three were converted to groundwater monitoring wells. Only one of the three wells was analyzed for organics (purgeable halocarbons) using EPA Method 601. The following maximum concentrations of organics were detected:

- Methylene chloride (14 ug/l).
- 1,1,1,-TCA (8 ug/l).
- PCE (9 ug/l).
- TCE (90 ug/l).
- 1,1-DCE (34 ug/l).
- 1,1-DCA (5 ug/l).
- Chloroform (3 ug/l).

No organics were detected in the soil samples analyzed (Kleinfelder 1986b).

Four USTs were removed from the property by Tetra Tech in October 1986. In November 1986, Tetra Tech submitted a closure report to DPW. The report indicated that some contaminated soil was removed and DPW had verbally approved spreading the soil to allow hydrocarbons to volatilize. The USTs were closed under Closure Permit 2040B. The treated soil was later used as fill upon which buildings were subsequently built.

Since Diversey is not upgradient of ACC, It does not appear that contamination from Diversey has impacted the ACC site.

T-Chem Corporation--

The T-Chem facility is located approximately 0.15 miles southwest of the ACC site at 9028 Dice Road. Materials listed with the Santa Fe Springs Fire Department as being used by T-Chem include chlorine, sodium hydroxide, hydrogen peroxide, ammonia, dodecylbenzene, sulfur dioxide, sulfuric acid, diethanolamine, 1,4-dioxane, ethanol, ethoxysulfate, and sodium dichloroisocyanate. One 12,000 gallon UST containing diesel was reported to exist on site with four (less than 40 feet deep) leak detection wells (HLA, RI Report, 1992). It is not known whether groundwater from these wells has been analyzed. County of Los Angeles, Department of Health, records indicate that water samples from the waste stream/clarifier system, analyzed in July 1989, had maximum detectable concentrations of:

- 1,1-DCE (18 ug/l).
- Chloroform (7,500 ug/l).
- 1,1,1-TCA (210 ug/l).
- Toluene (31 ug/l).

Soil samples collected when the wells were installed had no detectable concentrations of VOCs.

Since T-Chem is downgradient of ACC, it does not appear that contamination from T-Chem has impacted the ACC site.

2.0 SITE INVESTIGATION

The main purpose of the RI is to characterize the nature and extent of chemicals of concern, and evaluate migration pathways. This section describes the field and laboratory investigation conducted by SCS to characterize the site geology, hydrogeology, and chemicals at the subject site.

These investigations included cone penetrometer testing (CPT), exploratory drilling, collection and analysis of soil samples, installation of groundwater monitoring wells, and collection and analysis of groundwater samples. Field work was performed by SCS geologists and technicians under the oversight of a registered geologist. Field work was performed in accordance with the Quality Assurance Program Plan presented in Appendix B of the RI/FS Workplan (SCS, May 1993). Analytical testing of soil and groundwater samples was performed by a state-certified laboratory. Laboratory reports, chain-of-custody documentation, and well permits from the County of Los Angeles, Department of Health Services, are provided in Appendix B.

Since a large amount of soil data already existed, the primary focus for the RI was the groundwater investigation. One groundwater well (MW-1) had been installed along the southern portion of the site during a previous investigation. Five additional groundwater wells were installed during the RI to assess on-site groundwater quality, determine upgradient (background) water quality, and verify the groundwater gradient. Figure 7 illustrates monitoring well locations.

A soils data base was established during previous investigations; however, subsurface soil data were lacking in the northwestern portion of the site, along the railroad spur. The RI was also designed to augment the on-site soils data base by collecting and analyzing soil samples from nine borings, five of which were converted to groundwater monitoring wells (see Figure 7).

2.1 CPT/HYDROPUNCH STUDY

Prior to conducting the principal soil and groundwater investigations, a CPT was carried out on site. In connection with the CPT, a HydroPunch testing of groundwater was to be attempted. The main purpose of these studies was to verify the existence and assess the extent and quality of groundwater in the discontinuous perched aquifer believed to exist at 25 to 30 feet bgs on the northern portion of the site. In addition, continuous stratigraphic information by the CPT could be used for interpretation of local geology.

CPT probes were deployed by use of a 20-ton CPT rig. The CPT tool consists of a filter and pressure transducer assembly for measurement of the soil's pore fluid pressure. Significant increases in pore pressure may indicate a piezometric surface. These measurements are recorded continuously with depth, together with standard CPT measurements of cone tip resistance and sleeve friction for stratigraphic logging. One CPT probe was placed next to a previous auger boring location to correlate CPT data with actual boring log data.

On November 17, 1993, SCS completed its CPT investigation for the subject site as outlined in the SCS RI/FS Workplan. Six of the eight CPT locations proposed in the RI/FS

Workplan (see Figure 7) were attempted (CPT Nos. 1, 3, 4, 5, 6, and 8). Refusal prior to planned total depth was encountered in four of the six CPT locations (CPT Nos. 3, 4, 5, and 6). A zone containing gravel made penetration beyond 23 feet bgs impossible in the locations which experienced refusal.

In general, CPT data correlated well with available borehole data. Based upon standard interpretive parameters of tip resistance and sleeve friction, alternating silty clays and clayey silts were typically encountered in the top 15 to 17 feet, followed by a zone of silty sand leading into a gravelly sand zone which varied in thickness from 1 to 8 feet across the site. Clays and silts with some sand were encountered beneath the gravel zone to the total depth of the CPT. CPT log data and interpretation are provided in Appendix C.

Depths of 35 feet bgs were achieved in two probes (CPT-1 and CPT-8) located along the south side of the site. Based upon discussions with the CPT operator, no HydroPunch samples were attempted. It was the contractor's opinion that penetration of the zone of coarse sand and gravel with the larger diameter, narrower wall HydroPunch tubing would not be possible and might damage the HydroPunch system.

The holes in CPT-1 and CPT-8 were left open and piezometric head measured at the end of the work day. Groundwater appeared to have equilibrated in CPT-8 at approximately 25 feet bgs, while CPT-1 was dry. In January, a hollow stem auger exploratory boring was drilled at the location of CPT-8 to a depth of approximately 30 feet bgs, and left open for several hours. No groundwater was encountered, and the boring was backfilled (discussed in detail below).

Following removal of the CPT probe, all holes were backfilled by adding a bentonite grout to the CPT open hole (approximately 0.75-inch diameter) via a funnel from the surface, until the hole would not accept any additional grout. The quantity of bentonite grout used was not calculated. Bentonite grout for backfill was provided and backfilled by the CPT contractor, based upon their experience.

2.2 SOIL INVESTIGATION

The soil investigation consisted of soil sampling in nine borings (four exploratory borings and five groundwater monitoring well boreholes). Figure 7 illustrates the locations for all sampling points. These data were used to augment the existing soil data base, and to further investigate the extent of VOC contamination in soils in the vicinity of the northern railroad tracks.

Four exploratory borings (BH15, BH16, BH17, and MW-5) were drilled using a conventional hollow-stem auger drill rig to a depth of approximately 25 feet bgs, corresponding to the anticipated depth of anticipated perched aquifer. Soil samples were collected at 5-foot depth intervals in brass tubes using a California modified split-spoon sampler with a 140-pound slide hammer. All soil borings were logged by an SCS geologist.

Five borings (MW2, MW3, MW4, MW6, and MW-7), subsequently converted to groundwater wells, were drilled using a conventional hollow-stem auger drill rig to depths ranging between 30 and 55 feet bgs. Boring MW-5 was dry, and thus no monitoring well was installed at this location. Soil samples were collected in a manner similar to that described above.

A total of 37 soil samples were analyzed. These samples were selected based upon a field screening with an OVA and visual observations. Table 6 outlines the analytical results. Samples were collected and analyzed using industry-accepted protocols as outlined in the RI/FS Workplan, Appendix B. Samples were analyzed for VOCs using EPA Method 8240. Soil cuttings and any wash and steam cleaning rinsate water were contained in 55-gallon drums for later disposal. All monitoring well and sampling locations were surveyed by a California-licensed land surveyor, who also surveyed ground elevations of a reference point located at the top of each well casing. Survey data are presented in Appendix D.

2.3 PERCHED AQUIFER INVESTIGATION

Following a review of the CPT data, SCS attempted to install groundwater monitoring wells within the perched aquifer at four locations. The purpose of these wells was to assess the perched aquifer for groundwater gradient and groundwater quality (upgradient and downgradient). The borings were drilled in early January 1994. Well installation was attempted in four locations (MW4, MW5, MW6, and CPT-8). Borings at locations MW5 and CPT-8 were dry, thus no wells were installed. Borings at MW4 and MW6 exhibited a perched aquifer between 23 and 25 feet bgs. Both MW4 and MW6 are located on the northern portion of the site.

Wells MW4 and MW6 were installed, developed, sampled, and analyzed as described in the RI/FS Workplan. Figure 8 presents typical well construction details, and Appendix D contains boring logs with well construction details. These monitoring wells were constructed with approximately 5 feet of screen above and 5 feet below the groundwater interface. Longer screen length was not used to avoid penetrating the underlying aquitard and creating a conduit between the perched and Gaspur/Hollydale aquifers.

2.4 DEEP AQUIFER INVESTIGATION

To assess groundwater quality and gradient in the Gaspur/Hollydale Aquifer, or "deep aquifer," SCS installed three additional groundwater monitoring wells into this aquifer zone (MW2, MW3, and MW7). Well MW7 was located near the northern boundary of the subject site to monitor upgradient water quality, while wells MW2 and MW3 were located along the southern boundary of the site west of well MW1 (see Figure 7) to assess downgradient water quality.

Gaspur/Hollydale monitoring wells were installed, developed, sampled, and analyzed using industry-accepted protocols as outlined in the RI/FS Workplan. Wells MW2 and MW3 were drilled using a conventional hollow stem auger drill rig with an 11-inch diameter auger. These wells were constructed with a 4-inch-diameter flush threaded Schedule 40 polyvinyl chloride (PVC) blank casing and 0.020-inch factory-slotted screen. The annular space around the well was backfilled with filter sand, hydrated bentonite pellets, and a cement/bentonite grout. Well heads were furnished with a locking protective cover. The RI/FS Workplan called for approximately 5 feet of well screen above groundwater and approximately 15 feet of screen below groundwater. Figure 8 illustrates typical construction details.

Water was encountered in MW2 at about 34 feet bgs. The well was installed on January 7, 1994, and screened from about 30 feet bgs to 50 feet bgs. Possible confined condi-

tions in the deep aquifer subsequently resulted in groundwater rising above the top of the well screen, to a depth of 28.8 feet bgs (February 1, 1994).

Significant groundwater was not encountered during drilling of MW3. Occasional saturated sand/silt stringers were encountered at 35, 45, and 50 feet bgs. The hole was left open overnight to determine if water would enter the hole. The next day, groundwater was encountered at approximately 34 feet bgs. The well was installed on January 10, 1994, and screened from about 29 feet bgs to 49 feet bgs. Possible confined conditions in the deep aquifer subsequently resulted in groundwater rising to a depth of 29.7 feet bgs (February 1, 1994) below the top of the well screen.

The construction of well MW7 differed from MW2 and MW3 in that a conductor casing was installed to a depth of 28 feet bgs to prevent communication between the perched aquifer and the Gaspur/Hollydale. This construction method was used because of the anticipated presence of the perched aquifer in the area of MW7. The upper portion of well MW7 was drilled with a 14-inch-diameter auger approximately 2 to 3 feet into a clayey silt zone (24 to 25 feet bgs) believed to be acting as an aquiclude beneath the perched zone. The 14-inch auger was removed and a 10-inch steel conductor casing was then driven into the open hole to a depth of approximately 28 feet bgs. The annulus between the hole and the conductor casing was tremmie grouted to the surface with a bentonite/cement grout and allowed to cure for 3 days.

An 8-inch-diameter auger was used to continue drilling within the conductor casing to a depth of approximately 55 feet bgs. Well MW7 was constructed with a 2-inch-diameter flush threaded Schedule 40 PVC blank casing and 0.020-inch factory-slotted screen. The annular space around the well was backfilled with filter sand, hydrated bentonite pellets, and a cement/bentonite grout. A well head was furnished with a locking protective cover. MW7 was constructed with 20 feet of well screen. The bore log in Appendix D illustrates well construction details.

Following the cure time for MW7, drilling into the Gaspur/Hollydale aquifer commenced. Significant groundwater was not encountered until approximately 53 feet bgs. The total depth of the boring was 55 feet bgs. This hole was left open over night to determine an appropriate piezometric surface for well construction. The next day, water was encountered at approximately 39 feet bgs. The well was installed on January 11, 1994, and screened from about 34 feet bgs to 54 feet bgs. Confined conditions in the deep aquifer subsequently resulted in groundwater rising to a depth of 24.52 feet bgs (February 1, 1994), which is above the top of the well screen.

Well MW1, installed during a previous site investigation in June 1990, was screened from about 40 feet bgs to 60 feet bgs. Groundwater at that time was encountered at approximately 45 feet bgs. On February 1, 1994, groundwater was measured at 30.05 feet bgs in this well.

2.5 WELL SAMPLING AND LABORATORY ANALYSES

All groundwater monitoring wells were installed, developed, sampled, and analyzed using industry-accepted protocols as outlined in the RI/FS Workplan, see Appendix B. The five new wells were installed and developed in early January 1994. New and existing monitoring wells were sampled in early February 1994. Water levels were measured on

February 1, 1994, in each well prior to purging and sampling. Groundwater samples were collected after purging wells by removing a minimum of three casing volumes of water. Field parameters (specific conductance [EC], pH, and temperature) were monitored during purging, and stabilization of these parameters were used as an indication that sufficient water had been purged. Groundwater was sampled using a teflon bailer, which was decontaminated between wells by cleaning with a non-phosphate detergent, a single rinse with tap water, and double rinsing with distilled water. The 2-inch Grunfos pump used for purging was decontaminated in a manner similar to that for the bailer. Well sampling field notes are presented in Appendix D.

Water samples were collected in appropriately sized bottles supplied by the laboratory performing the analyses and properly preserved. Water and soil samples were identified with a sample tag and placed in a refrigerated cooler for transport to the SCS state-certified analytical laboratory. Chain-of-custody (COC) forms were completed by the SCS field geologist and laboratory personnel to ensure proper and accurate tracking/analyses in the laboratory. Specific data regarding the project number, borehole location, depth of sample, and analyses to be performed will be recorded on the COC. COC documentation is presented in Appendix B.

In addition to the standard quality control/quality assurance provided by the analytical laboratory, as an additional check on the precision and accuracy of laboratory analyses, one duplicate sample and one rinsate sample was collected and analyzed.

Groundwater samples were analyzed for the following parameters:

- General water quality analyses, including TDS, pH, EC, calcium, magnesium, sodium, potassium, bicarbonate, carbonate, chloride, sulfate, nitrate, iron, and manganese.
- VOCs by EPA Method 624.

Soil samples were analyzed for the following parameters:

- VOCs by EPA Method 8240.

Results of laboratory analyses are described in Section 4.0.

3.0 PHYSICAL CHARACTERISTICS OF STUDY AREA

3.1 SURFACE FEATURES

Surface features are discussed in detail in Section 1.2 of this RI report.

3.2 METEOROLOGY

The ACC site is located in the Los Angeles Basin region of California considered to be a semi-arid Mediterranean climate. Typically, summers are warm and dry while winters tend to be mild.

No meteorological data is recorded at the ACC site; however, the South Coast Air Quality Management District (AQMD) does maintain an air monitoring station in Whittier; located about 3 miles from the ACC facility. The prevailing wind conditions for the area are from the southwest and east with an average wind speed of 5.1 mph and 1.8 mph, respectively. These wind directions are associated with the daily sea breeze and land breeze circulation that exits all year.

The mean high and low temperatures for the area are 75 and 53 degrees Fahrenheit, respectively. Precipitation averages 15 inches annually, with most rainfall occurring between October and April.

3.3 SURFACE WATER HYDROLOGY

There are no permanent surface water bodies within 1 mile of the ACC site. The San Gabriel River channel is approximately 1.5 miles due west of the site. Surface water in the area of the site is primarily limited to runoff associated with precipitation. All of the ground surface within the site fenceline is paved with asphalt or concrete, except for the extreme western portion of the site, and gravel areas surrounding the railroad tracks. Site drainage is discussed in Section 1.2.

3.4 GEOLOGY

The ACC site is located near the northern boundary of the Santa Fe Springs Plain within the Los Angeles Coastal Plain at an elevation of approximately 150 feet above mean sea level. The Santa Fe Springs Plain is a low, slightly rolling topographic feature which has been warped by the Santa Fe Springs-Coyote Hills anticlinal system, whose limbs dip gently to the northeast toward Whittier and to the southeast toward the Downey Plain. The nearest major fault zones are the Whittier Fault Zone approximately 3.5 miles to the northeast, and the Newport-Inglewood Fault Zone approximately 11 miles southwest.

Surficial sediments consist of fluvial deposits composed of interbedded gravel, sand, silt, and clay. Available data from California Water Resources Bulletin No. 104, Appendix A, (June 1961) indicate that surficial sediments may be Recent Holocene and/or part of the upper Pleistocene Lakewood Formation. Bulletin 104 indicates that the Lakewood Formation generally ranges from 40 to 50 feet in thickness in the site vicinity. In this report we will refer to sediments located in the upper 45 feet as the Lakewood Formation. Frequent lateral lithologic changes are typical of the Lakewood Formation, with discontinuous permeable zones and considerable variation in particle size.

Underlying the Lakewood Formation are stratified deposits of sand, silty sand, silt, and fine gravel comprising the upper portion of the lower Pleistocene San Pedro Formation. The San Pedro Formation generally ranges from 700 to 800 feet in thickness in the site vicinity.

3.5 HYDROGEOLOGY

The site lies within the Central Basin Pressure area, a division of the Central Ground Water Basin which extends over most of the Coastal Plain. In this area the Gaspur aquifer, a part of the basal coarse unit of Recent Holocene deposits, is found within old channels of the San Gabriel and other rivers. The Gaspur may thin locally to approximately 40 feet in thickness, with its base at a depth of about 80 to 100 feet bgs. The underlying Gage aquifer is found within the Lakewood Formation. Data from Bulletin 104 indicate that the site is located close to the boundary at which the Gaspur truncates the Gage aquifer. In some areas, the Gaspur may be in contact with the Gage or underlying Hollydale aquifer.

Bulletin 104 (Plate 11A) indicates the Gaspur aquifer is present at the ACC site and that the Gage aquifer is not. Figure 9 presents the location of a cross-sectional line taken from Bulletin 104 running near the ACC site. Although Figure 10 illustrates the general area stratigraphy, the ACC site cannot be directly projected because the area in which the Gaspur is present intersects the cross section at a low angle. A representation of Plate 11A is provided in Figure 16.

The Hollydale aquifer is the uppermost aquifer in the San Pedro Formation. Bulletin 104 indicates that the Hollydale aquifer is approximately 30 feet thick in this area, with its top at a depth of about 70 feet bgs and its base at about 100 feet bgs.

The two aquifers encountered during drilling at the ACC site are (1) the perched aquifer at a depth of approximately 23 feet bgs, and (2) the Gaspur/Hollydale aquifer below a depth of approximately 45 feet bgs. Figure 11 illustrates a generalized stratigraphic column for units penetrated during the site investigation. Figure 7 shows the location of two geologic cross-sections across the site (Figures 12 and 13).

The McKesson RI report (HLA, 1992) designates the aquifer found below a depth of 45 feet as the Hollydale aquifer. This aquifer is equivalent to the one designated as the Gaspur/Hollydale herein. In addition, a discontinuous perched aquifer at depths of 20 to 25 feet bgs was designated the Gage aquifer at McKesson. This aquifer is equivalent to the one designated as the perched aquifer herein.

Based upon regional data (Bulletin 104), beneath the Gage/Hollydale aquifers is an aquitard, and below this the Jefferson aquifer, which is approximately 40 feet thick and has its base at about 175 feet bgs. Beneath the Jefferson aquifer is another aquitard, followed by the Lynwood aquifer, which is approximately 75 feet thick and has its base at about 275 feet bgs. Beneath the Lynwood aquifer is another aquitard, followed by the Silverado aquifer, which is approximately 200 feet thick and has its base at about 475 feet bgs. Beneath the Silverado is another aquitard, followed by the Sunnyside aquifer, which is approximately 275 feet thick and has its base at about 875 feet bgs. The Lynwood, Silverado, and Sunnyside aquifers are the major water-producing aquifers in the region.

Shallow subsurface material to a depth of 15 feet bgs consists primarily of silty clay with minor amounts of silt and sand. Poorly sorted, coarse-grained sand and gravel are found below the silty clay between approximately 15 and 26 feet bgs. The discontinuous perched aquifer detected under the northern portion of the ACC site is within this zone, at depths of 23 to 26 feet bgs.

A less permeable clayey zone, which apparently acts as an aquitard, typically exists beneath the zone of sand and gravel. This clayey zone continues to depths of approximately 40 to 50 feet bgs across the site (see Figure 11, 12, and 13). Within this clayey zone are occasional stringers of fine sand and silt, which are saturated at depths greater than about 34 feet bgs. Silt zones are present in MW1 from 35 to 45 feet bgs, in MW2 from 45 to 50 feet bgs, appears to begin at 50 feet bgs in MW3, and from 40 to 45 feet bgs and beginning at 55 feet bgs in MW7.

The top of the Gaspur/Hollydale aquifer is at approximately 45 feet bgs, but is not always defined by a distinct change in lithology and may be a gradual transition from clayey materials above, to sandier aquifer material. Only in MW1 was an obvious "aquifer sand" encountered at about 45 feet bgs through the total depth of MW1, which was 60 feet bgs. At the present time, the Gaspur/Hollydale aquifer is confined in most on-site locations. An apparent saturated zone was encountered in MW2 at approximately 34 feet bgs during drilling, without a clear change in lithology. A similar zone of water was encountered in MW3 at about 35 feet bgs.

During drilling in June 1990, the top of the Gaspur/Hollydale aquifer was measured at depths of 45 feet bgs in MW1. During drilling in February 1994, a saturated zone was encountered at about 34 feet bgs in MW2, and at about 53 feet bgs in MW7. In February 1994, the piezometric surface in monitoring wells was measured at about 30 feet bgs in MW1, MW2, and MW3, and at about 25 feet bgs in MW7. The piezometric level in the Gaspur/Hollydale, based upon well MW1, has risen approximately 15 feet in the last 3 years.

3.4.1 Regional Water Quality

There are four water production wells operated by the City of Santa Fe Springs located within the Santa Fe Springs city limits. Of these, the only one that draws water from the Gaspur/Hollydale aquifer is located over 9 miles south of the site. Water samples taken in November 1989 did not detect VOCs.

Santa Fe Springs Well No. 1, located near the corner of Burke Street and Dice Road approximately 0.4 miles north of the site, is screened in the Silverado and Sunnyside aquifers. Samples collected in June of 1991 indicated the presence of 1.1 ug/l of TCE. No other chemicals were detected.

Santa Fe Springs Well No. 4, located on Telegraph and Pioneer Road approximately 3.0 miles southwest of the site, is screened in the Lynwood, Silverado, and Sunnyside aquifers. Samples collected in May of 1991 indicated no VOCs.

Santa Fe Springs Well No. 304 WI, located near approximately 2.0 miles west of the site, is screened in the Silverado aquifer. Samples collected in May of 1991 indicated the presence of 0.5 ug/l of TCE and 1.6 ug/l of PCE. No other chemicals were detected.

Two wells owned by the City of Whittier are located approximately 7 miles north of the site. These wells draw water from 55 to 120 feet bgs, in what is probably the Gage aquifer. VOCs were not detected in these wells.

Groundwater data from surrounding sites are provided in Section 1.2.2.

3.6 DEMOGRAPHICS

Santa Fe Springs is a culturally and ethnically diverse community located approximately 20 miles southwest of central Los Angeles. Based upon the 1990 census, the population is 67 percent hispanic, 26 percent non-hispanic white, 4 percent Asian, 2 percent African-American, and 1 percent other. The city has a current population of approximately 16,000 permanent residents. However, about 70,000 to 80,000 people commute to the city daily to work at the estimated 3,000 businesses located within an area of approximately 8.75 square miles.

Established in the mid-1950s primarily as an industrial development, Santa Fe Springs has planned 85 percent of its area for business and industry. Approximately 30 State Bond Expenditure sites and one federal Superfund site are located throughout the city. In addition, six refineries and several hazardous waste treatment and storage facilities operate within city limits.

4.0 NATURE AND EXTENT OF CHEMICALS DETECTED

The nature and extent of chemicals detected on site during this and previous investigations are discussed below.

4.1 SOIL

Results of chemical analysis of soil samples collected during this investigation are summarized in Table 6. Results from previous investigations are summarized in Tables 1, 2, and 3. Analytical laboratory reports and chain-of-custody (COC) documentation for this investigation are presented in Appendix B.

A total of 14 separate VOCs were identified from soil analysis during this investigation. The five most prevalent compounds in terms of both concentration and frequency were acetone, MEK, PCE, toluene, and 1,1,1-TCA. Acetone was detected in 21 of the 37 samples (57 percent) at concentrations ranging from 0.05 to 39.7 mg/kg. 2-butanone was detected in 18 samples (49 percent) at concentrations ranging from 0.05 to 60.3 mg/kg. Both toluene and 1,1,1-TCA were detected in 17 samples (46 percent) at concentrations ranging from 0.01 to 48.7 mg/kg and 0.01 to 54.7 mg/kg, respectively. PCE was detected in 15 samples (41 percent) at concentrations ranging from 0.01 to 98 mg/kg. Other compounds, such as 1,1-DCA, 4-methyl-2-pentanone, and m&p-xylenes, were each detected in 13 of the 37 samples (35 percent).

On-site investigations in 1990, which focused on the south/central portion of the site adjacent to existing USTs, detected 13 different volatile compounds, including acetone, benzene, 1,1-DCA, 1,1-DCE, ethylbenzene, MEK, methylene chloride, MIBK, PCE, toluene, 1,1,1-TCA, TCE, and xylenes. The eight most prevalent compounds in terms of both concentration and frequency were acetone (36 percent), 2-butanone (33 percent), 4-methyl-2-pentanone (43 percent), PCE (37 percent), toluene (70 percent), 1,1,1-TCA (41 percent), ethylbenzene (38 percent), and xylenes (56 percent). A summary of the results of these investigations is provided in Tables 1 and 2.

In 1992, seven near-surface (0.5 to 1.5 feet bgs) soil samples were obtained along the railroad spur lines in the northwest portion of the site. Analytical data indicated elevated concentrations of TPH and VOCs, predominantly PCE, 1,1,1-TCA, xylenes, and toluene, A summary of the results of this investigation is provided in Table 3.

Based upon available data from all on-site investigations, the highest concentrations of detected chemicals in soil appear to be confined to two separate and distinct areas of: 1) northern railroad track and 2) the south central spill drain. This is discussed in detail below.

4.1.1 Northeast Railroad Spur Area

Based upon data from 12 sample locations (RR-1, RR-2, RR-3, RR-4, RR-5, RR-6, RR-7, BH-15, BH-16, BH-17, MW4, and MW6), elevated concentrations of VOCs and TPH have been detected in shallow soils (0.5 to 10 feet bgs) in the immediate vicinity of the northeast portion of the railroad spur. Concentrations of VOCs generally decrease with depth (i.e., BH-15, BH-16, and BH-17), but are again found to be elevated at sample

depths of 20 feet bgs (i.e., MW4 and MW6). This may be associated with deposition of VOCs from perched groundwater on soil grains.

Acetone (39.7 mg/kg), 2-butanone (60.3 mg/kg), and 1,1-DCA (0.7 mg/kg) were detected in shallow soil samples (1 to 5 feet bgs) from BH-17. Concentrations of most other detectable VOCs in BH-17 were generally second only to those from the 20-foot bgs sample from MW4. This MW4 sample indicated site maximum concentrations for four compounds, including 4-methyl-2-pentanone (12 mg/kg), PCE (98 mg/kg), 1,1,1-TCA (54.7 mg/kg), and TCE (16.5 mg/kg). Boring MW6 was the only location in which 1,2-DCA was detected (0.18 mg/kg).

4.1.2 South/Western Portion of Site

Soil samples collected from location MW5 near the southwest portion of the railroad track indicates non-detect to low concentrations of six compounds at shallow depths (2 to 5 feet bgs). Acetone and 2-butanone were detected only at a depth of 20 feet bgs in MW5.

Soil samples collected from MW2, along the southwest boundary of the ACC property, indicate non-detect concentrations of VOCs at 5 and 10 feet bgs, one compound (acetone at 0.97 mg/kg) at 20 feet bgs, and low concentrations of six compounds at 30 feet bgs, and slightly higher concentrations of VOCs at the 40-foot bgs depth (with 11 compounds).

Soil samples collected from MW3, along the southwest boundary of the ACC property, indicate low to non-detect concentrations of VOCs at 5 feet bgs, all VOCs are non-detect at 10 feet bgs, one compound (acetone at 0.26 mg/kg) at 20 feet bgs, slightly higher concentrations of VOCs were detected at 30 feet bgs (10 detectable compounds), and non-detect VOCs at 40 feet bgs, with the exception of very low concentrations of 1,1-DCA (0.02 mg/kg) and PCE (0.07 mg/kg).

Soil samples collected from MW1, along the southern boundary of the ACC property, indicate low to non-detect concentrations of most VOCs, with the exception of acetone (0.43 to 21 mg/kg), at 10, 20, and 25 feet bgs. Concentrations of VOCs increase at the 30-foot bgs depth (9 detectable compounds), and VOCs are low to non-detect at 35 feet bgs, with the exceptions of methylene chloride (6.8 mg/kg) and xylene (2.4 mg/kg), and non-detect at 40 feet bgs, with the exception of acetone (15 mg/kg).

4.1.3 Northeast Corner of Site

Soil samples collected from boring MW7 near the northeast corner of the site indicates no detectable VOCs at the 5 and 10-foot bgs depths, with the single exception of 0.01 mg/kg of 1,1-DCA at 5 foot bgs. Only two compounds, acetone (0.12 mg/kg) and 2-butanone (0.15 mg/kg) were detected at 20 feet bgs. Elevated concentrations of acetone (6.05 mg/kg) and 2-butanone (29.7 mg/kg) were detected at 30 feet bgs along with low concentrations of four other compounds. At 40 feet bgs, only one compound, 1,1-DCA (0.02 mg/kg) was detected.

4.1.4 Southcentral Portion of Site

Based upon data collected from exploratory borings during previous on-site investigations, elevated concentrations of VOCs have been detected in soils in the immediate vicinity of a broken drain pipe near the south central spill drain. Analytical results using EPA Method 8240 indicated 13 different VOCs (see Tables 1 and 2). Concentrations of VOCs generally decrease with depth but in some areas appear to increase again at sample depths greater than 20 feet bgs. This increase may be associated with the contaminated Gaspur\Hollydale aquifer, discussed below.

4.2 GROUNDWATER

Results of the chemical analyses of groundwater samples collected during previous investigations are summarized in Table 2, with laboratory reports and COC documentation presented in Appendix E. Analytical results from the RI are summarized in Tables 7 and 8, with laboratory reports and COC documentation presented in Appendix B.

4.2.1 Perched Aquifer

A perched aquifer was encountered in two of seven borings drilled during this investigation. Two monitoring wells (MW4 and MW6) were installed to monitor this aquifer along the northern portion of the site near the railroad tracks. Sampling and analyses conducted in February 1994 indicate the perched aquifer has elevated concentrations of VOCs. The perched aquifer appears to be discontinuous, and appears limited to the northern portion of the site; thus, an estimate of the groundwater flow direction and gradient based on data from the ACC site cannot be made at this time.

Eleven VOCs were detected in groundwater from the two perched aquifer wells (MW4 and MW6) during this investigation. The compounds identified are:

- Benzene (111 to 848 ug/l).
- Toluene (12,700 to 15,300 ug/l).
- Ethylbenzene (1,180 to 2,980 ug/l).
- Xylenes (4,362 to 5,420 ug/l - total xylenes).
- 1,1-DCA (1,410 to 2,570 ug/l).
- 1,2-DCA (<100 to 1,240 ug/l).
- 1,1-DCE (806 to 1,920 ug/l).
- Methylene Chloride (4,760 to 21,400 ug/l).
- PCE (2,130 to 3,320 ug/l).
- 1,1,1-TCA (36,200 to 118,000 ug/l).
- TCE (1320 to 14,300 ug/l).

General mineral analyses indicate that water from MW4 is of a magnesium sulfate type, and water from MW6 is a calcium chloride type. Water from the two perched aquifer wells is chemically different, suggesting different source areas for different parts of the perched aquifer. The fact that MW6, located closest to the former calcium carbide sludge pit on the LAC site, exhibits high TDS and elevated concentrations of calcium may indicate influence by the LAC sludge pit. The aquifer water is not potable quality, even without

considering VOC contaminants. All groundwater samples exceeded primary state drinking water MCLs for various quality parameters, including TDS, specific conductivity, chloride, sulfate, iron, and manganese.

4.2.2 Gaspur/Hollydale Aquifer

Three new monitoring wells (MW2, MW3, and MW7) were installed into the Gaspur/Hollydale aquifer during this investigation. Sampling and analyses of these three wells and a previously installed well (MW1) were conducted in February 1994. Data indicate elevated concentrations of VOCs. Groundwater flow appears to be to the south-southwest.

Eleven VOC compounds were detected in the groundwater from the four wells (MW1, MW2, MW3, and MW7) during this investigation. The compounds identified, which are the same as those in the perched aquifer, are:

- Benzene (63 to 194 ug/l).
- Toluene (398 to 7,390 ug/l).
- Ethylbenzene (45 to 1,720 ug/l).
- Xylenes (186 to 7,790 ug/l - total xylenes).
- 1,1-DCA (85 to 2,130 ug/l).
- 1,2-DCA (<100 to 31 ug/l).
- 1,1-DCE (151 to 2,800 ug/l).
- Methylene Chloride (<50 to 6,530 ug/l).
- PCE (134 to 5,370 ug/l).
- 1,1,1-TCA (90 to 9,370 ug/l).
- TCE (45 to 7,160 ug/l).

Well MW7 is the most upgradient well location on site. This well contains lower concentrations of VOCs than the three downgradient wells, with the single exception of 1,1-DCA (2,130 ug/l).

General mineral analyses indicate that the Gaspur/Hollydale aquifer water is not potable quality, even without considering VOCs. All groundwater samples exceeded primary state drinking water MCLs for various quality parameters, including TDS, specific conductivity, chloride, sulfate, iron, and manganese.

Relatively high concentrations of calcium in downgradient wells MW2 and MW3 suggest the influence of the LAC calcium carbide sludge pit. It may be postulated that LAC impacted water, migrating southward along the discontinuous perched aquifer, eventually migrates downward to the Gaspur/Hollydale aquifer south of the limits of the aquiclude which underlies the perched aquifer.

Laboratory data indicate pH ranges from 7.28 in MW3 to 6.37 in MW7. Relatively high concentrations of iron (33.9 mg/l), magnesium (128 mg/l), and manganese (10.3 mg/l) may be the result of dissolution of particulate matter within the sample by the sample preservative.

Approximately 0.10 feet (about 1-inch) of free product was detected floating on the groundwater surface in well MW1. Sampling was conducted using a teflon bailer. This

technique resulted in the collection of a mixture of free product and water, therefore, it was necessary to fill a 1-liter bottle in order to accumulate enough free product to analyze.

A sample of the free product was analyzed using EPA Method 8015 modified. Analytical results indicated total petroleum hydrocarbons (TPH) of 38,500 mg/kg; however the laboratory indicated that identification as to the exact nature of the free product was difficult. Due to this difficulty, the free product was also analyzed using EPA Method 8240 to provide additional compound parameters in order to assess the nature of the product.

The 8240 analysis was performed after state recommended holding times; however, this is not relevant as the goal of this analysis was to provide an indication as to the nature of the product, and not to quantify it. The 8240 data indicate that the product is probably a mixture of several chemicals (see Table 8). No samples for general water quality parameters were collected or analyzed for this well.

5.0 CONTAMINANT FATE AND TRANSPORT

5.1 FATE AND TRANSPORT OF CHEMICALS IN SOIL

Subsurface distribution of chemicals can be related to the properties of these compounds and characteristics of the local subsurface geologic and hydrogeologic settings. The northeast railroad spur area and the south-central drain area were the principal areas identified with shallow subsurface (0.5 to 10 feet bgs) impacted soils. Elevated concentrations of chemicals were also detected at depth (> 20 feet bgs) in some borings. This may be due to deposition of VOCs from the perched and Gaspur/Hollydale aquifers to soils during periods of high groundwater elevation. Each of these areas is discussed in detail below.

5.1.1 Northeast Railroad Spur

Elevated concentrations of VOCs and TPH have been detected in shallow soils in the immediate vicinity of the northeast railroad tracks. Concentrations of VOCs generally decrease below a depth of 10 feet. Concentrations of chemicals, such as acetone and MIBK appear to decrease with depth, however, they may still have migrated to perched groundwater. In addition, based upon concentrations of VOCs detected in the furthest upgradient perched zone well (MW4), it appears that some migration of VOCs from off-site sources may also have taken place.

5.1.2 South Central Spill Drain

Subsurface piping originally leading from a former sump in the central portion of the site was severed, during installation of two additional USTs in 1982. This allowed VOC-impacted runoff which collected in a concrete catch basin near the south central drain to discharge into soils through the break in the pipeline. Boring BH-14, which is closest to the south central drain, contained the highest concentrations of VOCs of any boring, although concentrations were not as high as the grab samples taken directly beneath the severed piping. Grab samples indicated concentrations of total VOCs 45 to 90 times as high as the highest concentrations found in samples from nearby soil borings BH-5 and BH-6.

Concentrations of total volatile organics were found to have a generally decreasing trend with depth; however, VOCs are found in all soil samples analyzed in boring BH-14 to a depth of 40 feet bgs. Thus, it appears that downward migration of VOCs has occurred and that these have reached groundwater (Gaspur/Hollydale aquifer). VOCs were found in groundwater well MW1, approximately 50 feet downgradient from the drain area. Figure 15 presents a schematic illustration of the distribution of total VOCs in soils near the severed piping.

5.1.3 Aquifer Deposition

Chemicals present within the water column can spread laterally within the aquifer by advective, dispersive, and diffusive mechanisms. Seasonal or other changes in groundwater levels can result in chemicals which become adsorbed onto soil grains during high groundwater, remaining in the soil as water levels fall. This could create a smearing

effect, resulting in the relatively higher concentrations of contaminants in soils at depths of 30 to 40 feet bgs, than in shallower soils. For example, groundwater in the Gaspur/ Hollydale aquifer has risen approximately 10 feet in the past 2 to 3 years.

5.2 FATE AND TRANSPORT OF CHEMICALS IN GROUNDWATER

The relative effect of groundwater transport mechanisms (advection, dispersion, and diffusion) on the migration of chemical compounds is dependent on aquifer properties including heterogeneity, permeability, and on hydraulic gradient.

5.2.1 Perched Aquifer

The perched aquifer was encountered along the northern portion of the site (MW4 and MW6) and appears to be absent along the southern portion of the site. This aquifer exists because a relatively low permeability zone, underlying the sand and gravel of the aquifer zone, acts as an aquiclude.

5.2.2 Gaspur/Hollydale Aquifer

In comparing the concentrations between upgradient well MW7 and downgradient wells MW1, MW2, and MW3, concentrations of chemicals appear relatively higher in the downgradient direction, which is to the southwest. Since VOCs are found in the upgradient Gaspur/Hollydale aquifer well (MW7), some migration of VOCs from off-site upgradient source(s) may have taken place.

6.0 RISK EVALUATION

The purpose of this portion of the RI document is to develop a protocol for a baseline human health risk assessment (HRA) at the Angeles Chemical facility.

The purpose of an HRA is to evaluate the probability and magnitude of potential health effects posed to the public by the site by existing site conditions. The objective of the HRA will be to provide upper-bound health conservative estimates of the potential human health impacts that may be attributable to the chemicals detected at the site.

This document contains methodologies to be followed and assumptions to be made during preparation of the HRA for the subject site. The HRA will address current and future potential health effects based on the assumption that site conditions will remain unchanged (i.e., no clean-up will take place). However, information developed during the HRA may be utilized to determine health risk-based clean-up levels for the site.

A separate HRA document will be prepared and submitted based on the protocols presented herein, which form a conceptual workplan. The HRA report will contain the sections discussed below.

6.1 SITE CHARACTERISTICS

In this section of the HRA document, information regarding the environmental and physical setting of the site will be summarized. Critical characteristics expected to influence the degree of chemical release and their subsequent transport to a potentially exposed population will be included. These factors will include, but will not be limited to, topography, climatology, meteorology, vegetation, geology, soil lithology, groundwater hydrology, surface hydrology, zoning, and land use.

In addition, local and regional demographic data will be evaluated to assess the potential impacts of site contaminants on nearby populations. This will include an assessment of groundwater consumption within the region.

6.1.1 Summary of Site Investigation

A brief summary of site investigations conducted to date will be presented in the HRA with emphasis on the scope and findings of these investigation (i.e., the nature, concentration, and distribution of contaminants). The investigation results will also be summarized in tabular form. These data will include pertinent information which is presented in this RI report.

6.1.2 Data Selection for Risk Assessment

The selection of data suitable for HRA begins with determining whether existing data are representative of site conditions as they exist today. Each data set will be evaluated according to the U.S. EPA guidelines (EPA, 1989a) regarding the appropriateness of sampling protocols and procedures used in collecting and analyzing the samples. Also, data quality will be evaluated through the review of data qualifiers. A summary of data deemed suitable for risk analysis will also be presented in this section.

6.1.3 Background Data

During the HRA, if deemed necessary, background data will be obtained for site contaminants. Since only VOCs are of concern at the site, background concentrations of VOCs will be assumed to be non-detect (ND) within on-site soils. However, since there are likely other off-site sources of VOCs within local and regional groundwater, a separate assessment of "background" concentrations for VOCs in groundwater may be necessary. These background data will be subject to a statistical analysis such that "background" data will be assumed to be within two standard deviations from the mean of the data (95 percent upper confidence limit [UCL] of the data).

6.2 SELECTION CRITERIA FOR CHEMICALS OF CONCERN

The objective of this section is to identify specific chemicals which may pose a potential public health risk. Representative concentrations (RCs) will be determined for the chemicals of concern. The RCs will be defined as the lesser of the maximum detected concentration and the 95 percent UCL of the mean concentration.

The HRA document will present a table summarizing the VOCs detected at the site, including frequency of detection (number of detected concentrations of compound per total number of samples), number of locations (total number of exploratory boring locations where compound was detected), and range of detected concentrations. In the initial screening to select chemicals of concern, chemicals that have toxicity values, criteria, or guidance numbers will be selected. Furthermore, chemicals will also be screened in accordance with EPA and State of California guidelines for frequency of detection and fate and transport in the environment (EPA, 1989a; DTSC, 1992). Based on toxicity data, fate, and transport information, and frequency of detection, chemicals of concern will be selected as representative compounds for further risk analysis.

The following chemicals have been detected at the site in varying concentrations and frequencies. An asterisk (*) denotes EPA weight-of-evidence classifications A, B1, and B2 carcinogens (see Section 6.5, Toxicity Assessment, for more information on EPA classifications for carcinogens):

- Soil:

  - Acetone.
  - Benzene*.
  - 2-Butanone.
  - 1,1 Dichloroethane (1,1-DCA).
  - 1,2 Dichloroethane (1,2-DCA)*.
  - 1,1 Dichloroethene (1,1-DCE).
  - Ethylbenzene.
  - 4-Methyl-2-Pentanone.
  - Tetrachloroethylene (PCE)*.
  - Toluene.
  - 1,1,1-Trichloroethane (1,1,1-TCA).
  - Trichloroethene (TCE)*
  - Xylenes.

- Groundwater:

  - Acetone.
  - Benzene*.
  - 1,1-DCA.
  - 1,2-DCA*.
  - 1,1-DCE.
  - Ethylbenzene.
  - Methylene Chloride*.
  - PCE*.
  - Toluene.
  - 1,1,1-TCA.
  - TCE*
  - Xylenes.

Note that only EPA weight-of-evidence classifications A, B1, and B2 carcinogens (EPA, 1989a) detected at the site will be assessed as part of this HRA. Based on information generated during this phase of the HRA, indicator chemicals will be selected and evaluated throughout the remainder of the HRA. Toxicity, fate, and transport characteristics of chemicals of concern selected from the above list will be presented in an appendix of the final HRA report.

6.3 EXPOSURE ASSESSMENT

Once the chemicals of concern are identified, populations which might potentially be exposed and exposure pathways for those populations will be determined and discussed in this section of the HRA document. Exposure modeling for this risk assessment will follow Superfund guidelines which state that "risk assessments should be based on estimates of reasonable maximum exposure (RME) expected to occur under both current and future land use conditions." The reasonable maximum exposure is defined as the highest exposure (i.e., chemical intake) that is reasonably expected to occur due to the site contamination. RMEs are estimated for individual pathways. If a population is exposed through more than one pathway, the combination of exposures across pathways also must represent an RME (EPA, 1989a).

6.3.1 Identification of Potentially Exposed Populations

As stated above, Superfund guidance for risk assessment (EPA, 1989a) specifies that risks be estimated for an RME. To achieve this goal, it is necessary to identify the probable areas of impact, potentially exposed populations (size, composition, their relative locations with respect to the site, and their activities), and current and future uses of the site and the surrounding areas. In this HRA, a 2-mile radius around the site is delineated as the area of potential maximum impact for off-site receptors.

Demographic characteristics in this area will be determined by compiling residential, commercial, and industrial population data and their projected growth rates, and sensitive populations (i.e., schools, day care centers, nursing homes, retirement communities).

6.3.2 Identification of Exposure Pathways

To determine the extent and magnitude of exposures to populations, the pathways of exposure to those populations will be analyzed. This analysis will take into account the sources of contaminants, release mechanisms, fate and transport in different media, receiving media, exposure points, exposure routes, and targeted populations. The results of this analysis (i.e., the pathways which will be addressed in the HRA) will be presented in tabular form within the HRA document.

The following populations will be considered to be potentially exposed:

Present Scenario--

- On-site populations:
  - Workers.
- Off-site populations:
  - Residents (adult and children) within 2-mile radius of the site.
  - Workers within 2-mile radius of the site.
  - Sensitive populations (i.e., schools, day care centers, hospitals, retirement communities, etc.) within 2-mile radius of the site.

Future Scenario--

- On-site populations:
  - Workers.
  - Residents (adults and children).
- Off-site populations:
  - Residents (adults and children) within 2-mile radius of the site.
  - Workers within 2-mile radius of the site.
  - Sensitive populations within 2-mile radius of the site.

6.3.3 Estimation of Exposure Point Concentrations (EPCs)

Populations on site and off site may be exposed to site contaminants via several general pathways: oral ingestion, dermal contact, and inhalation. Once all complete pathways of exposure are identified, population exposure to chemicals of concern through each pathway will be estimated as discussed below. Exposure Point Concentrations (EPCs) will be determined for each chemical of concern within each exposure pathway. Specific approaches for determining these EPCs are presented below.

Contaminant Migration from Soil to Groundwater; Groundwater Modeling--

SESOIL modeling--Contaminants present in soil will be assumed to migrate toward groundwater over time. In order to estimate the resulting contaminant concentrations in

groundwater as a result of soil contaminant leaching, computer modeling will be utilized. An EPA-approved vadose zone model, SESOIL (Seasonal Soil Compartment Model), will be used for this purpose (Bonazountas, et al., 1981). SESOIL is designed to conduct long-term environmental fate simulations of pollutants in the vadose zone. Using existing analytical data from soil samples, SESOIL can simulate movement of pollutants in the vadose zone and predict the amount of pollutant which will enter groundwater.

SESOIL includes assumptions about environmental fate processes, the handling of temporal and spatial variations, and the applicability to different fate and transport scenarios. The user must specify climatic conditions (i.e., precipitation), soil and pollutant characteristics, and various application parameters, including the following: (1) the width, length, and depth of the hypothetical contaminant soil column; (2) simulation time for model in order to predict maximum groundwater contaminant concentrations; (3) detailed climatic data; (4) absence or presence of infiltration barriers, (5) homogeneous soil type, and (6) rate of degradation processes.

Simulations will be carried for a 99-year period in order to estimate maximum contaminant concentrations over a human lifetime. Input parameters will be determined based on site-specific conditions or the most applicable literature values.

SESOIL modeling will (1) determine future impacts to groundwater due to contaminant migration from the unsaturated zone and (2) evaluate and estimate the level of contamination that can be safely left in-place without impacting groundwater.

AT123D modeling--Existing chemical concentrations in groundwater, with and without the addition of contaminant loading from the unsaturated zone (SESOIL modeling), will be modeled to determine fate and transport of the contaminants of concern with underlying aquifer(s). Groundwater modeling will be conducted using the EPA-approved AT123D (Analytical Transient 1-, 2-, or 3- Dimensional Simulation) computer model (Yeh, 1981).

AT123D is capable of simulating the fate and transport of chemicals in groundwater under numerous different user-selected situations. Two modeling studies will be conducted to account for (1) contaminant migration from existing groundwater contamination and (2) contaminant migration from existing contamination with the addition of vadose zone contaminants. The source of contamination will be assumed to be finite since no additional contaminants will be added to the soil in the future. Aquifer conditions and configurations will be determined from existing groundwater data from wells on site and within the vicinity of the site. The following inputs are necessary for AT123D modeling: (1) dispersion coefficients, (2) configuration of aquitards, (3) soil properties (bulk density, effective porosity, permeability, etc.), (4) partition coefficients, (5) overall decay constants, and (6) groundwater gradient. Site specific data will be generated whenever possible; however, appropriate literature values will be utilized as defaults when site specific data are lacking.

AT123D can take into effect, volatilization, degradation, and adsorption under steady-state conditions. Contaminant transport via dispersion and advection are simulated. Contaminant plumes will be approximated over a 99-year period in order to account for the most conservative risk assessment protocols. Plume maps will be produced and presented as part of the risk assessment document. AT123D will be utilized to predict contaminant

movement in three (3) dimensions for the substances being studied. Contaminant concentrations at lateral and vertical distances from the source will be estimated. These concentrations will be utilized to calculate risks to the closest off-site downgradient municipal water supply well as part of this HRA.

Air Emissions from Soil--

Exposures in air will be estimated for two pathways: (1) volatilization of chemicals from on-site soils into the breathing zone and (2) wind erosion activity that results in the formation of fugitive dust which may enter the breathing zone.

Volatilization emissions from soil will be calculated using the Farmer equation, re-evaluated by Shen, as presented in the California Site Mitigation Decision Tree Manual (DHS, 1986) and the Superfund Exposure Assessment Manual (EPA, 1988). The Farmer equation is based on Fick's Law of Diffusion and is used to calculate the diffusion of vapors through soil-gas. Emission rates can be approximated using the contaminant flux estimation method, which is presented below:

$$Q = D_i(p_a^{10/3}/p_T^2)(P_iM_iW_i/RT)/L$$

Where:

Q	=	Volatilization emission flux (g/cm^2-sec).
D_i	=	Air diffusion coefficient of chemical i (cm^2/sec).
p_a	=	Air filled porosity (dimensionless).
p_T	=	Total soil porosity (dimensionless).
P_i	=	Vapor pressure of i at the temperature T (mmHg).
M_i	=	Molecular weight of i (g/mole).
W_i	=	Weight fraction of i in the soil (mg/mg).
R	=	Universal gas constant.
T	=	Temperature (K).
L	=	Average depth of deeper soil strata samples.

If applicable, fugitive dust emissions by wind erosion will be calculated using the equation developed by the U.S. Department of Agriculture, Soil Conservation Service (EPA, 1988). The respirable fraction of the particulates (i.e., particles 10 μm or less in size) will be used for subsequent air dispersion modeling (EPA, 1989a). The equation is as follows (EPA, 1988):

$$E = f(I',C',K',L',V)$$

Where:

E	=	Potential average annual wind erosion soil loss (mass/area-time).
I'	=	Soil erodibility index (dimensionless).
C'	=	Climatic factor (dimensionless).
K'	=	Soil ridge roughness factor (dimensionless).
L'	=	Field length along prevailing wind direction (feet).
V	=	Vegetable cover factor (dimensionless).

To estimate the emission flux rate for fugitive dust, the "E" value is multiplied by the RC for shallow soil samples and a conversion factor (1.0E-06 kg/mg).

On-site EPCs in air for both volatilization and fugitive dust will be estimated using calculated emission flux rates and a "box" model methodology recommended by the California Air Resources Board (CARB). The following assumptions will be utilized: (1) the volatilization and fugitive dust emission rates are assumed to remain constant over the entire exposure duration, (2) the chemicals are uniformly mixed within the box, (3) the wind speed is uniform within the box, and (4) the size of the box remains constant (Hanna, et al., 1982).

To calculate off-site atmospheric concentrations of contaminants (both volatile and fugitive dust), the EPA-approved Industrial Source Complex (ISC) air dispersion model will be utilized (EPA, 1986d). ISC can calculate EPCs for the chemicals of concern at points on a receptor grid. Receptor grids will include various polar grids representing off-site populations and several discrete receptors representing significant on-site and site boundary receptors. Sensitive off-site receptors will also be considered. All of the receptors are "flagpole" receptors and will be given a height of 1.5 meters, roughly the height of the nose and mouth of an average person. Exact receptor grid locations will be determined at a later date. The receptor locations within the grid will be representative of population centroids (i.e., the total population within a particular grid sector will be assumed to be located at the centroid).

Atmospheric conditions (model inputs) will be obtained from the South Coast Air Quality Management District's (SCAQMD) database utilizing wind roses from the closest SCAQMD meteorological station (CAPCOA, 1987).

6.4 CHRONIC DAILY INTAKE (CDI)

The chronic daily intake (CDI) is a measure of the human uptake of EPCs for the chemicals of concern. Equations for specific exposure pathways that will be used to calculate CDIs to the on-site and off-site populations from the chemicals of concern are shown below.

6.4.1 Soil Ingestion

$$CDI = \frac{CS \times IR \times EF \times ED \times CF \times FI}{BW \times AT} \text{ (mg/kg-day)}$$

Where:

CS = Chemical concentration in soil to a depth of 1 foot (mg/kg).

IR = Ingestion Rate (mg soil/day) = 50 mg/day for occupational setting; 200 mg/day for children, ages 1-6; 100 mg/day for adults, ages 7-70 (EPA 1989b, 1991).

EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents. 250 days/year for occupational exposure (EPA, 1989b).

ED = Exposure Duration (years) = 30 years for residential exposure: 6 yrs as child, 24 years as adult; 4.2 years for occupational exposure (EPA, 1989a; DTSC, 1992; Chemrisk, 1992).

CF = Conversion Factor (10^{-6} kg/mg).

BW = Body weight (kg) = 70 kg for adult; 15 kg for child (EPA, 1989a).
AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for carcinogens; 365 days x 25 years for occupational exposure to non-carcinogens; 365 days x 30 years for residential exposure to non-carcinogens (EPA, 1989a).
FI = Fraction of ingested chemicals which are absorbed, assumed to be 100%.

6.4.2 Groundwater (Potable) Ingestion

$$CDI = \frac{CW \times IR \times EF \times ED}{BW \times AT} \text{ (mg/kg-day)}$$

CW = Chemical concentration in groundwater (mg/l).
IR = Ingestion Rate (l/day) = 2 liters/day for residential adult; 1.5 liters/day for residential child; 1.0 liters/day for worker (EPA, 1989a; DTSC, 1992).
EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents, 250 days/year for occupational exposure (EPA, 1989b).
ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult; 4.2 years for occupational exposure (EPA, 1989a; DTSC, 1992; Chemrisk, 1992).
BW = Body Weight (kg) = 70 kg for adult; 15 kg for child (EPA, 1989a).
AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for carcinogens; 365 days x 25 years for occupational exposure to non-carcinogens; 365 days x 30 years for residential exposure to non-carcinogens (EPA, 1989a).

6.4.3 Dermal Absorption (Soil)

$$CDI = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT} \text{ (mg/kg/day)}$$

Where:

CS = Chemical concentration in soil to a depth of 1 foot (mg/kg).
CF = Conversion Factor (10^{-6} mg/kg).
SA = Skin Surface Area Available for Contact (cm^2/day) = 3,360 cm^2/day for worker; 1,520 cm^2/day for residential child; 3,900 cm^2/day for residential adult (EPA, 1989a).
AF = Soil-to-Skin Adherence Factor (mg/cm^2) = assumed to be 0.5 mg/cm^2 (Chemrisk, 1992).
ABS = Dermal Absorption Factor Specific for Each Contaminant (unitless): assumed to be 10% for organics (DTSC, 1993).
EF = Exposure Frequency (days/year) = 350 days/year for child residents (7 events/week); 100 days/year for adult residents (2 events/week); 250 days/year for occupational exposure.

ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult; 4.2 years for occupational exposure (EPA, 1989a; DTSC, 1992; Chemrisk, 1992).

BW = Body Weight = 70 kg for adult; 15 kg for child (EPA, 1989a).

AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for carcinogens; 365 days x 25 years for occupational exposure to non-carcinogens; 365 days x 30 years for residential exposure to non-carcinogens (EPA, 1989a).

6.4.4 Inhalation (Volatilization and Fugitive Dust)

$$CDI = \frac{CA \times CF \times IR \times EF \times ED}{BW \times AT} \text{ (mg/kg-day)}$$

Where:

CA = Chemical concentration in air (ug/m^3).

CF = Conversion Factor (10^{-3} mg/ug).

IR = Inhalation Rate (m^3/day) = 20 m^3/day for adult resident; 15 m^3/day for child; 10 m^3/day for worker (Chemrisk, 1992).

EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents; 250 days/year for occupational exposure (EPA, 1989b).

ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult; 4.2 years for occupational exposure (EPA, 1989a; DTSC, 1992; Chemrisk, 1992).

BW = Body Weight = 70 kg for adult; 15 kg for child (EPA, 1989a).

AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for adult; 365 days x 6 years for child (EPA, 1989).

6.4.5 Inhalation (From Potable Groundwater)

$$CDI = \frac{CW \times CF \times IR \times WS \times MTE \times ET \times EF \times ED}{VR \times BW \times AT} \text{ (mg/kg-day)}$$

Where:

CW = Chemical concentration in water (mg/L).

CF = Conversion Factor (0.042 day/hour).

IR = Inhalation Rate (m^3/day) = 20 m^3/day for adult, worker and resident; 15 m^3/day for child (EPA, 1991).

WS = Water flow rate in shower (L/hour): estimated at 480 L/hour (DTSC. 1992)

MTE = Mass transfer efficiency from water to air: Estimated at 0.6 for low molecular weight VOCs (DTSC, 1992).

ET = Exposure time (hours/day): estimated at 0.13 hours/day for an individual showering (DTSC, 1992).

EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents (EPA, 1989b).

ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult; (EPA, 1989a).
BW = Body Weight = 70 kg for adult; 15 kg for child (EPA, 1989a).
AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for adult; 365 days x 6 years for child (EPA, 1989).
VR = Average ventilation rate for air in shower (m^3/hour): estimated at 12 m^3based on shower volume of 2 m^3 and the average number of air changed per hour in a shower as 6 (DTSC, 1992).

6.4.6 Dermal Absorption (Potable Groundwater)

$$CDI = \frac{CW \times CF \times SA \times PC \times ET \times EF \times ED}{BW \times AT} \text{ (mg/kg/day)}$$

Where:

CS = Chemical concentration in water (mg/L).
CF = Conversion Factor (10^{-3} L/cm^3).
SA = Skin Surface Area Available for Contact (cm^2/day) = 23,000 cm^2/day for a residential adult; 8,760 cm^2/day for residential child.
PC = Dermal aqueous permeability constant (cm/hour): assumed to be 1.0E-02 for organics (EPA, 1992).
ET = Exposure time (hours/day): estimated at 0.25 hours/day for an individualbathing (DTSC, 1992)
EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents (EPA, 1989b).
ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult (EPA, 1989a).
BW = Body Weight = 70 kg for adult; 15 kg for child (EPA, 1989a).
AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for carcinogens; 365 days x 25 years for occupational exposure to non-carcinogens; 365 days x 30 years for residential exposure to non-carcinogens (EPA, 1989a).

6.5 TOXICITY ASSESSMENT

In this section of the HRA document, toxicity information, both qualitative and quantitative, will be obtained, reviewed, and compiled for each chemical of concern. This information will include applicable toxicity values from the California EPA and the U.S. EPA. The presentation of toxicity values will be made separately for carcinogenic chemicals and non-carcinogenic chemicals. The non-carcinogenic effects of known carcinogenic chemicals will be presented along with those of non-carcinogens.

6.5.1 Health Effects Classification and Development of Criteria

For risk assessment purposes, chemicals are separated in two categories of toxicity, depending on whether they exhibit non-carcinogenic or carcinogenic effects. This distinction reflects the current scientific opinion that the mechanisms of action for each category are different. For purposes of assessing risks associated with potential carcinogens, the general risk assessment approach used by EPA assumes that a small number of molecular

events can cause changes in a single cell or a small number of cells that can lead to tumor formation. This is described as a no-threshold mechanism since there is essentially no level of exposure (i.e., threshold) to a carcinogen which will not result in some finite possibility of causing a disease. In the case of chemicals exhibiting non-carcinogenic effects, however, it is believed that organisms have protective mechanisms that must be overcome before toxic endpoints are manifested.

Health Effect Criteria for Carcinogens--

Cancer slope factors (CSF), developed by the California EPA's Office of the Environmental Health Hazard Assessment (OEHHA) and/or EPA's Carcinogen Assessment Group (CAG) for potentially carcinogenic chemicals and expressed in units of $(mg/kg/day)^{-1}$, are derived from the results of chronic animal bio-assays or, occasionally, human epidemiological studies. The animal studies must usually be conducted using relatively high doses in order to detect possible adverse effects. Since humans are expected to be exposed at much lower doses than those used in the animal studies, the data are adjusted by using mathematical models. The data from the animal studies are typically fitted to a linearized multi-stage model to obtain a dose-response curve. The 95th percentile UCL of the slope of the dose-response curve is subjected to various adjustments and an inter-species scaling factor is applied to derive the CSFs for humans. Thus, actual risks associated with exposure to a potential carcinogen, when quantitatively evaluated based on animal studies, are very conservative and not likely to exceed the risks estimated using these CSFs, but they may be much lower.

The EPA assigns weight-of-evidence classifications to potential carcinogens. Under this system, chemicals are classified as either Group A, Group B1, Group B2, Group C, Group D, or Group E. Group A chemicals (human carcinogens) are agents for which there is sufficient evidence to support a direct cause association between exposure to the agents in humans and cancer. Groups B1 and B2 chemicals (probable human carcinogens) are agents for which there is limited (B1) or inadequate (B2) evidence of carcinogenicity from animal studies. Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals, and Group D chemicals (not classified as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available. Group E chemicals (evidence of non-carcinogenicity in humans) are agents for which there is no evidence of carcinogenicity in adequate human or animal studies (EPA, 1989a).

For the purposes of this HRA, site contaminants that have been classified by the EPA as A (human carcinogens) or B (probable human carcinogens) will be considered as carcinogens. Any contaminants classified by EPA as C (possible carcinogens) or lower will be considered as non-carcinogens.

DTSC recommends the following hierarchy for selection and use of toxicity data (i.e., CSFs) for carcinogens: (1) California EPA, OEHHA, Standards and Criteria Workgroup, most recent list of CSFs (OEHHA, 1992), (2) the EPA's Integrated Risk Information System (IRIS), (EPA, 1994), and (3) the most current Health Effects Assessment Summary Tables (HEAST), (EPA, 1993). This hierarchy will be utilized during the HRA.

Toxicity Information for Non-Carcinogens--

Health criteria for chemicals exhibiting non-carcinogenic effects are generally developed using risk reference doses (RfDs), sometimes referred to as reference concentrations (RfCs) for the inhalation pathway, developed by the EPA RfD Work Group (IRIS) or RfDs obtained from HEAST. The RfD, expressed in units of mg/kg/day, is an estimate of the daily exposure to human population (including sensitive sub-populations) that is likely to be without an appreciable risk of deleterious effects during an entire lifetime. These RfDs are usually derived either from human studies involving work place exposure or from animal studies and are adjusted using uncertainty factors. The RfD provides a benchmark to which CDIs may be compared. When RfDs are not available for chemicals of concern, California Applied Action Levels (AALs) may be utilized.

6.6 RISK CHARACTERIZATION

In this section of the HRA document, the toxicity assessment and exposure assessment will be integrated into quantitative expressions of health risk. In accordance with EPA guidelines for evaluating the potential toxicity of complex mixtures (EPA, 1986), this assessment will assume that the toxic effects of the site chemicals of concern are additive. Namely, a population's EPC to each chemical of concern in each pathway will be compiled first. Next, specific pathways risks will be calculated for each chemical using toxicity values provided by the toxicity assessment. Risks will then be combined for each chemical and across pathways for each affected population. The final step will be a calculation of the total risks to each population.

6.6.1 Exposure Data Compilation

The exposure information developed earlier will be organized so that appropriate toxicity values may be applied. Exposure pathways will be organized according to duration (short term versus long term), if applicable. In addition, adjustments will be made so that exposures which are based on an absorbed dose will be converted to an appropriate applied dose, as in the case of dermal exposure.

6.6.2 Quantification of Pathway-Specific Risks

Carcinogenic Effects--

For carcinogens, excess lifetime cancer risks are obtained by multiplying the CDI of the contaminant under consideration by its CSF for each pathway of concern (EPA, 1989a). The total excess lifetime cancer risk for the site is determined by summing all the individualized risks for all the chemicals of concern:

$$Risk_i = CDI_i \times CSF_i$$

where:

$Risk_i$ = Individual excess lifetime cancer risk (probability) for inhalation of ith substance (unitless).
CDI_i = Chronic daily intake of chemical "i" (mg/kg/day).
CSF_i = Cancer slope factor of chemical "i" (mg/kg/day).

The upper bound lifetime excess cancer risks derived from this calculation will be compared to a risk range for health preventiveness used by EPA to make remediation decisions at hazardous waste sites. According to EPA policy, the target total individual carcinogenic risk resulting at a Superfund site may range from 10^{-4} to 10^{-6}, derived from contaminant concentrations based on either Applicable or Relevant and Appropriate Requirements (ARARs) or remediation goals calculated from CSFs or RfDs for non-carcinogens.

Non-Carcinogenic Effects--

Potential risks for non-carcinogens are presented as the ratio of the CDI exposure to the reference dose (CDI:RfD). This ratio is known as the Hazard Quotient (HQ). The sum of all of the CDI:RfD ratios (HQs) of chemicals under consideration is called the Hazard Index (HI). The HI is thus defined as follows:

$$HI_i = (CDI)_i/(RfD)_i$$

where:

HI_i	=	Hazard Index for chemical "i" (unitless).
$(CDI)_i$	=	Daily intake from all routes of exposure for the ith contaminant (mg/kg/day).
$(RfD)^i$	=	Acceptable daily intake (reference dose) for the ith contaminant.

The HI is useful as a reference point for gaging the potential effects of environmental exposures to complex mixtures. In general, $HI < 1$ are not likely to be associated with any health risks, and they are, therefore, less likely to be of regulatory concern than $HI > 1$. For HIs which are greater than 1.0, the associated HQs can be re-summed such that additive effects are compared only for those chemicals which attack the same target organ or organ group.

Risk Determination for Different Populations--

The potential for non-carcinogenic effects and cancer risks will be determined for on- and off-site workers and off-site residents in the current scenario and for on- and off-site workers and residents in the future scenario.

For each population involved, cancer risks for each pathway will be combined and expressed as a total cancer risk for that population. Similarly, hazard indices for each pathway will be combined and expressed as a total hazard index for that population.

6.7 UNCERTAINTIES

In this section of the HRA document, the results of the risk assessment will be discussed in view of the assumptions used in its development.

There are two principal sources of assumptions and, therefore, uncertainties for this risk assessment: site-specific factors and toxicity assessment. Both of these will be discussed in the document. In addition, uncertainties will be quantified whenever possible and applicable.

7.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

7.1 NATURE AND EXTENT OF CHEMICAL COMPOUNDS

7.1.1 Soil

This investigation identified impacts to vadose zone soils and groundwater by VOCs. The predominant compounds detected in soil samples in terms of frequency and concentration are acetone, MEK, MIBK, PCE, toluene, 1,1,1-TCA, TCE, and xylenes. Elevated concentrations of these compounds in shallow soils (< 20 feet bgs) appear to be limited in areal extent to two separate and distinct areas: 1) the immediate vicinity of the northeast portion of the railroad spur and 2) the south central spill drain area. This pattern suggests possible spillage along the northeast portion of the railroad spur, and leakage through a broken pipeline associated with a concrete catch basin. No significant impacts to the vadose zone were identified as resulting from the on-site USTs or activities involving aboveground storage of chemicals. In addition, there is no evidence of chemicals entering the soil through cracks in the concrete and asphalt pavement on the site. ACC has in the past received citations as a result of regulatory agency site inspections. All such violations have reportedly been corrected without imposition of penalties, and none of the violations appear to have contributed to the contamination in the spill drain area.

Elevated concentrations of VOCs detected in deeper soil (>20 feet bgs) may be associated with deposition from groundwater to soil during periods of high groundwater. These sources may have impacted soils at depths of approximately 20 feet bgs near the top of the perched aquifer (northern portion of the site), and at depths between 30 and 40 feet bgs near the top of the Gaspur/Hollydale aquifer.

7.1.2 Groundwater

7.1.2.1 Perched aquifer--

The highest concentrations of VOCs detected in groundwater were found in the perched aquifer along the northern portion of the site, where monitoring wells MW4 and MW6 are located. Elevated concentrations of chemicals, including benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, ethylbenzene, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE, and xylenes were detected. Exploratory borings indicated that the perched zone is discontinuous, being absent along the southern portion of the site. There are only two wells on site screened within the perched aquifer; therefore, exact groundwater flow direction cannot be determined.

7.1.2.2 Gaspur/Hollydale aquifer--

Four monitoring wells are screened within the Gaspur/Hollydale aquifer, one upgradient well (MW7) along the northern portion of the site, and three downgradient wells (MW1, MW2, and MW3) along the southern portion of the site.

Elevated concentrations of VOCs were observed in wells screened within the Gaspur/Hollydale aquifer. Chemicals detected included benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, ethylbenzene, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE, and xylenes. Concentra-

tions of individual chemicals dissolved in ground water in downgradient wells MW1, MW2, and MW3 vary somewhat from well to well; however, overall concentrations are comparable between wells. Free product was encountered in MW-1, which is directly downgradient of the broken pipe attached to the south central catch basin. Relatively lower concentrations were detected in the most upgradient well, MW7 (with the exception of 1,1-DCA). Detection of VOCs in the upgradient well suggests that some migration of these chemicals may be occurring from off-site sources.

7.2 FATE AND TRANSPORT

The observed distribution of compounds in the vadose zone appears to result from two transport processes. In the area of the northeast portion of the railroad tracks and near the broken drain pipe, the observed distribution may be the result of vertical migration of chemicals from near-surface points of spillage or leakage. Away from these areas, the detected concentrations of chemicals in soils may be the result of deposition from groundwater near the tops of both the perched and Gaspur/Hollydale aquifers.

7.3 RISK EVALUATION

Risk evaluation document will be submitted under a separate cover following completion of the final RI Report.

The risk evaluation will be performed as outlined in Section 6.0. The risk evaluation will provide an assessment of the potential threat to human health and the environment posed by the affected media (i.e., soil, groundwater, etc.) in the absence of any remedial action. The risk evaluation will provide the basis for determining remedial action, and provide constraints on remedial alternative selection.

7.4 RECOMMENDATIONS

At this time the following activities are recommended:

- Completion of Risk Evaluation (to be submitted under a separate cover).
- Further review of agency records for possible off-site sources.

ACC has submitted a draft proposal to DTSC, which includes a pilot vapor extraction study (VES) to examine this technique as a possible remediation alternative. Some additional soil sampling and analyses has also been proposed to augment existing data. Data generated from this additional work will be incorporated into the FS. This proposal will be submitted to DTSC within weeks of DTSC's approval of this RI Report.

In March 1993, ACC took legal action against Spencer and Jones, the contractor who installed two USTs in the area of the south central catch basin in 1981. In August 1994, after a 4 week jury trial, Spencer and Jones was found to have caused the break in the pipeline associated with this catch basin, and was adjudicated liable for known damages arising therefrom. As a result, ACC will consult with Spencer and Jones on future environmental investigation/remediation activities.

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TABLES

TABLE 1
ANALYTICAL DATA SUMMARY – SOIL INVESTIGATION JANUARY 1990
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

SAMPLE I.D.	VOLATILE ORGANIC COMPOUNDS (EPA METHOD 8240) IN UG/KG										
	Benzene	1,1-DCA	1,1-DCE	Ethylbenzene	MEK	MIBK	PCE	Toluene	1,1,1-TCA	TCE	Xylene
BH1-5	--	--	--	--	--	--	--	--	--	--	--
BH1-10	--	--	--	--	--	--	--	--	--	--	--
BH1-15	ND	ND	ND	ND	ND	ND	ND	19	ND	ND	ND
BH1-20	ND	ND	ND	ND	200	180	16	21	18	ND	12
BH2-5	--	--	--	--	--	--	--	--	--	--	--
BH2-10	21	76	29	87	ND	ND	210	250	91	40	412
BH2-15	ND	ND	ND	ND	ND	60	ND	12	ND	ND	ND
BH2-20	--	--	--	--	--	--	--	--	--	--	--
BH3-5	ND	62	ND	62	ND	230	120	440	19	10	450
BH3-10	ND	ND	ND	ND	ND	ND	ND	160	ND	ND	70
BH3-15	ND	ND	ND	ND	110	370	ND	28	ND	ND	ND
BH3-20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH4-5	ND	98	ND	ND	ND	ND	ND	150	65	ND	ND
BH4-10	--	--	--	--	--	--	--	--	--	--	--
BH4-15	ND	ND	ND	ND	ND	ND	ND	33	39	ND	ND
BH4-20	ND	ND	ND	ND	ND	980	ND	ND	ND	ND	ND
BH5-5	ND	ND	ND	42	1800	2100	ND	160	ND	ND	175
BH5-10	ND	ND	ND	53	640	2100	30	360	30	ND	163
BH5-15	ND	ND	ND	ND	600	1300	ND	35	ND	ND	15
BH5-20	ND	ND	ND	ND	300	630	ND	12	ND	ND	ND
BH6-5	ND	ND	ND	71	110	120	35	>700	ND	16	320
BH6-10	ND	ND	ND	ND	40	120	ND	40	ND	ND	13
BH6-15	11	25	ND	220	1300	1900	330	1900	230	60	>2300
BH6-20	ND	ND	ND	13	240	600	26	150	29	ND	67
BH6-25	ND	ND	ND	ND	110	450	ND	32	ND	ND	10
BH6-30	ND	ND	ND	260	1000	2000	750	870	45	ND	1650
BH6-35	ND	ND	ND	ND	200	620	ND	26	ND	ND	12
BH6-40	160	310	270	220	1200	2300	150	820	720	33	530
BH6-45	160	180	680	1100	750	2200	940	1600	900	87	2570
BH6-50	67	56	31	39	ND	1200	10	65	18	ND	123
BH7-5	--	--	--	--	--	--	--	--	--	--	--
BH7-10	120	18	21	ND	ND	ND	20	20	11	ND	13
BH7-15	46	ND	ND	ND	ND	ND	ND	ND	71	ND	ND
BH7-20	ND	ND	ND	ND	ND	ND	ND	28	ND	ND	ND
BH8-5	--	--	--	--	--	--	--	--	--	--	--
BH8-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH8-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH8-20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH8-25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

EXPLANATION:

Sample I.D. (BH1-5) = Boring BH1, sample depth of 5 feet below ground surface.
Refer to Figure 2 for sample locations.

-- = sample not analyzed.
ND = Not Detected
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethylene
MEK = methyl ethyl ketone (2-butanone)
MIBK = 4-Methyl-2-Pentanone
PCE = tetrachloroethene
1,1,1-TCA = 1,1,1-trichloroethene
TCE = trichloroethene

TABLE 2
ANALYTICAL DATA SUMMARY – SITE INVESTIGATION APRIL & JUNE 1990
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

SAMPLE I.D.	(EPA 418.1) TRPH (mg/kg)	VOLATILE ORGANIC COMPOUNDS (EPA METHOD 8240) in ug/kg												
		Acetone	Benzene	1,1-DCA	1,1-DCE	Ethylbenzene	MethChlo	MEK	MIBK	PCE	Toluene	1,1,1-TCA	TCE	Xylene
Soil samples:														
BH9-5	--	550	ND	30	ND	37	460	120	450	37	410	56	20	250
BH9-15	--	ND	ND	24	ND	32	730	ND	ND	ND	190	ND	ND	161
BH9-25	--	380	ND	ND	ND	ND	ND	390	170	ND	ND	ND	ND	ND
BH10-10	--	250	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH10-20	--	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH11-25	--	1300	ND	ND	ND	ND	ND	ND	ND	ND	59	ND	ND	50
BH11-30	--	ND	ND	ND	210	11000	ND	500	ND	ND	10000	1200	76	24300
BH11-35	--	ND	ND	81	130	1400	ND	ND	700	330	1900	1000	ND	2630
BH12-10	--	27000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH12-20	--	8600	ND	ND	ND	ND	ND	ND	54	ND	ND	ND	ND	ND
BH13-15	--	6900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH13-30	--	1300	ND	ND	ND	ND	ND	ND	ND	90	ND	210	ND	ND
BH13-40	--	11000	ND	ND	180	ND	300	530	150	230	96	260	120	60
BH14-5	--	ND	ND	ND	ND	45000	ND	ND	ND	ND	67000	ND	6700	233000
BH14-10	--	41000	ND	ND	ND	29000	ND	ND	ND	ND	96000	ND	6400	112000
BH14-15	--	ND	ND	ND	ND	9300	ND	ND	ND	6900	27000	2300	ND	26300
BH14-20	--	50000	ND	ND	ND	44000	ND	ND	ND	48000	150000	26000	ND	128000
BH14-25	--	39000	ND	ND	ND	17000	ND	ND	ND	19000	37000	ND	ND	52000
BH14-30	--	31000	10000	ND	ND	ND	7800	ND	9300	ND	3300	ND	ND	1900
BH14-35	--	55000	ND	ND	ND	ND	ND	15000	6300	ND	1600	ND	ND	ND
BH14-40	--	ND	ND	ND	ND	2600	ND	ND	ND	1400	2400	1800	ND	8300
MW1-10	--	21000	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	ND	ND
MW1-15	--	7900	ND	21	92	ND	ND	ND	ND	49	ND	150	ND	ND
MW1-20	--	8400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW1-25	--	430	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW1-30	--	15000	ND	240	ND	2200	10000	ND	ND	6300	330	3500	270	7700
MW1-35	--	85	16	39	ND	ND	6600	ND	ND	ND	ND	ND	180	2400
MW1-40	--	15000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1800
S-1 *	--	ND	ND	ND	ND	>210000	ND	ND	ND	32000	>220000	6400	9900	>540000
S-2 *	99	ND	ND	ND	ND	94000	ND	ND	ND	33000	120000	ND	5100	264000
Water Sample:														
MW1-1		--	10	21	270	ND	ND	--	--	100	10	120	210	18
MCLs		--	1	5	6	680	--	--	--	5	100	200	5	1750

EXPLANATION:

Sample I.D. (BH1-5) = Boring BH1, sample depth of 5 feet below ground surface. MW1-10 = soil sample from monitoring well (MW-1) boring at a depth of 10 feet below ground surface.
* Sample I.D. (SS-1) = shallow soil grab sample, sampled in April 1990. All other samples collected in June 1990.
Refer to Figure 2 for sample locations.
MCLs = maximum contaminant levels as established in California Code of Regulations Title 22.
-- = sample not analyzed, or not applicable.
ND = Not Detected
1,1-DCA = 1,1-Dichloroethane
TRPH = Total Recoverable Petroleum Hydrocarbons using EPA Method 418.1
1,1-DCE = 1,1-Dichloroethylene
MEK = methyl ethyl ketone (2-butanone)
MIBK = 4-Methyl-2-Pentanone
PCE = tetrachloroethene
1,1,1-TCA = 1,1,1-trichloroethane
TCE = trichloroethene
Note that trans-1,2-dichloroethene also detected in water sample at a concentration of 240 ug/l (MCL = 10 ug/l).

TABLE 3
SUMMARY OF ANALYTICAL RESULTS, SHALLOW SOIL STUDY, OCTOBER 1992
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

SAMPLE I.D.	EPA 418.1 (MG/KG)	VOLATILE ORGANIC COMPOUNDS (EPA METHOD 8240) IN UG/KG											
	TRPH	Acetone	1,2-DCA	1,1-DCE	Ethylbenzene	MEK	MIBK	PCE	Toluene	1,1,1-TCA	TCE	m,p-xylenes	o-xylene
RR-1*	22200	2800	ND	ND	ND	ND	ND	170	250	ND	ND	160	510
RR-2	19500	ND	ND	ND	16000	ND	ND	32000	210000	17000	2200	61000	54000
RR-3*	101000	ND	3900	8300	ND	ND	ND	7600	9300	19000000	4200	3400	ND
RR-4	115	ND	ND	ND	1100	15000	ND	4100	640	ND	ND	6800	2300
RR-5*	156	ND	ND	ND	ND	ND	ND	2300000	17000	16000	ND	3700	2700
RR-6	1390	3100000	ND	ND	5200	38000	7200	1200000	14000	160000	ND	21000	7500
RR-7*	11500	ND	ND	ND	3600	ND	ND	37000	4300	73000	ND	18000	13000

EXPLANATION:

TPH = total petroleum hydrocarbons
ND = Not Detected
1,2-DCA = 1,2-Dichloroethane
1,1-DCA = 1,1-Dichloroethene
MEK = methyl ethyl ketone (2-butanone)
MIBK = 4-Methyl-2-Pentanone
PCE = tetrachloroethene
1,1,1-TCA = 1,1,1-trichloroethane
TCE = trichloroethene

* = samples taken immediately below surficial gravel layer. All other samples taken at a depth of approximately 18 inches below grade.

TABLE 4
UNDERGROUND STORAGE TANK CONTENTS
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

TANK NO.	DATE INSTALLED	CAPACITY (GAL)	CONTENTS
1	1975	10000	Toluene
2	1975	10000	Xylenes
3	1975	10000	Lacquer thinner
4	1975	10000	Methanol
5	1975	10000	Mineral Spirit
6	1975	10000	N–Butyl Acetate
7	1975	10000	IPA
8	1975	10000	Isobutyl acetate
9	1975	10000	Wash thinner
10	1975	10000	Acetone
11	1975	10000	MEK
12	1975	10000	Isobutanol
13	1975	10000	Anhydrol 190, PM 4081
14	1975	10000	Kerosene/mineral spirit
15	1975	10000	Laquer thinner
16	1975	10000	Mineral spirit
17	1978	20000	VM & P Naptha
18	1978	5000	Blend tank
19	1978	5000	Solvent 140
20	1978	5000	Solvent PX–3
21	1978	5000	Blend tank
22	1978	10000	Kerosene
23	1978	10000	Solvent PX–2
24	1982	20000	LEP solvent
25	1982	20000	Mineral spirit
26	1982	10000	LEP solvent
27	1982	10000	Butyl Cellusolve
28	1982	10000	Kerosene
29	1982	10000	Mineral spirit
30	1982	10000	Mineral spirit
31	1982	10000	Kerosene
32	1982	10000	Waste water tank
33	1982	5000	Unleaded gasoline
34	1982	8000	Diesel fuel

EXPLANATION:

Data Source: ACC files, March 1994.

Tank wall thickness 0.25 inches of carbon steel for all tanks. No secondary containment on any tanks. Cathodic protection on all tanks.

Reference Figure 2 for tank locations.

TABLE 5
ABOVEGROUND STORAGE TANK CONTENTS
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

TANK NO.	CAPACITY (GAL)	CONTENTS	COMMENTS
AGT1	1872	unused	Compartmental storage tank – horizontal
AGT2	1400 1400	mineral spirits propyl alcohol	Compartmental storage tank – horizontal
AGT3	400 1472	unused denatured alcohol	Compartmental storage tank – horizontal
AGT4	1868	unused	Compartmental storage tank – horizontal
AGT5	1425	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.
AGT6	1200	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.
AGT7	2275	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.
AGT8	1750	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.
AGT9	1750	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.

EXPLANATION:

AGT = aboveground tank.

Tank wall thickness 0.25 inches of carbon steel for all tanks. No secondary containment on any tanks.

Reference Figure 3 for tank locations.

TABLE 6
REMEDIAL INVESTIGATION – SOIL
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA. JANUARY 1994

SAMPLE I.D.	VOLATILE ORGANIC COMPOUNDS (EPA METHOD 8240) IN UG/KG													
	Acetone	Benzene	2-Butanone	1,1-DCA	1,2-DCA	1,1-DCE	Ethybenzene	4-Met-2-Pent	PCE	Toluene	1,1,1-TCA	TCE	m&p-xylene	o-xylene
BH15-1	4480	8	193	462	ND	269	218	198	6330	1300	20900	27	14200	29000
BH15-5	9380	ND	1590	74	ND	10	ND	ND	11	24	109	ND	12	11
BH15-10	67	ND	ND	ND	ND	ND	ND	ND	ND	6	5	ND	ND	ND
BH15-20	261	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH16-1	10100	ND	23400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH16-5	2180	ND	62000	ND	ND	ND	ND	ND	ND	ND	55	61	ND	ND
BH16-10	ND	ND	11600	ND	ND	ND	ND	ND	ND	ND	8	ND	ND	ND
BH16-20	ND	ND	ND	ND	ND	ND	82	ND	471	125	ND	ND	318	104
BH17-1	39700	ND	12200	706	ND	ND	1560	2050	41800	11200	36600	9280	6460	4020
BH17-5	25200	ND	35200	ND	ND	ND	6330	11600	58200	48300	19400	5630	22900	4870
BH17-10	15400	ND	60300	11	ND	ND	ND	3020	12	179	55	21	24	ND
BH17-20	1050	ND	2400	ND	ND	ND	ND	399	ND	ND	ND	ND	ND	ND
MW2-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW2-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW2-20	97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW2-30	ND	ND	ND	10	ND	37	ND	ND	33	15	69	24	ND	ND
MW2-40	1102	ND	720	30	ND	102	113	352	194	168	88	ND	387	107
MW3-5	ND	ND	ND	ND	ND	ND	ND	ND	13	ND	16	16	ND	ND
MW3-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW3-20	261	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW3-30	15100	ND	3000	ND	ND	332	109	1340	452	480	88	ND	368	104
MW3-40	ND	ND	ND	23	ND	ND	ND	ND	69	ND	ND	ND	ND	ND
MW4-5	1640	ND	1990	ND	ND	ND	ND	594	ND	ND	ND	ND	ND	ND
MW4-10	2130	ND	4260	ND	ND	ND	ND	ND	ND	ND	71	ND	ND	ND
MW4-20	ND	ND	ND	ND	ND	ND	16600	12000	98900	48700	54700	16500	49000	12000
MW5-2	ND	ND	ND	ND	ND	ND	ND	ND	21	8	5	ND	13	ND
MW5-5	ND	ND	ND	31	ND	ND	ND	ND	19	6	ND	7	16	ND
MW5-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	ND	ND	ND	ND
MW5-20	974	ND	529	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW6-5	5180	17	3110	301	10	20	32	900	24	424	412	11	168	89
MW6-10	2030	ND	804	78	16	ND	ND	1230	ND	38	312	ND	ND	ND
MW6-20	ND	ND	ND	ND	ND	ND	3220	2440	3510	4300	2970	154	6240	4000
MW7-5	ND	ND	ND	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW7-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW7-20	117	ND	147	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW7-30	6050	ND	29700	28	ND	ND	ND	69	ND	34	ND	ND	7	ND
MW7-40	ND	ND	ND	27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

EXPLANATION:

Sample I.D. (BH15-5) = Boring BH5, sample depth of 5 feet below ground surface.
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethylene
4-Met-2-Pent = 4-Methyl-2-Pentanone
ND = Not Detected
PCE = Tetrachloroethene
1,1,1-TCA = 1,1,1-Trichloroethane
TCE = Trichloroethene

TABLE 7
REMEDIAL INVESTIGATION – GROUNDWATER
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA. FEBRUARY 1994

PARAMETER	MCL\SAL	MW-1	MW-2	MW-3	MW-4*	MW-6*	MW-6D*	MW-7
Purgeable Organics (ug/l) (EPA Method 624)								
Benzene	1.0	194	<100	63	111	795	848	46
1,1-Dichloroethane	5.0	649	1130	85	1410	2260	2570	2130
1,2-Dichloroethane	0.5	<100	<100	<50	<100	1140	1240	31
1,1-Dichloroethene	6.0	2210	2460	2800	806	1240	1920	151
Ethylbenzene	680	333	1720	115	1180	1910	2080	45
Methylene Chloride	40	1220	2980	6530	4760	21400	20000	<50
Tetrachloroethene	NS	662	2150	5370	3320	2130	2410	134
Toluene	100	560	7390	579	12700	15300	13500	398
1,1,1-Trichloroethane	200	9370	3470	444	36200	114000	118000	90
Trichloroethene	5.0	7160	3040	1730	14300	1320	1450	45
m and p-Xylenes	1750**	1220	5690	571	3410	2900	3320	133
o-Xylene	1750**	972	2100	443	952	1810	2100	53
General Water Quality								
pH	NS	--	6.55	7.28	6.54	5.65	5.60	6.37
Hardness	NS	--	849	925	698	3060	4180	2100
MBAS (mg/l)	0.5	--	0.30	0.30	ND	0.24	0.08	ND
TDS (mg/l)	1000	--	2040	1520	1480	4440	5240	3000
Specific Conductivity (umhos/cm)	2200	--	1760	1860	1730	5390	5300	2170
Chloride (mg/l)	500	--	222	247	154	1270	1120	185
SO4 (mg/l)	500	--	140	489	321	681	536	156
Alkalinity	NS	--	540	315	500	565	455	980
HCO3	NS	--	540	315	500	565	455	980
CO3	NS	--	ND	ND	ND	ND	ND	ND
NO3 (mg/l)	45	--	ND	ND	ND	ND	ND	ND
Calcium (mg/l)	NS	--	244	233	264	931	962	413
Copper (mg/l)	1.0	--	0.10	<0.05	<0.05	<0.05	<0.05	0.39
Iron (mg/l)	0.3	--	13.7	4.91	7.93	86.2	87.5	33.9
Magnesium (mg/l)	NS	--	58.1	89.4	36.9	177	189	128
Manganese (mg/l)	0.05	--	6.24	3.64	7.30	73.5	77.7	10.3
Potassium (mg/l)	NS	--	9.84	8.99	9.34	16.4	16.8	64.1
Sodium (mg/l)	NS	--	125	122	194	315	340	201
Zinc (mg/l)	5.0	--	0.14	0.06	0.05	0.08	0.06	1.07

EXPLANATION:

* Wells screened in perched aquifer zone, all others are Gaspur/Holydale aquifer.
** MCL for total xylenes.
-- = Not Analyzed. Note: free Product detected in MW-1.
NS = No Standard.
ND = Not Detected
Concentrations preceeded by a less than symbol (<) indicate that results were below detection limit.
MCL = State of California, Office of Drinking Water, Maximum Contaminant Level.

TABLE 8
REMEDIAL INVESTIGATION – FREE PRODUCT
ANGELES CHEMICAL COMPANY,
SANTA FE SPRINGS, CALIFORNIA. FEBRUARY 1994

PARAMETER	MCL\SAL	MW–1
Total Petroleum Hydrocarbons (mg/l) (EPA Method 8015M)	NS	38500
Volatile Organic Compounds (ug/l) (EPA Method 8240)		
Acetone	NS	12,400
2–Butanone (MEK)	NS	6,150
1,1–Dichloroethane	5.0	452
1,1–Dichloroethene	6.0	1,910
Ethylbenzene	680	1,240
Tetrachloroethene	NS	7,980
Toluene	100	463
1,1,1–Trichloroethane	200	4,780
Trichloroethene	5.0	2,720
m and p–Xylenes	1750*	5,750
o–Xylene	1750*	3,560

EXPLANATION:

Well screened in Gaspur/Hollydale aquifer.
Sample collected February 4, 1994.
* = MCL for total xylenes.
ND = Not Detected.
NS = No Standard.
MCL = State of California, Office of Drinking Water, Maximum Contaminant Level.

FIGURES

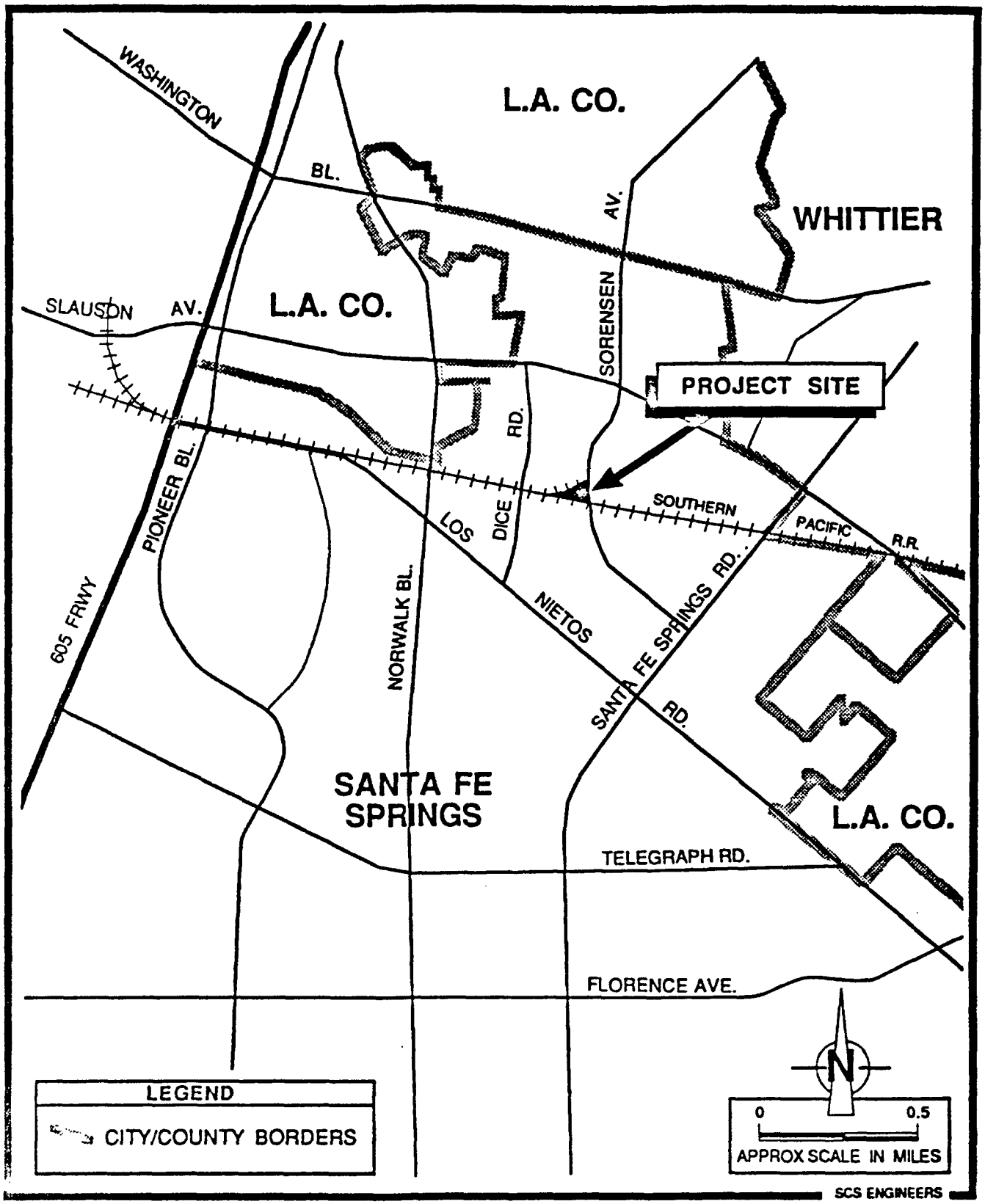


Figure 1. Map Showing Location of Angeles Chemical Project Site.

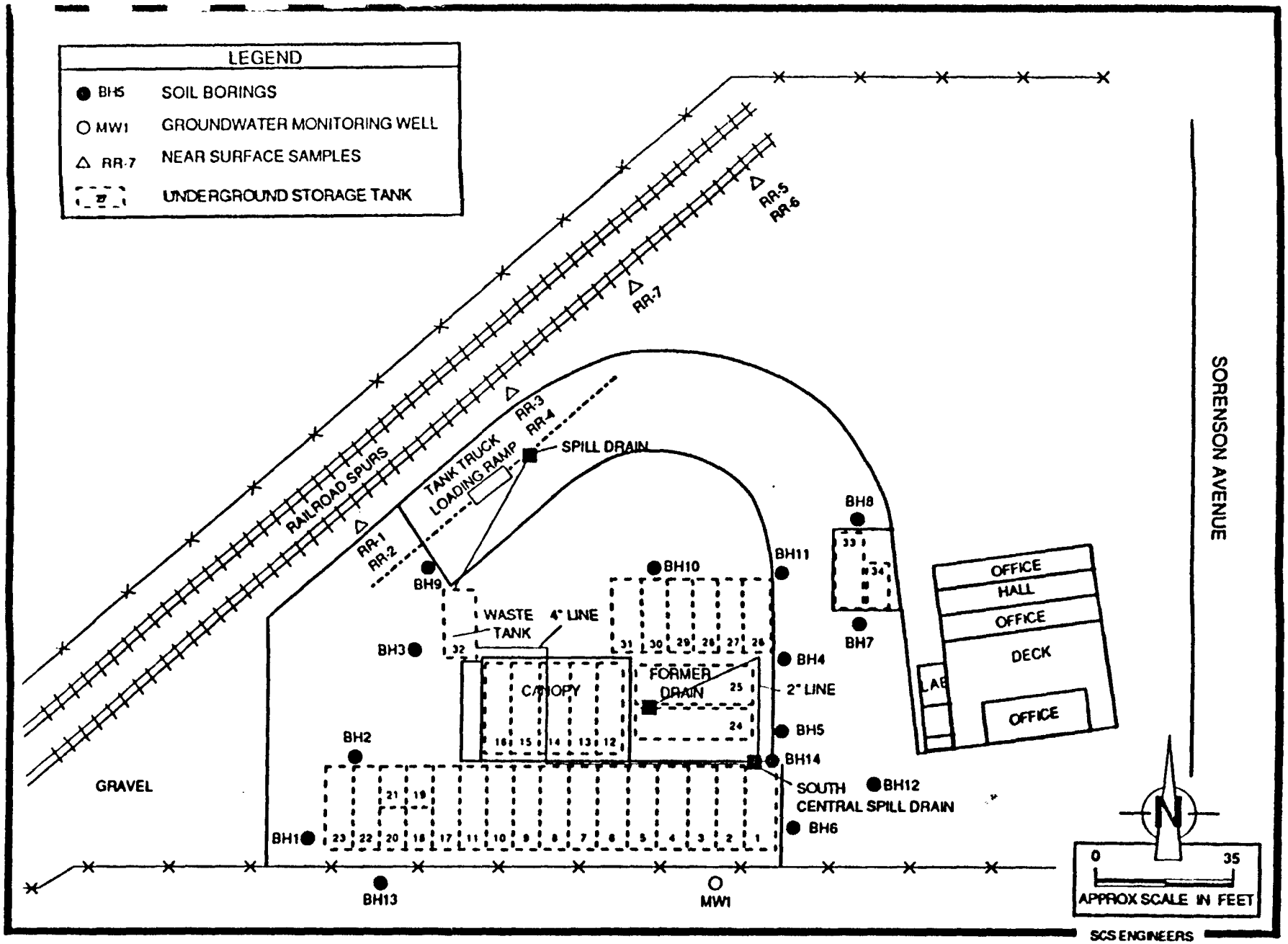


Figure 2. Approximate Locations of Soil Borings, Surface Samples, and Groundwater Well from Previous Investigations at Angeles Chemical, Santa Fe Springs, California.

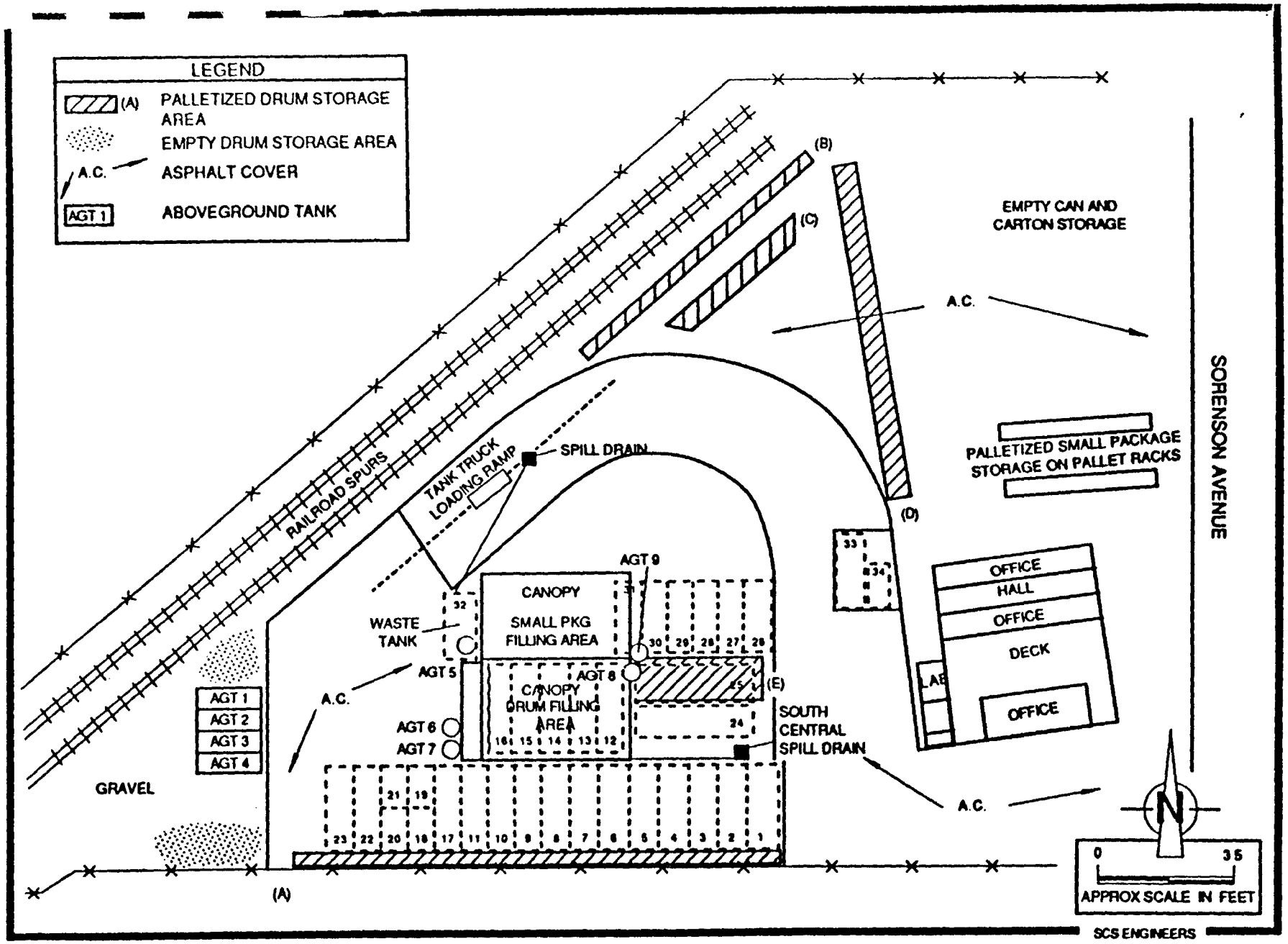


Figure 3. Approximate Locations of Aboveground Storage Tanks and Drum Storage Areas at Angeles Chemical, Santa Fe Springs, California.

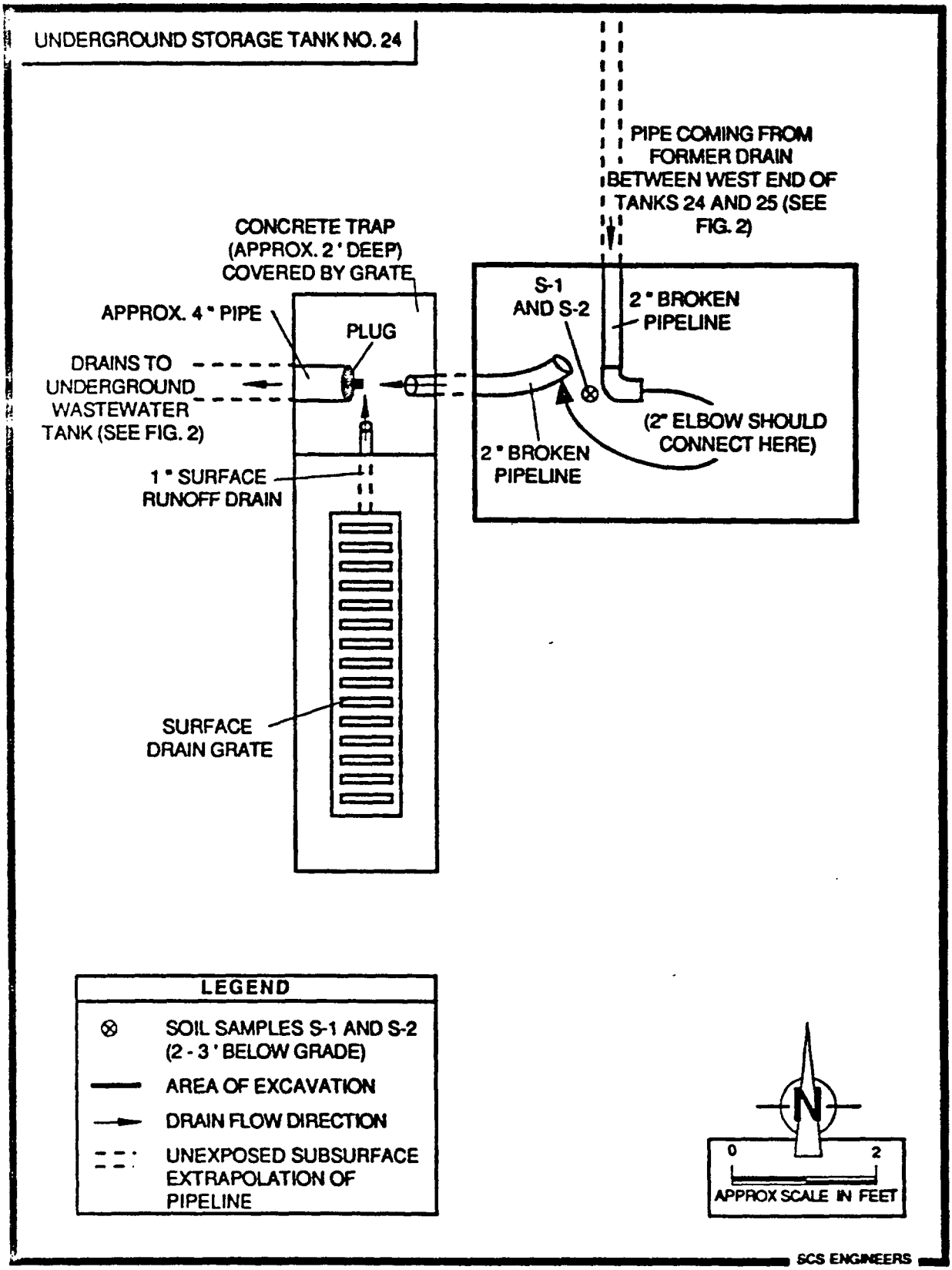


Figure 4. Illustration of South Central Spill Drain Excavation.

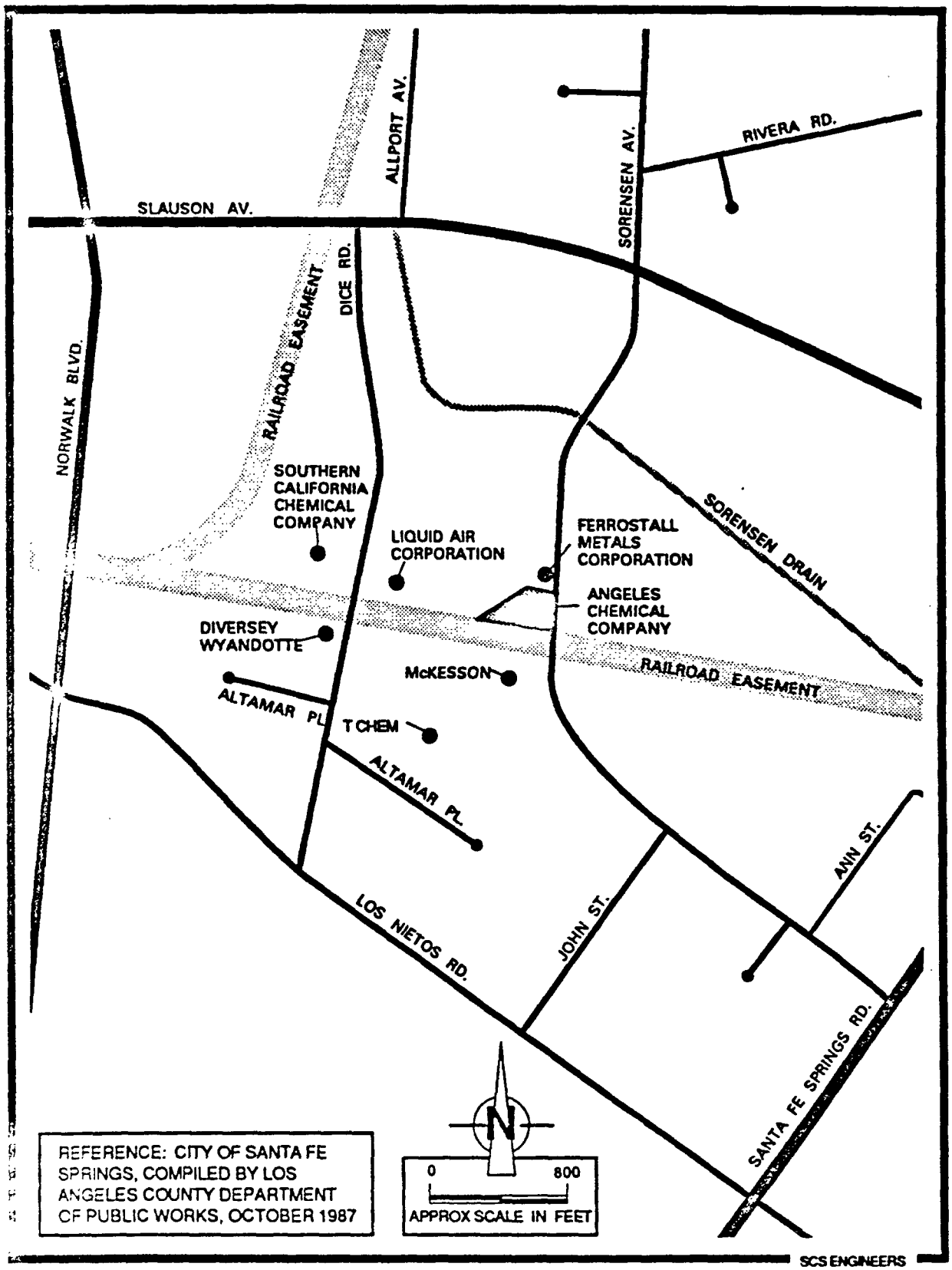
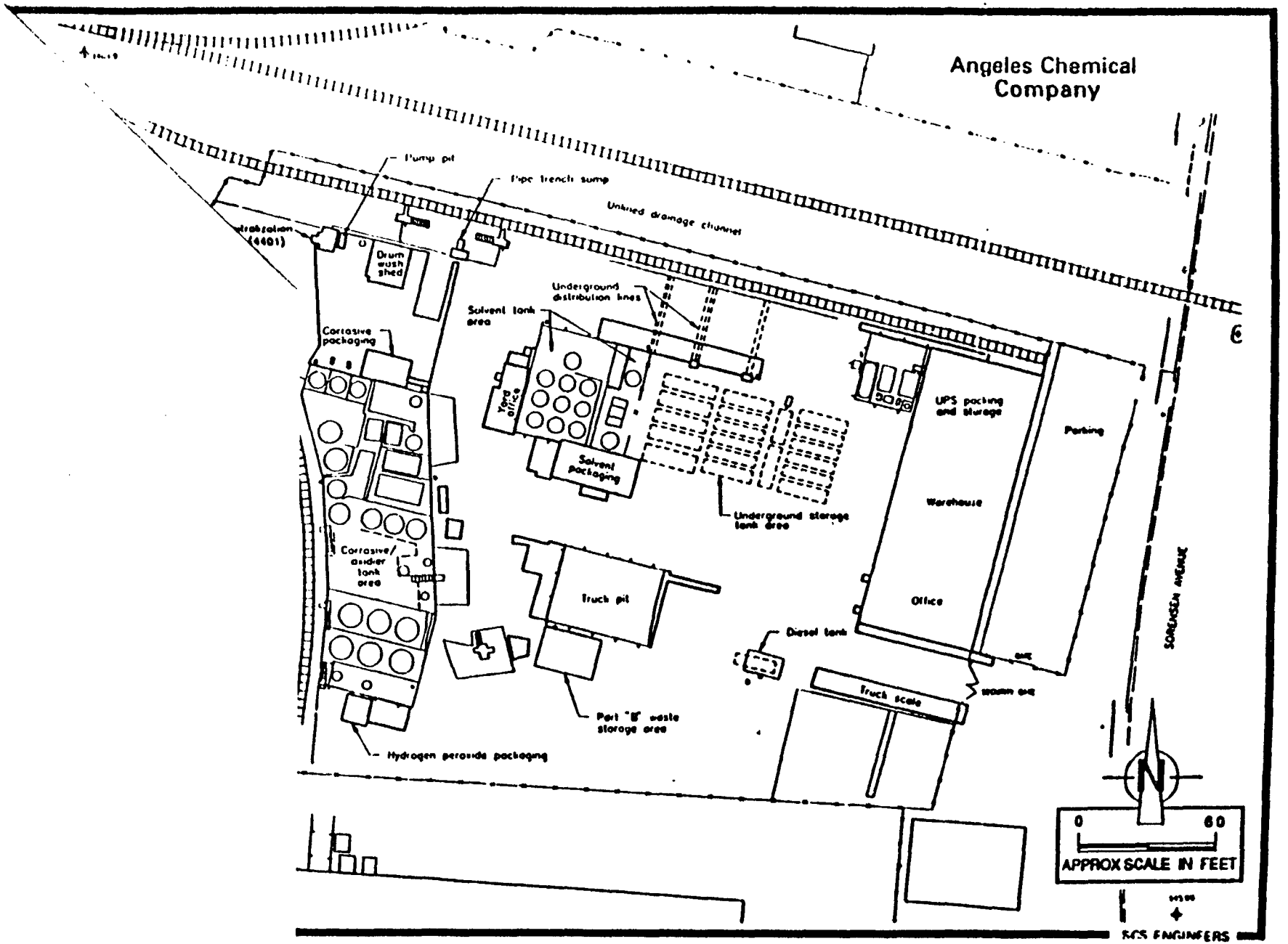


Figure 5. Facilities Neighboring Angeles Chemical Site, Santa Fe Springs, California.



w of McKesson Site, Santa Fe Springs, California.

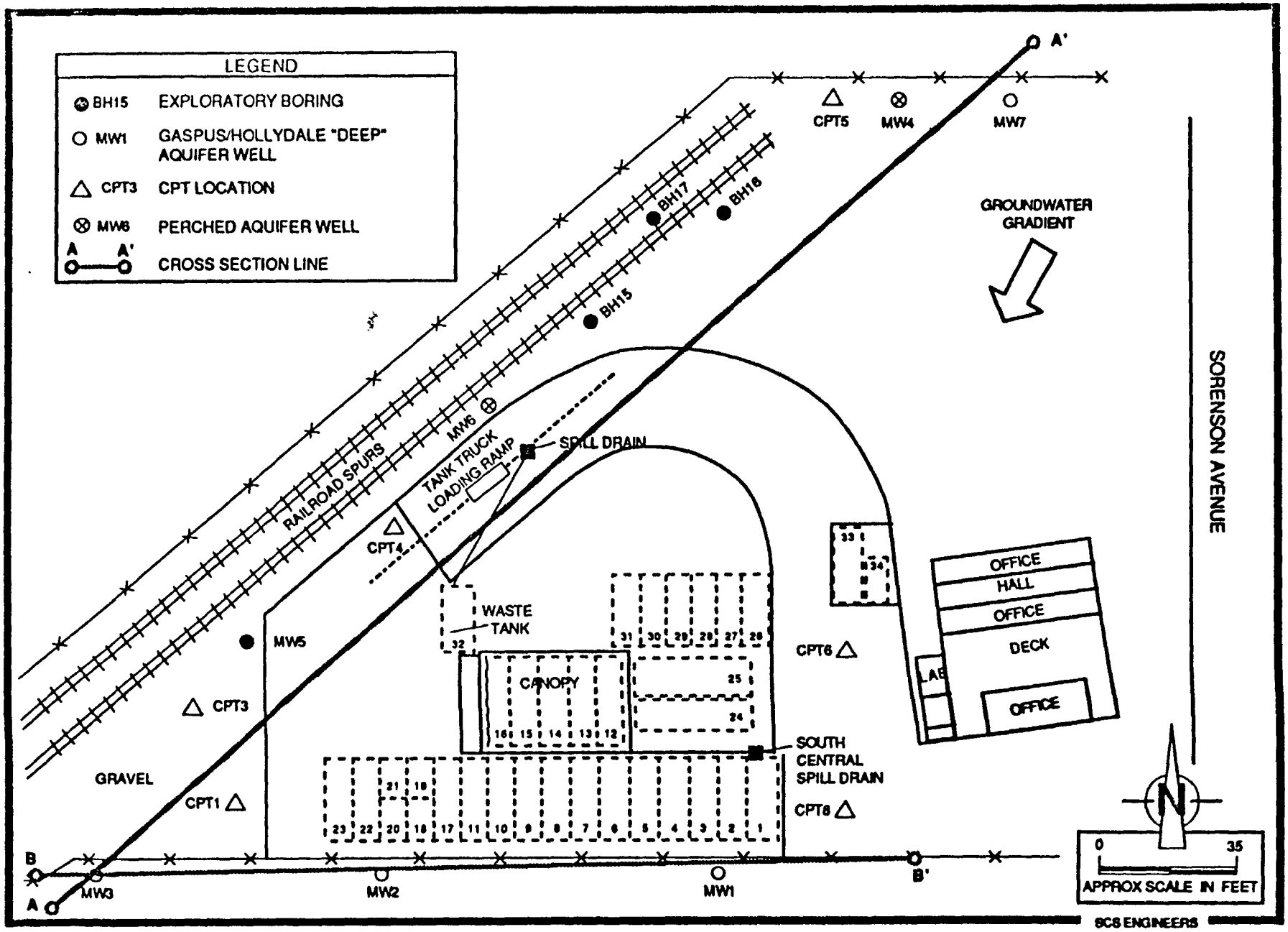


Figure 7. Approximate Locations of Borings, Wells, and CPT/Hydropunch from November 1993 through February 1994 RI at Angeles Chemical Site, Santa Fe Springs, California.

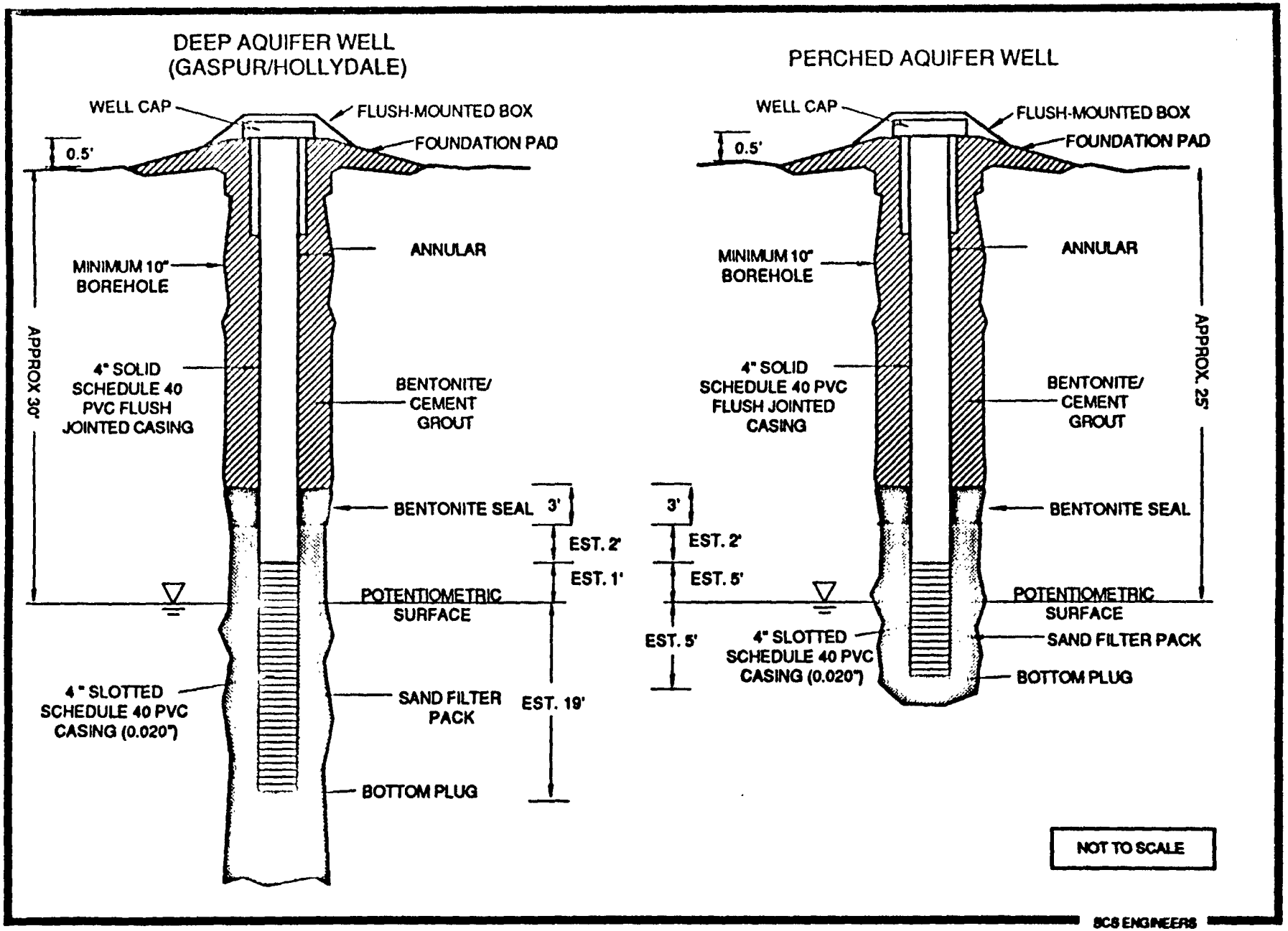


Figure 8. Typical Groundwater Monitoring Well Construction.

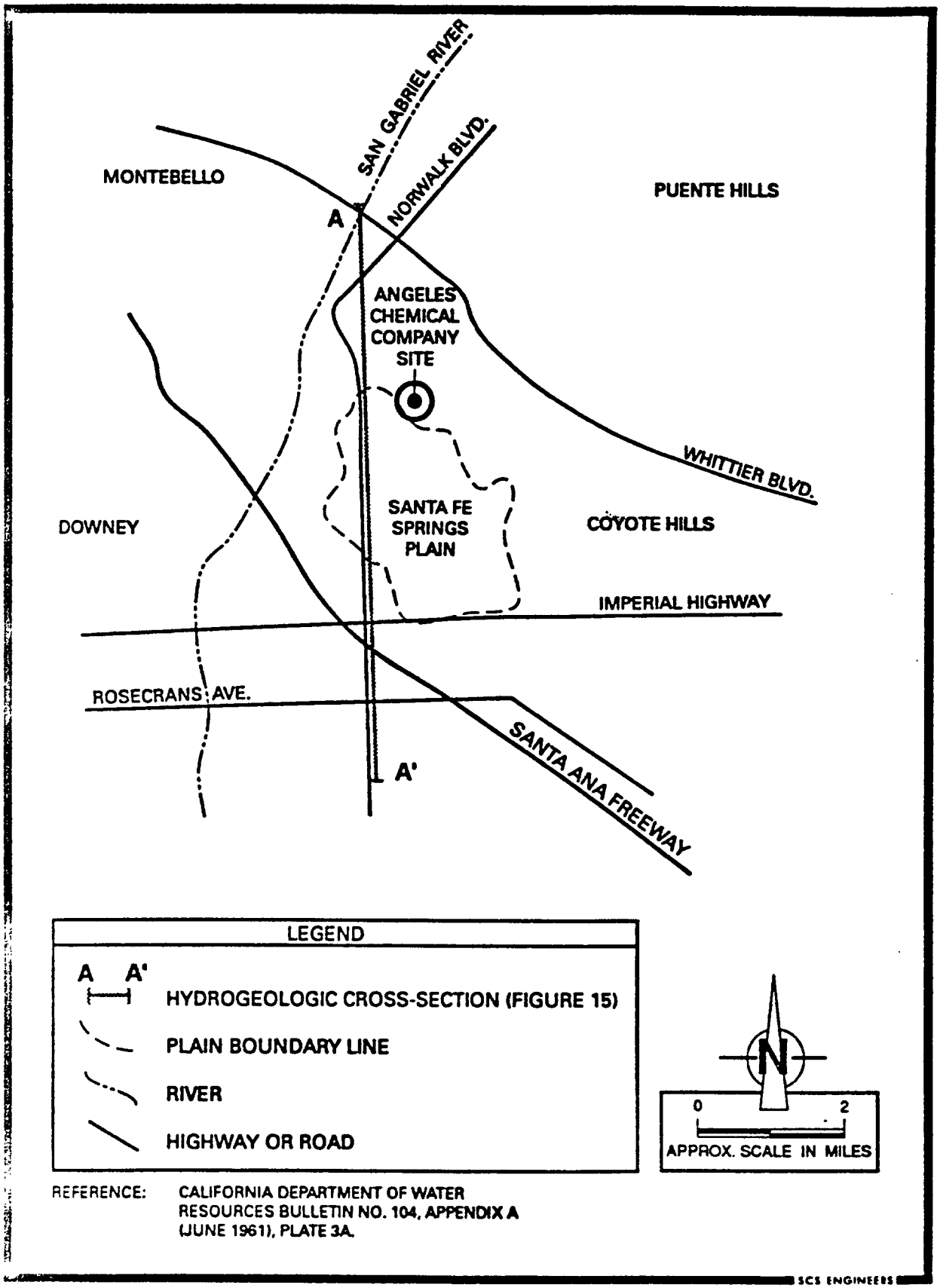


Figure 9. Physiographic Map, Angeles Chemical Company, Santa Fe Springs, California.

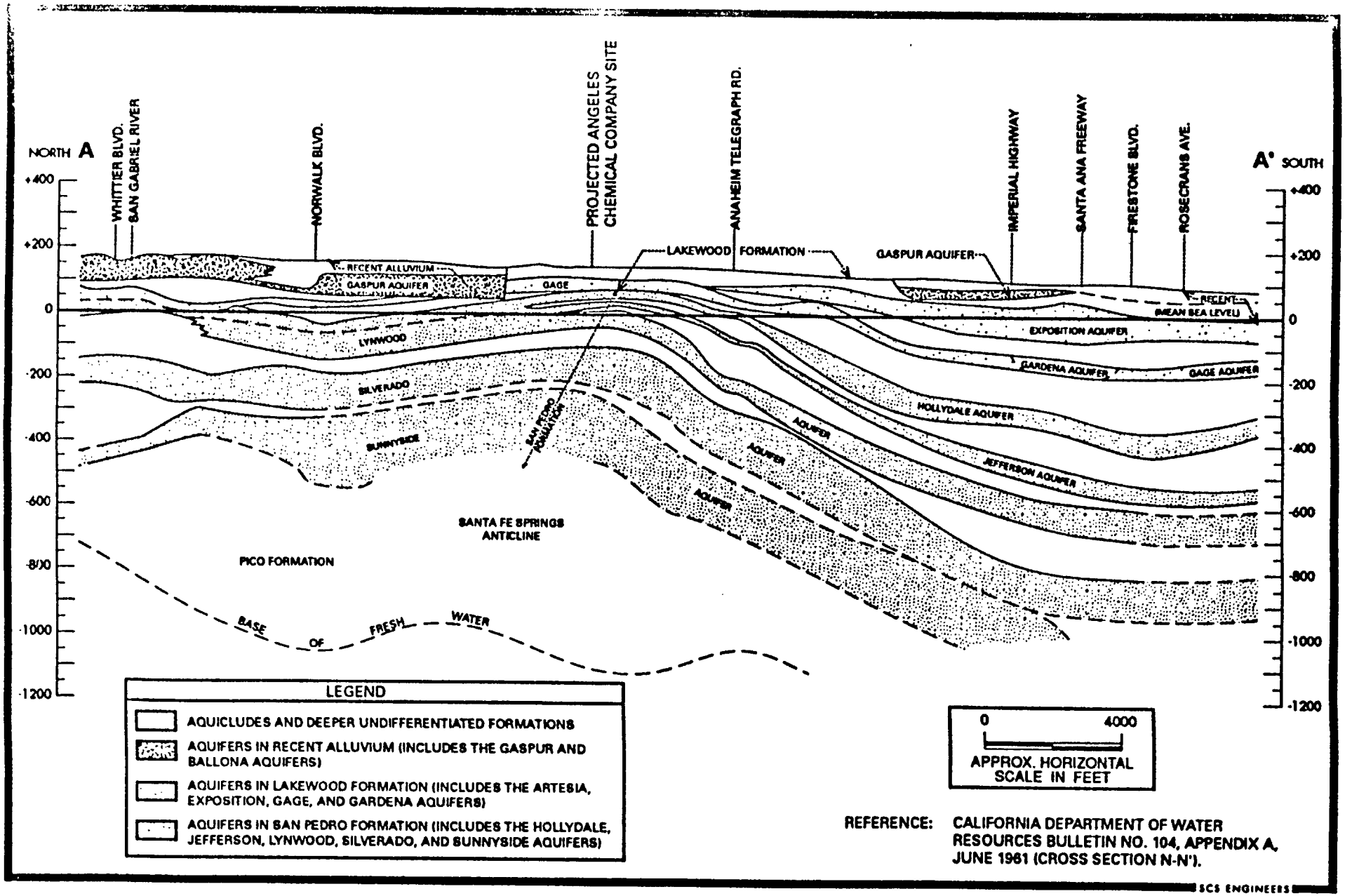


Figure 10. Hydrogeologic Cross Section, Angeles Chemical Company, Santa Fe Springs, California.

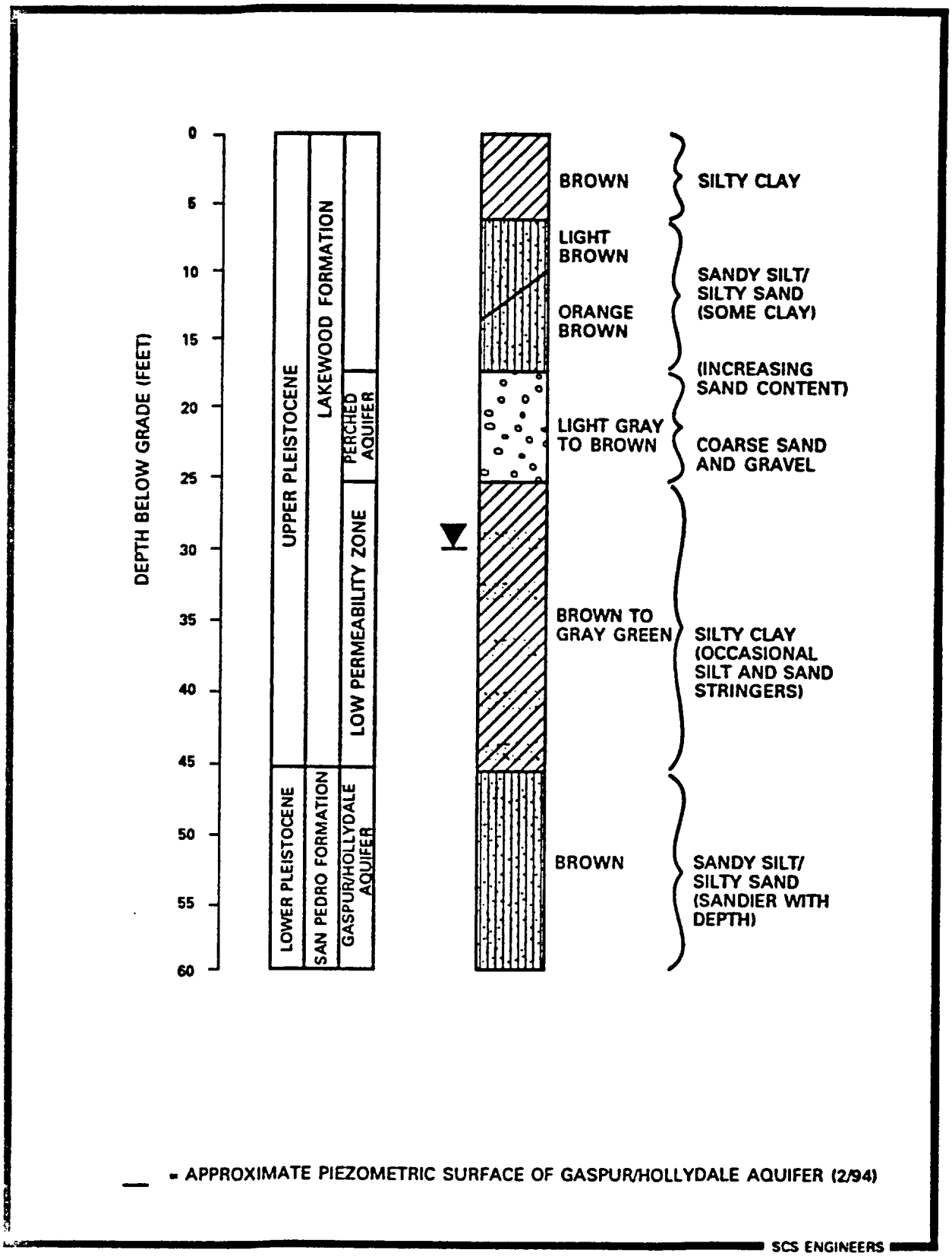


Figure 11. Generalized Stratagraphic Column, Angeles Chemical Company Site, Santa Fe Springs, California.

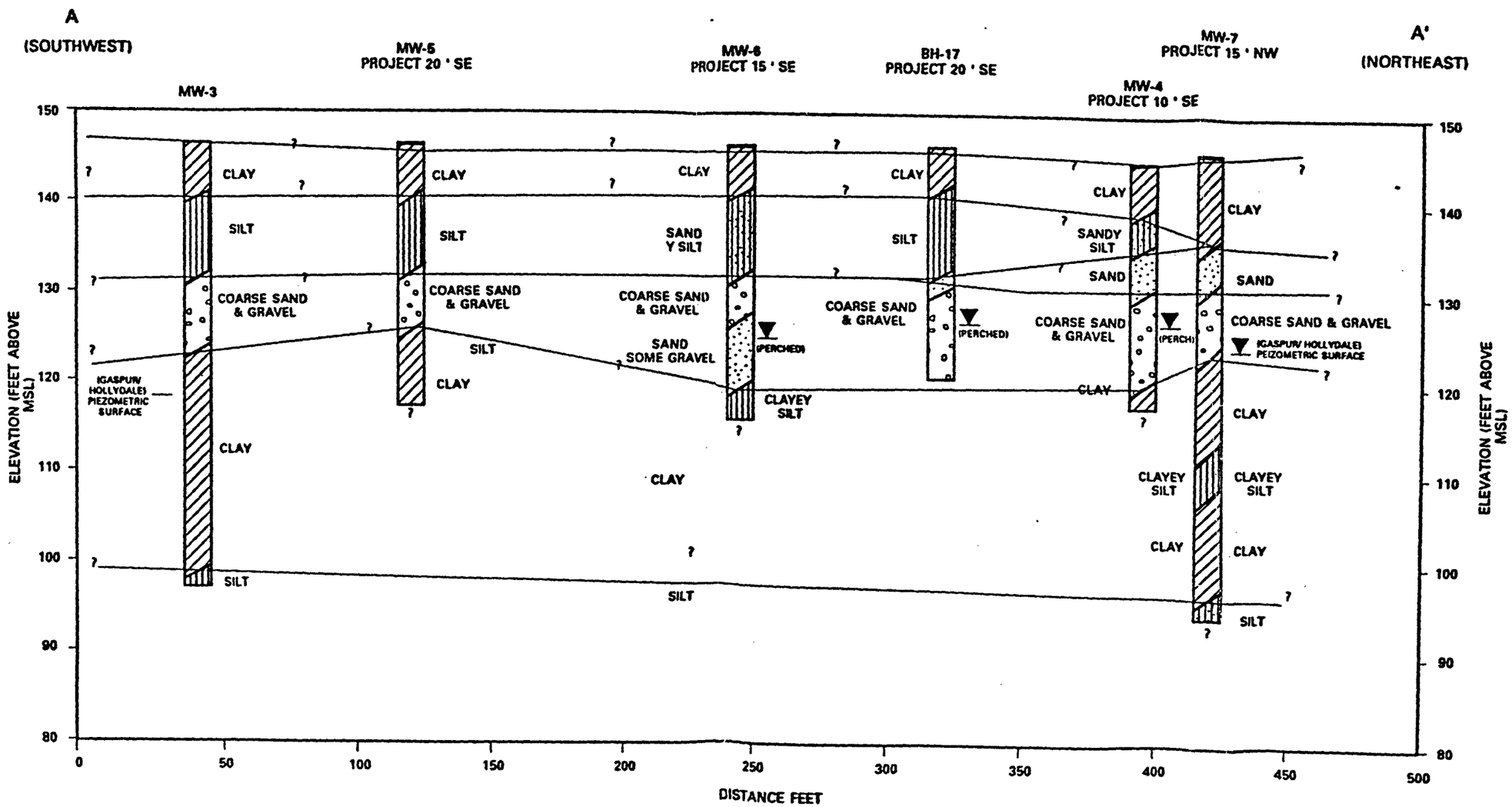
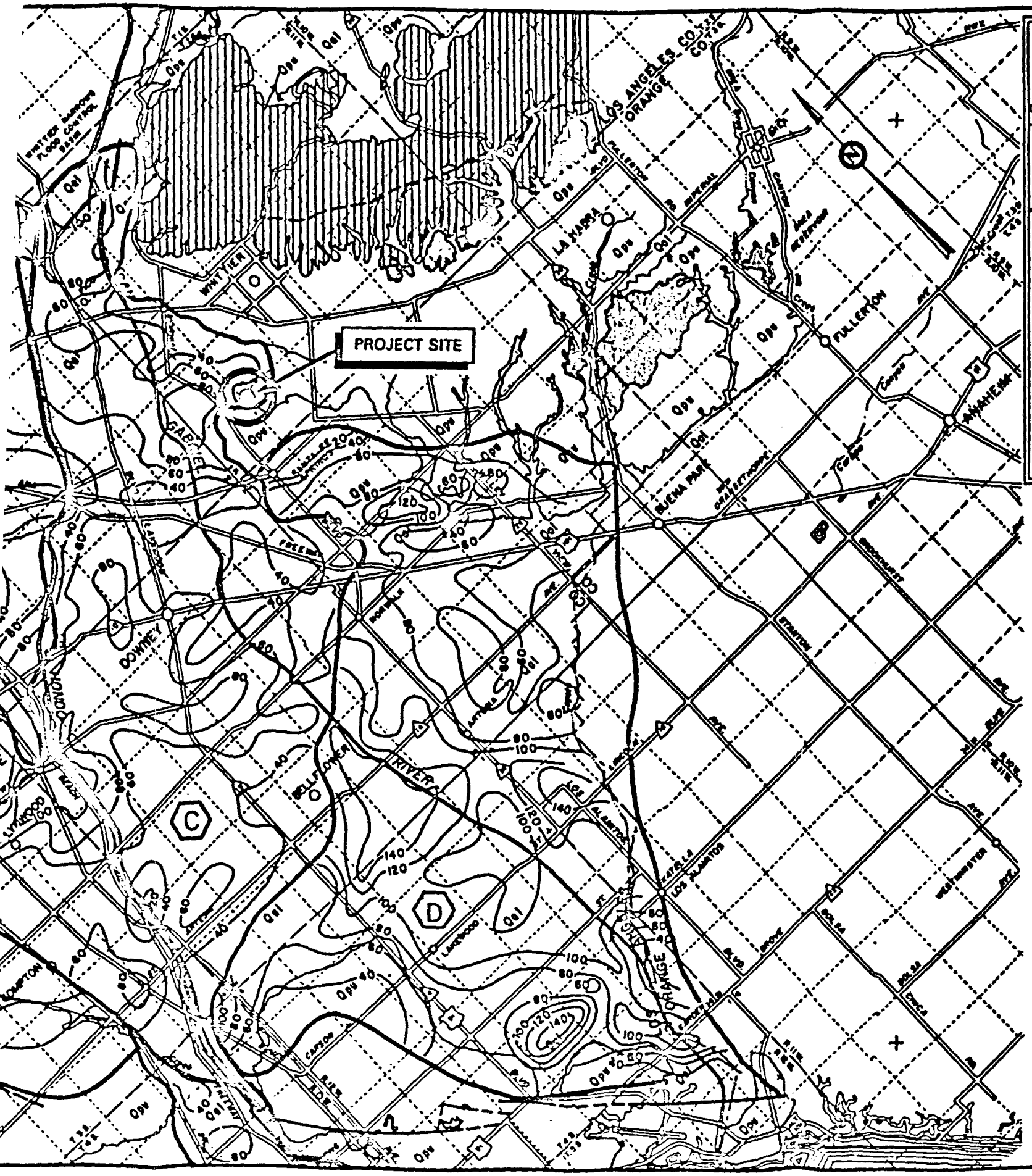
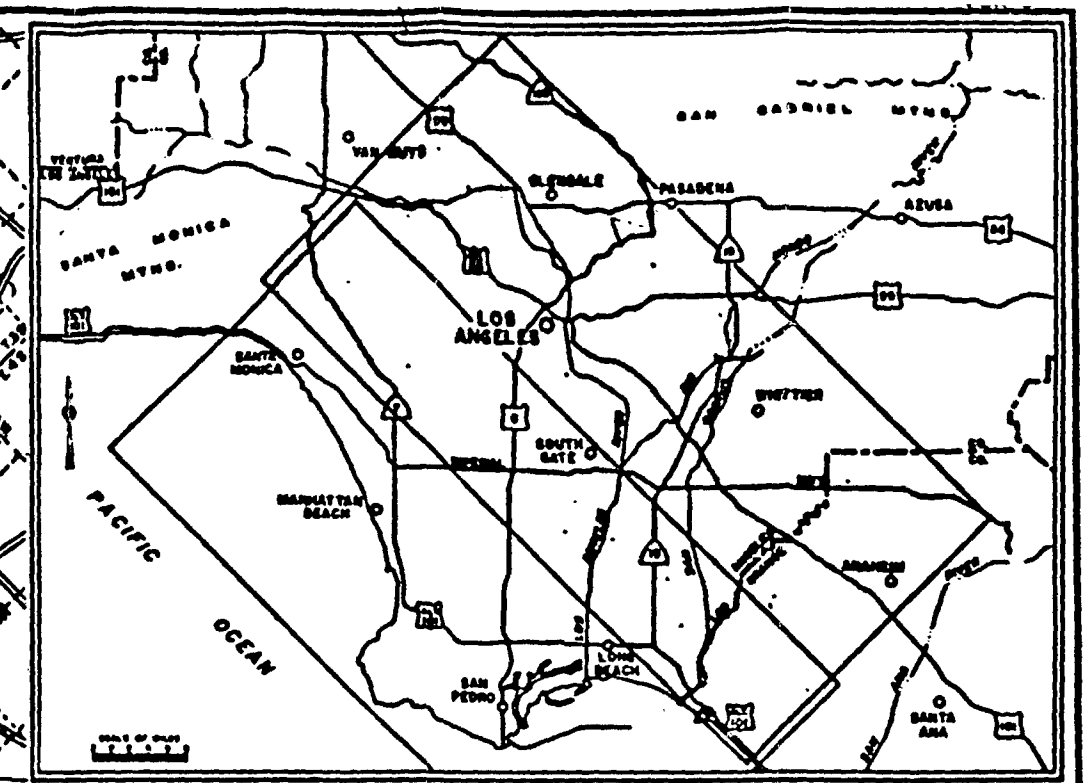


Figure 12. Cross Section A - A' Angeles Chemical Company, Santa Fe Springs, California.

SCS ENGINEERS





LOCATION MAP

LEGEND

SURFACE FEATURES

- Qal — RECENT ALLUVIUM
- Qpu — UPPER PLEISTOCENE DEPOSITS
- LOWER PLEISTOCENE DEPOSITS
- NONWATER-BEARING ROCKS

SUBSURFACE FEATURES

- BOUNDARY OF AQUIFERS (DASHED WHERE LOCATION IS APPROXIMATE)
- 80 — LINES OF EQUAL THICKNESS OF THE GASPUR, BALLONA, ARTESIA, AND EXPOSITION AQUIFERS (DASHED WHERE CONTROL IS POOR)
- FAULT (DASHED WHERE APPROXIMATELY LOCATED)
- C — GASPUR AQUIFER
- BALLONA AQUIFER
- D — ARTESIA AQUIFER
- E — EXPOSITION AQUIFER

FIGURE 16

STATE OF CALIFORNIA
DEPARTMENT OF WATER RESOURCES
SOUTHERN CALIFORNIA DISTRICT

GROUND WATER GEOLOGY OF THE COASTAL PLAIN OF LOS ANGELES COUNTY

LINES OF EQUAL THICKNESS OF THE GASPUR, BALLONA, ARTESIA, AND EXPOSITION AQUIFERS

SCALE OF MILES
1 0 1 2 3

1961

Underlying the Lakewood Formation are stratified deposits of sand, silty sand, silt, and fine gravel comprising the upper portion of the lower Pleistocene San Pedro Formation. The San Pedro Formation generally ranges from 700 to 800 feet in thickness in the site vicinity.

3.5 HYDROGEOLOGY

The site lies within the Central Basin Pressure area, a division of the Central Ground Water Basin which extends over most of the Coastal Plain. In this area the Gaspur aquifer, a part of the basal coarse unit of Recent Holocene deposits, is found within old channels of the San Gabriel and other rivers. The Gaspur may thin locally to approximately 40 feet in thickness, with its base at a depth of about 80 to 100 feet bgs. The underlying Gage aquifer is found within the Lakewood Formation. Data from Bulletin 104 indicate that the site is located close to the boundary at which the Gaspur truncates the Gage aquifer. In some areas, the Gaspur may be in contact with the Gage or underlying Hollydale aquifer.

Bulletin 104 (Plate 11A) indicates the Gaspur aquifer is present at the ACC site and that the Gage aquifer is not. Figure 9 presents the location of a cross-sectional line taken from Bulletin 104 running near the ACC site. Although Figure 10 illustrates the general area stratigraphy, the ACC site cannot be directly projected because the area in which the Gaspur is present intersects the cross section at a low angle. A representation of Plate 11A is provided in Figure 16.

The Hollydale aquifer is the uppermost aquifer in the San Pedro Formation. Bulletin 104 indicates that the Hollydale aquifer is approximately 30 feet thick in this area, with its top at a depth of about 70 feet bgs and its base at about 100 feet bgs.

The two aquifers encountered during drilling at the ACC site are (1) the perched aquifer at a depth of approximately 23 feet bgs, and (2) the Gaspur/Hollydale aquifer below a depth of approximately 45 feet bgs. Figure 11 illustrates a generalized stratigraphic column for units penetrated during the site investigation. Figure 7 shows the location of two geologic cross-sections across the site (Figures 12 and 13).

The McKesson RI report (HLA, 1992) designates the aquifer found below a depth of 45 feet as the Hollydale aquifer. This aquifer is equivalent to the one designated as the Gaspur/Hollydale herein. In addition, a discontinuous perched aquifer at depths of 20 to 25 feet bgs was designated the Gage aquifer at McKesson. This aquifer is equivalent to the one designated as the perched aquifer herein.

Based upon regional data (Bulletin 104), beneath the Gage/Hollydale aquifers is an aquitard, and below this the Jefferson aquifer, which is approximately 40 feet thick and has its base at about 175 feet bgs. Beneath the Jefferson aquifer is another aquitard, followed by the Lynwood aquifer, which is approximately 75 feet thick and has its base at about 275 feet bgs. Beneath the Lynwood aquifer is another aquitard, followed by the Silverado aquifer, which is approximately 200 feet thick and has its base at about 475 feet bgs. Beneath the Silverado is another aquitard, followed by the Sunnyside aquifer, which is approximately 275 feet thick and has its base at about 875 feet bgs. The Lynwood, Silverado, and Sunnyside aquifers are the major water-producing aquifers in the region.

Shallow subsurface material to a depth of 15 feet bgs consists primarily of silty clay with minor amounts of silt and sand. Poorly sorted, coarse-grained sand and gravel are found below the silty clay between approximately 15 and 26 feet bgs. The discontinuous perched aquifer detected under the northern portion of the ACC site is within this zone, at depths of 23 to 26 feet bgs.

A less permeable clayey zone, which apparently acts as an aquitard, typically exists beneath the zone of sand and gravel. This clayey zone continues to depths of approximately 40 to 50 feet bgs across the site (see Figure 11, 12, and 13). Within this clayey zone are occasional stringers of fine sand and silt, which are saturated at depths greater than about 34 feet bgs. Silt zones are present in MW1 from 35 to 45 feet bgs, in MW2 from 45 to 50 feet bgs, appears to begin at 50 feet bgs in MW3, and from 40 to 45 feet bgs and beginning at 55 feet bgs in MW7.

The top of the Gaspur/Hollydale aquifer is at approximately 45 feet bgs, but is not always defined by a distinct change in lithology and may be a gradual transition from clayey materials above, to sandier aquifer material. Only in MW1 was an obvious "aquifer sand" encountered at about 45 feet bgs through the total depth of MW1, which was 60 feet bgs. At the present time, the Gaspur/Hollydale aquifer is confined in most on-site locations. An apparent saturated zone was encountered in MW2 at approximately 34 feet bgs during drilling, without a clear change in lithology. A similar zone of water was encountered in MW3 at about 35 feet bgs.

During drilling in June 1990, the top of the Gaspur/Hollydale aquifer was measured at depths of 45 feet bgs in MW1. During drilling in February 1994, a saturated zone was encountered at about 34 feet bgs in MW2, and at about 53 feet bgs in MW7. In February 1994, the piezometric surface in monitoring wells was measured at about 30 feet bgs in MW1, MW2, and MW3, and at about 25 feet bgs in MW7. The piezometric level in the Gaspur/Hollydale, based upon well MW1, has risen approximately 15 feet in the last 3 years.

3.4.1 Regional Water Quality

There are four water production wells operated by the City of Santa Fe Springs located within the Santa Fe Springs city limits. Of these, the only one that draws water from the Gaspur/Hollydale aquifer is located over 9 miles south of the site. Water samples taken in November 1989 did not detect VOCs.

Santa Fe Springs Well No. 1, located near the corner of Burke Street and Dice Road approximately 0.4 miles north of the site, is screened in the Silverado and Sunnyside aquifers. Samples collected in June of 1991 indicated the presence of 1.1 ug/l of TCE. No other chemicals were detected.

Santa Fe Springs Well No. 4, located on Telegraph and Pioneer Road approximately 3.0 miles southwest of the site, is screened in the Lynwood, Silverado, and Sunnyside aquifers. Samples collected in May of 1991 indicated no VOCs.

Santa Fe Springs Well No. 304 WI, located near approximately 2.0 miles west of the site, is screened in the Silverado aquifer. Samples collected in May of 1991 indicated the presence of 0.5 ug/l of TCE and 1.6 ug/l of PCE. No other chemicals were detected.

Two wells owned by the City of Whittier are located approximately 7 miles north of the site. These wells draw water from 55 to 120 feet bgs, in what is probably the Gage aquifer. VOCs were not detected in these wells.

Groundwater data from surrounding sites are provided in Section 1.2.2.

3.6 DEMOGRAPHICS

Santa Fe Springs is a culturally and ethnically diverse community located approximately 20 miles southwest of central Los Angeles. Based upon the 1990 census, the population is 67 percent hispanic, 26 percent non-hispanic white, 4 percent Asian, 2 percent African-American, and 1 percent other. The city has a current population of approximately 16,000 permanent residents. However, about 70,000 to 80,000 people commute to the city daily to work at the estimated 3,000 businesses located within an area of approximately 8.75 square miles.

Established in the mid-1950s primarily as an industrial development, Santa Fe Springs has planned 85 percent of its area for business and industry. Approximately 30 State Bond Expenditure sites and one federal Superfund site are located throughout the city. In addition, six refineries and several hazardous waste treatment and storage facilities operate within city limits.

4.0 NATURE AND EXTENT OF CHEMICALS DETECTED

The nature and extent of chemicals detected on site during this and previous investigations are discussed below.

4.1 SOIL

Results of chemical analysis of soil samples collected during this investigation are summarized in Table 6. Results from previous investigations are summarized in Tables 1, 2, and 3. Analytical laboratory reports and chain-of-custody (COC) documentation for this investigation are presented in Appendix B.

A total of 14 separate VOCs were identified from soil analysis during this investigation. The five most prevalent compounds in terms of both concentration and frequency were acetone, MEK, PCE, toluene, and 1,1,1-TCA. Acetone was detected in 21 of the 37 samples (57 percent) at concentrations ranging from 0.05 to 39.7 mg/kg. 2-butanone was detected in 18 samples (49 percent) at concentrations ranging from 0.05 to 60.3 mg/kg. Both toluene and 1,1,1-TCA were detected in 17 samples (46 percent) at concentrations ranging from 0.01 to 48.7 mg/kg and 0.01 to 54.7 mg/kg, respectively. PCE was detected in 15 samples (41 percent) at concentrations ranging from 0.01 to 98 mg/kg. Other compounds, such as 1,1-DCA, 4-methyl-2-pentanone, and m&p-xylenes, were each detected in 13 of the 37 samples (35 percent).

On-site investigations in 1990, which focused on the south/central portion of the site adjacent to existing USTs, detected 13 different volatile compounds, including acetone, benzene, 1,1-DCA, 1,1-DCE, ethylbenzene, MEK, methylene chloride, MIBK, PCE, toluene, 1,1,1-TCA, TCE, and xylenes. The eight most prevalent compounds in terms of both concentration and frequency were acetone (36 percent), 2-butanone (33 percent), 4-methyl-2-pentanone (43 percent), PCE (37 percent), toluene (70 percent), 1,1,1-TCA (41 percent), ethylbenzene (38 percent), and xylenes (56 percent). A summary of the results of these investigations is provided in Tables 1 and 2.

In 1992, seven near-surface (0.5 to 1.5 feet bgs) soil samples were obtained along the railroad spur lines in the northwest portion of the site. Analytical data indicated elevated concentrations of TPH and VOCs, predominantly PCE, 1,1,1-TCA, xylenes, and toluene, A summary of the results of this investigation is provided in Table 3.

Based upon available data from all on-site investigations, the highest concentrations of detected chemicals in soil appear to be confined to two separate and distinct areas of: 1) northern railroad track and 2) the south central spill drain. This is discussed in detail below.

4.1.1 Northeast Railroad Spur Area

Based upon data from 12 sample locations (RR-1, RR-2, RR-3, RR-4, RR-5, RR-6, RR-7, BH-15, BH-16, BH-17, MW4, and MW6), elevated concentrations of VOCs and TPH have been detected in shallow soils (0.5 to 10 feet bgs) in the immediate vicinity of the northeast portion of the railroad spur. Concentrations of VOCs generally decrease with depth (i.e., BH-15, BH-16, and BH-17), but are again found to be elevated at sample

depths of 20 feet bgs (i.e., MW4 and MW6). This may be associated with deposition of VOCs from perched groundwater on soil grains.

Acetone (39.7 mg/kg), 2-butanone (60.3 mg/kg), and 1,1-DCA (0.7 mg/kg) were detected in shallow soil samples (1 to 5 feet bgs) from BH-17. Concentrations of most other detectable VOCs in BH-17 were generally second only to those from the 20-foot bgs sample from MW4. This MW4 sample indicated site maximum concentrations for four compounds, including 4-methyl-2-pentanone (12 mg/kg), PCE (98 mg/kg), 1,1,1-TCA (54.7 mg/kg), and TCE (16.5 mg/kg). Boring MW6 was the only location in which 1,2-DCA was detected (0.18 mg/kg).

4.1.2 South/Western Portion of Site

Soil samples collected from location MW5 near the southwest portion of the railroad track indicates non-detect to low concentrations of six compounds at shallow depths (2 to 5 feet bgs). Acetone and 2-butanone were detected only at a depth of 20 feet bgs in MW5.

Soil samples collected from MW2, along the southwest boundary of the ACC property, indicate non-detect concentrations of VOCs at 5 and 10 feet bgs, one compound (acetone at 0.97 mg/kg) at 20 feet bgs, and low concentrations of six compounds at 30 feet bgs, and slightly higher concentrations of VOCs at the 40-foot bgs depth (with 11 compounds).

Soil samples collected from MW3, along the southwest boundary of the ACC property, indicate low to non-detect concentrations of VOCs at 5 feet bgs, all VOCs are non-detect at 10 feet bgs, one compound (acetone at 0.26 mg/kg) at 20 feet bgs, slightly higher concentrations of VOCs were detected at 30 feet bgs (10 detectable compounds), and non-detect VOCs at 40 feet bgs, with the exception of very low concentrations of 1,1-DCA (0.02 mg/kg) and PCE (0.07 mg/kg).

Soil samples collected from MW1, along the southern boundary of the ACC property, indicate low to non-detect concentrations of most VOCs, with the exception of acetone (0.43 to 21 mg/kg), at 10, 20, and 25 feet bgs. Concentrations of VOCs increase at the 30-foot bgs depth (9 detectable compounds), and VOCs are low to non-detect at 35 feet bgs, with the exceptions of methylene chloride (6.8 mg/kg) and xylene (2.4 mg/kg), and non-detect at 40 feet bgs, with the exception of acetone (15 mg/kg).

4.1.3 Northeast Corner of Site

Soil samples collected from boring MW7 near the northeast corner of the site indicates no detectable VOCs at the 5 and 10-foot bgs depths, with the single exception of 0.01 mg/kg of 1,1-DCA at 5 foot bgs. Only two compounds, acetone (0.12 mg/kg) and 2-butanone (0.15 mg/kg) were detected at 20 feet bgs. Elevated concentrations of acetone (6.05 mg/kg) and 2-butanone (29.7 mg/kg) were detected at 30 feet bgs along with low concentrations of four other compounds. At 40 feet bgs, only one compound, 1,1-DCA (0.02 mg/kg) was detected.

4.1.4 Southcentral Portion of Site

Based upon data collected from exploratory borings during previous on-site investigations, elevated concentrations of VOCs have been detected in soils in the immediate vicinity of a broken drain pipe near the south central spill drain. Analytical results using EPA Method 8240 indicated 13 different VOCs (see Tables 1 and 2). Concentrations of VOCs generally decrease with depth but in some areas appear to increase again at sample depths greater than 20 feet bgs. This increase may be associated with the contaminated Gaspur\Hollydale aquifer, discussed below.

4.2 GROUNDWATER

Results of the chemical analyses of groundwater samples collected during previous investigations are summarized in Table 2, with laboratory reports and COC documentation presented in Appendix E.. Analytical results from the RI are summarized in Tables 7 and 8, with laboratory reports and COC documentation presented in Appendix B.

4.2.1 Perched Aquifer

A perched aquifer was encountered in two of seven borings drilled during this investigation. Two monitoring wells (MW4 and MW6) were installed to monitor this aquifer along the northern portion of the site near the railroad tracks. Sampling and analyses conducted in February 1994 indicate the perched aquifer has elevated concentrations of VOCs. The perched aquifer appears to be discontinuous, and appears limited to the northern portion of the site; thus, an estimate of the groundwater flow direction and gradient based on data from the ACC site cannot be made at this time.

Eleven VOCs were detected in groundwater from the two perched aquifer wells (MW4 and MW6) during this investigation. The compounds identified are:

- Benzene (111 to 848 ug/l).
- Toluene (12,700 to 15,300 ug/l).
- Ethylbenzene (1,180 to 2,980 ug/l).
- Xylenes (4,362 to 5,420 ug/l - total xylenes).
- 1,1-DCA (1,410 to 2,570 ug/l).
- 1,2-DCA (<100 to 1,240 ug/l).
- 1,1-DCE (806 to 1,920 ug/l).
- Methylene Chloride (4,760 to 21,400 ug/l).
- PCE (2,130 to 3,320 ug/l).
- 1,1,1-TCA (36,200 to 118,000 ug/l).
- TCE (1320 to 14,300 ug/l).

General mineral analyses indicate that water from MW4 is of a magnesium sulfate type, and water from MW6 is a calcium chloride type. Water from the two perched aquifer wells is chemically different, suggesting different source areas for different parts of the perched aquifer. The fact that MW6, located closest to the former calcium carbide sludge pit on the LAC site, exhibits high TDS and elevated concentrations of calcium may indicate influence by the LAC sludge pit. The aquifer water is not potable quality, even without

considering VOC contaminants. All groundwater samples exceeded primary state drinking water MCLs for various quality parameters, including TDS, specific conductivity, chloride, sulfate, iron, and manganese.

4.2.2 Gaspur/Hollydale Aquifer

Three new monitoring wells (MW2, MW3, and MW7) were installed into the Gaspur/Hollydale aquifer during this investigation. Sampling and analyses of these three wells and a previously installed well (MW1) were conducted in February 1994. Data indicate elevated concentrations of VOCs. Groundwater flow appears to be to the south-southwest.

Eleven VOC compounds were detected in the groundwater from the four wells (MW1, MW2, MW3, and MW7) during this investigation. The compounds identified, which are the same as those in the perched aquifer, are:

- Benzene (63 to 194 ug/l).
- Toluene (398 to 7,390 ug/l).
- Ethylbenzene (45 to 1,720 ug/l).
- Xylenes (186 to 7,790 ug/l - total xylenes).
- 1,1-DCA (85 to 2,130 ug/l).
- 1,2-DCA (<100 to 31 ug/l).
- 1,1-DCE (151 to 2,800 ug/l).
- Methylene Chloride (<50 to 6,530 ug/l).
- PCE (134 to 5,370 ug/l).
- 1,1,1-TCA (90 to 9,370 ug/l).
- TCE (45 to 7,160 ug/l).

Well MW7 is the most upgradient well location on site. This well contains lower concentrations of VOCs than the three downgradient wells, with the single exception of 1,1-DCA (2,130 ug/l).

General mineral analyses indicate that the Gaspur/Hollydale aquifer water is not potable quality, even without considering VOCs. All groundwater samples exceeded primary state drinking water MCLs for various quality parameters, including TDS, specific conductivity, chloride, sulfate, iron, and manganese.

Relatively high concentrations of calcium in downgradient wells MW2 and MW3 suggest the influence of the LAC calcium carbide sludge pit. It may be postulated that LAC impacted water, migrating southward along the discontinuous perched aquifer, eventually migrates downward to the Gaspur/Hollydale aquifer south of the limits of the aquiclude which underlies the perched aquifer.

Laboratory data indicate pH ranges from 7.28 in MW3 to 6.37 in MW7. Relatively high concentrations of iron (33.9 mg/l), magnesium (128 mg/l), and manganese (10.3 mg/l) may be the result of dissolution of particulate matter within the sample by the sample preservative.

Approximately 0.10 feet (about 1-inch) of free product was detected floating on the groundwater surface in well MW1. Sampling was conducted using a teflon bailer. This

technique resulted in the collection of a mixture of free product and water, therefore, it was necessary to fill a 1-liter bottle in order to accumulate enough free product to analyze.

A sample of the free product was analyzed using EPA Method 8015 modified. Analytical results indicated total petroleum hydrocarbons (TPH) of 38,500 mg/kg; however the laboratory indicated that identification as to the exact nature of the free product was difficult. Due to this difficulty, the free product was also analyzed using EPA Method 8240 to provide additional compound parameters in order to assess the nature of the product.

The 8240 analysis was performed after state recommended holding times; however, this is not relevant as the goal of this analysis was to provide an indication as to the nature of the product, and not to quantify it. The 8240 data indicate that the product is probably a mixture of several chemicals (see Table 8). No samples for general water quality parameters were collected or analyzed for this well.

5.0 CONTAMINANT FATE AND TRANSPORT

5.1 FATE AND TRANSPORT OF CHEMICALS IN SOIL

Subsurface distribution of chemicals can be related to the properties of these compounds and characteristics of the local subsurface geologic and hydrogeologic settings. The northeast railroad spur area and the south-central drain area were the principal areas identified with shallow subsurface (0.5 to 10 feet bgs) impacted soils. Elevated concentrations of chemicals were also detected at depth (> 20 feet bgs) in some borings. This may be due to deposition of VOCs from the perched and Gaspur/Hollydale aquifers to soils during periods of high groundwater elevation. Each of these areas is discussed in detail below.

5.1.1 Northeast Railroad Spur

Elevated concentrations of VOCs and TPH have been detected in shallow soils in the immediate vicinity of the northeast railroad tracks. Concentrations of VOCs generally decrease below a depth of 10 feet. Concentrations of chemicals, such as acetone and MIBK appear to decrease with depth, however, they may still have migrated to perched groundwater. In addition, based upon concentrations of VOCs detected in the furthest upgradient perched zone well (MW4), it appears that some migration of VOCs from off-site sources may also have taken place.

5.1.2 South Central Spill Drain

Subsurface piping originally leading from a former sump in the central portion of the site was severed, during installation of two additional USTs in 1982. This allowed VOC-impacted runoff which collected in a concrete catch basin near the south central drain to discharge into soils through the break in the pipeline. Boring BH-14, which is closest to the south central drain, contained the highest concentrations of VOCs of any boring, although concentrations were not as high as the grab samples taken directly beneath the severed piping. Grab samples indicated concentrations of total VOCs 45 to 90 times as high as the highest concentrations found in samples from nearby soil borings BH-5 and BH-6.

Concentrations of total volatile organics were found to have a generally decreasing trend with depth; however, VOCs are found in all soil samples analyzed in boring BH-14 to a depth of 40 feet bgs. Thus, it appears that downward migration of VOCs has occurred and that these have reached groundwater (Gaspur/Hollydale aquifer). VOCs were found in groundwater well MW1, approximately 50 feet downgradient from the drain area. Figure 15 presents a schematic illustration of the distribution of total VOCs in soils near the severed piping.

5.1.3 Aquifer Deposition

Chemicals present within the water column can spread laterally within the aquifer by advective, dispersive, and diffusive mechanisms. Seasonal or other changes in groundwater levels can result in chemicals which become adsorbed onto soil grains during high groundwater, remaining in the soil as water levels fall. This could create a smearing

effect, resulting in the relatively higher concentrations of contaminants in soils at depths of 30 to 40 feet bgs, than in shallower soils. For example, groundwater in the Gaspur/ Hollydale aquifer has risen approximately 10 feet in the past 2 to 3 years.

5.2 FATE AND TRANSPORT OF CHEMICALS IN GROUNDWATER

The relative effect of groundwater transport mechanisms (advection, dispersion, and diffusion) on the migration of chemical compounds is dependent on aquifer properties including heterogeneity, permeability, and on hydraulic gradient.

5.2.1 Perched Aquifer

The perched aquifer was encountered along the northern portion of the site (MW4 and MW6) and appears to be absent along the southern portion of the site. This aquifer exists because a relatively low permeability zone, underlying the sand and gravel of the aquifer zone, acts as an aquiclude.

5.2.2 Gaspur/Hollydale Aquifer

In comparing the concentrations between upgradient well MW7 and downgradient wells MW1, MW2, and MW3, concentrations of chemicals appear relatively higher in the downgradient direction, which is to the southwest. Since VOCs are found in the upgradient Gaspur/Hollydale aquifer well (MW7), some migration of VOCs from off-site upgradient source(s) may have taken place.

6.0 RISK EVALUATION

The purpose of this portion of the RI document is to develop a protocol for a baseline human health risk assessment (HRA) at the Angeles Chemical facility.

The purpose of an HRA is to evaluate the probability and magnitude of potential health effects posed to the public by the site by existing site conditions. The objective of the HRA will be to provide upper-bound health conservative estimates of the potential human health impacts that may be attributable to the chemicals detected at the site.

This document contains methodologies to be followed and assumptions to be made during preparation of the HRA for the subject site. The HRA will address current and future potential health effects based on the assumption that site conditions will remain unchanged (i.e., no clean-up will take place). However, information developed during the HRA may be utilized to determine health risk-based clean-up levels for the site.

A separate HRA document will be prepared and submitted based on the protocols presented herein, which form a conceptual workplan. The HRA report will contain the sections discussed below.

6.1 SITE CHARACTERISTICS

In this section of the HRA document, information regarding the environmental and physical setting of the site will be summarized. Critical characteristics expected to influence the degree of chemical release and their subsequent transport to a potentially exposed population will be included. These factors will include, but will not be limited to, topography, climatology, meteorology, vegetation, geology, soil lithology, groundwater hydrology, surface hydrology, zoning, and land use.

In addition, local and regional demographic data will be evaluated to assess the potential impacts of site contaminants on nearby populations. This will include an assessment of groundwater consumption within the region.

6.1.1 Summary of Site Investigation

A brief summary of site investigations conducted to date will be presented in the HRA with emphasis on the scope and findings of these investigation (i.e., the nature, concentration, and distribution of contaminants). The investigation results will also be summarized in tabular form. These data will include pertinent information which is presented in this RI report.

6.1.2 Data Selection for Risk Assessment

The selection of data suitable for HRA begins with determining whether existing data are representative of site conditions as they exist today. Each data set will be evaluated according to the U.S. EPA guidelines (EPA, 1989a) regarding the appropriateness of sampling protocols and procedures used in collecting and analyzing the samples. Also, data quality will be evaluated through the review of data qualifiers. A summary of data deemed suitable for risk analysis will also be presented in this section.

6.1.3 Background Data

During the HRA, if deemed necessary, background data will be obtained for site contaminants. Since only VOCs are of concern at the site, background concentrations of VOCs will be assumed to be non-detect (ND) within on-site soils. However, since there are likely other off-site sources of VOCs within local and regional groundwater, a separate assessment of "background" concentrations for VOCs in groundwater may be necessary. These background data will be subject to a statistical analysis such that "background" data will be assumed to be within two standard deviations from the mean of the data (95 percent upper confidence limit [UCL] of the data).

6.2 SELECTION CRITERIA FOR CHEMICALS OF CONCERN

The objective of this section is to identify specific chemicals which may pose a potential public health risk. Representative concentrations (RCs) will be determined for the chemicals of concern. The RCs will be defined as the lesser of the maximum detected concentration and the 95 percent UCL of the mean concentration.

The HRA document will present a table summarizing the VOCs detected at the site, including frequency of detection (number of detected concentrations of compound per total number of samples), number of locations (total number of exploratory boring locations where compound was detected), and range of detected concentrations. In the initial screening to select chemicals of concern, chemicals that have toxicity values, criteria, or guidance numbers will be selected. Furthermore, chemicals will also be screened in accordance with EPA and State of California guidelines for frequency of detection and fate and transport in the environment (EPA, 1989a; DTSC, 1992). Based on toxicity data, fate, and transport information, and frequency of detection, chemicals of concern will be selected as representative compounds for further risk analysis.

The following chemicals have been detected at the site in varying concentrations and frequencies. An asterisk (*) denotes EPA weight-of-evidence classifications A, B1, and B2 carcinogens (see Section 6.5, Toxicity Assessment, for more information on EPA classifications for carcinogens):

- Soil:

  - Acetone.
  - Benzene*.
  - 2-Butanone.
  - 1,1 Dichloroethane (1,1-DCA).
  - 1,2 Dichloroethane (1,2-DCA)*.
  - 1,1 Dichloroethene (1,1-DCE).
  - Ethylbenzene.
  - 4-Methyl-2-Pentanone.
  - Tetrachloroethylene (PCE)*.
  - Toluene.
  - 1,1,1-Trichloroethane (1,1,1-TCA).
  - Trichloroethene (TCE)*
  - Xylenes.

- Groundwater:

  - Acetone.
  - Benzene*.
  - 1,1-DCA.
  - 1,2-DCA*.
  - 1,1-DCE.
  - Ethylbenzene.
  - Methylene Chloride*.
  - PCE*.
  - Toluene.
  - 1,1,1-TCA.
  - TCE*
  - Xylenes.

Note that only EPA weight-of-evidence classifications A, B1, and B2 carcinogens (EPA, 1989a) detected at the site will be assessed as part of this HRA. Based on information generated during this phase of the HRA, indicator chemicals will be selected and evaluated throughout the remainder of the HRA. Toxicity, fate, and transport characteristics of chemicals of concern selected from the above list will be presented in an appendix of the final HRA report.

6.3 EXPOSURE ASSESSMENT

Once the chemicals of concern are identified, populations which might potentially be exposed and exposure pathways for those populations will be determined and discussed in this section of the HRA document. Exposure modeling for this risk assessment will follow Superfund guidelines which state that "risk assessments should be based on estimates of reasonable maximum exposure (RME) expected to occur under both current and future land use conditions." The reasonable maximum exposure is defined as the highest exposure (i.e., chemical intake) that is reasonably expected to occur due to the site contamination. RMEs are estimated for individual pathways. If a population is exposed through more than one pathway, the combination of exposures across pathways also must represent an RME (EPA, 1989a).

6.3.1 Identification of Potentially Exposed Populations

As stated above, Superfund guidance for risk assessment (EPA, 1989a) specifies that risks be estimated for an RME. To achieve this goal, it is necessary to identify the probable areas of impact, potentially exposed populations (size, composition, their relative locations with respect to the site, and their activities), and current and future uses of the site and the surrounding areas. In this HRA, a 2-mile radius around the site is delineated as the area of potential maximum impact for off-site receptors.

Demographic characteristics in this area will be determined by compiling residential, commercial, and industrial population data and their projected growth rates, and sensitive populations (i.e., schools, day care centers, nursing homes, retirement communities).

6.3.2 Identification of Exposure Pathways

To determine the extent and magnitude of exposures to populations, the pathways of exposure to those populations will be analyzed. This analysis will take into account the sources of contaminants, release mechanisms, fate and transport in different media, receiving media, exposure points, exposure routes, and targeted populations. The results of this analysis (i.e., the pathways which will be addressed in the HRA) will be presented in tabular form within the HRA document.

The following populations will be considered to be potentially exposed:

Present Scenario--

- On-site populations:
  - Workers.
- Off-site populations:
  - Residents (adult and children) within 2-mile radius of the site.
  - Workers within 2-mile radius of the site.
  - Sensitive populations (i.e., schools, day care centers, hospitals, retirement communities, etc.) within 2-mile radius of the site.

Future Scenario--

- On-site populations:
  - Workers.
  - Residents (adults and children).
- Off-site populations:
  - Residents (adults and children) within 2-mile radius of the site.
  - Workers within 2-mile radius of the site.
  - Sensitive populations within 2-mile radius of the site.

6.3.3 Estimation of Exposure Point Concentrations (EPCs)

Populations on site and off site may be exposed to site contaminants via several general pathways: oral ingestion, dermal contact, and inhalation. Once all complete pathways of exposure are identified, population exposure to chemicals of concern through each pathway will be estimated as discussed below. Exposure Point Concentrations (EPCs) will be determined for each chemical of concern within each exposure pathway. Specific approaches for determining these EPCs are presented below.

Contaminant Migration from Soil to Groundwater; Groundwater Modeling--

SESOIL modeling--Contaminants present in soil will be assumed to migrate toward groundwater over time. In order to estimate the resulting contaminant concentrations in

groundwater as a result of soil contaminant leaching, computer modeling will be utilized. An EPA-approved vadose zone model, SESOIL (Seasonal Soil Compartment Model), will be used for this purpose (Bonazountas, et al., 1981). SESOIL is designed to conduct long-term environmental fate simulations of pollutants in the vadose zone. Using existing analytical data from soil samples, SESOIL can simulate movement of pollutants in the vadose zone and predict the amount of pollutant which will enter groundwater.

SESOIL includes assumptions about environmental fate processes, the handling of temporal and spatial variations, and the applicability to different fate and transport scenarios. The user must specify climatic conditions (i.e., precipitation), soil and pollutant characteristics, and various application parameters, including the following: (1) the width, length, and depth of the hypothetical contaminant soil column; (2) simulation time for model in order to predict maximum groundwater contaminant concentrations; (3) detailed climatic data; (4) absence or presence of infiltration barriers, (5) homogeneous soil type, and (6) rate of degradation processes.

Simulations will be carried for a 99-year period in order to estimate maximum contaminant concentrations over a human lifetime. Input parameters will be determined based on site-specific conditions or the most applicable literature values.

SESOIL modeling will (1) determine future impacts to groundwater due to contaminant migration from the unsaturated zone and (2) evaluate and estimate the level of contamination that can be safely left in-place without impacting groundwater.

AT123D modeling--Existing chemical concentrations in groundwater, with and without the addition of contaminant loading from the unsaturated zone (SESOIL modeling), will be modeled to determine fate and transport of the contaminants of concern with underlying aquifer(s). Groundwater modeling will be conducted using the EPA-approved AT123D (Analytical Transient 1-, 2-, or 3- Dimensional Simulation) computer model (Yeh, 1981).

AT123D is capable of simulating the fate and transport of chemicals in groundwater under numerous different user-selected situations. Two modeling studies will be conducted to account for (1) contaminant migration from existing groundwater contamination and (2) contaminant migration from existing contamination with the addition of vadose zone contaminants. The source of contamination will be assumed to be finite since no additional contaminants will be added to the soil in the future. Aquifer conditions and configurations will be determined from existing groundwater data from wells on site and within the vicinity of the site. The following inputs are necessary for AT123D modeling: (1) dispersion coefficients, (2) configuration of aquitards, (3) soil properties (bulk density, effective porosity, permeability, etc.), (4) partition coefficients, (5) overall decay constants, and (6) groundwater gradient. Site specific data will be generated whenever possible; however, appropriate literature values will be utilized as defaults when site specific data are lacking.

AT123D can take into effect, volatilization, degradation, and adsorption under steady-state conditions. Contaminant transport via dispersion and advection are simulated. Contaminant plumes will be approximated over a 99-year period in order to account for the most conservative risk assessment protocols. Plume maps will be produced and presented as part of the risk assessment document. AT123D will be utilized to predict contaminant

movement in three (3) dimensions for the substances being studied. Contaminant concentrations at lateral and vertical distances from the source will be estimated. These concentrations will be utilized to calculate risks to the closest off-site downgradient municipal water supply well as part of this HRA.

Air Emissions from Soil–

Exposures in air will be estimated for two pathways: (1) volatilization of chemicals from on-site soils into the breathing zone and (2) wind erosion activity that results in the formation of fugitive dust which may enter the breathing zone.

Volatilization emissions from soil will be calculated using the Farmer equation, re-evaluated by Shen, as presented in the California Site Mitigation Decision Tree Manual (DHS, 1986) and the Superfund Exposure Assessment Manual (EPA, 1988). The Farmer equation is based on Fick's Law of Diffusion and is used to calculate the diffusion of vapors through soil-gas. Emission rates can be approximated using the contaminant flux estimation method, which is presented below:

$$Q = D_i(p_a^{10/3}/p_T^2)(P_iM_iW_i/RT)/L$$

Where:

Q	=	Volatilization emission flux (g/cm^2-sec).
D_i	=	Air diffusion coefficient of chemical i (cm^2/sec).
p_a	=	Air filled porosity (dimensionless).
p_T	=	Total soil porosity (dimensionless).
P_i	=	Vapor pressure of i at the temperature T (mmHg).
M_i	=	Molecular weight of i (g/mole).
W_i	=	Weight fraction of i in the soil (mg/mg).
R	=	Universal gas constant.
T	=	Temperature (K).
L	=	Average depth of deeper soil strata samples.

If applicable, fugitive dust emissions by wind erosion will be calculated using the equation developed by the U.S. Department of Agriculture, Soil Conservation Service (EPA, 1988). The respirable fraction of the particulates (i.e., particles 10 μm or less in size) will be used for subsequent air dispersion modeling (EPA, 1989a). The equation is as follows (EPA, 1988):

$$E = f(I',C',K',L',V)$$

Where:

E	=	Potential average annual wind erosion soil loss (mass/area-time).
I'	=	Soil erodibility index (dimensionless).
C'	=	Climatic factor (dimensionless).
K'	=	Soil ridge roughness factor (dimensionless).
L'	=	Field length along prevailing wind direction (feet).
V	=	Vegetable cover factor (dimensionless).

To estimate the emission flux rate for fugitive dust, the "E" value is multiplied by the RC for shallow soil samples and a conversion factor (1.0E-06 kg/mg).

On-site EPCs in air for both volatilization and fugitive dust will be estimated using calculated emission flux rates and a "box" model methodology recommended by the California Air Resources Board (CARB). The following assumptions will be utilized: (1) the volatilization and fugitive dust emission rates are assumed to remain constant over the entire exposure duration, (2) the chemicals are uniformly mixed within the box, (3) the wind speed is uniform within the box, and (4) the size of the box remains constant (Hanna, et al., 1982).

To calculate off-site atmospheric concentrations of contaminants (both volatile and fugitive dust), the EPA-approved Industrial Source Complex (ISC) air dispersion model will be utilized (EPA, 1986d). ISC can calculate EPCs for the chemicals of concern at points on a receptor grid. Receptor grids will include various polar grids representing off-site populations and several discrete receptors representing significant on-site and site boundary receptors. Sensitive off-site receptors will also be considered. All of the receptors are "flagpole" receptors and will be given a height of 1.5 meters, roughly the height of the nose and mouth of an average person. Exact receptor grid locations will be determined at a later date. The receptor locations within the grid will be representative of population centroids (i.e., the total population within a particular grid sector will be assumed to be located at the centroid).

Atmospheric conditions (model inputs) will be obtained from the South Coast Air Quality Management District's (SCAQMD) database utilizing wind roses from the closest SCAQMD meteorological station (CAPCOA, 1987).

6.4 CHRONIC DAILY INTAKE (CDI)

The chronic daily intake (CDI) is a measure of the human uptake of EPCs for the chemicals of concern. Equations for specific exposure pathways that will be used to calculate CDIs to the on-site and off-site populations from the chemicals of concern are shown below.

6.4.1 Soil Ingestion

$$CDI = \frac{CS \times IR \times EF \times ED \times CF \times FI}{BW \times AT} \text{ (mg/kg-day)}$$

Where:

CS	=	Chemical concentration in soil to a depth of 1 foot (mg/kg).
IR	=	Ingestion Rate (mg soil/day) = 50 mg/day for occupational setting; 200 mg/day for children, ages 1-6; 100 mg/day for adults, ages 7-70 (EPA 1989b, 1991).
EF	=	Exposure Frequency (days/year) = 350 days/year for adult and child residents. 250 days/year for occupational exposure (EPA, 1989b).
ED	=	Exposure Duration (years) = 30 years for residential exposure: 6 yrs as child, 24 years as adult; 4.2 years for occupational exposure (EPA, 1989a; DTSC, 1992; Chemrisk, 1992).
CF	=	Conversion Factor (10^{-6} kg/mg).

BW = Body weight (kg) = 70 kg for adult; 15 kg for child (EPA, 1989a).
AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for carcinogens; 365 days x 25 years for occupational exposure to non-carcinogens; 365 days x 30 years for residential exposure to non-carcinogens (EPA, 1989a).
FI = Fraction of ingested chemicals which are absorbed, assumed to be 100%.

6.4.2 Groundwater (Potable) Ingestion

$$CDI = \frac{CW \times IR \times EF \times ED}{BW \times AT} \text{ (mg/kg-day)}$$

CW = Chemical concentration in groundwater (mg/l).
IR = Ingestion Rate (l/day) = 2 liters/day for residential adult; 1.5 liters/day for residential child; 1.0 liters/day for worker (EPA, 1989a; DTSC, 1992).
EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents, 250 days/year for occupational exposure (EPA, 1989b).
ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult; 4.2 years for occupational exposure (EPA, 1989a; DTSC, 1992; Chemrisk, 1992).
BW = Body Weight (kg) = 70 kg for adult; 15 kg for child (EPA, 1989a).
AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for carcinogens; 365 days x 25 years for occupational exposure to non-carcinogens; 365 days x 30 years for residential exposure to non-carcinogens (EPA, 1989a).

6.4.3 Dermal Absorption (Soil)

$$CDI = \frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT} \text{ (mg/kg/day)}$$

Where:

CS = Chemical concentration in soil to a depth of 1 foot (mg/kg).
CF = Conversion Factor (10^{-6} mg/kg).
SA = Skin Surface Area Available for Contact (cm^2/day) = 3,360 cm^2/day for worker; 1,520 cm^2/day for residential child; 3,900 cm^2/day for residential adult (EPA, 1989a).
AF = Soil-to-Skin Adherence Factor (mg/cm^2) = assumed to be 0.5 mg/cm^2 (Chemrisk, 1992).
ABS = Dermal Absorption Factor Specific for Each Contaminant (unitless): assumed to be 10% for organics (DTSC, 1993).
EF = Exposure Frequency (days/year) = 350 days/year for child residents (7 events/week); 100 days/year for adult residents (2 events/week); 250 days/year for occupational exposure.

ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult; 4.2 years for occupational exposure (EPA, 1989a; DTSC, 1992; Chemrisk, 1992).

BW = Body Weight = 70 kg for adult; 15 kg for child (EPA, 1989a).

AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for carcinogens; 365 days x 25 years for occupational exposure to non-carcinogens; 365 days x 30 years for residential exposure to non-carcinogens (EPA, 1989a).

6.4.4 Inhalation (Volatilization and Fugitive Dust)

$$CDI = \frac{CA \times CF \times IR \times EF \times ED}{BW \times AT} \text{ (mg/kg-day)}$$

Where:

CA = Chemical concentration in air (ug/m^3).

CF = Conversion Factor (10^{-3} mg/ug).

IR = Inhalation Rate (m^3/day) = 20 m^3/day for adult resident; 15 m^3/day for child; 10 m^3/day for worker (Chemrisk, 1992).

EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents; 250 days/year for occupational exposure (EPA, 1989b).

ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult; 4.2 years for occupational exposure (EPA, 1989a; DTSC, 1992; Chemrisk, 1992).

BW = Body Weight = 70 kg for adult; 15 kg for child (EPA, 1989a).

AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for adult; 365 days x 6 years for child (EPA, 1989).

6.4.5 Inhalation (From Potable Groundwater)

$$CDI = \frac{CW \times CF \times IR \times WS \times MTE \times ET \times EF \times ED}{VR \times BW \times AT} \text{ (mg/kg-day)}$$

Where:

CW = Chemical concentration in water (mg/L).

CF = Conversion Factor (0.042 day/hour).

IR = Inhalation Rate (m^3/day) = 20 m^3/day for adult, worker and resident; 15 m^3/day for child (EPA, 1991).

WS = Water flow rate in shower (L/hour): estimated at 480 L/hour (DTSC. 1992)

MTE = Mass transfer efficiency from water to air: Estimated at 0.6 for low molecular weight VOCs (DTSC, 1992).

ET = Exposure time (hours/day): estimated at 0.13 hours/day for an individual showering (DTSC, 1992).

EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents (EPA, 1989b).

ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult; (EPA, 1989a).
BW = Body Weight = 70 kg for adult; 15 kg for child (EPA, 1989a).
AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for adult; 365 days x 6 years for child (EPA, 1989).
VR = Average ventilation rate for air in shower (m^3/hour): estimated at 12 m^3based on shower volume of 2 m^3 and the average number of air changed per hour in a shower as 6 (DTSC, 1992).

6.4.6 Dermal Absorption (Potable Groundwater)

$$CDI = \frac{CW \times CF \times SA \times PC \times ET \times EF \times ED}{BW \times AT} \text{ (mg/kg/day)}$$

Where:

CS = Chemical concentration in water (mg/L).
CF = Conversion Factor (10^{-3} L/cm^3).
SA = Skin Surface Area Available for Contact (cm^2/day) = 23,000 cm^2/day for a residential adult; 8,760 cm^2/day for residential child.
PC = Dermal aqueous permeability constant (cm/hour): assumed to be 1.0E-02 for organics (EPA, 1992).
ET = Exposure time (hours/day): estimated at 0.25 hours/day for an individualbathing (DTSC, 1992)
EF = Exposure Frequency (days/year) = 350 days/year for adult and child residents (EPA, 1989b).
ED = Exposure Duration (years) = 30 years for residential exposure: 6 years as child, 24 years as adult (EPA, 1989a).
BW = Body Weight = 70 kg for adult; 15 kg for child (EPA, 1989a).
AT = Averaging Time (period over which exposure is averaged) = 365 days x 70 years for carcinogens; 365 days x 25 years for occupational exposure to non-carcinogens; 365 days x 30 years for residential exposure to non-carcinogens (EPA, 1989a).

6.5 TOXICITY ASSESSMENT

In this section of the HRA document, toxicity information, both qualitative and quantitative, will be obtained, reviewed, and compiled for each chemical of concern. This information will include applicable toxicity values from the California EPA and the U.S. EPA. The presentation of toxicity values will be made separately for carcinogenic chemicals and non-carcinogenic chemicals. The non-carcinogenic effects of known carcinogenic chemicals will be presented along with those of non-carcinogens.

6.5.1 Health Effects Classification and Development of Criteria

For risk assessment purposes, chemicals are separated in two categories of toxicity, depending on whether they exhibit non-carcinogenic or carcinogenic effects. This distinction reflects the current scientific opinion that the mechanisms of action for each category are different. For purposes of assessing risks associated with potential carcinogens, the general risk assessment approach used by EPA assumes that a small number of molecular

events can cause changes in a single cell or a small number of cells that can lead to tumor formation. This is described as a no-threshold mechanism since there is essentially no level of exposure (i.e., threshold) to a carcinogen which will not result in some finite possibility of causing a disease. In the case of chemicals exhibiting non-carcinogenic effects, however, it is believed that organisms have protective mechanisms that must be overcome before toxic endpoints are manifested.

Health Effect Criteria for Carcinogens--

Cancer slope factors (CSF), developed by the California EPA's Office of the Environmental Health Hazard Assessment (OEHHA) and/or EPA's Carcinogen Assessment Group (CAG) for potentially carcinogenic chemicals and expressed in units of $(mg/kg/day)^{-1}$, are derived from the results of chronic animal bio-assays or, occasionally, human epidemiological studies. The animal studies must usually be conducted using relatively high doses in order to detect possible adverse effects. Since humans are expected to be exposed at much lower doses than those used in the animal studies, the data are adjusted by using mathematical models. The data from the animal studies are typically fitted to a linearized multi-stage model to obtain a dose-response curve. The 95th percentile UCL of the slope of the dose-response curve is subjected to various adjustments and an inter-species scaling factor is applied to derive the CSFs for humans. Thus, actual risks associated with exposure to a potential carcinogen, when quantitatively evaluated based on animal studies, are very conservative and not likely to exceed the risks estimated using these CSFs, but they may be much lower.

The EPA assigns weight-of-evidence classifications to potential carcinogens. Under this system, chemicals are classified as either Group A, Group B1, Group B2, Group C, Group D, or Group E. Group A chemicals (human carcinogens) are agents for which there is sufficient evidence to support a direct cause association between exposure to the agents in humans and cancer. Groups B1 and B2 chemicals (probable human carcinogens) are agents for which there is limited (B1) or inadequate (B2) evidence of carcinogenicity from animal studies. Group C chemicals (possible human carcinogens) are agents for which there is limited evidence of carcinogenicity in animals, and Group D chemicals (not classified as to human carcinogenicity) are agents with inadequate human and animal evidence of carcinogenicity or for which no data are available. Group E chemicals (evidence of non-carcinogenicity in humans) are agents for which there is no evidence of carcinogenicity in adequate human or animal studies (EPA, 1989a).

For the purposes of this HRA, site contaminants that have been classified by the EPA as A (human carcinogens) or B (probable human carcinogens) will be considered as carcinogens. Any contaminants classified by EPA as C (possible carcinogens) or lower will be considered as non-carcinogens.

DTSC recommends the following hierarchy for selection and use of toxicity data (i.e., CSFs) for carcinogens: (1) California EPA, OEHHA, Standards and Criteria Workgroup, most recent list of CSFs (OEHHA, 1992), (2) the EPA's Integrated Risk Information System (IRIS), (EPA, 1994), and (3) the most current Health Effects Assessment Summary Tables (HEAST), (EPA, 1993). This hierarchy will be utilized during the HRA.

Toxicity Information for Non-Carcinogens--

Health criteria for chemicals exhibiting non-carcinogenic effects are generally developed using risk reference doses (RfDs), sometimes referred to as reference concentrations (RfCs) for the inhalation pathway, developed by the EPA RfD Work Group (IRIS) or RfDs obtained from HEAST. The RfD, expressed in units of mg/kg/day, is an estimate of the daily exposure to human population (including sensitive sub-populations) that is likely to be without an appreciable risk of deleterious effects during an entire lifetime. These RfDs are usually derived either from human studies involving work place exposure or from animal studies and are adjusted using uncertainty factors. The RfD provides a benchmark to which CDIs may be compared. When RfDs are not available for chemicals of concern, California Applied Action Levels (AALs) may be utilized.

6.6 RISK CHARACTERIZATION

In this section of the HRA document, the toxicity assessment and exposure assessment will be integrated into quantitative expressions of health risk. In accordance with EPA guidelines for evaluating the potential toxicity of complex mixtures (EPA, 1986), this assessment will assume that the toxic effects of the site chemicals of concern are additive. Namely, a population's EPC to each chemical of concern in each pathway will be compiled first. Next, specific pathways risks will be calculated for each chemical using toxicity values provided by the toxicity assessment. Risks will then be combined for each chemical and across pathways for each affected population. The final step will be a calculation of the total risks to each population.

6.6.1 Exposure Data Compilation

The exposure information developed earlier will be organized so that appropriate toxicity values may be applied. Exposure pathways will be organized according to duration (short term versus long term), if applicable. In addition, adjustments will be made so that exposures which are based on an absorbed dose will be converted to an appropriate applied dose, as in the case of dermal exposure.

6.6.2 Quantification of Pathway-Specific Risks

Carcinogenic Effects--

For carcinogens, excess lifetime cancer risks are obtained by multiplying the CDI of the contaminant under consideration by its CSF for each pathway of concern (EPA, 1989a). The total excess lifetime cancer risk for the site is determined by summing all the individualized risks for all the chemicals of concern:

$$Risk_i = CDI_i \times CSF_i$$

where:

$Risk_i$	=	Individual excess lifetime cancer risk (probability) for inhalation of ith substance (unitless).
CDI_i	=	Chronic daily intake of chemical "i" (mg/kg/day).
CSF_i	=	Cancer slope factor of chemical "i" (mg/kg/day).

The upper bound lifetime excess cancer risks derived from this calculation will be compared to a risk range for health preventiveness used by EPA to make remediation decisions at hazardous waste sites. According to EPA policy, the target total individual carcinogenic risk resulting at a Superfund site may range from 10^{-4} to 10^{-6}, derived from contaminant concentrations based on either Applicable or Relevant and Appropriate Requirements (ARARs) or remediation goals calculated from CSFs or RfDs for non-carcinogens.

Non-Carcinogenic Effects--

Potential risks for non-carcinogens are presented as the ratio of the CDI exposure to the reference dose (CDI:RfD). This ratio is known as the Hazard Quotient (HQ). The sum of all of the CDI:RfD ratios (HQs) of chemicals under consideration is called the Hazard Index (HI). The HI is thus defined as follows:

$$HI_i = (CDI)_i/(RfD)_i$$

where:

HI_i	=	Hazard Index for chemical "i" (unitless).
$(CDI)_i$	=	Daily intake from all routes of exposure for the ith contaminant (mg/kg/day).
$(RfD)^i$	=	Acceptable daily intake (reference dose) for the ith contaminant.

The HI is useful as a reference point for gaging the potential effects of environmental exposures to complex mixtures. In general, $HI < 1$ are not likely to be associated with any health risks, and they are, therefore, less likely to be of regulatory concern than $HI > 1$. For HIs which are greater than 1.0, the associated HQs can be re-summed such that additive effects are compared only for those chemicals which attack the same target organ or organ group.

Risk Determination for Different Populations--

The potential for non-carcinogenic effects and cancer risks will be determined for on- and off-site workers and off-site residents in the current scenario and for on- and off-site workers and residents in the future scenario.

For each population involved, cancer risks for each pathway will be combined and expressed as a total cancer risk for that population. Similarly, hazard indices for each pathway will be combined and expressed as a total hazard index for that population.

6.7 UNCERTAINTIES

In this section of the HRA document, the results of the risk assessment will be discussed in view of the assumptions used in its development.

There are two principal sources of assumptions and, therefore, uncertainties for this risk assessment: site-specific factors and toxicity assessment. Both of these will be discussed in the document. In addition, uncertainties will be quantified whenever possible and applicable.

7.0 SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

7.1 NATURE AND EXTENT OF CHEMICAL COMPOUNDS

7.1.1 Soil

This investigation identified impacts to vadose zone soils and groundwater by VOCs. The predominant compounds detected in soil samples in terms of frequency and concentration are acetone, MEK, MIBK, PCE, toluene, 1,1,1-TCA, TCE, and xylenes. Elevated concentrations of these compounds in shallow soils (< 20 feet bgs) appear to be limited in areal extent to two separate and distinct areas: 1) the immediate vicinity of the northeast portion of the railroad spur and 2) the south central spill drain area. This pattern suggests possible spillage along the northeast portion of the railroad spur, and leakage through a broken pipeline associated with a concrete catch basin. No significant impacts to the vadose zone were identified as resulting from the on-site USTs or activities involving aboveground storage of chemicals. In addition, there is no evidence of chemicals entering the soil through cracks in the concrete and asphalt pavement on the site. ACC has in the past received citations as a result of regulatory agency site inspections. All such violations have reportedly been corrected without imposition of penalties, and none of the violations appear to have contributed to the contamination in the spill drain area.

Elevated concentrations of VOCs detected in deeper soil (>20 feet bgs) may be associated with deposition from groundwater to soil during periods of high groundwater. These sources may have impacted soils at depths of approximately 20 feet bgs near the top of the perched aquifer (northern portion of the site), and at depths between 30 and 40 feet bgs near the top of the Gaspur/Hollydale aquifer.

7.1.2 Groundwater

7.1.2.1 Perched aquifer--

The highest concentrations of VOCs detected in groundwater were found in the perched aquifer along the northern portion of the site, where monitoring wells MW4 and MW6 are located. Elevated concentrations of chemicals, including benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, ethylbenzene, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE, and xylenes were detected. Exploratory borings indicated that the perched zone is discontinuous, being absent along the southern portion of the site. There are only two wells on site screened within the perched aquifer; therefore, exact groundwater flow direction cannot be determined.

7.1.2.2 Gaspur/Hollydale aquifer--

Four monitoring wells are screened within the Gaspur/Hollydale aquifer, one upgradient well (MW7) along the northern portion of the site, and three downgradient wells (MW1, MW2, and MW3) along the southern portion of the site.

Elevated concentrations of VOCs were observed in wells screened within the Gaspur/Hollydale aquifer. Chemicals detected included benzene, 1,1-DCA, 1,2-DCA, 1,1-DCE, ethylbenzene, methylene chloride, PCE, toluene, 1,1,1-TCA, TCE, and xylenes. Concentra-

tions of individual chemicals dissolved in ground water in downgradient wells MW1, MW2, and MW3 vary somewhat from well to well; however, overall concentrations are comparable between wells. Free product was encountered in MW-1, which is directly downgradient of the broken pipe attached to the south central catch basin. Relatively lower concentrations were detected in the most upgradient well, MW7 (with the exception of 1,1-DCA). Detection of VOCs in the upgradient well suggests that some migration of these chemicals may be occurring from off-site sources.

7.2 FATE AND TRANSPORT

The observed distribution of compounds in the vadose zone appears to result from two transport processes. In the area of the northeast portion of the railroad tracks and near the broken drain pipe, the observed distribution may be the result of vertical migration of chemicals from near-surface points of spillage or leakage. Away from these areas, the detected concentrations of chemicals in soils may be the result of deposition from groundwater near the tops of both the perched and Gaspur/Hollydale aquifers.

7.3 RISK EVALUATION

Risk evaluation document will be submitted under a separate cover following completion of the final RI Report.

The risk evaluation will be performed as outlined in Section 6.0. The risk evaluation will provide an assessment of the potential threat to human health and the environment posed by the affected media (i.e., soil, groundwater, etc.) in the absence of any remedial action. The risk evaluation will provide the basis for determining remedial action, and provide constraints on remedial alternative selection.

7.4 RECOMMENDATIONS

At this time the following activities are recommended:

- Completion of Risk Evaluation (to be submitted under a separate cover).
- Further review of agency records for possible off-site sources.

ACC has submitted a draft proposal to DTSC, which includes a pilot vapor extraction study (VES) to examine this technique as a possible remediation alternative. Some additional soil sampling and analyses has also been proposed to augment existing data. Data generated from this additional work will be incorporated into the FS. This proposal will be submitted to DTSC within weeks of DTSC's approval of this RI Report.

In March 1993, ACC took legal action against Spencer and Jones, the contractor who installed two USTs in the area of the south central catch basin in 1981. In August 1994, after a 4 week jury trial, Spencer and Jones was found to have caused the break in the pipeline associated with this catch basin, and was adjudicated liable for known damages arising therefrom. As a result, ACC will consult with Spencer and Jones on future environmental investigation/remediation activities.

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TABLES

TABLE 1
ANALYTICAL DATA SUMMARY – SOIL INVESTIGATION JANUARY 1990
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

SAMPLE I.D.	VOLATILE ORGANIC COMPOUNDS (EPA METHOD 8240) IN UG/KG										
	Benzene	1,1-DCA	1,1-DCE	Ethylbenzene	MEK	MIBK	PCE	Toluene	1,1,1-TCA	TCE	Xylene
BH1-5	--	--	--	--	--	--	--	--	--	--	--
BH1-10	--	--	--	--	--	--	--	--	--	--	--
BH1-15	ND	ND	ND	ND	ND	ND	ND	19	ND	ND	ND
BH1-20	ND	ND	ND	ND	200	180	16	21	18	ND	12
BH2-5	--	--	--	--	--	--	--	--	--	--	--
BH2-10	21	76	29	87	ND	ND	210	250	91	40	412
BH2-15	ND	ND	ND	ND	ND	60	ND	12	ND	ND	ND
BH2-20	--	--	--	--	--	--	--	--	--	--	--
BH3-5	ND	62	ND	62	ND	230	120	440	19	10	450
BH3-10	ND	ND	ND	ND	ND	ND	ND	160	ND	ND	70
BH3-15	ND	ND	ND	ND	110	370	ND	26	ND	ND	ND
BH3-20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH4-5	ND	96	ND	ND	ND	ND	ND	150	65	ND	ND
BH4-10	--	--	--	--	--	--	--	--	--	--	--
BH4-15	ND	ND	ND	ND	ND	ND	ND	33	39	ND	ND
BH4-20	ND	ND	ND	ND	ND	980	ND	ND	ND	ND	ND
BH5-5	ND	ND	ND	42	1800	2100	ND	160	ND	ND	175
BH5-10	ND	ND	ND	53	640	2100	30	360	30	ND	163
BH5-15	ND	ND	ND	ND	600	1300	ND	35	ND	ND	15
BH5-20	ND	ND	ND	ND	300	630	ND	12	ND	ND	ND
BH6-5	ND	ND	ND	71	110	120	35	>700	ND	16	320
BH6-10	ND	ND	ND	ND	40	120	ND	40	ND	ND	13
BH6-15	11	25	ND	220	1300	1900	330	1900	230	60	>2300
BH6-20	ND	ND	ND	13	240	600	26	150	29	ND	67
BH6-25	ND	ND	ND	ND	110	450	ND	32	ND	ND	10
BH6-30	ND	ND	ND	260	1000	2000	750	870	45	ND	1650
BH6-35	ND	ND	ND	ND	200	620	ND	26	ND	ND	12
BH6-40	160	310	270	220	1200	2300	150	820	720	33	530
BH6-45	160	180	680	1100	750	2200	940	1600	900	87	2570
BH6-50	67	56	31	39	ND	1200	10	65	18	ND	123
BH7-5	--	--	--	--	--	--	--	--	--	--	--
BH7-10	120	18	21	ND	ND	ND	20	20	11	ND	13
BH7-15	46	ND	ND	ND	ND	ND	ND	ND	71	ND	ND
BH7-20	ND	ND	ND	ND	ND	ND	ND	28	ND	ND	ND
BH8-5	--	--	--	--	--	--	--	--	--	--	--
BH8-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH8-15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH8-20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH8-25	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

EXPLANATION:

Sample I.D. (BH1-5) = Boring BH1, sample depth of 5 feet below ground surface.
Refer to Figure 2 for sample locations.
-- = sample not analyzed.
ND = Not Detected
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethylene
MEK = methyl ethyl ketone (2-butanone)
MIBK = 4-Methyl-2-Pentanone
PCE = tetrachloroethene
1,1,1-TCA = 1,1,1-trichloroethene
TCE = trichloroethene

TABLE 2
ANALYTICAL DATA SUMMARY – SITE INVESTIGATION APRIL & JUNE 1990
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

SAMPLE I.D.	(EPA 418.1) TRPH (mg/kg)	VOLATILE ORGANIC COMPOUNDS (EPA METHOD 8240) in ug/kg												
		Acetone	Benzene	1,1-DCA	1,1-DCE	Ethylbenzene	Meth Chlo	MEK	MIBK	PCE	Toluene	1,1,1-TCA	TCE	Xylene
Soil samples:														
BH9-5	--	550	ND	30	ND	37	460	120	450	37	410	56	20	250
BH9-15	--	ND	ND	24	ND	32	730	ND	ND	ND	190	ND	ND	161
BH9-25	--	380	ND	ND	ND	ND	ND	390	170	ND	ND	ND	ND	ND
BH10-10	--	250	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH10-20	--	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH11-25	--	1300	ND	ND	ND	ND	ND	ND	ND	ND	59	ND	ND	50
BH11-30	--	ND	ND	ND	210	11000	ND	500	ND	ND	10000	1200	78	24300
BH11-35	--	ND	ND	61	130	1400	ND	ND	700	330	1900	1000	ND	2630
BH12-10	--	27000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH12-20	--	8600	ND	ND	ND	ND	ND	ND	54	ND	ND	ND	ND	ND
BH13-15	--	6900	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH13-30	--	1300	ND	ND	ND	ND	ND	ND	ND	90	ND	210	ND	ND
BH13-40	--	11000	ND	ND	160	ND	300	530	150	230	96	280	120	60
BH14-5	--	ND	ND	ND	ND	45000	ND	ND	ND	ND	67000	ND	8700	233000
BH14-10	--	41000	ND	ND	ND	29000	ND	ND	ND	ND	98000	ND	8400	112000
BH14-15	--	ND	ND	ND	ND	9300	ND	ND	ND	8900	27000	2300	ND	28300
BH14-20	--	50000	ND	ND	ND	44000	ND	ND	ND	48000	150000	28000	ND	128000
BH14-25	--	39000	ND	ND	ND	17000	ND	ND	ND	19000	37000	ND	ND	52000
BH14-30	--	31000	10000	ND	ND	ND	7800	ND	9300	ND	3300	ND	ND	1900
BH14-35	--	55000	ND	ND	ND	ND	ND	15000	8300	ND	1600	ND	ND	ND
BH14-40	--	ND	ND	ND	ND	2800	ND	ND	ND	1400	2400	1800	ND	8300
MW1-10	--	21000	ND	ND	ND	ND	ND	ND	ND	ND	14	ND	ND	ND
MW1-15	--	7900	ND	21	92	ND	ND	ND	ND	49	ND	150	ND	ND
MW1-20	--	8400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW1-25	--	430	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW1-30	--	15000	ND	240	ND	2200	10000	ND	ND	6300	330	3500	270	7700
MW1-35	--	85	16	39	ND	ND	6800	ND	ND	ND	ND	ND	180	2400
MW1-40	--	15000	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1800
S-1 *	--	ND	ND	ND	ND	>210000	ND	ND	ND	32000	>220000	6400	9900	>540000
S-2 *	99	ND	ND	ND	ND	94000	ND	ND	ND	33000	120000	ND	5100	264000
Water Sample:														
MW1-1		--	10	21	270	ND	ND	--	--	100	10	120	210	18
MCLs		--	1	5	6	680	--	--	--	5	100	200	5	1750

EXPLANATION:

Sample I.D. (BH1-5) = Boring BH1, sample depth of 5 feet below ground surface. MW1-10 = soil sample from monitoring well (MW-1) boring at a depth of 10 feet below ground surface.
* Sample I.D. (SS-1) = shallow soil grab sample, sampled in April 1990. All other samples collected in June 1990.
Refer to Figure 2 for sample locations.
MCLs = maximum contaminant levels as established in California Code of Regulations Title 22.
-- = sample not analyzed, or not applicable.
ND = Not Detected
1,1-DCA = 1,1-Dichloroethane
TRPH = Total Recoverable Petroleum Hydrocarbons using EPA Method 418.1
1,1-DCE = 1,1-Dichloroethylene
MEK = methyl ethyl ketone (2-butanone)
MIBK = 4-Methyl-2-Pentanone
PCE = tetrachloroethene
1,1,1-TCA = 1,1,1-trichloroethane
TCE = trichloroethene
Note that trans-1,2-dichloroethene also detected in water sample at a concentration of 240 ug/l (MCL = 10 ug/l).

TABLE 3
SUMMARY OF ANALYTICAL RESULTS, SHALLOW SOIL STUDY, OCTOBER 1992
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

SAMPLE I.D.	EPA 418.1 (MG/KG)	VOLATILE ORGANIC COMPOUNDS (EPA METHOD 8240) IN UG/KG											
	TRPH	Acetone	1,2-DCA	1,1-DCE	Ethylbenzene	MEK	MIBK	PCE	Toluene	1,1,1-TCA	TCE	m,p-xylenes	o-xylene
RR-1*	22200	2800	ND	ND	ND	ND	ND	170	250	ND	ND	160	510
RR-2	19500	ND	ND	ND	16000	ND	ND	32000	210000	17000	2200	61000	54000
RR-3*	101000	ND	3900	8300	ND	ND	ND	7600	9300	19000000	4200	3400	ND
RR-4	115	ND	ND	ND	1100	15000	ND	4100	640	ND	ND	6800	2300
RR-5*	156	ND	ND	ND	ND	ND	ND	2300000	17000	16000	ND	3700	2700
RR-6	1390	3100000	ND	ND	5200	36000	7200	1200000	14000	160000	ND	21000	7500
RR-7*	11500	ND	ND	ND	3600	ND	ND	37000	4300	73000	ND	16000	13000

EXPLANATION:

TPH = total petroleum hydrocarbons
ND = Not Detected
1,2-DCA = 1,2-Dichloroethane
1,1-DCA = 1,1-Dichloroethene
MEK = methyl ethyl ketone (2-butanone)
MIBK = 4-Methyl-2-Pentanone
PCE = tetrachloroethene
1,1,1-TCA = 1,1,1-trichloroethane
TCE = trichloroethene

* = samples taken immediately below surficial gravel layer. All other samples taken at a depth of approximately 18 inches below grade.

TABLE 4
UNDERGROUND STORAGE TANK CONTENTS
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

TANK NO.	DATE INSTALLED	CAPACITY (GAL)	CONTENTS
1	1975	10000	Toluene
2	1975	10000	Xylenes
3	1975	10000	Lacquer thinner
4	1975	10000	Methanol
5	1975	10000	Mineral Spirit
6	1975	10000	N–Butyl Acetate
7	1975	10000	IPA
8	1975	10000	Isobutyl acetate
9	1975	10000	Wash thinner
10	1975	10000	Acetone
11	1975	10000	MEK
12	1975	10000	Isobutanol
13	1975	10000	Anhydrol 190, PM 4081
14	1975	10000	Kerosene/mineral spirit
15	1975	10000	Laquer thinner
16	1975	10000	Mineral spirit
17	1978	20000	VM & P Naptha
18	1978	5000	Blend tank
19	1978	5000	Solvent 140
20	1978	5000	Solvent PX–3
21	1978	5000	Blend tank
22	1978	10000	Kerosene
23	1978	10000	Solvent PX–2
24	1982	20000	LEP solvent
25	1982	20000	Mineral spirit
26	1982	10000	LEP solvent
27	1982	10000	Butyl Cellusolve
28	1982	10000	Kerosene
29	1982	10000	Mineral spirit
30	1982	10000	Mineral spirit
31	1982	10000	Kerosene
32	1982	10000	Waste water tank
33	1982	5000	Unleaded gasoline
34	1982	8000	Diesel fuel

EXPLANATION:

Data Source: ACC files, March 1994.

Tank wall thickness 0.25 inches of carbon steel for all tanks. No secondary containment on any tanks. Cathodic protection on all tanks.

Reference Figure 2 for tank locations.

TABLE 5
ABOVEGROUND STORAGE TANK CONTENTS
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA

TANK NO.	CAPACITY (GAL)	CONTENTS	COMMENTS
AGT1	1872	unused	Compartmental storage tank – horizontal
AGT2	1400 1400	mineral spirits propyl alcohol	Compartmental storage tank – horizontal
AGT3	400 1472	unused denatured alcohol	Compartmental storage tank – horizontal
AGT4	1868	unused	Compartmental storage tank – horizontal
AGT5	1425	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.
AGT6	1200	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.
AGT7	2275	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.
AGT8	1750	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.
AGT9	1750	varies	Transfer tank – temporary holding tank, used during filling of drums or containers. Oriented vertically.

EXPLANATION:

AGT = aboveground tank.

Tank wall thickness 0.25 inches of carbon steel for all tanks. No secondary containment on any tanks.

Reference Figure 3 for tank locations.

TABLE 6
REMEDIAL INVESTIGATION – SOIL
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA. JANUARY 1994

SAMPLE I.D.	VOLATILE ORGANIC COMPOUNDS (EPA METHOD 8240) IN UG/KG													
	Acetone	Benzene	2-Butanone	1,1-DCA	1,2-DCA	1,1-DCE	Ethylbenzene	4-Met-2-Pent	PCE	Toluene	1,1,1-TCA	TCE	m&p-xylene	o-xylene
BH15-1	4480	8	193	462	ND	269	218	198	8330	1300	20900	27	14200	29000
BH15-5	9380	ND	1590	74	ND	10	ND	ND	11	24	109	ND	12	11
BH15-10	67	ND	ND	ND	ND	ND	ND	ND	ND	6	5	ND	ND	ND
BH15-20	261	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH16-1	10100	ND	23400	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BH16-5	2180	ND	52000	ND	ND	ND	ND	ND	ND	ND	55	61	ND	ND
BH16-10	ND	ND	11600	ND	ND	ND	ND	ND	ND	ND	6	ND	ND	ND
BH16-20	ND	ND	ND	ND	ND	ND	82	ND	471	125	ND	ND	318	104
BH17-1	39700	ND	12200	706	ND	ND	1560	2050	41800	11200	36800	9280	6460	4020
BH17-5	25200	ND	35200	ND	ND	ND	6330	11600	58200	48300	19400	5630	22900	4870
BH17-10	15400	ND	60300	11	ND	ND	ND	3020	12	179	55	21	24	ND
BH17-20	1050	ND	2400	ND	ND	ND	ND	399	ND	ND	ND	ND	ND	ND
MW2-5	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW2-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW2-20	97	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW2-30	ND	ND	ND	10	ND	37	ND	ND	33	15	69	24	ND	ND
MW2-40	1102	ND	720	30	ND	102	113	352	194	168	88	ND	387	107
MW3-5	ND	ND	ND	ND	ND	ND	ND	ND	13	ND	16	16	ND	ND
MW3-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW3-20	261	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW3-30	15100	ND	3000	ND	ND	332	109	1340	452	460	88	ND	366	104
MW3-40	ND	ND	ND	23	ND	ND	ND	ND	69	ND	ND	ND	ND	ND
MW4-5	1640	ND	1990	ND	ND	ND	ND	594	ND	ND	ND	ND	ND	ND
MW4-10	2130	ND	4260	ND	ND	ND	ND	ND	ND	ND	71	ND	ND	ND
MW4-20	ND	ND	ND	ND	ND	ND	16600	12000	96900	48700	54700	16500	49000	12000
MW5-2	ND	ND	ND	ND	ND	ND	ND	ND	21	6	5	ND	13	ND
MW5-5	ND	ND	ND	31	ND	ND	ND	ND	19	6	ND	7	16	ND
MW5-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	ND	ND	ND	ND
MW5-20	974	ND	529	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW6-5	5160	17	3110	301	10	20	32	900	24	424	412	11	188	89
MW6-10	2030	ND	604	78	18	ND	ND	1230	ND	36	312	ND	ND	ND
MW6-20	ND	ND	ND	ND	ND	ND	3220	2440	3510	4300	2970	154	6240	4000
MW7-5	ND	ND	ND	12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW7-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW7-20	117	ND	147	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
MW7-30	6050	ND	29700	28	ND	ND	ND	69	ND	34	ND	ND	7	ND
MW7-40	ND	ND	ND	27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

EXPLANATION:

Sample I.D. (BH15-5) = Boring BH5, sample depth of 5 feet below ground surface.
1,1-DCA = 1,1-Dichloroethane
1,1-DCE = 1,1-Dichloroethylene
4-Met-2-Pent = 4-Methyl-2-Pentanone
ND = Not Detected
PCE = Tetrachloroethene
1,1,1-TCA = 1,1,1-Trichloroethane
TCE = Trichloroethene

TABLE 7
REMEDIAL INVESTIGATION – GROUNDWATER
ANGELES CHEMICAL COMPANY, SANTA FE SPRINGS, CALIFORNIA. FEBRUARY 1994

PARAMETER	MCL\SAL	MW-1	MW-2	MW-3	MW-4*	MW-6*	MW-6D*	MW-7
Purgeable Organics (ug/l) (EPA Method 624)								
Benzene	1.0	194	<100	63	111	795	848	46
1,1-Dichloroethane	5.0	649	1130	85	1410	2260	2570	2130
1,2-Dichloroethane	0.5	<100	<100	<50	<100	1140	1240	31
1,1-Dichloroethene	6.0	2210	2460	2800	806	1240	1920	151
Ethylbenzene	680	333	1720	115	1180	1910	2080	45
Methylene Chloride	40	1220	2980	6530	4760	21400	20000	<50
Tetrachloroethene	NS	662	2150	5370	3320	2130	2410	134
Toluene	100	560	7390	579	12700	15300	13500	398
1,1,1-Trichloroethane	200	9370	3470	444	36200	114000	118000	90
Trichloroethene	5.0	7160	3040	1730	14300	1320	1450	45
m and p-Xylenes	1750**	1220	5690	571	3410	2900	3320	133
o-Xylene	1750**	972	2100	443	952	1810	2100	53
General Water Quality								
pH	NS	--	6.55	7.28	6.54	5.65	5.60	6.37
Hardness	NS	--	849	925	698	3060	4180	2100
MBAS (mg/l)	0.5	--	0.30	0.30	ND	0.24	0.08	ND
TDS (mg/l)	1000	--	2040	1520	1480	4440	5240	3000
Specific Conductivity (umhos/cm)	2200	--	1760	1860	1730	5390	5300	2170
Chloride (mg/l)	500	--	222	247	154	1270	1120	185
SO4 (mg/l)	500	--	140	489	321	681	536	156
Alkalinity	NS	--	540	315	500	565	455	980
HCO3	NS	--	540	315	500	565	455	980
CO3	NS	--	ND	ND	ND	ND	ND	ND
NO3 (mg/l)	45	--	ND	ND	ND	ND	ND	ND
Calcium (mg/l)	NS	--	244	233	264	931	962	413
Copper (mg/l)	1.0	--	0.10	<0.05	<0.05	<0.05	<0.05	0.39
Iron (mg/l)	0.3	--	13.7	4.91	7.93	86.2	87.5	33.9
Magnesium (mg/l)	NS	--	58.1	89.4	36.9	177	189	128
Manganese (mg/l)	0.05	--	6.24	3.64	7.30	73.5	77.7	10.3
Potassium (mg/l)	NS	--	9.84	8.99	9.34	16.4	16.8	84.1
Sodium (mg/l)	NS	--	125	122	194	315	340	201
Zinc (mg/l)	5.0	--	0.14	0.06	0.05	0.08	0.06	1.07

EXPLANATION:

* Wells screened in perched aquifer zone, all others are Gaspur/Holydale aquifer.
** MCL for total xylenes.
-- = Not Analyzed. Note: free Product detected in MW-1.
NS = No Standard.
ND = Not Detected
Concentrations preceeded by a less than symbol (<) indicate that results were below detection limit.
MCL = State of California, Office of Drinking Water, Maximum Contaminant Level.

TABLE 8
REMEDIAL INVESTIGATION – FREE PRODUCT
ANGELES CHEMICAL COMPANY,
SANTA FE SPRINGS, CALIFORNIA. FEBRUARY 1994

PARAMETER	MCL\SAL	MW–1
Total Petroleum Hydrocarbons (mg/l) (EPA Method 8015M)	NS	38500
Volatile Organic Compounds (ug/l) (EPA Method 8240)		
Acetone	NS	12,400
2–Butanone (MEK)	NS	6,150
1,1–Dichloroethane	5.0	452
1,1–Dichloroethene	6.0	1,910
Ethylbenzene	680	1,240
Tetrachloroethene	NS	7,980
Toluene	100	463
1,1,1–Trichloroethane	200	4,780
Trichloroethene	5.0	2,720
m and p–Xylenes	1750*	5,750
o–Xylene	1750*	3,560

EXPLANATION:

Well screened in Gaspur/Hollydale aquifer.
Sample collected February 4, 1994.
* = MCL for total xylenes.
ND = Not Detected.
NS = No Standard.
MCL = State of California, Office of Drinking Water, Maximum Contaminant Level.

FIGURES

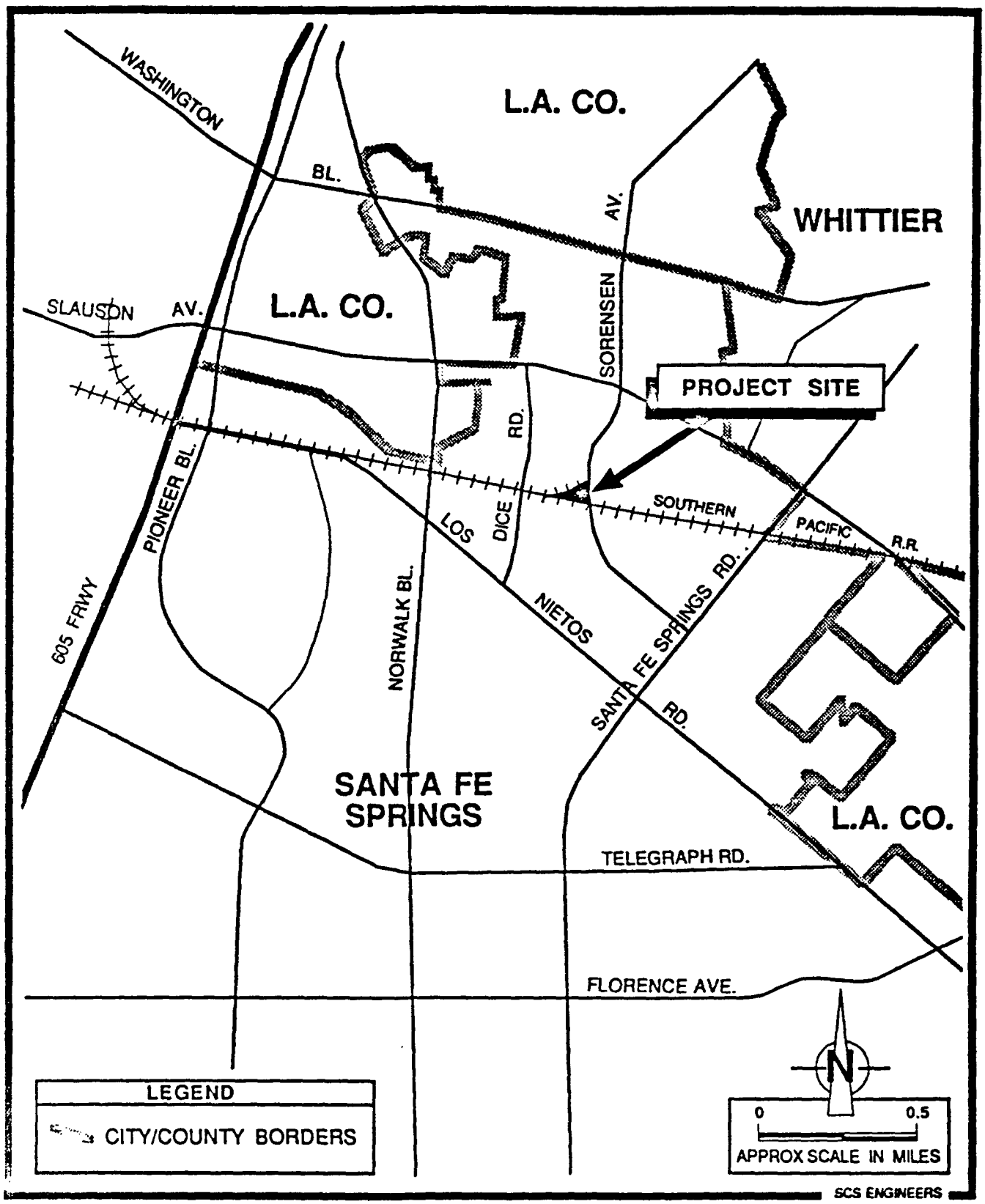


Figure 1. Map Showing Location of Angeles Chemical Project Site.

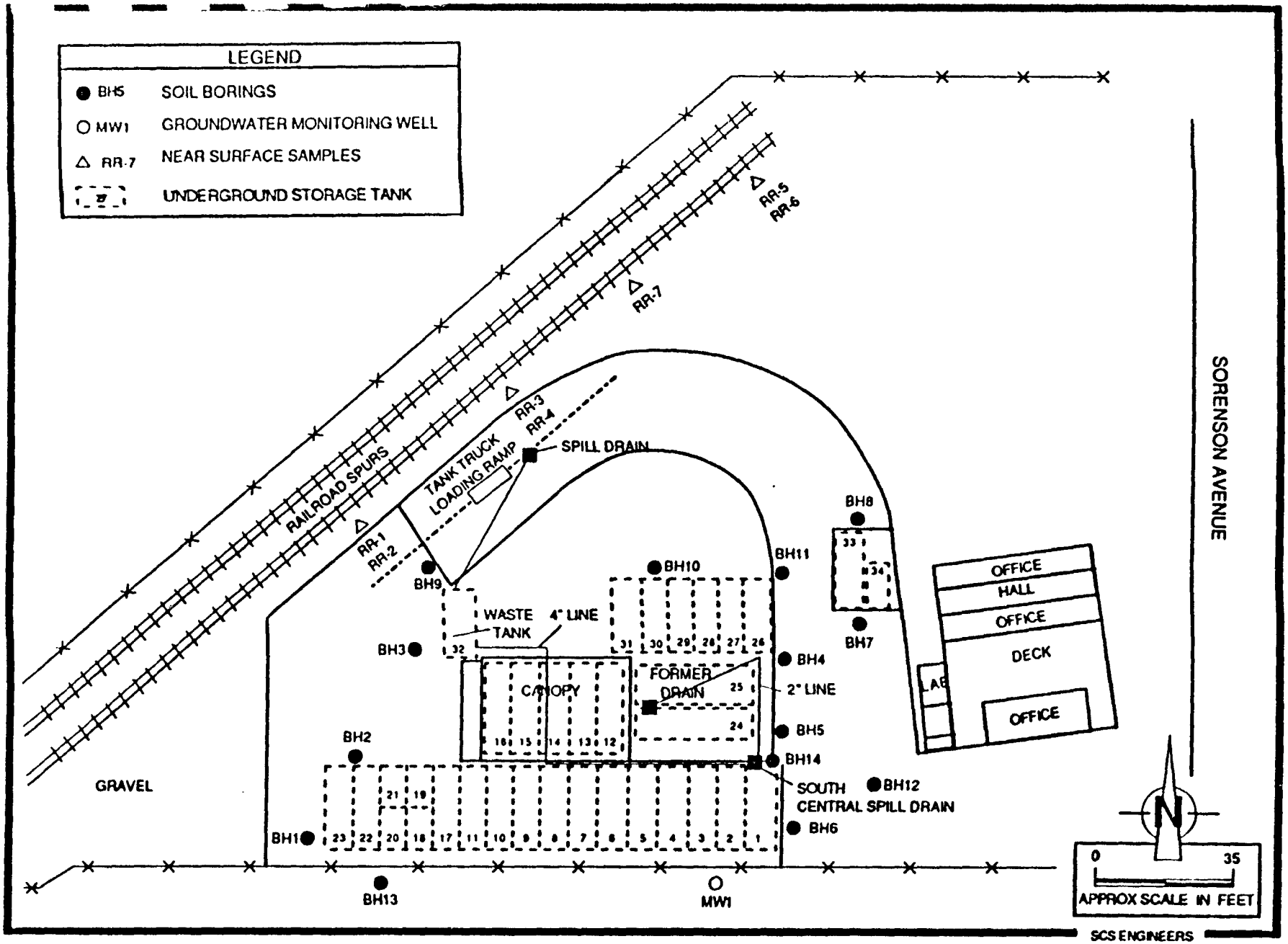


Figure 2. Approximate Locations of Soil Borings, Surface Samples, and Groundwater Well from Previous Investigations at Angeles Chemical, Santa Fe Springs, California.

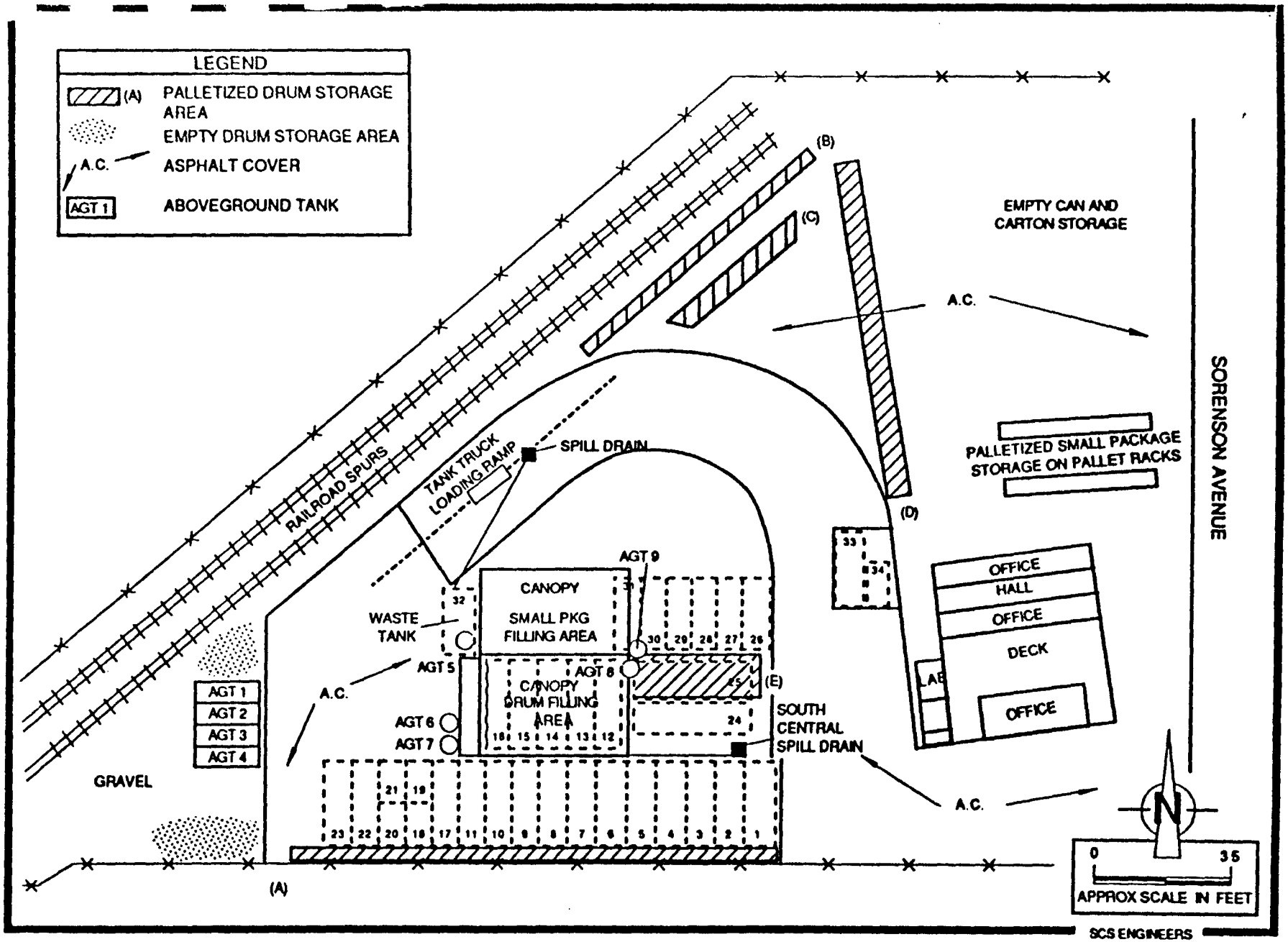


Figure 3. Approximate Locations of Aboveground Storage Tanks and Drum Storage Areas at Angeles Chemical, Santa Fe Springs, California.

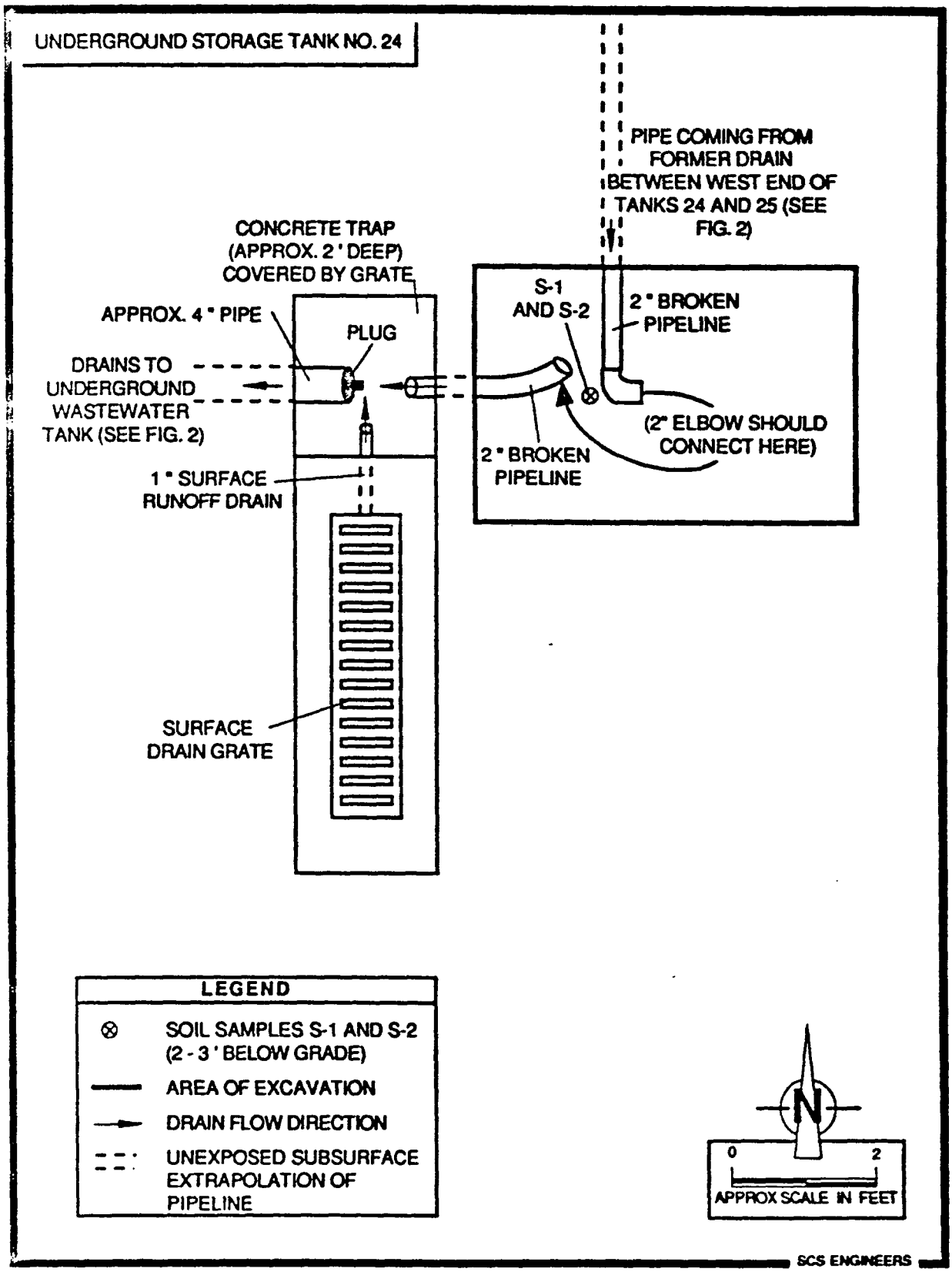


Figure 4. Illustration of South Central Spill Drain Excavation.

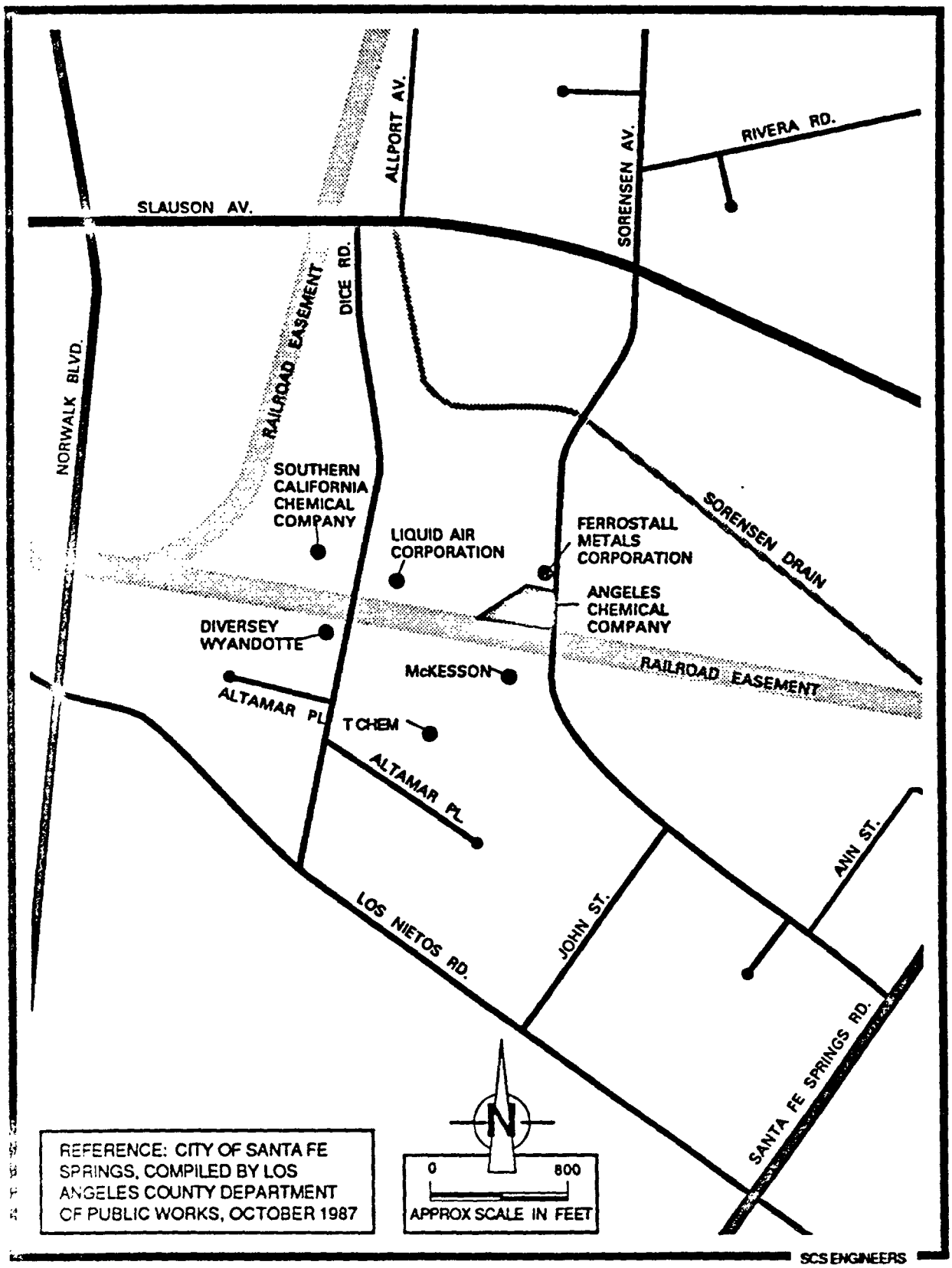
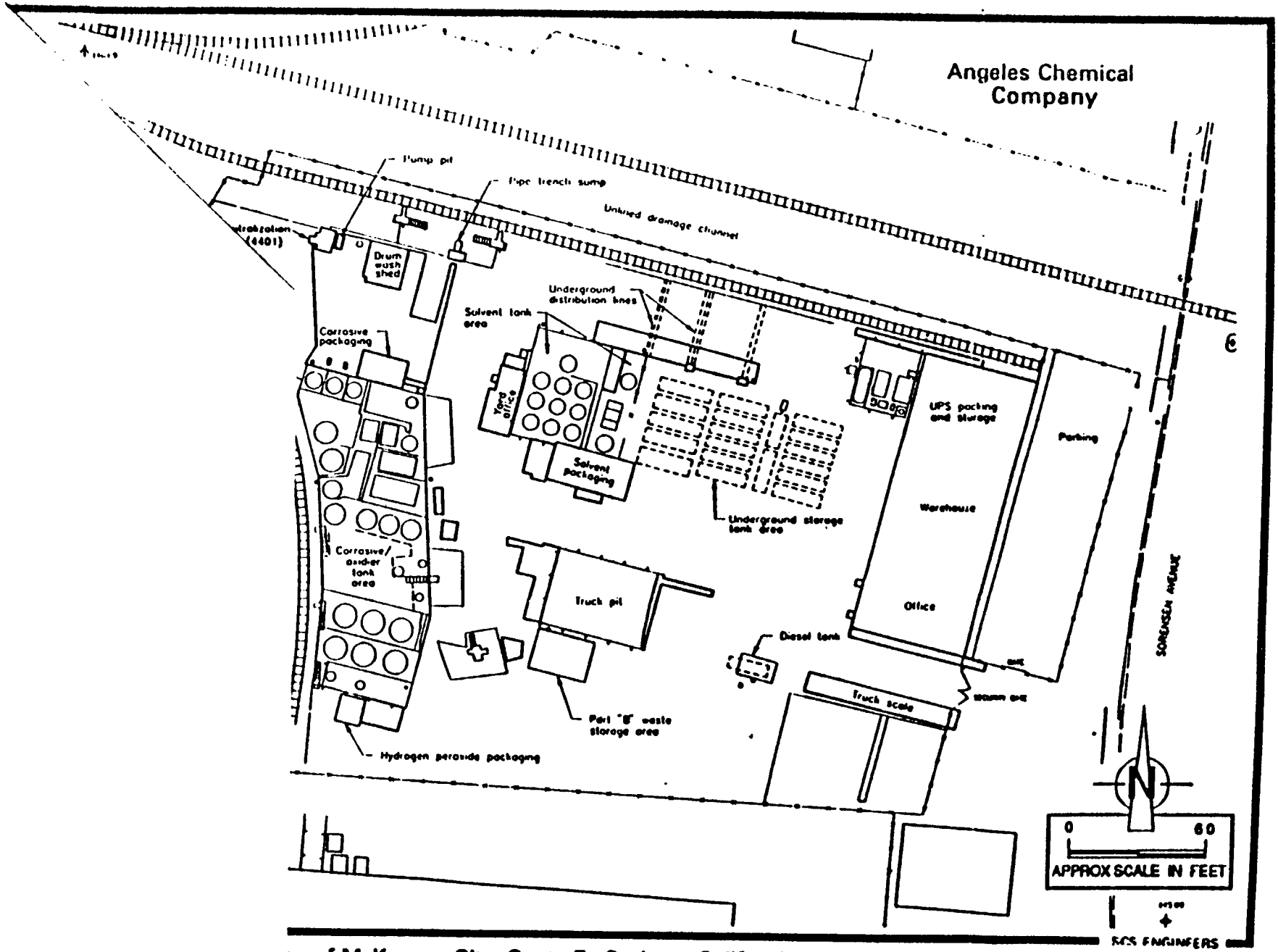


Figure 5. Facilities Neighboring Angeles Chemical Site, Santa Fe Springs, California.



w of McKesson Site, Santa Fe Springs, California.

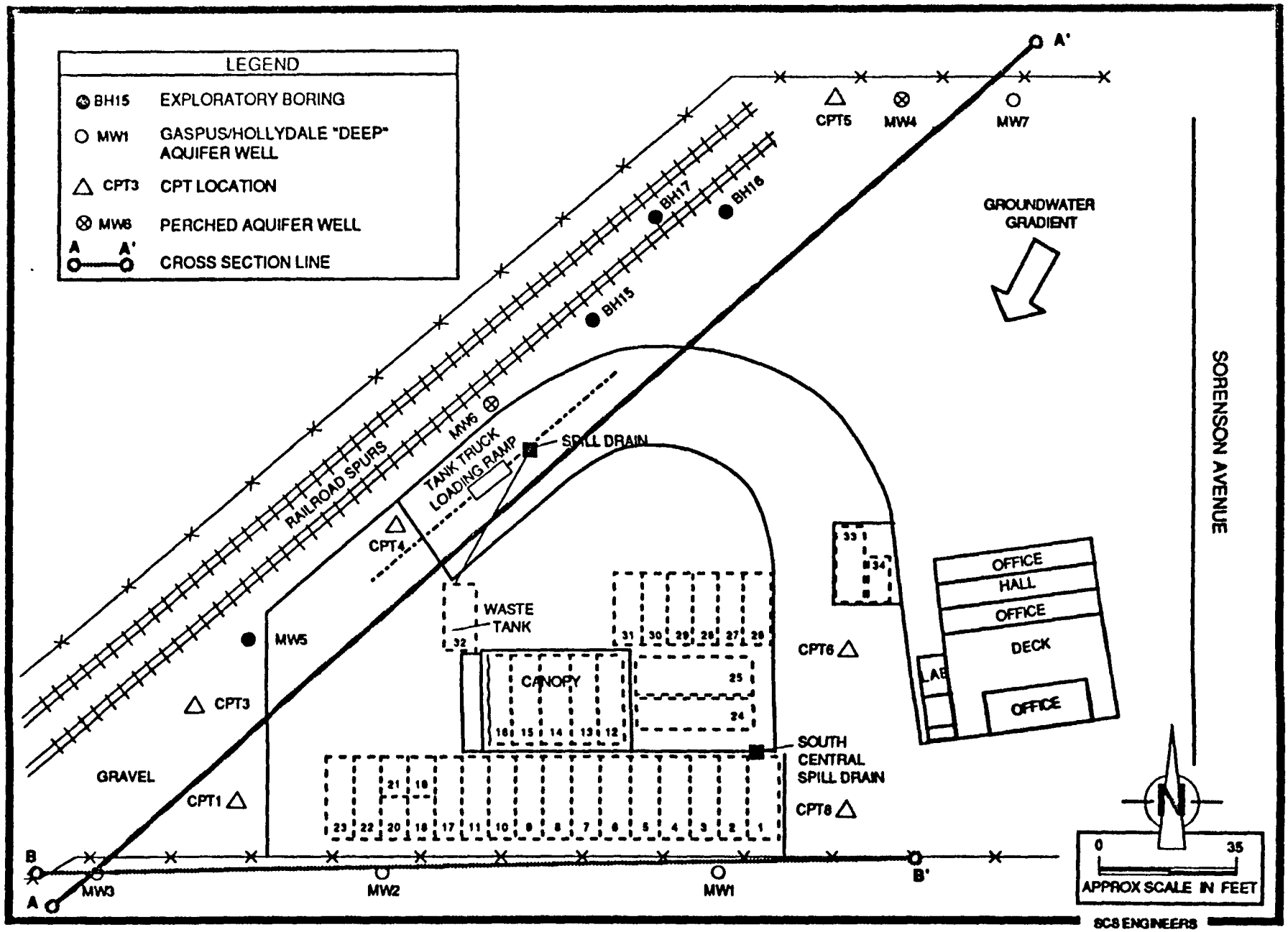


Figure 7. Approximate Locations of Borings, Wells, and CPT/Hydropunch from November 1993 through February 1994 RI at Angeles Chemical Site, Santa Fe Springs, California.

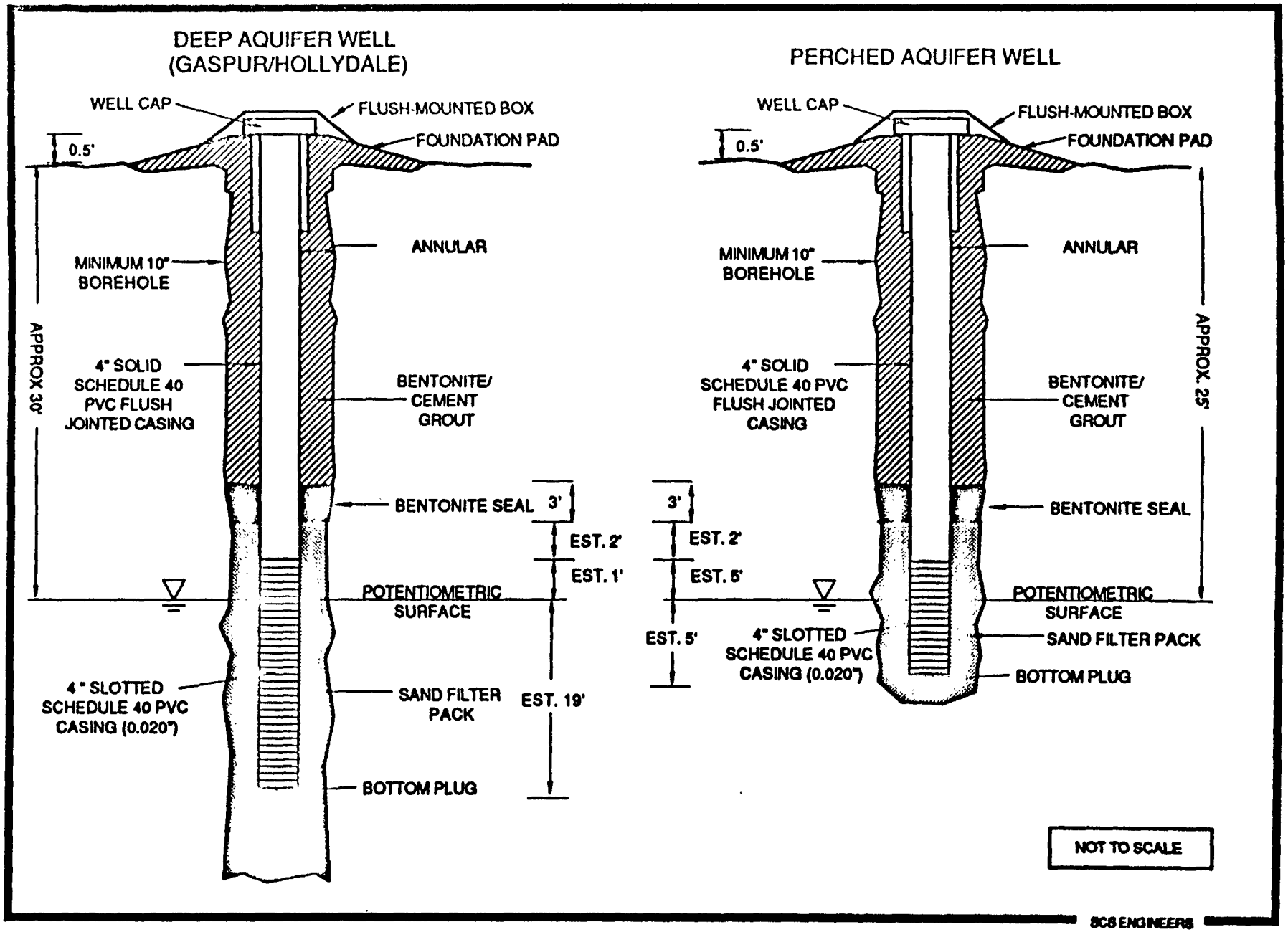


Figure 8. Typical Groundwater Monitoring Well Construction.

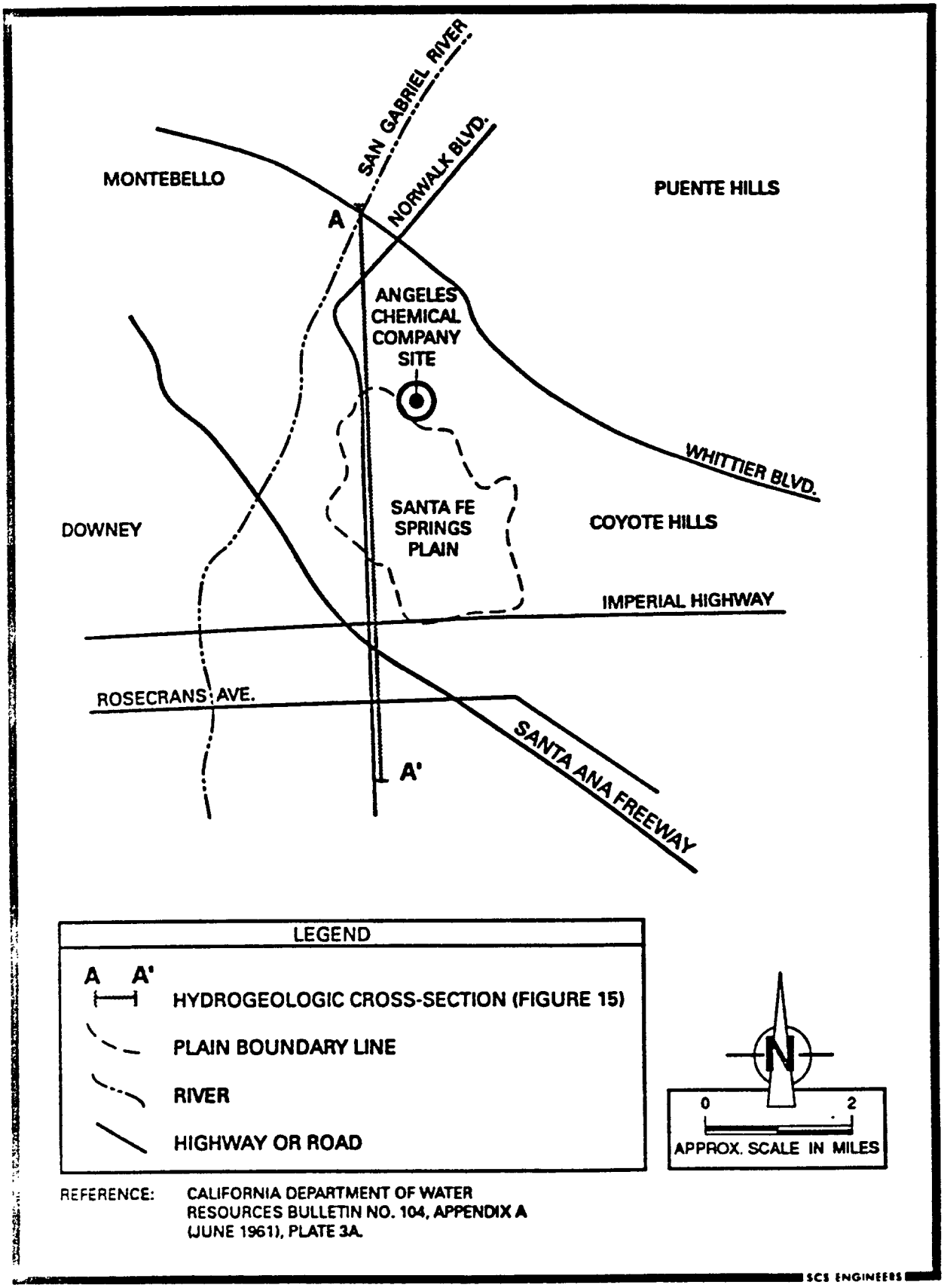


Figure 9. Physiographic Map, Angeles Chemical Company, Santa Fe Springs, California.

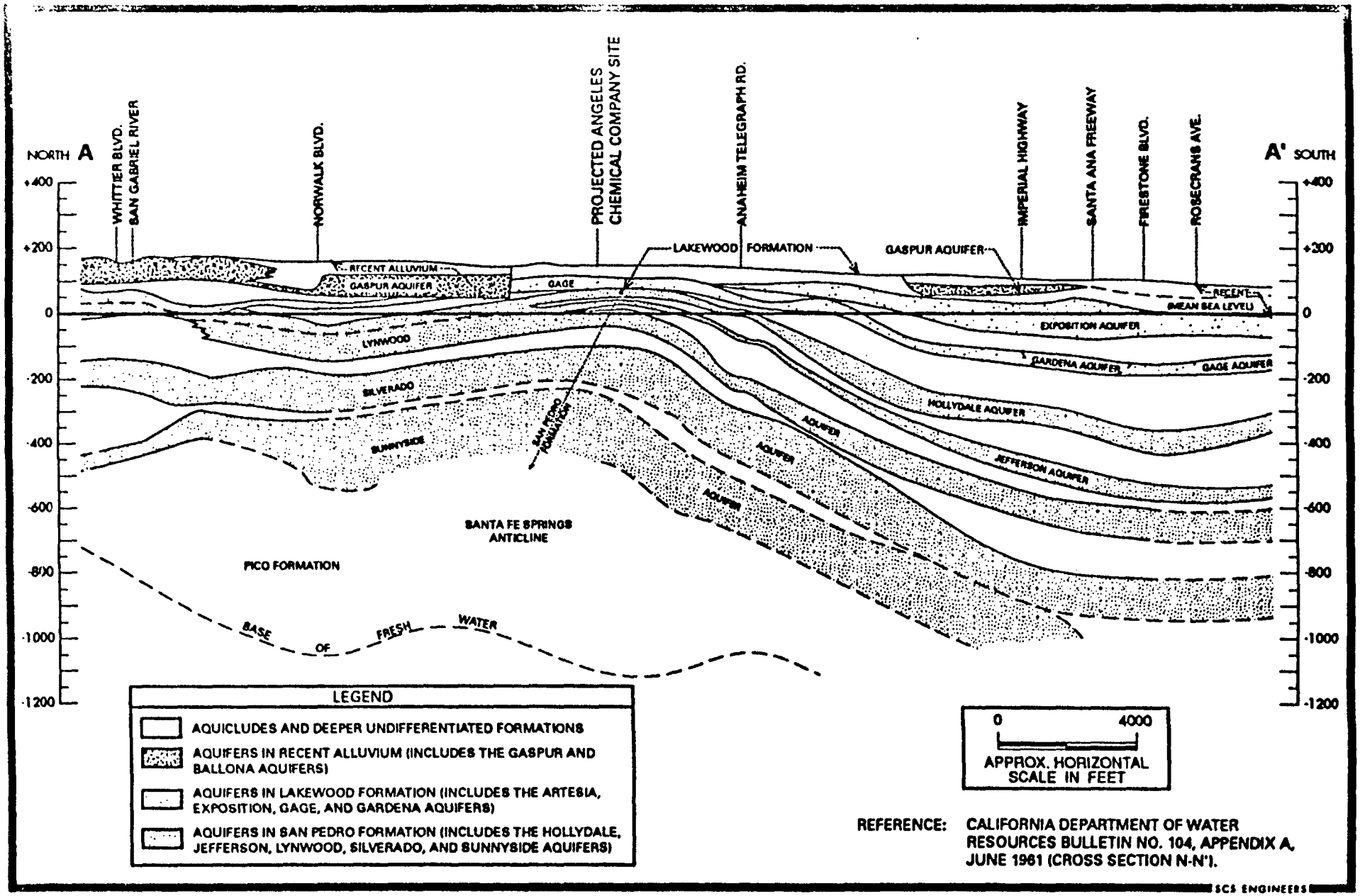


Figure 10. Hydrogeologic Cross Section, Angeles Chemical Company, Santa Fe Springs, California.

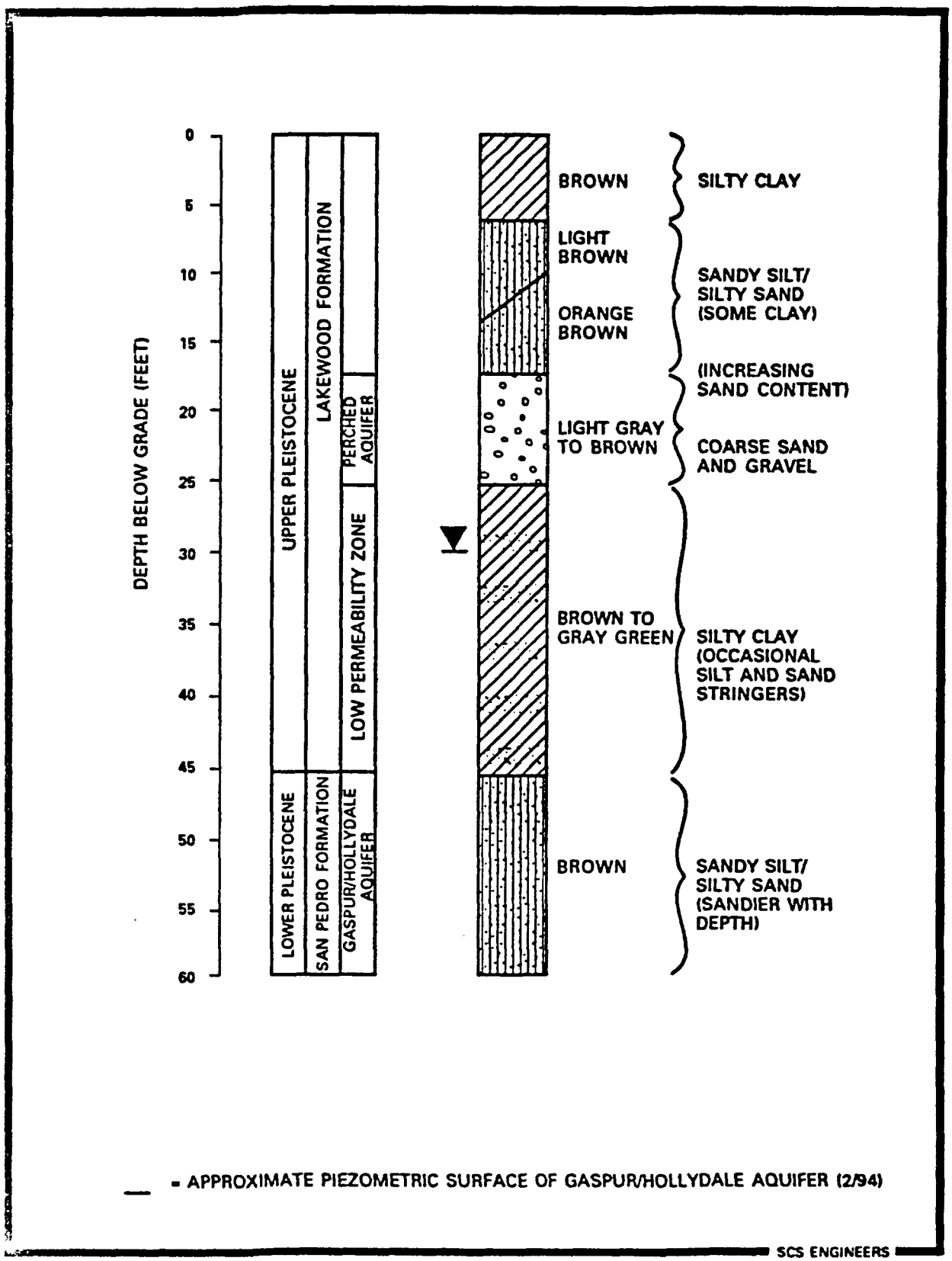


Figure 11. Generalized Stratagraphic Column, Angeles Chemical Company Site, Santa Fe Springs, California.

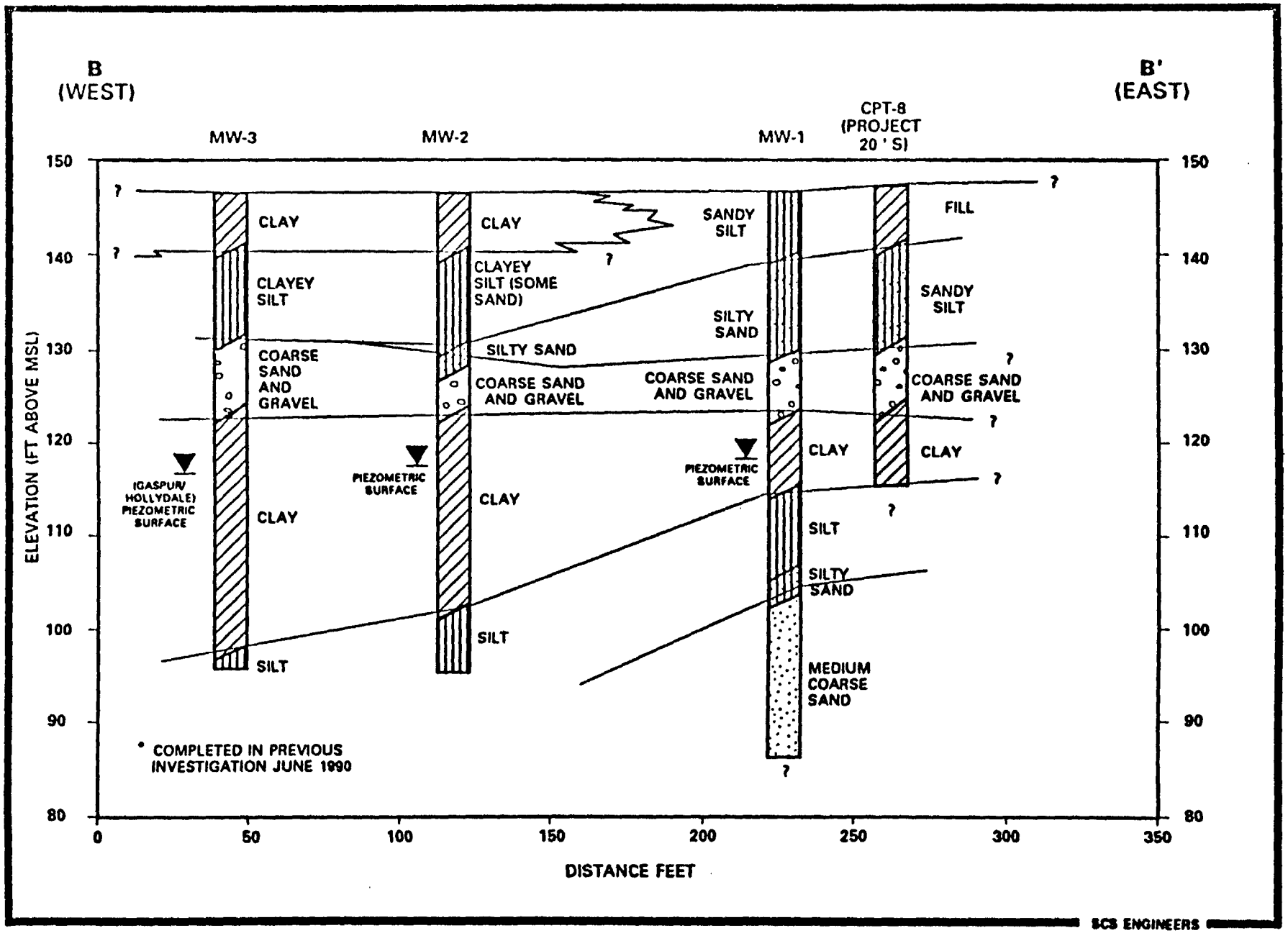


Figure 13. Cross Section B - B' Angeles Chemical Company, Santa Fe Springs, California.

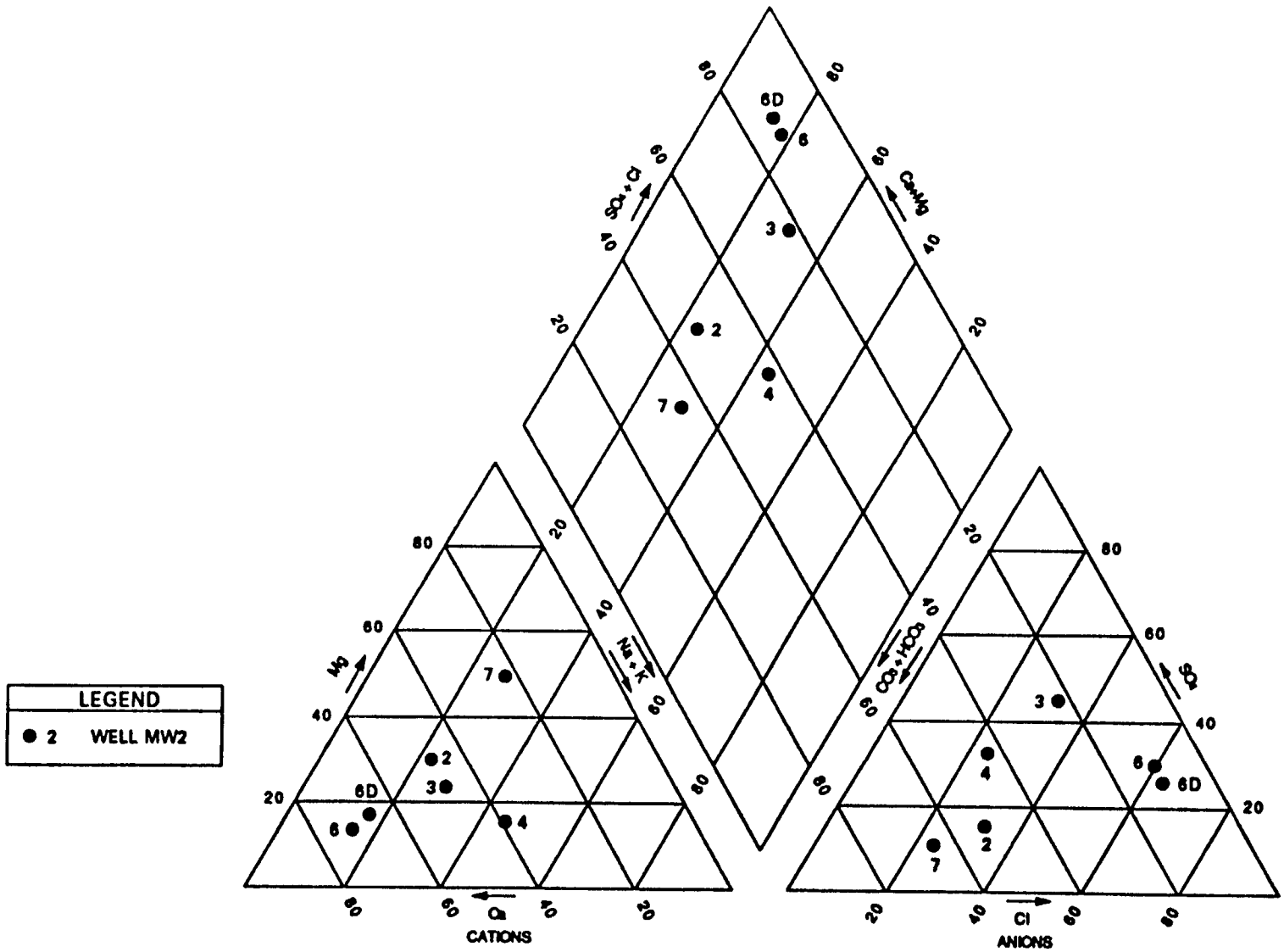


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Figure 14. Piper Diagram - Groundwater from Wells from Angeles Chemical Site, Santa Fe Springs, California.

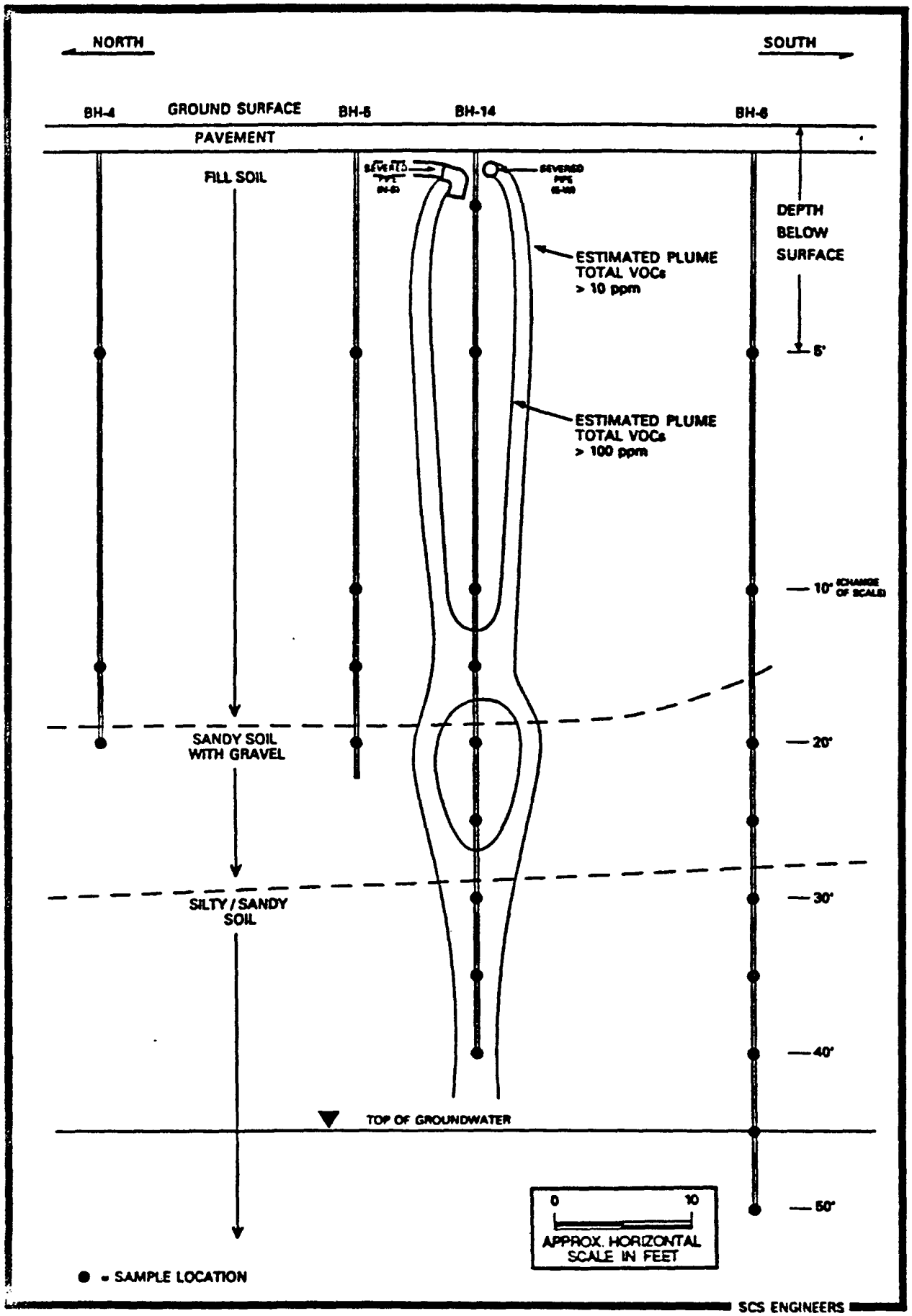

Figure 15. Angeles Chemical Drain Area.

BORING LOG

PROJECT : ANGELES CHEMICAL

JOB NUMBER: 0185016.01

HOLE / WELL # : BH15

PAGE : 2 OF 2

DEPTH (FEET)	SAMPLE	COMPLETION DETAIL	SAMPLE #	BLOW COUNTS / 6 INCHES	USCS SYMBOL	DESCRIPTION
21						
22						
23		BENTONITE CEMENT GROUT				
24						
25			BH15-25		GM	LIGHT BROWN SANDY GRAVEL, MEDIUM - COARSE SAND WITH GRAVEL AND PEBBLES, MILD ODOR OVA = 30 ppm
26						
27						WATER AT 26.5'
28						
29						
30						
31						
32						
33						
34						
35						
36						
37						
38						
39						
40						
41						
42						
43						
44						
45						

DRAFT
REMEDIAL INVESTIGATION REPORT
ANGELES CHEMICAL COMPANY SITE
SANTA FE SPRINGS, CALIFORNIA
VOLUME II - APPENDICES

Prepared for:

Angeles Chemical Company
8915 Sorenson Avenue
Santa Fe Springs, California 90670

Prepared by:

SCS Engineers
3711 Long Beach Boulevard
Ninth Floor
Long Beach, California 90807
(310) 426-9544

March, 1994

File No. 0185016.01

APPENDICES

Appendix A: Letter: DTSC's Imminent or Substantial Endangerment Order dated February 10, 1993

Appendix B: Laboratory Reports, Chain of Custody Documentation, and Well Permits

Appendix C: CPT Data and Interpretation

Appendix D: Boring Logs, Well Construction Details, and Well Sampling Field Notes, and Survey Data

APPENDIX A

Letter: DTSC's Imminent or Substantial Endangerment Order Dated February 10, 1993

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

PETE WILSON, Governor

DEPARTMENT OF TOXIC SUBSTANCES CONTROL
(ON 3)
GRANDVIEW AVENUE
.E. CA 91201
-2800

February 10, 1993

CERTIFIED MAIL

L. R. & B., a Joint Venture
2915 Sorensen Avenue
Santa Fe Springs, California 90670

ANGELES CHEMICAL COMPANY, INC. SITE

Enclosed please find an IMMINENT OR SUBSTANTIAL ENDANGERMENT ORDER issued to you and other respondents. The Department has determined that there is a release or threatened release of hazardous substances at the above-captioned site. In addition, the Department suspects that the ground water contamination at the above-captioned site is migrating to the McKesson property which is down gradient and thereby contributing to the contamination of the McKesson property. In order to properly remediate the McKesson ground water contamination, it is necessary to identify and investigate all contributing sources of contamination. Consequently, the Department is issuing this order for the protection of the public health and/or the environment.

The Department understands that this order will have a significant impact on the respondents. In order to minimize the cost of remediating the site and expedite the implementation of the order the Department can provide guidance documents to develop a remedial investigation work plan, a remedial investigation report, a risk assessment report, and other required documents necessary to properly characterize and remediate the site.

If you wish to discuss this order with the Department you may call Douglas Suzuki at (818) 551-2856 to schedule a meeting.

Sincerely,

Hamid Saebfar
Acting Branch Chief
Site Mitigation Branch
Department of Toxic Substances Control

Enclosures

RETURN RECEIPT REQUESTED
P-471-076-870

STATE OF CALIFORNIA
ENVIRONMENTAL PROTECTION AGENCY
DEPARTMENT OF TOXIC SUBSTANCES CONTROL

In the matter of: ANGELES CHEMICAL COMPANY, INC., a California Corporation 8915 Sorensen Avenue SANTA FE SPRINGS, CA 90670 L. R. & B., a Joint Venture 8915 Sorensen Avenue Santa Fe Springs, CA 90670 Mr. John G. Locke 20449 Rancho Los Cerritos Covina, CA 91724 Mrs. Janyce B. Locke 20449 Rancho Los Cerritos Covina, CA 91724 Mr. Robert O. Berg 93-A Surfside, CA 90743 Mrs. Donna M. Berg 93-A Surfside, CA 90743 Mr. Arnold Rosenthal 838 North Doheny Drive West Hollywood, CA 90069 Mrs. Pearl Rosenthal 838 North Doheny Drive West Hollywood, CA 90069	Docket No. I§S/E 92/93-012 IMMINENT OR SUBSTANTIAL ENDANGERMENT ORDER Health and Safety Code section 25358.3 (a)(1)

1.0 INTRODUCTION

1.1. Parties. The State of California, Environmental Protection Agency, Department of Toxic Substances Control (Department) issues this Imminent or Substantial Endangerment Order (Order) to: Angeles Chemical Company, Inc., a California corporation, L. R. & B., a Joint Venture, Mr. John G. Locke, an individual, Mrs. Janyce B. Locke, an individual,

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Mr. Robert O. Berg, an individual, Mrs. Donna M. Berg, an individual, Mr. Arnold Rosenthal, an individual, and Mrs. Pearl Rosenthal, an individual (Respondents).

1.1.2. Each and every Respondent which has been identified by the Department is a responsible party as that term is defined in Health and Safety Code, section 25323.5. There may be other responsible parties which may not have been identified thus far by the Department.

1.2. Site. This Order applies to the Site located at 8915 Sorensen Avenue in the city of Santa Fe Springs, County of Los Angeles, State of California. The Site is bounded by Sorensen Avenue on the east, an Atchison, Topeka, and Santa Fe Railroad right-of-way on the south, the Liquid Air Corporation property on the west, and the PLAS-TAC Manufacturing Company property on the north. The exact boundaries of land impacted by the contamination caused by past activities at the Site are unknown at this time. A map of the general area is attached as Exhibit 1.

1.3. Jurisdiction. Section 25358.3(a)(1) of the Health and Safety Code authorizes the Department to issue an Order when the Department determines that there may be an imminent or substantial endangerment to the public health or welfare or to the environment, because of a release or a threatened release of hazardous substances, to any responsible party or parties to take appropriate removal or remedial action necessary to protect the public health and safety and the environment.

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2.0 FINDINGS OF FACT

2.1. Ownership of Property/Leasing of Property.

2.1.1. Prior to May 1975, Southern Pacific Transportation Company (SPTC) owned the site. The site was used as an agricultural field to grow strawberries.

2.1.2. Mr. John G. Locke, an individual, Mrs. Janyce B. Locke, an individual, Mr. Arnold Rosenthal, an individual, Mrs. Pearl Rosenthal, an individual, Mr. Robert O. Berg, an individual, and Mrs. Donna M. Berg, an individual (Respondents) formed a joint venture called the L. R. & B., a joint venture (LRB). The joint venture purchased the site from SPTC in or about May 1975 and continues to own the site to the present date.

2.1.3. In January 1976, the Angeles Chemical Company, Inc. (ACC) leased the property from LRB. ACC operates a chemical distribution facility, repackaging bulk hazardous materials into various size containers for resale to their customers. ACC continues to lease and operate on the site.

2.2. Physical Description of Site. The site is on approximately 1.9 acre parcel of land located in an industrial portion of the city of Santa Fe Springs. The site generally slopes to the Southwest in a direction towards the Southern Pacific Transportation Railroad tracks.

2.2.1 The site contains 33 under-ground storage tanks and 4 above-ground storage tanks on the south side of the site. These tanks contain the hazardous material product destined to be repackaged. In addition, ACC has an additional under-

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ground waste storage tank, the contents of which are unknown.

2.2.2. The drums of repackaged hazardous materials are stored on the north east side of the site.

2.3. Site History. The real property is owned by LRB. ACC leased the site beginning on or about January 1976 to operate a chemical distribution business. ACC repackages petroleum solvents and chemicals into various size containers for resale to their customers.

The following are two known releases on the site:

1) On April 12, 1984, approximately 10 gallons of Acetate were released on site. The Santa Fe Springs Fire Department supervised the clean up of the Acetate.

2) On June 6, 1984, approximately 50 gallons of kerosene were released on site. The Santa Fe Springs Fire Department supervised the clean up of the Kerosene.

2.3.1. ACC conducted an initial under-ground tank investigation under the supervision of the Los Angeles County - Department of Public Works. The purpose of the investigation was to identify any contamination from their under-ground tanks. Substances found in the soil and ground water samples are those identified in paragraph 2.4.

2.3.2. The Los Angeles County Fire Department's Hazardous Materials Section is currently ordering ACC to conduct additional soil investigations at the south east and south west areas of the site.

2.4. Substances Found at the Site. In the subsurface soil samples, thirteen different volatile compounds, which are

also hazardous substances, were identified. They include acetone, benzene, 2-butanone (Methyl Ethyl Ketone [MEK]), 1,1 dichloroethane (1,1-DCA), 1,1 dichloroethene (1,1-DCE), ethylbenzene, methylene chloride, 4-methyl-2-pentanone (methyl isobutyl ketone [MIBK]), tetrachloroethene (PERC), toluene, 1,1,1-trichloroethane (1,1-TCA), trichloroethene (TCE), and xylenes.

In the ground water samples, eight different volatile compounds, which are also hazardous substances, were identified. They include benzene, 1,1 dichloroethane (1,1-DCA), toluene, xylenes, tetrachloroethene (PERC), 1,1 dichloroethene (1,1-DCE), 1,1,1-trichloroethane (1,1-TCA), and trichloroethene (TCE).

2.4.1. Benzene is a known human carcinogen. Acute poisoning from benzene exposure has an affect on the human Central Nervous System. Benzene poisoning can occur through inhalation of vapors and absorption through the skin.

2.4.2. Trichloroethylene (TCE) is a possible human carcinogen, cause reproductive and tumorogenic affects and a strong skin and eye irritant. Chronic exposure to TCE can cause irreparable damage to the liver and other organs. Exposure can occur through ingestion, respiration, and adsorption through the skin.

2.4.3. Tetrachloroethene (PERC) is a possible human carcinogen and a skin and eye irritant. Exposure to PERC can cause damage to the central nervous system and the liver. Exposure can occur through ingestion, inhalation, and

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adsorption through the skin.

2.5. Population at Risk. The site is located within a half a mile radius of an industrial/commercial area. The workers/employees will be the initial population exposed to any air borne emissions. Exposure can occur through ingestion, inhalation, and adsorption through the skin. See also paragraph 2.6.2.

2.5.1. The nearest school is within a mile from the site. There are several other schools within two miles of the site.

2.5.2. The Presbyterian and another church are located within a mile and a half of the site.

2.5.3. There are several parks within two miles of the site.

2.6. Routes of Exposure. The routes of exposure from the constituents in the soil and ground water are from inhalation, ingestion, and dermal pathways.

2.6.1. The site workers are potentially at risk of being exposed to the air borne soil contaminants during daily work (moving trucks, wind dispersion, etc.) and any excavation activities. The potential routes of exposure are from inhalation, ingestion, and dermal pathways.

2.6.2. The population (identified in paragraph 2.5) and/or the environment is potentially at risk of being exposed to the soil and ground water contaminants. The air borne soil contaminants are a potential risk to the surrounding community of up to 1/2 a mile. The Gage aquifer is the closest upper aquifer to the site and would be the first aquifer affected by

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the ground water contaminants. The Gage aquifer merges with the Hollydale aquifer northeast of the site (up gradient). The City of Santa Fe Springs has one production water (drinking) well in the Hollydale aquifer, which is located approximately nine miles south of the site (down gradient). In addition, the City of Santa Fe Springs has two deeper production water (drinking) wells. One well is approximately 0.5 miles north of the site and is drawing water from the Silverado and Sunnyside aquifers (lower than the Gage and Hollydale aquifers). The other well is approximately 2 miles west of the site and is drawing water from the Silverado aquifer. The water quality data from samples of the two wells have indicated the presence of TCE and PCE constituents in the ground water. There exists a possible inter-connection between the upper and lower aquifers due to the geological characteristics.

3.0 CONCLUSIONS OF LAW

3.1. The substances, described above, are "hazardous substances" as defined by Health and Safety Code, Section 25316.

3.2. The Respondents are responsible persons or parties as defined by Health and Safety Code, Section 25319, 25360, and 25385.1(g).

3.3. The past, present and potential migration of hazardous substances from the site into the soil and ground water constitutes an actual or threatened "release" as defined in Health and Safety Code, Section 25320.

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4.0 DETERMINATIONS

4.1. Based on the foregoing Findings of Fact and Conclusions of Law, the Department has determined that:

a. There maybe an imminent or substantial endangerment to the public health or welfare or to the environment, because of a release or threatened release of hazardous substances from the site.

b. The Respondents are responsible parties who are required to take the actions ordered below to protect the public health and safety and environment.

c. The remedial actions set forth in this Order are necessary to respond to releases or threatened releases of hazardous substances at and from the site.

5.0 ORDER

Based on the foregoing FINDINGS OF FACT, CONCLUSIONS OF LAW, AND DETERMINATIONS, IT IS HEREBY ORDERED THAT Respondents conduct the following remedial activities in the manner specified herein, and in accordance with a schedule specified by the Department as follows:

6.0 REMOVAL ACTIONS

6.1. The Respondents shall submit to the Department for review and approval a detailed work plan and implementation schedule which covers all the activities necessary to stabilize all un-contained hazardous substances on site. These activities may include but are not limited to:

a. Placement of the material into containers;

b. Removal of the material for off-site disposal;

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c. Application of a protective cover to prevent direct contact and dispersal; and

d. Construction of fencing and appropriate posting of signs to restrict access.

The work plan must be approved by the Department prior to the commencement of any removal activities.

7.0 REMEDIAL INVESTIGATION AND FEASIBILITY STUDY

7.1. Work plan Submission. Within 45 calendar days of the effective date of this Order, the Respondents shall submit to Department for review and approval a detailed work plan and implementation schedule which covers all the activities necessary to conduct a complete remedial investigation and feasibility study of the site and any areas where there is a release or threatened release of hazardous substances from the site. The work plan and activities under it shall, at a minimum, conform to the National Contingency Plan (40 CFR Part 300), as amended, and the U.S. Environmental Protection Agency's "Guidance on Remedial Investigation under CERCLA" and "Guidance on Feasibility Studies under CERCLA" both dated June 1985, as amended, as well as state laws and regulations.

7.2. Work plan Objectives. The objectives of the Work plan are to:

a. Determine the nature and full extent of contamination of air, soil, surface water and ground water at the site and adjacent areas;

b. Identify all existing and potential migration pathways, including the direction, rate and dispersion

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of contaminant migration;

c. Identify and evaluate appropriate remedial measures to prevent future releases and mitigate any releases which have already occurred; and

d. Collect and evaluate the information necessary to prepare a remedial action plan in accordance with the requirements of Health and Safety Code, Section 25356.1.

7.3. Work plan Contents. The work plan shall cover each of the following elements: remedial investigation, remedial investigation report, feasibility study and feasibility study report and shall contain a schedule for implementation of each element.

7.3.1. The remedial investigation portion of the work plan shall include at least the following elements:

a. A history of the site including a list of the hazardous materials used on-site and their estimated volumes and concentrations, a description of all manufacturing processes which are or were related to each hazardous material or produced any hazardous waste, and a site map delineating each area where hazardous materials and/or hazardous wastes were disposed, treated, stored, transferred, transported, handled or used;

b. A summary of all air, soil, surface water and ground water assessment work completed to date, including data reduction and interpretation of the data;

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c. A description of the activities which will be undertaken to develop a complete profile of on-site and off-site air, soil, surface water and ground water contamination attributable to operations at the site;

d. Sampling protocols for air, surface water, standing liquid, ground water, sediment, surface soil and subsurface soil;

e. Analytic and quality control protocols for all sampling and analysis programs including:

(1) adequate sample identification;

(2) sample preservation techniques;

(3) chain of custody procedures;

(4) use of DHS approved analytical methods;

(5) identification of qualified person(s) conducting the sampling; and

(6) identification of a certified laboratory which will perform the analyses;

f. A description of locations where sampling will occur, and a list of chemical analyses to be performed;

g. Engineering specifications for all installations such as ground water monitoring wells and piezometers;

h. A description of provisions for gaining access to and obtaining samples from adjacent properties, where appropriate;

i. A description of how the date obtained pursuant to this Order will be managed and preserved by the Respondents in accordance with paragraph 9.14;

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j. A site health and safety plan which covers all measures including contingency plans which will be taken to protect persons on and off the site from exposure to hazardous wastes, substances or materials during activities under the work plan; and

k. A public participation plan for informing local residents about activities at the site and responding to inquiries from concerned citizens.

7.3.2. The remedial investigation report portion of the work plan shall describe the steps necessary to submit this report in compliance with paragraph 7.4.

7.3.3. The feasibility study portion of the work plan shall include at least the following elements:

a. A summary of the existing and potential hazards for which corrective action is required;

b. A description of the alternative remedial actions which will be evaluated;

c. A list of the technologies which will be screened for each alternative remedial action described in (b) above;

d. A description of the factors which will be considered in screening and analyzing each alternative remedial action technology, including, but not limited to, effectiveness, reliability, timeliness of implementation, unit cost, availability, operation and maintenance costs and conformity with applicable laws and regulations;

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STD. 113 (REV. 8-72)

e. A list of the criteria for screening and analyzing the alternative remedial action technologies; and

f. A description of all pilot studies, bench tests or other activities which will be performed to evaluate each alternative remedial action technology.

7.3.4. The feasibility study report portion of the work plan shall describe the steps necessary to submit this report in compliance with paragraph 7.5.

7.4. Remedial Investigation Report. The remedial investigation report shall be submitted by the Respondents to Department for review and approval in accordance with the approved work plan schedule. The remedial investigation report shall summarize the results of the remedial investigation including reduction and interpretation of all data and information generated and/or compiled during the remedial investigation. The remedial investigation report shall cover the following subjects relating to the site.

a. Introduction

1. Overview of Report

2. The Site Background Information

3. Nature and Extent of Problems

4. Remedial Investigation Summary

b. The Site Features Investigation

1. Demography

2. Land Use

3. Natural Resources

4. Climatology

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c. Hazardous Substance Investigation

1. Waste Types

2. Waste Component Characteristics and Behavior

d. Hydrogeologic Investigation

1. Soils

2. Geology

3. Ground Water

e. Surface Water Investigation

1. Surface Water

2. Sediments

3. Flood Potential

4. Drainage

f. Air Investigation

g. Biota Investigation

1. Flora

2. Fauna

h. Bench and Pilot Tests

i. Public Health and Environmental Concerns

1. Potential Receptors

2. Public Health Impacts

3. Environmental Impacts

j. Public Participation Plan

7.5. Feasibility Study Report. The feasibility study report shall be submitted by the Respondents to Department for review and approval in accordance with the approved work plan schedule. The feasibility study report shall summarize the results of the feasibility study including reduction and

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STATE OF CALIFORNIA
STD 113 (REV. 8-72)

interpretation of all data and information generated and/or compiled during the feasibility study. The feasibility study shall cover the following subjects relating to the site.

a. Description of Current Situation

1. The Site Background Information

2. Nature and Extent of Release

3. Objective of Remedial Actions

b. Screening of Remedial Action Technologies

1. Technical Criteria

2. Remedial Action Alternatives Developed

3. Environmental and Public Health Criteria

4. Other Screening Criteria

5. Cost Criteria

c. Analysis of Remedial Action Alternatives

1. Technical Feasibility

2. Environmental Evaluation

3. Institutional Requirements

4. Public Health Evaluation

5. Cost Analysis

d. Recommended Remedial Action

7.6. Work plan Implementation. The Respondents shall implement the work plan as approved by Department in accordance with the approved schedule.

8.0 REMEDIAL ACTION PLAN

8.1. Draft Remedial Action Plan. Within 30 calendar days of Department's approval of the feasibility study report, the Respondents shall prepare and submit to Department for

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review and approval a draft Remedial Action Plan (RAP) and the California Environmental Quality Act (CEQA) documents. The RAP shall set forth in detail appropriate steps to remedy air, soil, surface water and ground water contamination at the site and adjacent areas. The RAP shall be prepared in accordance with the standards and requirements set forth in Health and Safety Code, Section 25356.1. In addition, the RAP shall contain a schedule for implementation of all removal and remedial actions proposed to be taken. The CEQA documents shall be prepared in accordance with CEQA requirements.

8.2. Implementation of Final Remedial Action Plan. Within 60 days after Department's approval of the final RAP in accordance with Health and Safety Code, Section 25356.1, the Respondents shall submit to Department a detailed RAP work plan containing technical and operational plans and engineering designs for implementation of the approved remedial or removal action alternatives, and a schedule for implementing the construction phase. The work plan shall also describe the nature and design of the construction or equipment to be employed, a site specific hazardous waste transportation plan (if necessary), the identity of any contractors, transporters and other persons conducting the removal and remedial activities for the site, post remedial sampling and monitoring procedures for air, soil, surface water, and ground water, and shall cover all of the subjects described in paragraph 7.3.1 subdivisions (d), (e), (f), (g), (h), (i), (j) and (k) as they pertain to the removal and remedial activities. The schedule

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submitted with the work plan shall provide that all approved removal or remedial actions excluding operation and maintenance shall be completed by May 5, 1995.

8.2.1. Upon Department approval of the RAP work plan and schedule, the Respondents shall implement the final RAP as approved in accordance with the approved RAP work plan and the schedule for implementing the construction phase as specified in paragraph 8.2., above.

8.2.2. The Respondents shall be responsible for all operation and maintenance requirements in accordance with the final RAP and RAP work plan.

8.2.3. During the implementation of the final RAP and RAP work plan the Department may specify such additions, modifications and revisions to the RAP work plan as it deems appropriate to implement the RAP.

8.2.4. Any remedial technology employed in implementation of the final RAP shall be left in place and operated by the Respondents until and except to the extent that the Department determines and states in writing that the Respondents may discontinue or modify some or all of such remedial technology because the Respondents have met the criteria specified in the final RAP for discontinuance of such technology or because such modifications would better achieve the goals of the final RAP.

9.0 OTHER PROVISIONS

9.1. Project Coordinator. Within 15 calendar days of the effective date of this Order, the Respondents shall submit to the Department in writing, the name and address of a Project

Coordinator whose responsibilities will be to receive all notices, comments, approvals, and other communications from the Department to the Respondents.

9.2. Project Engineer/Geologist. The work performed pursuant to this Order shall be under the direction and supervision of a qualified registered professional engineer or a registered geologist in the State of California with expertise in hazardous waste site cleanup.

9.3. Monthly Activity Reports. Within 30 calendar days of the effective date of this Order and monthly thereafter, the Respondents shall submit a Monthly Activity Report of its activities under the provisions of this Order. The Monthly Activity Report shall describe:

(a) The specific actions taken by or on behalf of the Respondents during the previous month;

(b) The actions expected to be undertaken during the current month;

(c) All planned activities for the following month;

(d) Any requirements under this Order that were not completed;

(e) Any problems or anticipated problems in complying with this Order; and

(f) A summary of all results of sample analyses, tests and other data generated or received by the Respondents under this Order.

The Monthly Activity Report shall be received by the Department no later than ten (10) days after the reporting

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month ends.

9.4. Incorporation of Documents. All plans, schedules, reports, specifications, and other documents required or submitted by the Respondents pursuant to this Order are, upon written approval by the Department, incorporated in this Order and shall be implemented by the Respondents as approved. Any noncompliance with such documents shall be noncompliance with this Order.

9.5. Exhibits. All Exhibits attached hereto are incorporated herein by this reference.

9.6. Submittals and Approvals. All submittals and notifications from the Respondents required by this Order shall be in writing and sent simultaneously to:

Mr. Hamid Saebfar
Acting Branch Chief
Department of Toxic Substances Control
ATTN: Angeles Chemical Company
1011 N. Grandview Avenue
Glendale, California 91201

Dr. Robert P. Ghirelli
Executive Officer
California Regional Water Quality Control Board
101 Centre Plaza
Monterey Park, California 91754

Mr. Bill Jones
Chief Investigative Section
Health Hazardous Materials Division
5825 Rickenbacker Road
Commerce, California 90040

Mr. George Baker
County of Los Angeles
Department of Health Services
Hazardous Materials Control Program
7300 East Alondra, Suite 203
Paramount, California 90723

All approvals and decisions of the Department made

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regarding such submittals and notifications shall be communicated to the Respondents in writing by the Site Mitigation Branch Chief, Department of Toxic Substances Control or his/her designee. No informal advice, guidance, suggestions, or comments by the Department regarding reports, plans, specifications, schedules or any other writing prepared or submitted by or for the Respondents shall be construed to relieve the Respondents of their obligation to obtain such formal approvals as may be required herein.

9.7. Department Review and Approval. If the Department determines that any report, plan, schedule or other document submitted for approval pursuant to this Order fails to comply with this Order or fails to protect public health, public safety, or the environment, the Department may:

(a) Modify the document as deemed necessary and approve the document as modified; or

(b) Return the document to the Respondents with recommended changes and a date by which the Respondents must submit to the Department a revised document incorporating the recommended changes.

9.8. Modifications. The Department reserves the right to unilaterally modify this Order. Any modification to this Order shall be effective upon issuance and deemed incorporated in this Order.

9.9. Time Periods. Unless otherwise specified, time periods begin from the effective date of this Order and "days" means calendar days. The effective date of this Order is the

date of issuance by the Department.

9.10. Extension Requests. If, for any reason, the Respondents are unable to perform any activity or submit any document within the time required under this Order, the Respondents may request, in writing, an extension of the time specified. The extension request shall include a justification for the delay. All such requests shall be in advance of the date on which the activity or document is due.

9.11. Extension Approvals. If the Department determines, that good cause exists for an extension as set forth in Paragraph 9.10 the Department may grant the request and specify in writing a new schedule. The Respondents shall comply with the new schedule.

9.12. Endangerment During Implementation. In the event that the Department determines that any circumstances or activities (whether or not pursued in conformance with this Order) are creating an imminent or substantial endangerment to the health and safety and welfare of persons on the site or in the surrounding area, or to the environment, the Department may issue a Stop Work Order to the Respondents to stop further implementation of this Order for such period of time as needed to abate the endangerment. Any deadline contained in this Order which is directly affected by a Stop Work Order under this section shall be extended for the term of such Stop Work Order.

9.13. Site Access. Access to the Site and laboratories used for analyses of samples under this Order shall be

provided at all reasonable times to employees, contractors, and consultants of the Department. Nothing in this Paragraph is intended or shall be construed to limit in any way the right of entry or inspection that the Department or any other agency may otherwise have by operation of law. The Department and its authorized representatives shall have the authority to enter and move freely about all property at the Site at all reasonable times for purposes including, but not limited to:

(a) Inspecting records, operating logs, sampling and analytical data, and contracts relating to this Site;

(b) Reviewing the progress of the Respondents in carrying out the terms of this Order;

(c) Conducting such tests as the Department may deem necessary; and

(d) Verifying the data submitted to the Department by the Respondents.

9.14. Sampling, Data and Document Availability. The Respondents shall permit the Department and its authorized representative to inspect and copy all sampling, testing, monitoring or other data generated by the Respondents or on behalf of the Respondents in any way pertaining to work undertaken pursuant to this Order. The Respondents shall inform the Department at least two (2) days in advance of all field sampling under this Order and shall allow the Department and its authorized representatives to collect duplicates of any samples collected pursuant to this Order. The Respondents shall maintain a central depository of the data, reports, and

other documents prepared pursuant to this Order. All such data, reports, and other documents shall be preserved by the Respondents for a minimum of six (6) years after the conclusion of all activities under this Order. If the Department requests that some or all of these documents be preserved for a longer period of time, the Respondents shall either comply with that request or deliver the documents to the Department. The Respondents shall notify the Department in writing at least six (6) months prior to destroying any documents prepared pursuant to this Order.

9.15. Penalties for Noncompliance. Failure to comply with the provisions of this Order, or with any reports, plans, specifications, schedules, or other documents incorporated as part of this Order pursuant to Paragraph 9.4., may subject the Respondents to civil penalties in addition to cost recovery as specified in Paragraph 9.16.

9.16. Cost Recovery. Failure or refusal of the Respondents to comply with this Order may make the Respondents liable for any government costs incurred, including those payable from the Hazardous Substance Account or the Hazardous Substance Cleanup Fund for any response action at the Site, as provided in Health and Safety Code, Section 25360 and other applicable provisions of law. These costs include the Department's direct, indirect, and administrative overhead costs. Cost recovery may also be pursued by the Department under CERCLA.

9.16.1. Past Costs. Within sixty (60) days of receipt of

an invoice, the Respondents shall reimburse the Department for all past costs related to the Site and incurred prior to issuance of this Order. The Department will deduct the amounts of:

(a) Fees paid by the Respondent; and

(b) Any payments on past invoices.

9.16.2. Future Costs. The Respondents shall be liable for all costs and fees owing to the Department or the Board of Equalization in accordance with applicable law. The Respondents shall pay all fees for oversight assessed pursuant to Health and Safety Code, Section 25347.6 upon billing by the Board of Equalization. The Department has determined that the Site is a medium sized site, however, the site size may be revised based upon the receipt of further information. The Department reserves any and all rights under applicable law to recover all costs expended for oversight of response activities at the Site which are above the fees paid under Health and Safety Code, Section 25347.6.

9.17. Additional Enforcement Actions. By issuance of this Order, the Department does not waive the right to take any further enforcement actions.

9.18. Compliance with Applicable Laws. The Respondents shall carry out this Order in compliance with all applicable local, State, and Federal requirements, including, but not limited to, requirements to obtain permits and assure worker safety.

9.19. Government Liabilities. The State of California

shall not be liable for any injuries or damages to persons or property resulting from acts or omissions by the Respondents, and related parties specified in Paragraph 9.22 in carrying out the activities pursuant to this Order, nor shall the State of California be held as party to any contract entered into by the Respondents or its agents in carrying out activities pursuant to this Order.

9.20. Reservation of Rights. Nothing in this Order is intended or shall be construed to limit the rights of any of the parties hereto with respect to claims arising out of or relating to the deposit or disposal at any other location of substances removed from the Site. Nothing in this Order is intended or shall be construed to limit or preclude the Department from taking any other action authorized by law to protect the public health and welfare or the environment and recovering costs thereof.

9.21. Severability. The requirements of this Order are severable, and the Respondents shall comply with each and every provision hereof notwithstanding the effectiveness of any other provision.

9.22. Parties Bound. This order applies to and is binding upon the Respondents, and its officers, directors, agents, employees, contractors, consultants, receivers, trustees, successors and assignees, including but not limited to, individuals, partners, and subsidiary and parent corporations and upon any successor agency of the State of California that may have responsibility for and jurisdiction

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over the subject matter of this Order.

IT IS SO ORDERED THIS TENTH DAY OF FEBRUARY, 1993.

Hamid Saebfar
Acting Branch Chief
Department of Toxic Substances Control

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EXHIBIT 1

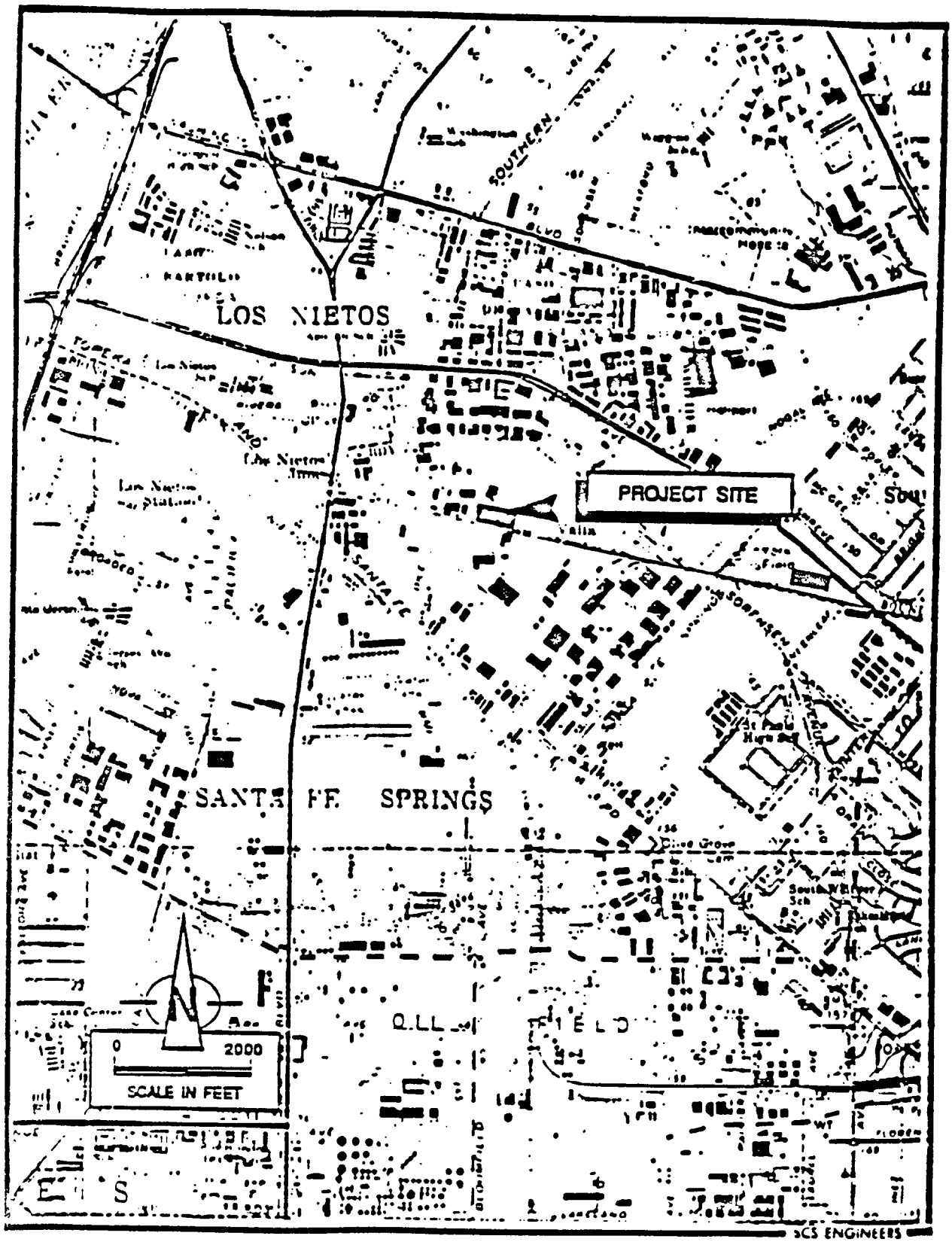

Figure 1. Map Showing Location of Project Site.

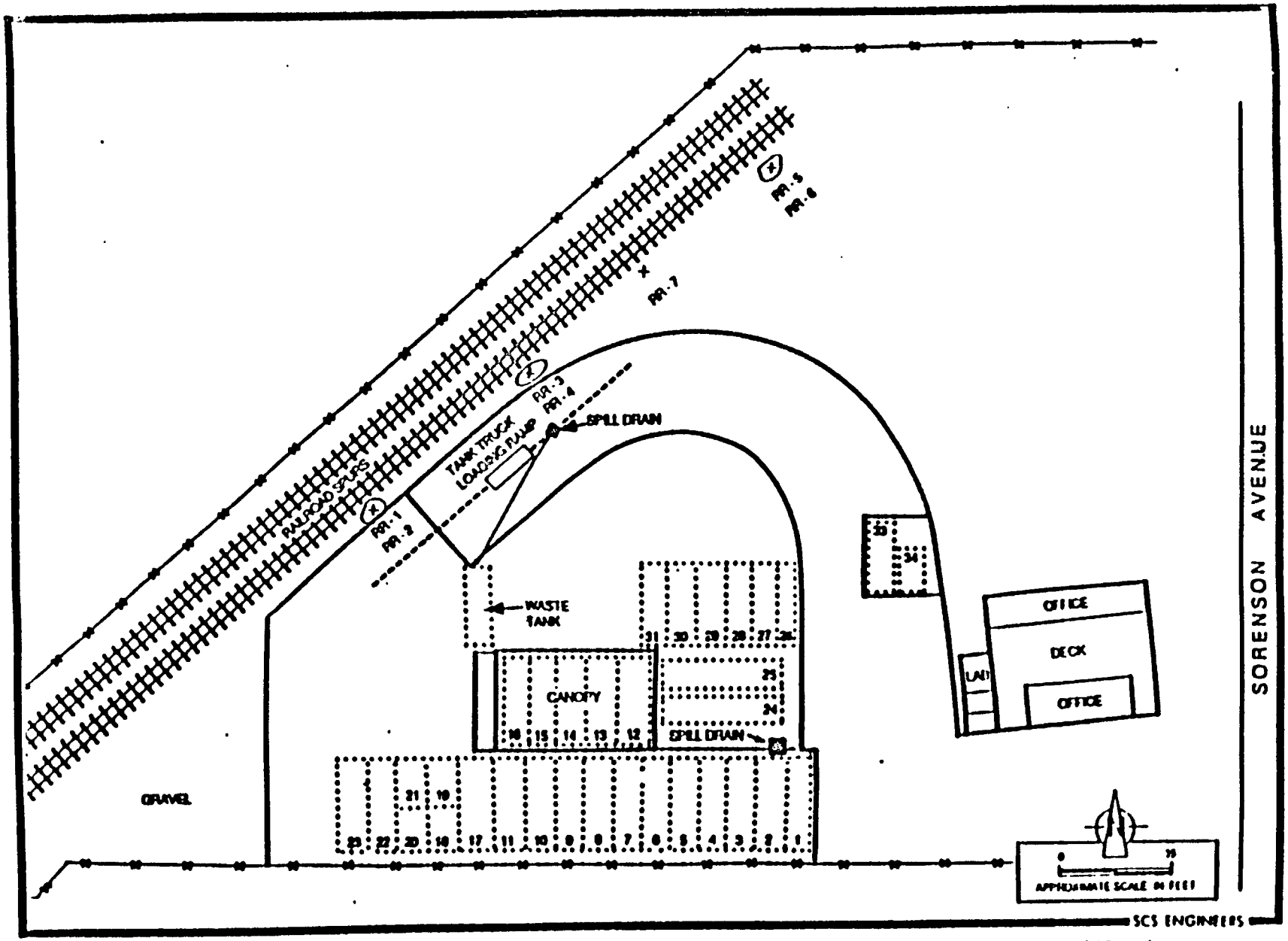

Figure 2. Approximate Locations of Soil Samples at Angeles Chemical, Santa Fe Springs, California.

PROOF OF SERVICE

1. I served the following documents:

a. Imminent or Substantial Endangerment Order

Docket Number I&S/E 92/93-012

b. (Name): L. R. & B., a Joint Venture

c. By serving: /X/ Responsible Party/Respondent

/_/ Other (Name and Title):

_____

_____

2. a. /_/ By personally delivering copies to (address) ___

_____

_____

at (time) _____ on (date) _____.

b. /X/ By mailing copies by first-class certified mail, Certified Mail Receipt No. P-471-076-870, return receipt requested, in a sealed envelope addressed to:

L. R. & B., a Joint Venture
8915 Sorensen Avenue
Santa Fe Springs, California 90670

3. At the time of service I was at least 18 years of age and not a party to this action.

4. My name, business address, and telephone number are:

Mr. Douglas M. Suzuki
California Environmental Protection Agency
Department of Toxic Substances Control
1011 N. Grandview Avenue
Glendale, California 91201
(818) 551-2856

I declare under penalty of perjury that the foregoing is true and correct and that this declaration is executed on February 10, 1993 at Glendale, California.
(date) (place)

_____
(Signature)

SM.06
(1/93)

SCS ANALYTICAL LABORATORY
2860 WALNUT AVENUE
LONG BEACH, CALIFORNIA 90806
(310) 595-9324
FAX (310) 595-6709

:on

January 20, 1994

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LABORATORY REPORT

:wo (42) soil samples from Angeles Chemical, collected on 01/05/94, 01/06/94 and 01/07/94,)4. Twenty three (23) samples to be analyzed, : archived.

ıched sheets.

Approved by

:AL LABORATORY

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Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH 15-1
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	6,330	5
108-88-3	Toluene	1,300	5
71-55-6	1,1,1-Trichloroethane	20,900	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	27	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	14,200	5
95-47-6	o-Xylene	29,000	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: BH 15-5
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	9,380	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	1,590	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	74	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	10	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH 15-5
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	11	5
108-88-3	Toluene	24	5
71-55-6	1,1,1-Trichloroethane	109	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	12	5
95-47-6	o-Xylene	11	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: BH 15-10
Date Received: 01/07/94
Date Analyzed: 01/17/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	67	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH 15-10
Date Received: 01/07/94
Date Analyzed: 01/17/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg(ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	6	5
71-55-6	1,1,1-Trichloroethane	5	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: BH15-20
Date Received: 01/07/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	261	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH15-20
Date Received: 01/07/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

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SCS ANALYTICAL LABORATORY

Sample I.D.: BH16-1
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	10,100	500
107-02-8	Acrolein	ND	500
107-13-1	Acrylonitrile	ND	500
71-43-2	Benzene	ND	50
75-27-4	Bromodichloromethane	ND	50
75-25-2	Bromoform	ND	50
74-83-9	Bromomethane	ND	300
78-93-3	2-Butanone	23,400	500
75-15-0	Carbon Disulfide	ND	50
56-23-5	Carbon Tetrachloride	ND	50
108-90-7	Chlorobenzene	ND	50
124-48-1	Chlorodibromomethane	ND	50
75-00-3	Chloroethane	ND	300
110-75-8	2-Chloroethyl Vinyl Ether	ND	500
67-66-3	Chloroform	ND	50
74-87-3	Chloromethane	ND	300
124-48-1	Dibromochloromethane	ND	50
74-95-3	Dibromomethane	ND	50
541-73-1	1,3-Dichlorobenzene	ND	50
106-46-7	1,4-Dichlorobenzene	ND	50
95-50-1	1,2-Dichlorobenzene	ND	50
110-56-5	1,4-Dichloro-2-butene	ND	50
75-71-8	Dichlorodifluoromethane	ND	50
75-34-3	1,1-Dichloroethane	ND	50
107-06-2	1,2-Dichloroethane	ND	50
75-35-4	1,1-Dichloroethylene	ND	50
156-60-5	trans-1,2-Dichloroethene	ND	50
78-87-5	1,2-Dichloropropane	ND	50
10061-01-5	cis-1,3-Dichloropropene	ND	50
10061-02-6	trans-1,3-Dichloropropene	ND	50
64-17-5	Ethanol	ND	50
100-41-4	Ethylbenzene	ND	50
97-63-2	Ethyl Methacrylate	ND	50
591-78-6	2-Hexanone	ND	300
74-88-4	Iodomethane	ND	50
75-09-2	Methylene Chloride	ND	500
108-10-1	4-Methyl-2-Pentanone	ND	300

R.L. = Reporting Limit
ND = Not Detected

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SCS ANALYTICAL LABORATORY

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH16-1
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	50
127-18-4	Tetrachloroethene	ND	50
108-88-3	Toluene	ND	50
71-55-6	1,1,1-Trichloroethane	ND	50
79-00-5	1,1,2-Trichloroethane	ND	50
79-01-6	Trichloroethene	ND	50
75-69-4	Trichlorofluoromethane	ND	50
96-18-4	1,2,3-Trichloropropane	ND	50
108-05-4	Vinyl Acetate	ND	300
75-01-4	Vinyl Chloride	ND	300
1330-20-7	m- and p-Xylenes	ND	50
95-47-6	o-Xylene	ND	50

R.L. = Reporting Limit
ND = Not Detected

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SCS ANALYTICAL LABORATORY

Sample I.D.: BH16-5
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result µg/kg (ppb)	R.L. µg/kg (ppb)
67-64-1	Acetone	2,180	500
107-02-8	Acrolein	ND	500
107-13-1	Acrylonitrile	ND	500
71-43-2	Benzene	ND	50
75-27-4	Bromodichloromethane	ND	50
75-25-2	Bromoform	ND	50
74-83-9	Bromomethane	ND	300
78-93-3	2-Butanone	52,000	500
75-15-0	Carbon Disulfide	ND	50
56-23-5	Carbon Tetrachloride	ND	50
108-90-7	Chlorobenzene	ND	50
124-48-1	Chlorodibromomethane	ND	50
75-00-3	Chloroethane	ND	300
110-75-8	2-Chloroethyl Vinyl Ether	ND	500
67-66-3	Chloroform	ND	50
74-87-3	Chloromethane	ND	300
124-48-1	Dibromochloromethane	ND	50
74-95-3	Dibromomethane	ND	50
541-73-1	1,3-Dichlorobenzene	ND	50
106-46-7	1,4-Dichlorobenzene	ND	50
95-50-1	1,2-Dichlorobenzene	ND	50
110-56-5	1,4-Dichloro-2-butene	ND	50
75-71-8	Dichlorodifluoromethane	ND	50
75-34-3	1,1-Dichloroethane	ND	50
107-06-2	1,2-Dichloroethane	ND	50
75-35-4	1,1-Dichloroethylene	ND	50
156-60-5	trans-1,2-Dichloroethene	ND	50
78-87-5	1,2-Dichloropropane	ND	50
10061-01-5	cis-1,3-Dichloropropene	ND	50
10061-02-6	trans-1,3-Dichloropropene	ND	50
64-17-5	Ethanol	ND	50
100-41-4	Ethylbenzene	ND	50
97-63-2	Ethyl Methacrylate	ND	50
591-78-6	2-Hexanone	ND	300
74-88-4	Iodomethane	ND	50
75-09-2	Methylene Chloride	ND	500
108-10-1	4-Methyl-2-Pentanone	ND	300

R.L. = Reporting Limit
ND = Not Detected

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GEOMATRIX

SCS ANALYTICAL LABORATORY

Sample I.D.: BH16-5
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	50
127-18-4	Tetrachloroethene	ND	50
108-88-3	Toluene	ND	50
71-55-6	1,1,1-Trichloroethane	55	50
79-00-5	1,1,2-Trichloroethane	ND	50
79-01-6	Trichloroethene	61	50
75-69-4	Trichlorofluoromethane	ND	50
96-18-4	1,2,3-Trichloropropane	ND	50
108-05-4	Vinyl Acetate	ND	300
75-01-4	Vinyl Chloride	ND	300
1330-20-7	m- and p-Xylenes	ND	50
95-47-6	o-Xylene	ND	50

R.L. = Reporting Limit
ND = Not Detected

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SCS ANALYTICAL LABORATORY

Sample I.D.: BH16-10
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	500
107-02-8	Acrolein	ND	500
107-13-1	Acrylonitrile	ND	500
71-43-2	Benzene	ND	50
75-27-4	Bromodichloromethane	ND	50
75-25-2	Bromoform	ND	50
74-83-9	Bromomethane	ND	300
78-93-3	2-Butanone	11,600	500
75-15-0	Carbon Disulfide	ND	50
56-23-5	Carbon Tetrachloride	ND	50
108-90-7	Chlorobenzene	ND	50
124-48-1	Chlorodibromomethane	ND	50
75-00-3	Chloroethane	ND	300
110-75-8	2-Chloroethyl Vinyl Ether	ND	500
67-66-3	Chloroform	ND	50
74-87-3	Chloromethane	ND	300
124-48-1	Dibromochloromethane	ND	50
74-95-3	Dibromomethane	ND	50
541-73-1	1,3-Dichlorobenzene	ND	50
106-46-7	1,4-Dichlorobenzene	ND	50
95-50-1	1,2-Dichlorobenzene	ND	50
110-56-5	1,4-Dichloro-2-butene	ND	50
75-71-8	Dichlorodifluoromethane	ND	50
75-34-3	1,1-Dichloroethane	ND	50
107-06-2	1,2-Dichloroethane	ND	50
75-35-4	1,1-Dichloroethylene	ND	50
156-60-5	trans-1,2-Dichloroethene	ND	50
78-87-5	1,2-Dichloropropane	ND	50
10061-01-5	cis-1,3-Dichloropropene	ND	50
10061-02-6	trans-1,3-Dichloropropene	ND	50
64-17-5	Ethanol	ND	50
100-41-4	Ethylbenzene	ND	50
97-63-2	Ethyl Methacrylate	ND	50
591-78-6	2-Hexanone	ND	300
74-88-4	Iodomethane	ND	50
75-09-2	Methylene Chloride	ND	500
108-10-1	4-Methyl-2-Pentanone	ND	300

R.L. = Reporting Limit
ND = Not Detected

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GEOMATRIX

SCS ANALYTICAL LABORATORY

Sample I.D.: BH16-10
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	50
127-18-4	Tetrachloroethene	ND	50
108-88-3	Toluene	ND	50
71-55-6	1,1,1-Trichloroethane	6	50
79-00-5	1,1,2-Trichloroethane	ND	50
79-01-6	Trichloroethene	ND	50
75-69-4	Trichlorofluoromethane	ND	50
96-18-4	1,2,3-Trichloropropane	ND	50
108-05-4	Vinyl Acetate	ND	300
75-01-4	Vinyl Chloride	ND	300
1330-20-7	m- and p-Xylenes	ND	50
95-47-6	o-Xylene	ND	50

R.L. = Reporting Limit
ND = Not Detected

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SCS ANALYTICAL LABORATORY

Sample I.D.: BH16-20
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	500
107-02-8	Acrolein	ND	500
107-13-1	Acrylonitrile	ND	500
71-43-2	Benzene	ND	50
75-27-4	Bromodichloromethane	ND	50
75-25-2	Bromoform	ND	50
74-83-9	Bromomethane	ND	300
78-93-3	2-Butanone	ND	500
75-15-0	Carbon Disulfide	ND	50
56-23-5	Carbon Tetrachloride	ND	50
108-90-7	Chlorobenzene	ND	50
124-48-1	Chlorodibromomethane	ND	50
75-00-3	Chloroethane	ND	300
110-75-8	2-Chloroethyl Vinyl Ether	ND	500
67-66-3	Chloroform	ND	50
74-87-3	Chloromethane	ND	300
124-48-1	Dibromochloromethane	ND	50
74-95-3	Dibromomethane	ND	50
541-73-1	1,3-Dichlorobenzene	ND	50
106-46-7	1,4-Dichlorobenzene	ND	50
95-50-1	1,2-Dichlorobenzene	ND	50
110-56-5	1,4-Dichloro-2-butene	ND	50
75-71-8	Dichlorodifluoromethane	ND	50
75-34-3	1,1-Dichloroethane	ND	50
107-06-2	1,2-Dichloroethane	ND	50
75-35-4	1,1-Dichloroethylene	ND	50
156-60-5	trans-1,2-Dichloroethene	ND	50
78-87-5	1,2-Dichloropropane	ND	50
10061-01-5	cis-1,3-Dichloropropene	ND	50
10061-02-6	trans-1,3-Dichloropropene	ND	50
64-17-5	Ethanol	ND	50
100-41-4	Ethylbenzene	82	50
97-63-2	Ethyl Methacrylate	ND	50
591-78-6	2-Hexanone	ND	300
74-88-4	Iodomethane	ND	50
75-09-2	Methylene Chloride	ND	500
108-10-1	4-Methyl-2-Pentanone	ND	300

R.L. = Reporting Limit
ND = Not Detected

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SCS ANALYTICAL LABORATORY

Sample I.D.: BH16-20
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	50
127-18-4	Tetrachloroethene	471	50
108-88-3	Toluene	125	50
71-55-6	1,1,1-Trichloroethane	ND	50
79-00-5	1,1,2-Trichloroethane	ND	50
79-01-6	Trichloroethene	ND	50
75-69-4	Trichlorofluoromethane	ND	50
96-18-4	1,2,3-Trichloropropane	ND	50
108-05-4	Vinyl Acetate	ND	300
75-01-4	Vinyl Chloride	ND	300
1330-20-7	m- and p-Xylenes	318	50
95-47-6	o-Xylene	104	50

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 4-5
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	1,640	500
107-02-8	Acrolein	ND	500
107-13-1	Acrylonitrile	ND	500
71-43-2	Benzene	ND	50
75-27-4	Bromodichloromethane	ND	50
75-25-2	Bromoform	ND	50
74-83-9	Bromomethane	ND	300
78-93-3	2-Butanone	1,990	500
75-15-0	Carbon Disulfide	ND	50
56-23-5	Carbon Tetrachloride	ND	50
108-90-7	Chlorobenzene	ND	50
124-48-1	Chlorodibromomethane	ND	50
75-00-3	Chloroethane	ND	300
110-75-8	2-Chloroethyl Vinyl Ether	ND	500
67-66-3	Chloroform	ND	50
74-87-3	Chloromethane	ND	300
124-48-1	Dibromochloromethane	ND	50
74-95-3	Dibromomethane	ND	50
541-73-1	1,3-Dichlorobenzene	ND	50
106-46-7	1,4-Dichlorobenzene	ND	50
95-50-1	1,2-Dichlorobenzene	ND	50
110-56-5	1,4-Dichloro-2-butene	ND	50
75-71-8	Dichlorodifluoromethane	ND	50
75-34-3	1,1-Dichloroethane	54	50
107-06-2	1,2-Dichloroethane	ND	50
75-35-4	1,1-Dichloroethylene	ND	50
156-60-5	trans-1,2-Dichloroethene	ND	50
78-87-5	1,2-Dichloropropane	ND	50
10061-01-5	cis-1,3-Dichloropropene	ND	50
10061-02-6	trans-1,3-Dichloropropene	ND	50
64-17-5	Ethanol	ND	50
100-41-4	Ethylbenzene	ND	50
97-63-2	Ethyl Methacrylate	ND	50
591-78-6	2-Hexanone	ND	300
74-88-4	Iodomethane	ND	50
75-09-2	Methylene Chloride	ND	500
108-10-1	4-Methyl-2-Pentanone	594	300

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 4-5
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	50
127-18-4	Tetrachloroethene	ND	50
108-88-3	Toluene	ND	50
71-55-6	1,1,1-Trichloroethane	ND	50
79-00-5	1,1,2-Trichloroethane	ND	50
79-01-6	Trichloroethene	ND	50
75-69-4	Trichlorofluoromethane	ND	50
96-18-4	1,2,3-Trichloropropane	ND	50
108-05-4	Vinyl Acetate	ND	300
75-01-4	Vinyl Chloride	ND	300
1330-20-7	m- and p-Xylenes	ND	50
95-47-6	o-Xylene	ND	50

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 4-10
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	2,130	500
107-02-8	Acrolein	ND	500
107-13-1	Acrylonitrile	ND	500
71-43-2	Benzene	ND	50
75-27-4	Bromodichloromethane	ND	50
75-25-2	Bromoform	ND	50
74-83-9	Bromomethane	ND	300
78-93-3	2-Butanone	4,260	500
75-15-0	Carbon Disulfide	ND	50
56-23-5	Carbon Tetrachloride	ND	50
108-90-7	Chlorobenzene	ND	50
124-48-1	Chlorodibromomethane	ND	50
75-00-3	Chloroethane	ND	300
110-75-8	2-Chloroethyl Vinyl Ether	ND	500
67-66-3	Chloroform	ND	50
74-87-3	Chloromethane	ND	300
124-48-1	Dibromochloromethane	ND	50
74-95-3	Dibromomethane	ND	50
541-73-1	1,3-Dichlorobenzene	ND	50
106-46-7	1,4-Dichlorobenzene	ND	50
95-50-1	1,2-Dichlorobenzene	ND	50
110-56-5	1,4-Dichloro-2-butene	ND	50
75-71-8	Dichlorodifluoromethane	ND	50
75-34-3	1,1-Dichloroethane	ND	50
107-06-2	1,2-Dichloroethane	ND	50
75-35-4	1,1-Dichloroethylene	ND	50
156-60-5	trans-1,2-Dichloroethene	ND	50
78-87-5	1,2-Dichloropropane	ND	50
10061-01-5	cis-1,3-Dichloropropene	ND	50
10061-02-6	trans-1,3-Dichloropropene	ND	50
64-17-5	Ethanol	ND	50
100-41-4	Ethylbenzene	ND	50
97-63-2	Ethyl Methacrylate	ND	50
591-78-6	2-Hexanone	ND	300
74-88-4	Iodomethane	ND	50
75-09-2	Methylene Chloride	ND	500
108-10-1	4-Methyl-2-Pentanone	ND	300

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 4-10
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	50
127-18-4	Tetrachloroethene	ND	50
108-88-3	Toluene	ND	50
71-55-6	1,1,1-Trichloroethane	71	50
79-00-5	1,1,2-Trichloroethane	ND	50
79-01-6	Trichloroethene	ND	50
75-69-4	Trichlorofluoromethane	ND	50
96-18-4	1,2,3-Trichloropropane	ND	50
108-05-4	Vinyl Acetate	ND	300
75-01-4	Vinyl Chloride	ND	300
1330-20-7	m- and p-Xylenes	ND	50
95-47-6	o-Xylene	ND	50

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 4-20
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	10,000
107-02-8	Acrolein	ND	10,000
107-13-1	Acrylonitrile	ND	10,000
71-43-2	Benzene	ND	1,000
75-27-4	Bromodichloromethane	ND	1,000
75-25-2	Bromoform	ND	1,000
74-83-9	Bromomethane	ND	6,000
78-93-3	2-Butanone	ND	10,000
75-15-0	Carbon Disulfide	ND	1,000
56-23-5	Carbon Tetrachloride	ND	1,000
108-90-7	Chlorobenzene	ND	1,000
124-48-1	Chlorodibromomethane	ND	1,000
75-00-3	Chloroethane	ND	6,000
110-75-8	2-Chloroethyl Vinyl Ether	ND	10,000
67-66-3	Chloroform	ND	1,000
74-87-3	Chloromethane	ND	6,000
124-48-1	Dibromochloromethane	ND	1,000
74-95-3	Dibromomethane	ND	1,000
541-73-1	1,3-Dichlorobenzene	ND	1,000
106-46-7	1,4-Dichlorobenzene	ND	1,000
95-50-1	1,2-Dichlorobenzene	ND	1,000
110-56-5	1,4-Dichloro-2-butene	ND	1,000
75-71-8	Dichlorodifluoromethane	ND	1,000
75-34-3	1,1-Dichloroethane	ND	1,000
107-06-2	1,2-Dichloroethane	ND	1,000
75-35-4	1,1-Dichloroethylene	ND	1,000
156-60-5	trans-1,2-Dichloroethene	ND	1,000
78-87-5	1,2-Dichloropropane	ND	1,000
10061-01-5	cis-1,3-Dichloropropene	ND	1,000
10061-02-6	trans-1,3-Dichloropropene	ND	1,000
64-17-5	Ethanol	ND	1,000
100-41-4	Ethylbenzene	16,600	1,000
97-63-2	Ethyl Methacrylate	ND	1,000
591-78-6	2-Hexanone	ND	6,000
74-88-4	Iodomethane	ND	1,000
75-09-2	Methylene Chloride	ND	10,000
108-10-1	4-Methyl-2-Pentanone	12,000	6,000

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 4-20
Date Received: 01/07/94
Date Analyzed: 01/14/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	1,000
79-34-5	1,1,2,2-Tetrachloroethane	ND	1,000
127-18-4	Tetrachloroethene	98,900	1,000
108-88-3	Toluene	48,700	1,000
71-55-6	1,1,1-Trichloroethane	54,700	1,000
79-00-5	1,1,2-Trichloroethane	ND	1,000
79-01-6	Trichloroethene	16,500	1,000
75-69-4	Trichlorofluoromethane	ND	1,000
96-18-4	1,2,3-Trichloropropane	ND	1,000
108-05-4	Vinyl Acetate	ND	6,000
75-01-4	Vinyl Chloride	ND	6,000
1330-20-7	m- and p-Xylenes	49,000	1,000
95-47-6	o-Xylene	12,000	1,000

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 7-5
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	12	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 7-5
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 7-10
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 7-10
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 7-20
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	117	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	147	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 7-20
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 5-2
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 5-2
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	21	5
108-88-3	Toluene	8	5
71-55-6	1,1,1-Trichloroethane	5	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	13	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 5-5
Date Received: 01/07/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	31	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 5-5
Date Received: 01/07/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	19	5
108-88-3	Toluene	6	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	7	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	16	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 5-10
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 5-10
Date Received: 01/07/94
Date Analyzed: 01/17/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	9	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 5-20
Date Received: 01/07/94
Date Analyzed: 01/17/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	974	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	529	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 5-20
Date Received: 01/07/94
Date Analyzed: 01/17/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 2-5
Date Received: 01/07/94
Date Analyzed: 01/17/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 2-5
Date Received: 01/07/94
Date Analyzed: 01/17/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 2-10
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 2-10
Date Received: 01/07/94
Date Analyzed: 01/ /94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 2-20
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	97	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 2-20
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 2-30
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	10	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	37	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 2-30
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	33	5
108-88-3	Toluene	15	5
71-55-6	1,1,1-Trichloroethane	69	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	24	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 2-40
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	1,102	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	720	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	30	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	102	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	113	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	352	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 2-40
Date Received: 01/07/94
Date Analyzed: 01/18/94
Matrix: Soil
Project #: 0185016.01
File #: A1436.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	194	5
108-88-3	Toluene	168	5
71-55-6	1,1,1-Trichloroethane	88	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	387	5
95-47-6	o-Xylene	107	5

R.L. = Reporting Limit
ND = Not Detected

Quality Assurance Addendum Report

EPA 8240

Surrogate Spikes

Lab ID	$DCAd_4$	$Told_8$	BFB
	% Recovery		
1436-5	90	114	94
1436-6	83	99	90
1436-7	87	102	78
1436-9	84	103	74
1436-11	84	103	85
1436-12	82	98	86
1436-13	83	104	83
1436-15	85	103	88
1436-17	86	102	79
1436-18	83	102	78
1436-20	86	107	99
1436-22	81	100	72
1436-23	85	102	73
1436-25	83	101	74
1436-26	85	108	67
1436-27	83	100	76
1436-28	83	100	73
1436-29	83	103	69
1436-32	87	103	70
1436-33	90	105	65
1436-35	87	100	73
1436-37	83	100	74
1436-39	88	102	103

Matrix Spikes

Lab ID 1436-6	MS	MSD	RPD(%)	Control Limits
	% Recovery			
1,1-Dichloroethene	103	86	18	57/139
Benzene	91	98	7	80/119
Trichloroethene	93	95	2	78/126
Toluene	113	101	12	74/123
Chlorobenzene	95	98	3	81/127

Matrix Spikes

Lab ID 1436-28	MS	MSD	RPD(%)	Control Limits
	% Recovery			
1,1-Dichloroethene	81	78	3	57/139
Benzene	95	94	1	80/119
Trichloroethene	94	93	1	78/126
Toluene	100	93	7	74/123
Chlorobenzene	102	94	7	81/127

Quality Assurance Addendum Report

Notes:

Note that Matrix Spikes are not project specific. Therefore, spike information shown on this report may not be from the same project; however, they were analyzed in the same analytical batch.

Definitions:

Spike: A sample from the analytical batch which has been spiked with the parameter(s) of interest at a known concentration and taken through the same preparation and analysis as the samples.

Spike Duplicate: A duplicate of the spiked sample, taken from a separate aliquot of the sample.

RPD: Relative Percent Difference between a Spike and a Spike Duplicate (or a sample and sample duplicate).
RPD = [(Spike-Spk. Dup.)/Mean] * 100

Where the mean is the average spike recovery of the matrix spike and the matrix spike duplicate.

Mean: The average sample results, from both samples and sample duplicates.

Control limits are calculated by SCS Analytical Laboratory for internal use from existing spike data. Control limits are found by calculating three standard deviations above and below the mean of the population.

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1436.

COMPANY NAME: SCS ENGINEERS	CARRIER:	TURNAROUND TIME REQUIRED:	
ADDRESS: LONG BEACH	SHIPMENT DATE:	☑ NORMAL	
PHONE NUMBER: 310 426-9544	SHIPPING NUMBER:	☐ 5-DAY	☐ 3-DAY
PO NUMBER:	NUMBER OF SAMPLES: 10	PAGE 2 OF 5	☐ 24-HOUR
			☐ IMMEDIATE ATTENTION

PROJECT NAME: ANGELES CHEMICAL

PROJECT ADDRESS: SANTA FE SPRINGS

PROJECT NUMBER: 0185016.01

SAMPLER NAME AND SIGNATURE: BRIAN WATTERSON / B.A. Watterson

REPORTS TO BE SENT TO: BRIAN WATTERSON

ANALYSES REQUIRED

	SAMPLE ID NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	8240	Archive									LAB ONLY SAMPLE CONDITION UPON RECEIPT
5	BH15-1		SOIL			1/5/94					X										Cool
6	BH15-5		↓			↓					X										↓
7	BH15-10		↓			↓					X										↓
8	BH15-15		↓			↓						X									↓
9	BH15-20		↓			↓					X										↓
10	BH15-25		↓			↓						X									↓
11	BH16-1		↓			1/6/94					X										↓
12	BH16-5		↓			↓					X										↓
13	BH16-10		↓			↓					X										↓
14	BH16-15		↓			↓						X									↓

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)
B.A. Watterson	1/7/94	[signature]	[signature]	1-7-94	Janny Hotel
COMPANY: SCS ENGINEERS	TIME: 1:00 p	COMPANY: SCS ENGINEERS	COMPANY: SCS ENGINEERS	TIME: 2:00 p	COMPANY: SCS Lab 1-7-94

02/91 SCS ANALYTICAL LABORATORY 2860 Walnut Avenue • Long Beach, California 90806 - (213) 595-9324

2:00 pm

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

14360

COMPANY NAME: SCS ENGINEERS	CARRIER:	TURNAROUND TIME REQUIRED:	
ADDRESS: LONG BEACH	SHIPMENT DATE:	[X] NORMAL	
PHONE NUMBER: 310 426-9544	SHIPPING NUMBER:	[ ] 5-DAY	[ ] 3-DAY
PO NUMBER:	NUMBER OF SAMPLES: 5 PAGE 1 OF 5	[ ] 24-HOUR	
		[ ] IMMEDIATE ATTENTION	

PROJECT NAME: ANGELES CHEMICAL

PROJECT ADDRESS: SANTA FE SPRINGS

PROJECT NUMBER: 0185016.01

SAMPLER NAME AND SIGNATURE: BRIAN WATTERSON / B.A. Watt

REPORTS TO BE SENT TO: BRIAN WATTERSON

SAMPLE ID NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP.	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	ANALYSES REQUIRED: Archive	LAB ONLY: SAMPLE CONDITION UPON RECEIPT
CPT 8-1		SOIL			1-5-94					X	Cold
CPT 8-5		↓			↓					X	↓
CPT 8-10		↓			↓					X	↓
~~CPT 8-15~~		↓			↓					X	↓
CPT 8-20		↓			↓					X	↓
CPT 8-27		↓			↓					X	↓

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	RELINQUISHED BY: (Signature)	DATE	RECEIVED BY: (Signature)
B.A. Watt	1/7/94	Bruce Sorbonne	Bruce Sorbonne	1-7-94	Nancy Hahel
COMPANY: SCS ENGINEERS	TIME: 1:00 P	COMPANY: SCS ENGINEERS	COMPANY: SCS ENGINEERS	TIME: 2:00 P	COMPANY: SCS lab 1.7.94

02/91 SCS ANALYTICAL LABORATORY 2860 Walnut Avenue • Long Beach, California 90806 - (213) 595-9324

2:00pm.

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1136

COMPANY NAME: SCS ENGINEERS	CARRIER:	TURNAROUND TIME REQUIRED:	
ADDRESS: LONG BEACH	SHIPMENT DATE:	☒ NORMAL	
PHONE NUMBER: 310 426-9544	SHIPPING NUMBER:	☐ 5-DAY	☐ 3-DAY
P.O. NUMBER:	NUMBER OF SAMPLES: PAGE 3 OF 5	☐ 24-HOUR	
		☐ IMMEDIATE ATTENTION	

PROJECT NAME: ANGELES CHEMICAL
PROJECT ADDRESS: SANTA FE SPRINGS
PROJECT NUMBER: 01850161.01
SAMPLER NAME AND SIGNATURE: BRIAN WATTERSON / BG Watterson
REPORTS TO BE SENT TO: BRIAN WATTERSON

	SAMPLE ID NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	8240	archive									SAMPLE CONDITION UPON RECEIPT
15	BH6-20		SOIL			1/6/94					X										Good
16	BH6-25		↓			"						X									
17	MW4-5		SOIL			1-5-94					X										
18	MW4-10										X										
19	MW4-15											X									
20	MW4-20										X										
21	MW4-28		↓			↓						X									↓

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY (Signature)	DATE	RECEIVED BY: (Signature)	RELINQUISHED BY (Signature)	DATE	RECEIVED BY: (Signature)
B.G. Watterson	1/7/94	Bruce Barbanis	Bruce Barbanis	1-7-94	Jimmy Hahl
COMPANY: SCS ENGINEERS	TIME: 1:00P	COMPANY: SCS ENGINEERS	COMPANY: SCS ENGINEERS	TIME: 2:00P	COMPANY: SCS lab 1-7-94

2 copies

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1436

COMPANY NAME: SCS ENGINEERS	CARRIER:	TURNAROUND TIME REQUIRED: ☒ NORMAL ☐ 5-DAY ☐ 3-DAY ☐ 24-HOUR ☐ IMMEDIATE ATTENTION	
ADDRESS: LONG BEACH	SHIPMENT DATE:		
PHONE NUMBER: 310 426-9544	SHIPPING NUMBER:		
PO NUMBER:	NUMBER OF SAMPLES: 10	PAGE 4 OF 5	

PROJECT NAME: ANGELES CHEMICAL
PROJECT ADDRESS: SANTA FE SPRINGS
PROJECT NUMBER: 01850/6.01
SAMPLER NAME AND SIGNATURE: B. Watterson B.G. Watterson
REPORTS TO BE SENT TO: BRIAN WATTERSON

	SAMPLE ID NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP.	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	ANALYSES REQUIRED: BZ40	ANALYSES REQUIRED: Archive	LAB ONLY: SAMPLE CONDITION UPON RECEIPT
12	MW7-5		SOIL			1/6/94					X		Cold
13	MW7-10		↓			"					X		↓
14	MW7-15					"						X	
15	MW7-20					"					X		
16	~~MW7-25~~ MW5-2					1/5/94					X		
17	MW5-5					↓					X		
18	MW5-10										X		
19	MW5-20										X		
20	MW5-25											X	
21	MW5-30		↓									X	

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)
B.G. Watterson	1/7/94	Bonnie Bertonnin	Bonnie Bertonnin	1-7-94	Lindy Hall
COMPANY: SCS ENGINEERS	TIME: 1:00 PM	COMPANY: SCS ENGINEERS	COMPANY: SCS ENGINEERS	TIME: 2:00P	COMPANY: SCS Lab 1-7-94

2:00p.

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1/4/86

COMPANY NAME: ~~Angeles Chemical~~ SCS ENGINEERS	CARRIER:	TURNAROUND TIME REQUIRED:	
ADDRESS: LONG BEACH	SHIPMENT DATE:	☒ NORMAL	
PHONE NUMBER: 310 426-9544	SHIPPING NUMBER:	☐ 5-DAY ☐ 3-DAY	
P.O. NUMBER:	NUMBER OF SAMPLES: 10 PAGE 5 OF 5	☐ 24-HOUR	
		☐ IMMEDIATE ATTENTION	

PROJECT NAME: ANGELES CHEMICAL

PROJECT ADDRESS: SANTA FE SPRINGS

PROJECT NUMBER: 0185016.01

SAMPLER NAME AND SIGNATURE: B. Watterson BA Watterson

REPORTS TO BE SENT TO: B. Watterson

	SAMPLE ID NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP.	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	ANALYSES REQUIRED: EPA 8240	ANALYSES REQUIRED: ARCHIVE	LAB ONLY: SAMPLE CONDITION UPON RECEIPT
2	MW2-5		SOIL			1-7-94					X		
3	MW2-10		↓			↓					X		
34	MW2-15											X	
35	MW2-20										X		
36	MW2-25											X	
37	MW2-30										X		
38	MW2-35											X	
39	MW2-40										X		
40	MW2-45											X	
41	MW2-50		✓			✓						X	

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)	RELINQUISHED BY (Signature)	DATE	RECEIVED BY (Signature)
BA Watterson	1/7/94	Bruce Anderson	Bruce Anderson	1-7-94	
COMPANY: SCS ENGINEERS	TIME: 1:00P	COMPANY: SCS ENGINEERS	COMPANY: SCS ENGINEERS	TIME: 2:00P	COMPANY:

SCS ANALYTICAL LABORATORY
2860 WALNUT AVENUE
LONG BEACH CALIFORNIA 90806
(310) 595-9324
FAX (310) 595-6709

MEMO

TO: Brian Watterson

January 24, 1994

JOB NO.: 0185016.01
FOLDER NO.: 1442

LABORATORY REPORT

Samples: Sixteen (16) soil samples from Angeles Chemical, Santa Fe Springs, collected on 01/07/94 and 01/10/94. Seven (7) samples to be analyzed, the remainder to be archived.

EPA 8240 - see attached sheets.

Reviewed by	Approved by

Addendum Report, EPA 8240

Sample I.D.: MW 7-30
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	6,050	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	29,700	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	28	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	69	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 7-30
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	34	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	7	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 7-40
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	27	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 7-40
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 3-5
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 3-5
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	13	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	18	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	18	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 3-10
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 3-10
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 3-20
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	261	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 3-20
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 3-30
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg(ppb)	
67-64-1	Acetone	15,100	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	3,000	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	332	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	109	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	1,340	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 3-30
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	452	5
108-88-3	Toluene	480	5
71-55-6	1,1,1-Trichloroethane	88	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	366	5
95-47-6	o-Xylene	104	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW 3-40
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	5
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
124-48-1	Chlorodibromomethane	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
74-95-3	Dibromomethane	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
110-56-5	1,4-Dichloro-2-butene	ND	5
75-71-8	Dichlorodifluoromethane	ND	5
75-34-3	1,1-Dichloroethane	23	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethylene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
64-17-5	Ethanol	ND	5
100-41-4	Ethylbenzene	ND	5
97-63-2	Ethyl Methacrylate	ND	5
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	5
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	ND	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW 3-40
Date Received: 01/10/94
Date Analyzed: 01/19/94
Matrix: Soil
Project #: 0185016.01
File #: A1442.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	5
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	69	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
96-18-4	1,2,3-Trichloropropane	ND	5
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Quality Assurance Addendum Report

EPA 8240

Surrogate Spikes

Lab ID	$DCAd_4$	$Told_8$	BFB
	% Recovery		
1442-0	85	103	83
1442-2	79	101	67
1442-6	81	103	68
1442-7	79	99	85
1442-9	84	103	74
1442-11	83	103	82
1442-13	81	100	72

Matrix Spikes

Lab ID 1442-2	MS	MSD	RPD(%)	Control Limits
	% Recovery			
1,1-Dichloroethene	101	87	15	57/139
Benzene	94	91	4	80/119
Trichloroethene	93	91	2	78/126
Toluene	98	95	3	74/123
Chlorobenzene	97	97	0	81/127

Quality Assurance Addendum Report

Notes:

Note that Matrix Spikes are not project specific. Therefore, spike information shown on this report may not be from the same project; however, they were analyzed in the same analytical batch.

Definitions:

Spike: A sample from the analytical batch which has been spiked with the parameter(s) of interest at a known concentration and taken through the same preparation and analysis as the samples.

Spike Duplicate: A duplicate of the spiked sample, taken from a separate aliquot of the sample.

RPD: Relative Percent Difference between a Spike and a Spike Duplicate (or a sample and sample duplicate).
RPD = [(Spike-Spk. Dup.)/Mean] * 100

Where the mean is the average spike recovery of the matrix spike and the matrix spike duplicate.

Mean: The average sample results, from both samples and sample duplicates.

Control limits are calculated by SCS Analytical Laboratory for internal use from existing spike data. Control limits are found by calculating three standard deviations above and below the mean of the population.

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1442

COMPANY NAME: SCS ENGINEERS	CARRIER:	TURNAROUND TIME REQUIRED:	
ADDRESS: LONG BEACH	SHIPMENT DATE:	☑ NORMAL	
PHONE NUMBER:	SHIPPING NUMBER:	☐ 5-DAY ☐ 3-DAY	
P.O NUMBER:	NUMBER OF SAMPLES: PAGE 1 OF 2	☐ 24-HOUR	
		☐ IMMEDIATE ATTENTION	

PROJECT NAME: Angeles Chemical

PROJECT ADDRESS: Santa Fe Springs

PROJECT NUMBER: 0185016.01

SAMPLER NAME AND SIGNATURE: BRIAN WATTERSON B.G. Wat

REPORTS TO BE SENT TO: Brian Watterson

SCS TAC	SAMPLE ID NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE/TIME COLLECTED	FIELD TEMP.	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	ANALYSES REQUIRED: 8240	ANALYSES REQUIRED: Archive	LAB ONLY: SAMPLE CONDITION UPON RECEIPT
1442-0	MW7-30		SOIL		brass 2x6	1/10/94					X		Cold
-1	MW7-35		↓		↓	↓						X	↓
-2	MW7-40										X		
-3	MW7-45											X	
-4	MW7-50											X	
-5	MW7-55		↓		↓	↓						X	
-6	MW3-5					1/7/94					X		
-7	MW3-10					↑					X		
-8	MW3-15											X	
-9	MW3-20					↓					X		

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY (Signature)	DATE:	RECEIVED BY: (Signature)	RELINQUISHED BY (Signature)	DATE:	RECEIVED BY (Signature)
B. Chiarito	1/10/94	Gary Stickel			
COMPANY:	TIME:	COMPANY: SCS Pick 1-10-94 4:00 pm	COMPANY:	TIME:	COMPANY

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1442

COMPANY NAME: SCS ENG.	CARRIER:		TURNAROUND TIME REQUIRED: ☑ NORMAL ☐ 5-DAY ☐ 3-DAY ☐ 24-HOUR ☐ IMMEDIATE ATTENTION
ADDRESS: LONG BEACH	SHIPMENT DATE:		
PHONE NUMBER:	SHIPPING NUMBER:		
P.O. NUMBER:	NUMBER OF SAMPLES:	PAGE 2 OF 2	

PROJECT NAME: Angeles Chemical

PROJECT ADDRESS: Santa Fe Springs

PROJECT NUMBER: 0185016.01

SAMPLER NAME AND SIGNATURE: Brian Watterson B.G. Watt

REPORTS TO BE SENT TO: Brian Watterson

SCS TAC	SAMPLE I.D. NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP.	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	ANALYSES REQUIRED: 8240	Archive	LAB ONLY: SAMPLE CONDITION UPON RECEIPT
1442-10	MW3-25		Soil		brass 2x6	1/7/94						X	Cold
.11	MW3-30		↓		↓	↓					X		↓
.12	MW3-35		↓		↓	↓						X	↓
13	MW3-40		↓		↓	↓					X		↓
.14	MW3-45		↓		↓	↓						X	↓
.15	MW3-50											X	

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY: (Signature)	DATE:	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE:	RECEIVED BY: (Signature)
B.G. Watt	1/10/94	Nancy Hofel			
COMPANY:	TIME:	COMPANY: SCS Lab 1-10-94	COMPANY	TIME:	COMPANY

08.93 SCS ANALYTICAL LABORATORY 2860 Walnut Avenue • Long Beach, California 90806-1834 - (310) 595-9324

4:00 pm

SCS ANALYTICAL LABORATORY
2860 WALNUT AVENUE
LONG BEACH CALIFORNIA 90806
(310) 595-9324
FAX (310) 595-6709

MEMO

TO: Brian Watterson

January 26, 1994

JOB NO.: 0185016.01
FOLDER NO.: 1450

LABORATORY REPORT

Samples: Twelve (12) soil samples from Angeles Chemical, collected on 01/11/94 and received on 01/12/94. Seven (7) samples to be analyzed, the remainder to be archived.

EPA 8240 - See attached sheets.

Reviewed by	Approved by

Addendum Report, EPA 8240

Sample I.D.: BH17-1
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	39,700	1,250
107-02-8	Acrolein	ND	1,250
107-13-1	Acrylonitrile	ND	1,250
71-43-2	Benzene	ND	250
75-27-4	Bromodichloromethane	ND	250
75-25-2	Bromoform	ND	250
74-83-9	Bromomethane	ND	750
78-93-3	2-Butanone	12,200	1,250
75-15-0	Carbon Disulfide	ND	250
56-23-5	Carbon Tetrachloride	ND	250
108-90-7	Chlorobenzene	ND	250
124-48-1	Chlorodibromomethane	ND	250
75-00-3	Chloroethane	ND	750
110-75-8	2-Chloroethyl Vinyl Ether	ND	1,250
67-66-3	Chloroform	ND	250
74-87-3	Chloromethane	ND	750
124-48-1	Dibromochloromethane	ND	250
74-95-3	Dibromomethane	ND	250
541-73-1	1,3-Dichlorobenzene	ND	250
106-46-7	1,4-Dichlorobenzene	ND	250
95-50-1	1,2-Dichlorobenzene	ND	250
110-56-5	1,4-Dichloro-2-butene	ND	250
75-71-8	Dichlorodifluoromethane	ND	250
75-34-3	1,1-Dichloroethane	706	250
107-06-2	1,2-Dichloroethane	ND	250
75-35-4	1,1-Dichloroethene	ND	250
156-60-5	trans-1,2-Dichloroethene	ND	250
78-87-5	1,2-Dichloropropane	ND	250
10061-01-5	cis-1,3-Dichloropropene	ND	250
10061-02-6	trans-1,3-Dichloropropene	ND	250
64-17-5	Ethanol	ND	250
100-41-4	Ethylbenzene	1,560	250
97-63-2	Ethyl Methacrylate	ND	250
591-78-6	2-Hexanone	ND	750
74-88-4	Iodomethane	ND	250
75-09-2	Methylene Chloride	ND	1,250
108-10-1	4-Methyl-2-Pentanone	2,050	750

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH17-1
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	250
79-34-5	1,1,2,2-Tetrachloroethane	ND	250
127-18-4	Tetrachloroethene	41,800	250
108-88-3	Toluene	11,200	250
71-55-6	1,1,1-Trichloroethane	36,800	250
79-00-5	1,1,2-Trichloroethane	ND	250
79-01-6	Trichloroethene	9,280	250
75-69-4	Trichlorofluoromethane	ND	250
96-18-4	1,2,3-Trichloropropane	ND	250
108-05-4	Vinyl Acetate	ND	750
75-01-4	Vinyl Chloride	ND	750
1330-20-7	m- and p-Xylenes	6,460	250
95-47-6	o-Xylene	4,020	250

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: BH17-5
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	25,200	5,000
107-02-8	Acrolein	ND	5,000
107-13-1	Acrylonitrile	ND	5,000
71-43-2	Benzene	ND	1,000
75-27-4	Bromodichloromethane	ND	1,000
75-25-2	Bromoform	ND	1,000
74-83-9	Bromomethane	ND	3,000
78-93-3	2-Butanone	35,200	1,250
75-15-0	Carbon Disulfide	ND	1,000
56-23-5	Carbon Tetrachloride	ND	1,000
108-90-7	Chlorobenzene	ND	1,000
124-48-1	Chlorodibromomethane	ND	1,000
75-00-3	Chloroethane	ND	3,000
110-75-8	2-Chloroethyl Vinyl Ether	ND	5,000
67-66-3	Chloroform	ND	1,000
74-87-3	Chloromethane	ND	3,000
124-48-1	Dibromochloromethane	ND	1,000
74-95-3	Dibromomethane	ND	1,000
541-73-1	1,3-Dichlorobenzene	ND	1,000
106-46-7	1,4-Dichlorobenzene	ND	1,000
95-50-1	1,2-Dichlorobenzene	ND	1,000
110-56-5	1,4-Dichloro-2-butene	ND	1,000
75-71-8	Dichlorodifluoromethane	ND	1,000
75-34-3	1,1-Dichloroethane	ND	1,000
107-06-2	1,2-Dichloroethane	ND	1,000
75-35-4	1,1-Dichloroethene	ND	1,000
156-60-5	trans-1,2-Dichloroethene	ND	1,000
78-87-5	1,2-Dichloropropane	ND	1,000
10061-01-5	cis-1,3-Dichloropropene	ND	1,000
10061-02-6	trans-1,3-Dichloropropene	ND	1,000
64-17-5	Ethanol	ND	1,000
100-41-4	Ethylbenzene	6,330	1,000
97-63-2	Ethyl Methacrylate	ND	1,000
591-78-6	2-Hexanone	ND	3,000
74-88-4	Iodomethane	ND	1,000
75-09-2	Methylene Chloride	ND	5,000
108-10-1	4-Methyl-2-Pentanone	11,600	3,000

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH17-5
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	1,000
79-34-5	1,1,2,2-Tetrachloroethane	ND	1,000
127-18-4	Tetrachloroethene	58,200	1,000
108-88-3	Toluene	48,300	1,000
71-55-6	1,1,1-Trichloroethane	19,400	1,000
79-00-5	1,1,2-Trichloroethane	ND	1,000
79-01-6	Trichloroethene	5,630	1,000
75-69-4	Trichlorofluoromethane	ND	1,000
96-18-4	1,2,3-Trichloropropane	ND	1,000
108-05-4	Vinyl Acetate	ND	3,000
75-01-4	Vinyl Chloride	ND	3,000
1330-20-7	m- and p-Xylenes	22,900	1,000
95-47-6	o-Xylene	4,870	1,000

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: BH17-10
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	15,400	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	10
75-27-4	Bromodichloromethane	ND	10
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	60,300	50
75-15-0	Carbon Disulfide	ND	10
56-23-5	Carbon Tetrachloride	ND	10
108-90-7	Chlorobenzene	ND	10
124-48-1	Chlorodibromomethane	ND	10
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	10
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	10
74-95-3	Dibromomethane	ND	10
541-73-1	1,3-Dichlorobenzene	ND	10
106-46-7	1,4-Dichlorobenzene	ND	10
95-50-1	1,2-Dichlorobenzene	ND	10
110-56-5	1,4-Dichloro-2-butene	ND	10
75-71-8	Dichlorodifluoromethane	ND	10
75-34-3	1,1-Dichloroethane	11	10
107-06-2	1,2-Dichloroethane	ND	10
75-35-4	1,1-Dichloroethene	ND	10
156-60-5	trans-1,2-Dichloroethene	ND	10
78-87-5	1,2-Dichloropropane	ND	10
10061-01-5	cis-1,3-Dichloropropene	ND	10
10061-02-6	trans-1,3-Dichloropropene	ND	10
64-17-5	Ethanol	ND	10
100-41-4	Ethylbenzene	ND	10
97-63-2	Ethyl Methacrylate	ND	10
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	10
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	3,020	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH17-10
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	10
79-34-5	1,1,2,2-Tetrachloroethane	ND	10
127-18-4	Tetrachloroethene	12	10
108-88-3	Toluene	179	10
71-55-6	1,1,1-Trichloroethane	55	10
79-00-5	1,1,2-Trichloroethane	ND	10
79-01-6	Trichloroethene	21	10
75-69-4	Trichlorofluoromethane	ND	10
96-18-4	1,2,3-Trichloropropane	ND	10
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	24	10
95-47-6	o-Xylene	ND	10

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: BH17-20
Date Received: 01/12/94
Date Analyzed: 01/19/94, 01/20/94 and 01/21/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	1,050	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	10
75-27-4	Bromodichloromethane	ND	10
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	2,400	50
75-15-0	Carbon Disulfide	ND	10
56-23-5	Carbon Tetrachloride	ND	10
108-90-7	Chlorobenzene	ND	10
124-48-1	Chlorodibromomethane	ND	10
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	10
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	10
74-95-3	Dibromomethane	ND	10
541-73-1	1,3-Dichlorobenzene	ND	10
106-46-7	1,4-Dichlorobenzene	ND	10
95-50-1	1,2-Dichlorobenzene	ND	10
110-56-5	1,4-Dichloro-2-butene	ND	10
75-71-8	Dichlorodifluoromethane	ND	10
75-34-3	1,1-Dichloroethane	ND	10
107-06-2	1,2-Dichloroethane	ND	10
75-35-4	1,1-Dichloroethene	ND	10
156-60-5	trans-1,2-Dichloroethene	ND	10
78-87-5	1,2-Dichloropropane	ND	10
10061-01-5	cis-1,3-Dichloropropene	ND	10
10061-02-6	trans-1,3-Dichloropropene	ND	10
64-17-5	Ethanol	ND	10
100-41-4	Ethylbenzene	ND	10
97-63-2	Ethyl Methacrylate	ND	10
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	10
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	399	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: BH17-20
Date Received: 01/12/94
Date Analyzed: 01/19/94, 01/20/94 and 01/21/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	10
79-34-5	1,1,2,2-Tetrachloroethane	ND	10
127-18-4	Tetrachloroethene	ND	10
108-88-3	Toluene	ND	10
71-55-6	1,1,1-Trichloroethane	ND	10
79-00-5	1,1,2-Trichloroethane	ND	10
79-01-6	Trichloroethene	ND	10
75-69-4	Trichlorofluoromethane	ND	10
96-18-4	1,2,3-Trichloropropane	ND	10
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	10
95-47-6	o-Xylene	ND	10

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW6-5
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	5,180	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	17	10
75-27-4	Bromodichloromethane	ND	10
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	3,110	50
75-15-0	Carbon Disulfide	ND	10
56-23-5	Carbon Tetrachloride	ND	10
108-90-7	Chlorobenzene	ND	10
124-48-1	Chlorodibromomethane	ND	10
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	10
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	10
74-95-3	Dibromomethane	ND	10
541-73-1	1,3-Dichlorobenzene	ND	10
106-46-7	1,4-Dichlorobenzene	ND	10
95-50-1	1,2-Dichlorobenzene	ND	10
110-56-5	1,4-Dichloro-2-butene	ND	10
75-71-8	Dichlorodifluoromethane	ND	10
75-34-3	1,1-Dichloroethane	301	10
107-06-2	1,2-Dichloroethane	10	10
75-35-4	1,1-Dichloroethene	20	10
156-60-5	trans-1,2-Dichloroethene	ND	10
78-87-5	1,2-Dichloropropane	ND	10
10061-01-5	cis-1,3-Dichloropropene	ND	10
10061-02-6	trans-1,3-Dichloropropene	ND	10
64-17-5	Ethanol	ND	10
100-41-4	Ethylbenzene	32	10
97-63-2	Ethyl Methacrylate	ND	10
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	10
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	900	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW6-5
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	10
79-34-5	1,1,2,2-Tetrachloroethane	ND	10
127-18-4	Tetrachloroethene	24	10
108-88-3	Toluene	424	10
71-55-6	1,1,1-Trichloroethane	412	10
79-00-5	1,1,2-Trichloroethane	ND	10
79-01-6	Trichloroethene	11	10
75-69-4	Trichlorofluoromethane	ND	10
96-18-4	1,2,3-Trichloropropane	ND	10
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	188	10
95-47-6	o-Xylene	89	10

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW6-10
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result µg/kg (ppb)	R.L. µg/kg (ppb)
67-64-1	Acetone	2,030	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	10
75-27-4	Bromodichloromethane	ND	10
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	804	50
75-15-0	Carbon Disulfide	ND	10
56-23-5	Carbon Tetrachloride	ND	10
108-90-7	Chlorobenzene	ND	10
124-48-1	Chlorodibromomethane	ND	10
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	10
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	10
74-95-3	Dibromomethane	ND	10
541-73-1	1,3-Dichlorobenzene	ND	10
106-46-7	1,4-Dichlorobenzene	ND	10
95-50-1	1,2-Dichlorobenzene	ND	10
110-56-5	1,4-Dichloro-2-butene	ND	10
75-71-8	Dichlorodifluoromethane	ND	10
75-34-3	1,1-Dichloroethane	78	10
107-06-2	1,2-Dichloroethane	18	10
75-35-4	1,1-Dichloroethene	ND	10
156-60-5	trans-1,2-Dichloroethene	ND	10
78-87-5	1,2-Dichloropropane	ND	10
10061-01-5	cis-1,3-Dichloropropene	ND	10
10061-02-6	trans-1,3-Dichloropropene	ND	10
64-17-5	Ethanol	ND	10
100-41-4	Ethylbenzene	ND	10
97-63-2	Ethyl Methacrylate	ND	10
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	10
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	1,230	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: ~~BH1~~ MW6 7-10
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	10
79-34-5	1,1,2,2-Tetrachloroethane	ND	10
127-18-4	Tetrachloroethene	ND	10
108-88-3	Toluene	36	10
71-55-6	1,1,1-Trichloroethane	312	10
79-00-5	1,1,2-Trichloroethane	ND	10
79-01-6	Trichloroethene	ND	10
75-69-4	Trichlorofluoromethane	ND	10
96-18-4	1,2,3-Trichloropropane	ND	10
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	ND	10
95-47-6	o-Xylene	ND	10

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240

Sample I.D.: MW6-20
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
67-64-1	Acetone	ND	50
107-02-8	Acrolein	ND	50
107-13-1	Acrylonitrile	ND	50
71-43-2	Benzene	ND	10
75-27-4	Bromodichloromethane	ND	10
75-25-2	Bromoform	ND	10
74-83-9	Bromomethane	ND	30
78-93-3	2-Butanone	ND	50
75-15-0	Carbon Disulfide	ND	10
56-23-5	Carbon Tetrachloride	ND	10
108-90-7	Chlorobenzene	ND	10
124-48-1	Chlorodibromomethane	ND	10
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	10
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	10
74-95-3	Dibromomethane	ND	10
541-73-1	1,3-Dichlorobenzene	ND	10
106-46-7	1,4-Dichlorobenzene	ND	10
95-50-1	1,2-Dichlorobenzene	ND	10
110-56-5	1,4-Dichloro-2-butene	ND	10
75-71-8	Dichlorodifluoromethane	ND	10
75-34-3	1,1-Dichloroethane	ND	10
107-06-2	1,2-Dichloroethane	ND	10
75-35-4	1,1-Dichloroethene	27	10
156-60-5	trans-1,2-Dichloroethene	ND	10
78-87-5	1,2-Dichloropropane	ND	10
10061-01-5	cis-1,3-Dichloropropene	ND	10
10061-02-6	trans-1,3-Dichloropropene	ND	10
64-17-5	Ethanol	ND	10
100-41-4	Ethylbenzene	3,220	10
97-63-2	Ethyl Methacrylate	ND	10
591-78-6	2-Hexanone	ND	30
74-88-4	Iodomethane	ND	10
75-09-2	Methylene Chloride	ND	50
108-10-1	4-Methyl-2-Pentanone	2,440	30

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 8240 (Cont.)

Sample I.D.: MW6-20
Date Received: 01/12/94
Date Analyzed: 01/19/94 and 01/20/94
Matrix: Soil
Project #: 0185016.01
File #: a1450.rep

CAS #	Compound	Result	R.L.
		µg/kg (ppb)	
100-42-5	Styrene	ND	10
79-34-5	1,1,2,2-Tetrachloroethane	ND	10
127-18-4	Tetrachloroethene	3,510	10
108-88-3	Toluene	4,300	10
71-55-6	1,1,1-Trichloroethane	2,970	10
79-00-5	1,1,2-Trichloroethane	ND	10
79-01-6	Trichloroethene	154	10
75-69-4	Trichlorofluoromethane	ND	10
96-18-4	1,2,3-Trichloropropane	ND	10
108-05-4	Vinyl Acetate	ND	30
75-01-4	Vinyl Chloride	ND	30
1330-20-7	m- and p-Xylenes	6,240	10
95-47-6	o-Xylene	4,000	10

R.L. = Reporting Limit
ND = Not Detected

Quality Assurance Addendum Report

EPA 8240

Surrogate Spikes

Lab ID	$DCAd_4$	$Told_8$	BFB
	% Recovery		
1450-0	81	100	94
1450-1	87	106	89
1450-2	82	103	83
1450-4	81	99	81
1450-6	84	105	89
1450-7	86	97	81
1450-9	81	111	112

Matrix Spikes

Lab ID 1442-2	MS	MSD	RPD(%)	Control Limits
	% Recovery			
1,1-Dichloroethene	101	87	15	57/139
Benzene	94	91	4	80/119
Trichloroethene	93	91	2	78/126
Toluene	98	95	3	74/123
Chlorobenzene	97	97	0	81/127

Quality Assurance Addendum Report
Page 2 of 2

Notes:

Note that Matrix Spikes are not project specific. Therefore, spike information shown on this report may not be from the same project; however, they were analyzed in the same analytical batch.

Definitions:

Spike: A sample from the analytical batch which has been spiked with the parameter(s) of interest at a known concentration and taken through the same preparation and analysis as the samples.

Spike Duplicate: A duplicate of the spiked sample, taken from a separate aliquot of the sample.

RPD: Relative Percent Difference between a Spike and a Spike Duplicate (or a sample and sample duplicate).
RPD = [(Spike-Spk. Dup.)/Mean] * 100

Where the mean is the average spike recovery of the matrix spike and the matrix spike duplicate.

Mean: The average sample results, from both samples and sample duplicates.

Control limits are calculated by SCS Analytical Laboratory for internal use from existing spike data. Control limits are found by calculating three standard deviations above and below the mean of the population.

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1450

COMPANY NAME: SCS
ADDRESS:
PHONE NUMBER:
P.O. NUMBER: 0185016.01
PROJECT NAME: Angeles Chemical
PROJECT ADDRESS: Santa Fe Springs
PROJECT NUMBER:
SAMPLER NAME AND SIGNATURE: Brian Watterson B. Watterson
REPORTS TO BE SENT TO: Brian Watterson

CARRIER:
SHIPMENT DATE:
SHIPPING NUMBER:
NUMBER OF SAMPLES:
PAGE 1 OF 2

TURNAROUND TIME REQUIRED:
- [x] NORMAL
- [ ] 5-DAY
- [ ] 3-DAY
- [ ] 24-HOUR
- [ ] IMMEDIATE ATTENTION

	SAMPLE ID NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP.	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	8240	Archive	LAB ONLY: SAMPLE CONDITION UPON RECEIPT
0	BH17-1		Soil		Glass 2½x4	1/11/94					X		Cold
1	BH17-5		↓		↓						X		↓
2	BH17-10										X		
3	BH17-15											X	
4	BH17-20										X		
5	BH17-25											X	
6	MW6-5										X		
7	MW6-10										X		
8	MW6-15											X	
9	MW6-20										X		

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY: (Signature)	DATE	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE:	RECEIVED BY (Signature)
B. Watterson	1/12/94	Randy Hotel			
COMPANY:	TIME:	COMPANY: SCS lab 1-12-94	COMPANY:	TIME:	COMPANY

11:15am

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1450

COMPANY NAME: SCS	CARRIER:		TURNAROUND TIME REQUIRED: ☑ NORMAL ☐ 5-DAY ☐ 3-DAY ☐ 24-HOUR ☐ IMMEDIATE ATTENTION
ADDRESS:	SHIPMENT DATE:		
PHONE NUMBER:	SHIPPING NUMBER:		
P.O. NUMBER:	NUMBER OF SAMPLES:	PAGE 2 OF 2	

PROJECT NAME: Angeles Chemical
PROJECT ADDRESS: Santa Fe Springs
PROJECT NUMBER: 0135016.01
SAMPLER NAME AND SIGNATURE: Brian Watterson B.G. Watt
REPORTS TO BE SENT TO: BRIAN WATTERSON

ANALYSES REQUIRED

SAMPLE I.D. NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP.	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	8240	Archive									LAB ONLY: SAMPLE CONDITION UPON RECEIPT
MW6-25		SOIL		brass 2½x4"	1/11/94						X									Cold
MW6-30		"			"						X									"

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY: (Signature)	DATE:	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE:	RECEIVED BY: (Signature)
B.G. Watt	1/12/94	Tandy Hahl			
COMPANY	TIME	COMPANY: SCS Lab 1.12.94	COMPANY:	TIME:	COMPANY:

08/93 SCS ANALYTICAL LABORATORY 2860 Walnut Avenue • Long Beach, California 90806-1834 - (310) 595-9324

11.15 am

SCS ANALYTICAL LABORATORY
2860 WALNUT AVENUE
LONG BEACH CALIFORNIA 90806
(310) 595-9324
FAX (310) 595-6709

MEMO

TO: Brian Watterson

February 11, 1994

JOB NO.: 0185016.01
FOLDER NO.: 1503

REVISED	LABORATORY REPORT	3/28/94

Samples: Twenty nine (29) water samples, one (1) free product sample and one (1) tripblank from Angeles Chemical, Santa Fe Springs, collected on 2/03/94 and received on 2/04/94. Twenty two (22) samples to be analyzed, the remainder to be archived.

Miscellaneous analysis and EPA 624 - see attached sheets.

Reviewed by	Approved by

JOB NO.: 0185016.01

LABORATORY REPORT

Sample ID	TDS (160.1)	Specific Conductivity (120.1)	Chloride (300.0)	SO_4^{2-} (300.0)
	mg/L	umhos/cm	mg/L	
MW-2	2,040	1,760	222	140
MW-3	1,520	1,860	247	489
MW-4	1,480	1,730	154	321
MW-6	4,440	5,390	1,270	681
MW-6D	5,240	5,300	1,120	536
MW-7	3,000	2,170	185	156
Reporting Limit	5	10	0.3	1.5
Date Analyzed	2/07/94	2/04/94	2/09/94	2/09/94

A1503.rep

JOB NO.: 0185016.01

LABORATORY REPORT

Sample ID	Alkalinity (310.1)	HCO_3 (310.1)	CO_3 (310.1)	NO_3 (300.0)
	mg/L $CaCO_3$			mg/L
MW-2	540	540	ND	ND
MW-3	315	315	ND	ND
MW-4	500	500	ND	ND
MW-6	565	565	ND	ND
MW-6D	455	455	ND	ND
MW-7	980	980	ND	ND
Reporting Limit	10	10	10	0.2
Date Analyzed	2/08/94	2/08/94	2/08/94	2/09/94

Sample ID	pH (150.1)	Hardness (SM 314A)	MBAS* (425.1)
		mg eq $CaCO_3$/L	mg/L
MW-2	6.55	849	0.30
MW-3	7.28	925	0.30
MW-4	6.54	698	ND
MW-6	5.65	3,060	0.24
MW-6D	5.60	4,180	0.08
MW-7	6.37	2,100	ND
Reporting Limit	----	7.5	0.05
Date Analyzed	2/04/94	2/09/94	2/04/94

Sample ID	8015M/5030
	mg/L
MW-1	38,500 (G)
Reporting Limit	250
Date Analyzed	2/07/94

(G) = Gasoline
ND = Not Detected

*analysis performed at Weck Laboratories

A1503.rep

Addendum Report, Metals

Sample I.D.: MW-2
Date Received: 02/04/94
Date Analyzed: 02/07/94 and 02/09/94
Matrix: Water
Project: 0185016.01
File #: A1503.rep

Compound	EPA Number	Result mg/L (ppm)	R.L.
Calcium	200.7	244	0.05
Copper	200.7	0.10	0.05
Iron	200.7	13.7	0.05
Magnesium	200.7	58.1	0.05
Manganese	200.7	6.24	0.05
Potassium	200.7	9.84	0.05
Sodium	200.7	125	0.1
Zinc	200.7	0.14	0.05

ND = Not Detected
R.L. = Detection Limit

Note: Metal digestates will be kept 45 days from the report date unless otherwise notified by the client.

Addendum Report, Metals

Sample I.D.: MW-3
Date Received: 02/04/94
Date Analyzed: 02/07/94 and 02/09/94
Matrix: Water
Project: 0185016.01
File #: A1503.rep

Compound	EPA Number	Result	R.L.
		mg/L (ppm)	
Calcium	200.7	223	0.05
Copper	200.7	ND	0.05
Iron	200.7	4.91	0.05
Magnesium	200.7	89.4	0.05
Manganese	200.7	3.64	0.05
Potassium	200.7	8.99	0.05
Sodium	200.7	122	0.1
Zinc	200.7	0.06	0.05

ND = Not Detected
R.L. = Detection Limit

Note: Metal digestates will be kept 45 days from the report date unless otherwise notified by the client.

Addendum Report, Metals

Sample I.D.: MW-4
Date Received: 02/04/94
Date Analyzed: 02/07/94 and 02/09/94
Matrix: Water
Project: 0185016.01
File #: A1503.rep

Compound	EPA Number	Result	R.L.
		mg/L (ppm)	
Calcium	200.7	264	0.05
Copper	200.7	ND	0.05
Iron	200.7	7.93	0.05
Magnesium	200.7	36.9	0.05
Manganese	200.7	7.30	0.05
Potassium	200.7	9.34	0.05
Sodium	200.7	194	0.1
Zinc	200.7	0.05	0.05

ND = Not Detected
R:L. = Detection Limit

Note: Metal digestates will be kept 45 days from the report date unless otherwise notified by the client.

Addendum Report, Metals

Sample I.D.: MW-6
Date Received: 02/04/94
Date Analyzed: 02/07/94 and 02/09/94
Matrix: Water
Project: 0185016.01
File #: A1503.rep

Compound	EPA Number	Result	R.L.
		mg/L (ppm)	
Calcium	200.7	931	0.05
Copper	200.7	ND	0.05
Iron	200.7	86.2	0.05
Magnesium	200.7	177	0.05
Manganese	200.7	73.5	0.05
Potassium	200.7	16.4	0.05
Sodium	200.7	315	0.1
Zinc	200.7	0.08	0.05

ND = Not Detected
R.L. = Detection Limit

Note: Metal digestates will be kept 45 days from the report date unless otherwise notified by the client.

Addendum Report, Metals

Sample I.D.: MW-6D
Date Received: 02/04/94
Date Analyzed: 02/07/94 and 02/09/94
Matrix: Water
Project: 0185016.01
File #: A1503.rep

Compound	EPA Number	Result	R.L.
		mg/L (ppm)	
Calcium	200.7	962	0.05
Copper	200.7	ND	0.05
Iron	200.7	87.5	0.05
Magnesium	200.7	189	0.05
Manganese	200.7	77.7	0.05
Potassium	200.7	16.8	0.05
Sodium	200.7	340	0.1
Zinc	200.7	0.06	0.05

ND = Not Detected
R.L. = Detection Limit

Note: Metal digestates will be kept 45 days from the report date unless otherwise notified by the client.

Addendum Report, EPA 624

Sample I.D.: MW-1
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result	R.L.
		µg/L(ppb)	
71-43-2	Benzene	194	100
75-27-4	Bromodichloromethane	ND	100
75-25-2	Bromoform	ND	100
74-83-9	Bromomethane	ND	600
56-23-5	Carbon Tetrachloride	ND	100
108-90-7	Chlorobenzene	ND	100
75-00-3	Chloroethane	ND	600
110-75-8	2-Chloroethyl Vinyl Ether	ND	1,000
67-66-3	Chloroform	ND	100
74-87-3	Chloromethane	ND	600
124-48-1	Dibromochloromethane	ND	100
95-50-1	1,2-Dichlorobenzene	ND	100
541-73-1	1,3-Dichlorobenzene	ND	100
106-46-7	1,4-Dichlorobenzene	ND	100
75-34-3	1,1-Dichloroethane	649	100
107-06-2	1,2-Dichloroethane	ND	100
75-35-4	1,1-Dichloroethene	2,210	100
156-60-5	trans-1,2-Dichloroethene	ND	100
78-87-5	1,2-Dichloropropane	ND	100
10061-01-5	cis-1,3-Dichloropropene	ND	100
10061-02-6	trans-1,3-Dichloropropene	ND	100
100-41-4	Ethylbenzene	333	100
75-09-2	Methylene Chloride	1,220	1,000
79-34-5	1,1,2,2-Tetrachloroethane	ND	100
127-18-4	Tetrachloroethene	662	100
108-88-3	Toluene	560	100
71-55-6	1,1,1-Trichloroethane	9,370	100
79-00-5	1,1,2-Trichloroethane	ND	100
79-01-6	Trichloroethene	7,160	100
75-69-4	Trichlorofluoromethane	ND	100
75-01-4	Vinyl Chloride	ND	20
1330-20-7	m- and p-Xylenes	1,220	100
95-47-6	o-Xylene	972	100

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 624

Sample I.D.: MW-2
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result µg/L(ppb)	R.L.
71-43-2	Benzene	ND	100
75-27-4	Bromodichloromethane	ND	100
75-25-2	Bromoform	ND	100
74-83-9	Bromomethane	ND	600
56-23-5	Carbon Tetrachloride	ND	100
108-90-7	Chlorobenzene	ND	100
75-00-3	Chloroethane	ND	600
110-75-8	2-Chloroethyl Vinyl Ether	ND	1,000
67-66-3	Chloroform	ND	100
74-87-3	Chloromethane	ND	600
124-48-1	Dibromochloromethane	ND	100
95-50-1	1,2-Dichlorobenzene	ND	100
541-73-1	1,3-Dichlorobenzene	ND	100
106-46-7	1,4-Dichlorobenzene	ND	100
75-34-3	1,1-Dichloroethane	1,130	100
107-06-2	1,2-Dichloroethane	ND	100
75-35-4	1,1-Dichloroethene	2,460	100
156-60-5	trans-1,2-Dichloroethene	ND	100
78-87-5	1,2-Dichloropropane	ND	100
10061-01-5	cis-1,3-Dichloropropene	ND	100
10061-02-6	trans-1,3-Dichloropropene	ND	100
100-41-4	Ethylbenzene	1,720	100
75-09-2	Methylene Chloride	2,980	1,000
79-34-5	1,1,2,2-Tetrachloroethane	ND	100
127-18-4	Tetrachloroethene	2,150	100
108-88-3	Toluene	7,390	100
71-55-6	1,1,1-Trichloroethane	3,470	100
79-00-5	1,1,2-Trichloroethane	ND	100
79-01-6	Trichloroethene	3,040	100
75-69-4	Trichlorofluoromethane	ND	100
75-01-4	Vinyl Chloride	ND	20
1330-20-7	m- and p-Xylenes	5,690	100
95-47-6	o-Xylene	2,100	100

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 624

Sample I.D.: MW-3
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result	R.L.
		µg/L(ppb)	
71-43-2	Benzene	63	50
75-27-4	Bromodichloromethane	ND	50
75-25-2	Bromoform	ND	50
74-83-9	Bromomethane	ND	300
56-23-5	Carbon Tetrachloride	ND	50
108-90-7	Chlorobenzene	ND	50
75-00-3	Chloroethane	ND	300
110-75-8	2-Chloroethyl Vinyl Ether	ND	500
67-66-3	Chloroform	ND	50
74-87-3	Chloromethane	ND	300
124-48-1	Dibromochloromethane	ND	50
95-50-1	1,2-Dichlorobenzene	ND	50
541-73-1	1,3-Dichlorobenzene	ND	50
106-46-7	1,4-Dichlorobenzene	ND	50
75-34-3	1,1-Dichloroethane	85	50
107-06-2	1,2-Dichloroethane	ND	50
75-35-4	1,1-Dichloroethene	2,800	50
156-60-5	trans-1,2-Dichloroethene	ND	50
78-87-5	1,2-Dichloropropane	ND	50
10061-01-5	cis-1,3-Dichloropropene	ND	50
10061-02-6	trans-1,3-Dichloropropene	ND	50
100-41-4	Ethylbenzene	115	50
75-09-2	Methylene Chloride	6,530	500
79-34-5	1,1,2,2-Tetrachloroethane	ND	50
127-18-4	Tetrachloroethene	5,370	50
108-88-3	Toluene	579	50
71-55-6	1,1,1-Trichloroethane	444	50
79-00-5	1,1,2-Trichloroethane	ND	50
79-01-6	Trichloroethene	1,730	50
75-69-4	Trichlorofluoromethane	ND	50
75-01-4	Vinyl Chloride	ND	10
1330-20-7	m- and p-Xylenes	571	50
95-47-6	o-Xylene	443	50

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 624

Sample I.D.: MW-4
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result	R.L.
		µg/L(ppb)	
71-43-2	Benzene	111	100
75-27-4	Bromodichloromethane	ND	100
75-25-2	Bromoform	ND	100
74-83-9	Bromomethane	ND	600
56-23-5	Carbon Tetrachloride	ND	100
108-90-7	Chlorobenzene	ND	100
75-00-3	Chloroethane	ND	600
110-75-8	2-Chloroethyl Vinyl Ether	ND	1,000
67-66-3	Chloroform	ND	100
74-87-3	Chloromethane	ND	600
124-48-1	Dibromochloromethane	ND	100
95-50-1	1,2-Dichlorobenzene	ND	100
541-73-1	1,3-Dichlorobenzene	ND	100
106-46-7	1,4-Dichlorobenzene	ND	100
75-34-3	1,1-Dichloroethane	1,410	100
107-06-2	1,2-Dichloroethane	ND	100
75-35-4	1,1-Dichloroethene	806	100
156-60-5	trans-1,2-Dichloroethene	ND	100
78-87-5	1,2-Dichloropropane	ND	100
10061-01-5	cis-1,3-Dichloropropene	ND	100
10061-02-6	trans-1,3-Dichloropropene	ND	100
100-41-4	Ethylbenzene	1,180	100
75-09-2	Methylene Chloride	4,760	1,000
79-34-5	1,1,2,2-Tetrachloroethane	ND	100
127-18-4	Tetrachloroethene	3,320	100
108-88-3	Toluene	12,700	100
71-55-6	1,1,1-Trichloroethane	36,200	100
79-00-5	1,1,2-Trichloroethane	ND	100
79-01-6	Trichloroethene	14,300	100
75-69-4	Trichlorofluoromethane	ND	100
75-01-4	Vinyl Chloride	ND	20
1330-20-7	m- and p-Xylenes	3,410	100
95-47-6	o-Xylene	952	100

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 624

Sample I.D.: MW-6
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result	R.L.
		µg/L(ppb)	
71-43-2	Benzene	795	50
75-27-4	Bromodichloromethane	ND	50
75-25-2	Bromoform	ND	50
74-83-9	Bromomethane	ND	300
56-23-5	Carbon Tetrachloride	ND	50
108-90-7	Chlorobenzene	ND	50
75-00-3	Chloroethane	ND	300
110-75-8	2-Chloroethyl Vinyl Ether	ND	500
67-66-3	Chloroform	ND	50
74-87-3	Chloromethane	ND	300
124-48-1	Dibromochloromethane	ND	50
95-50-1	1,2-Dichlorobenzene	ND	50
541-73-1	1,3-Dichlorobenzene	ND	50
106-46-7	1,4-Dichlorobenzene	ND	50
75-34-3	1,1-Dichloroethane	2,260	50
107-06-2	1,2-Dichloroethane	1,140	50
75-35-4	1,1-Dichloroethene	1,240	50
156-60-5	trans-1,2-Dichloroethene	ND	50
78-87-5	1,2-Dichloropropane	ND	50
10061-01-5	cis-1,3-Dichloropropene	ND	50
10061-02-6	trans-1,3-Dichloropropene	ND	50
100-41-4	Ethylbenzene	1,910	50
75-09-2	Methylene Chloride	21,400	500
79-34-5	1,1,2,2-Tetrachloroethane	ND	50
127-18-4	Tetrachloroethene	2,130	50
108-88-3	Toluene	15,300	50
71-55-6	1,1,1-Trichloroethane	114,000	50
79-00-5	1,1,2-Trichloroethane	ND	50
79-01-6	Trichloroethene	1,320	50
75-69-4	Trichlorofluoromethane	ND	50
75-01-4	Vinyl Chloride	ND	10
1330-20-7	m- and p-Xylenes	2,900	50
95-47-6	o-Xylene	1,810	50

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 624

Sample I.D.: MW-6D
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result	R.L.
		µg/L(ppb)	
71-43-2	Benzene	848	100
75-27-4	Bromodichloromethane	ND	100
75-25-2	Bromoform	ND	100
74-83-9	Bromomethane	ND	600
56-23-5	Carbon Tetrachloride	ND	100
108-90-7	Chlorobenzene	ND	100
75-00-3	Chloroethane	ND	600
110-75-8	2-Chloroethyl Vinyl Ether	ND	1,000
67-66-3	Chloroform	ND	100
74-87-3	Chloromethane	ND	600
124-48-1	Dibromochloromethane	ND	100
95-50-1	1,2-Dichlorobenzene	ND	100
541-73-1	1,3-Dichlorobenzene	ND	100
106-46-7	1,4-Dichlorobenzene	ND	100
75-34-3	1,1-Dichloroethane	2,570	100
107-06-2	1,2-Dichloroethane	1,240	100
75-35-4	1,1-Dichloroethene	1,920	100
156-60-5	trans-1,2-Dichloroethene	ND	100
78-87-5	1,2-Dichloropropane	ND	100
10061-01-5	cis-1,3-Dichloropropene	ND	100
10061-02-6	trans-1,3-Dichloropropene	ND	100
100-41-4	Ethylbenzene	2,080	100
75-09-2	Methylene Chloride	20,000	1,000
79-34-5	1,1,2,2-Tetrachloroethane	ND	100
127-18-4	Tetrachloroethene	2,410	100
108-88-3	Toluene	13,500	100
71-55-6	1,1,1-Trichloroethane	118,000	100
79-00-5	1,1,2-Trichloroethane	ND	100
79-01-6	Trichloroethene	1,450	100
75-69-4	Trichlorofluoromethane	ND	100
75-01-4	Vinyl Chloride	ND	20
1330-20-7	m- and p-Xylenes	3,320	100
95-47-6	o-Xylene	2,100	100

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 624

Sample I.D.: MW-7
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result	R.L.
		µg/L(ppb)	
71-43-2	Benzene	46	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
75-34-3	1,1-Dichloroethane	2,130	5
107-06-2	1,2-Dichloroethane	31	5
75-35-4	1,1-Dichloroethene	151	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
100-41-4	Ethylbenzene	45	5
75-09-2	Methylene Chloride	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	134	5
108-88-3	Toluene	398	5
71-55-6	1,1,1-Trichloroethane	90	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	45	5
75-69-4	Trichlorofluoromethane	ND	5
75-01-4	Vinyl Chloride	ND	1
1330-20-7	m- and p-Xylenes	133	5
95-47-6	o-Xylene	53	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 624

Sample I.D.: Rinsate
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result	R.L.
		µg/L(ppb)	
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
100-41-4	Ethylbenzene	ND	5
75-09-2	Methylene Chloride	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
75-01-4	Vinyl Chloride	ND	1
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Addendum Report, EPA 624

Sample I.D.: Tripblank
Date Received: 02/04/94
Date Analyzed: 02/04/94 and 02/08/94
Matrix: Water
Project #: 0185016.01
File #: A1503.rep

CAS #	Compound	Result	R.L.
		µg/L(ppb)	
71-43-2	Benzene	ND	5
75-27-4	Bromodichloromethane	ND	5
75-25-2	Bromoform	ND	5
74-83-9	Bromomethane	ND	30
56-23-5	Carbon Tetrachloride	ND	5
108-90-7	Chlorobenzene	ND	5
75-00-3	Chloroethane	ND	30
110-75-8	2-Chloroethyl Vinyl Ether	ND	50
67-66-3	Chloroform	ND	5
74-87-3	Chloromethane	ND	30
124-48-1	Dibromochloromethane	ND	5
95-50-1	1,2-Dichlorobenzene	ND	5
541-73-1	1,3-Dichlorobenzene	ND	5
106-46-7	1,4-Dichlorobenzene	ND	5
75-34-3	1,1-Dichloroethane	ND	5
107-06-2	1,2-Dichloroethane	ND	5
75-35-4	1,1-Dichloroethene	ND	5
156-60-5	trans-1,2-Dichloroethene	ND	5
78-87-5	1,2-Dichloropropane	ND	5
10061-01-5	cis-1,3-Dichloropropene	ND	5
10061-02-6	trans-1,3-Dichloropropene	ND	5
100-41-4	Ethylbenzene	ND	5
75-09-2	Methylene Chloride	ND	50
79-34-5	1,1,2,2-Tetrachloroethane	ND	5
127-18-4	Tetrachloroethene	ND	5
108-88-3	Toluene	ND	5
71-55-6	1,1,1-Trichloroethane	ND	5
79-00-5	1,1,2-Trichloroethane	ND	5
79-01-6	Trichloroethene	ND	5
75-69-4	Trichlorofluoromethane	ND	5
75-01-4	Vinyl Chloride	ND	1
1330-20-7	m- and p-Xylenes	ND	5
95-47-6	o-Xylene	ND	5

R.L. = Reporting Limit
ND = Not Detected

Quality Assurance Addendum Report

LAB ID	SYMBOL	TEST	% Recovery MS	MSD	RPD(%)
LCS	Cl^-	Chloride	93.2	97.5	2.3
1503-6	NO_3^-	Nitrate	99.9	100.0	0.1
LCS	SO_4^{3-}	Sulfate	97.4	101.5	4.1

LAB ID	SYMBOL	TEST	UNITS	QA/QC Results Sample	Dup.	RPD(%)
1503-6	---	Alkalinity	mg/L $CaCO_3$	540	555	2.7
1503-6	HCO_3^-	Bicarbonate	mg/L	540	555	2.7
1503-6	$CO_3^=$	Carbonate	mg/L	ND<10	ND<10	0.0
1503-6	---	EC	umhos/cm	1760	1760	0.0
1503-6	--	pH	units	6.55	6.55	0.0
1503-6	TDS	TDS	mg/L	2040	1800	12.5

EPA 8015M/602

Matrix Spikes

Lab ID 1506-0	MS	MSD	RPD (%)	Control Limits
	% Recovery			
Benzene	96	100	3	50/134
Toluene	96	97	1	40/143
Ethylbenzene	99	99	0	40/135
Xylenes	103	103	0	33/135

Metals - Waters

LAB ID	METAL		% Recovery MS	MSD	RPD(%)	Control Limits
1503-7	Ca	Calcium*	99.3	98.1	1.2	69/135
	Cu	Copper	88.6	83.3	6.2	62/119
	Fe	Iron*	99.7	98.3	1.4	81/119
	Mg	Magnesium*	98.1	98.1	0.0	78/123
	Mn	Manganese	94.3	90.5	4.1	72/114
	K	Potassium	88.5	85.8	3.0	78/131
	Na	Sodium*	102.6	102.6	0.0	51/126
	Zn	Zinc	90.4	88.2	2.5	71/114

*: LCS used as control.

A1503.qa

Quality Assurance Addendum Report

EPA 624

Surrogate Spikes

Lab ID	$DCAd_4$	$Told_8$	BFB
	% Recovery		
1503-0	93	100	94
1503-4	92	100	91
1503-8	90	98	94
1503-12	94	100	103
1503-16	90	101	78
1503-20	97	100	97
1503-24	104	103	95
1503-28	91	98	86
1503-30	92	102	71

Matrix Spikes

Lab ID 1503-28	MS	MSD	RPD(%)	Control Limits
	% Recovery			
1,1-Dichloroethene	89	84	7	57/139
Benzene	102	99	3	80/119
Trichloroethene	100	94	7	78/126
Toluene	102	92	10	74/123
Chlorobenzene	100	96	4	81/127

Quality Assurance Addendum Report

Notes:

Note that Matrix Spikes are not project specific. Therefore, spike information shown on this report may not be from the same project; however, they were analyzed in the same analytical batch.

Definitions:

Spike: A sample from the analytical batch which has been spiked with the parameter(s) of interest at a known concentration and taken through the same preparation and analysis as the samples.

Spike Duplicate: A duplicate of the spiked sample, taken from a separate aliquot of the sample.

RPD: Relative Percent Difference between a Spike and a Spike Duplicate (or a sample and sample duplicate).
RPD = [(Spike-Spk. Dup.)/Mean] * 100

Where the mean is the average spike recovery of the matrix spike and the matrix spike duplicate.

Mean: The average sample results, from both samples and sample duplicates.

Control limits are calculated by SCS Analytical Laboratory for internal use from existing spike data. Control limits are found by calculating three standard deviations above and below the mean of the population.

CHAIN OF CUSTODY RECORD REQUEST FOR ANALYSIS

1503

COMPANY NAME: SCS	CARRIER:	TURNAROUND TIME REQUIRED:	
ADDRESS:	SHIPMENT DATE: 2-4-94	☑ NORMAL	
PHONE NUMBER:	SHIPPING NUMBER:	☐ 5-DAY ☐ 3-DAY	
P.O. NUMBER:	NUMBER OF SAMPLES: PAGE 2 OF 2	☐ 24-HOUR	
		☐ IMMEDIATE ATTENTION	

PROJECT NAME: Angeles Chemical

PROJECT ADDRESS: Santa Fe Springs

PROJECT NUMBER: 0185016.01

SAMPLER NAME AND SIGNATURE: B. Watterson B.G. Watterson

REPORTS TO BE SENT TO: B. Watterson

SAMPLE ID NUMBER	SAMPLE DESCRIPTION	SAMPLE MATRIX	SAMPLE PRESERVATIVE(S)	CONTAINER SIZE / TYPE	DATE / TIME COLLECTED	FIELD TEMP.	FIELD pH	FIELD EC	SPECIAL PROGRAM REQUIREMENTS OR EPA - SOP & QAM REF	624	General Quality	~~[illegible]~~									LAB ONLY: SAMPLE CONDITION UPON RECEIPT
20,21 MW-6D	·	H_2O	HCL	2-40ml VOA						X											Cold
22,23 MW-6D		↓	HNO_3 /	2-1l bottles							X										↓
24,25 MW-7			HCL	2-40ml VOA						X											
26,27 MW-7			HNO_3	2-1l bottles							X	M									
28,29 Blank				2-40ml VOA						X											
30 Blank										X											

SPECIAL INSTRUCTIONS / COMMENTS:

RELINQUISHED BY: (Signature)	DATE:	RECEIVED BY: (Signature)	RELINQUISHED BY: (Signature)	DATE:	RECEIVED BY: (Signature)
B.G. Watterson	2-4-94	Andrew [illegible]			
COMPANY: SCS	TIME:	COMPANY: SCS Lab 2/4/94	COMPANY:	TIME:	COMPANY:

9:00 A.M.