EXHIBIT "A"

January 30, 1991

SOIL AND GROUNDWATER ASSESSMENT WORK PLAN
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

HARGIS+ASSOCIATES, INC.

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January 30, 1991

VIA FEDERAL EXPRESS

Michael Yalch, Ph.D.
HUGHES AIRCRAFT COMPANY
Electron Dynamics Division
3100 West Lomita Boulevard
Torrance, CA 90509

Re: Transmittal of Final Soil and Groundwater Assessment Work Plan

Dear Dr. Yalch:

Enclosed are three copies of the final report entitled:

Soil and Groundwater Assessment Work Plan
Hughes Aircraft Company
Torrance, California

As discussed in our telephone conversation on January 29, 1991, Hughes Aircraft Company is responsible for submitting this report to the California Regional Water Quality Control Board by January 31, 1991.

Please return all previous draft copies of this report dated January 24, 1991, to our office. If you have any questions or require further discussion, please contact me.

Sincerely,

HARGIS + ASSOCIATES, INC.

Melissa Tyff for:

Matthew P. Wiedlin
Project Hydrogeologist

MPW:mdu

Enclosures

cc: Gary L. Rafferty, Esq.

yalch03.850

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SOIL AND GROUNDWATER ASSESSMENT WORK PLAN
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

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SOIL AND GROUNDWATER ASSESSMENT WORK PLAN
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

1.0 INTRODUCTION

This work plan has been prepared at the request of the Hughes Aircraft Company, Electron Dynamics Division (HAC) to evaluate soil and groundwater quality at the Electron Dynamics Division site located at 3100 W. Lomita Boulevard, Torrance, California (the site) (Figure 1). HAC requested that Hargis + Associates, Inc. (H+A) prepare this work plan to address groundwater quality issues referred to in a California Regional Water Quality Control Board (CRWQCB) letter pertaining to a former diesel fuel underground storage tank previously located at the site (CRWQCB, 1990). HAC also requested that the work plan to address groundwater and soil quality issues pertaining to two former underground solvent storage tanks previously located on the site. HAC requested this additional soil and groundwater work to confirm soil and groundwater quality in the vicinity of the former solvent tanks and to integrate the solvent tank assessment with the diesel fuel tank assessment required by the CRWQCB.

This work plan has been prepared to outline procedures for obtaining soil and groundwater data. These data will be used to evaluate the hydrogeologic conditions at the site and to evaluate the potential for groundwater contamination and provide information regarding potential on- and off-site sources.

1.1 BACKGROUND

HAC originally began operations at the site in 1966. Prior to that time, the site had been used as farm land. Historically, two buried steel tanks were used to store used industrial solvents at the site. Waste solvents were

periodically pumped out of the tanks and then disposed of at a licensed landfill. Tank no. 1 was located immediately south of Building no. 230 and was reported to have a capacity of approximately 3,000 gallons (Figure 2). This tank was reportedly installed in 1967. Tank no. 2 was located east of Building No. 231 and was reported to have a capacity of slightly more than 500 gallons (Figure 2). HAC personnel have indicated that tank no. 2 was installed in about 1974 (Hargis & Montgomery [H&M], 1983a). In 1983, tanks no. 1 and no. 2 were removed by IT Corporation and inspected by David Bacharowski and Al Novak of the CRWQCB (Yalch, 1991). Subsequently, Building No. 232 was constructed over the former tank no. 1 location.

Diesel fuel for an emergency electrical generator was stored in a third tank, designated in this report as tank no. 3, located adjacent to Building No. 230 (Figure 2). In 1985, tank no. 3 was removed by IT Corporation. An electrical substation was constructed over the former tank location.

1.2 PREVIOUS INVESTIGATIONS

In 1983, soil and groundwater conditions in the vicinity of tanks no. 1 and 2 were investigated by Hargis + Montgomery, Inc., (H&M). In 1985, soil conditions in the vicinity of tank no. 3 were investigated by IT Corporation. In 1988, the CRWQCB requested that additional soil sampling be performed at tank no. 3. Additional soil data were obtained and evaluated by H+A in 1989 (H+A, 1989).

1.2.1 Tanks No. 1 and No. 2

In 1983, a soil investigation was conducted at tanks no. 1 and no. 2 (H&M, 1983a and b). Four soil borings were drilled near tank no. 1 (Appendix A). Total depths for three of these borings ranged between approximately 30 and 49 feet below land surface (bls) (H&M, 1983b). The fourth soil boring was drilled

to a depth of approximately 110 feet. Seventeen soil samples were collected from the four soil borings near tank no. 1 and were analyzed for volatile organic compounds (VOCs). Tetrachloroethylene (PCE), trichloroethylene (TCE), and 1,1,1-trichloroethane (TCA) were the most frequently detected VOCs in soil samples collected near tank no. 1 (H&M, 1983b). The highest concentration of VOCs detected was 440,000 milligrams per kilogram (mg/kg) of PCE in a soil sample collected at 31 feet bls in soil boring T-1 (Appendix A).

One soil boring was drilled near tank no. 2 to a depth of 30 feet bls. Three soil samples were collected from the soil boring near tank no. 2 and were analyzed for VOCs. VOCs were detected in only one of the three soil samples collected. PCE and methylene chloride were detected at concentrations of 270 mg/kg and 28 mg/kg, respectively, in the soil sample collected at 30 feet bls (Appendix A).

Groundwater samples were collected from the 110-foot soil boring drilled near tank no. 1 and from the industrial water supply well located on the site (Appendix A). Groundwater samples were analyzed for VOCs, trace metals, and common ions. The water from the industrial water supply well was reportedly used to operate a heat exchanger for industrial cooling and was returned to the groundwater system using two injection wells (H&M, 1983b). All three wells were subsequently deactivated in 1985. The groundwater sample collected from the soil boring was collected from just below the water table. The groundwater sample collected from the industrial water supply well was representative of deeper groundwater because the well is perforated between 300 and 500 feet bls.

The industrial water supply well was resampled by the Los Angeles County Sanitation District (LACSD) in 1986. The LACSD apparently sampled the well as part of a regional groundwater quality investigation. VOCs were not detected in the groundwater sample collected by the LACSD (McTaggart, 1990).

The VOCs TCE, trichlorofluoroethane, PCE, and TCA were detected in the groundwater sample collected from the soil boring near tank no. 1. TCE,

trichlorofluoromethane, PCE, and TCA were detected at concentrations of 65 micrograms per liter (ug/l), 12 ug/l, 11 ug/l, and 5 ug/l, respectively (H&M, 1983b) (Appendix A). In addition, nitrate as NO_3 was detected at a concentration of 177 milligrams per liter (mg/l) (H&M, 1983b) (Appendix A).

The VOCs chloroform and trichlorofluoromethane were detected in the water sample collected from the industrial water supply well. Chloroform and trichlorofluoromethane were detected at concentrations of 12 ug/l and 9 ug/l, respectively (Appendix A).

1.2.2 Tank No. 3

In 1985, series of soil investigations were conducted at tank no. 3 by IT Corporation and in 1989 by H+A (Collins, 1985; H+A, 1989). In September 1985, tank no. 3 was removed and soil containing diesel fuel was excavated. Subsequently an electrical substation was constructed at the former tank location. After the tank removal, IT Corporation drilled one angle and six vertical soil borings to a maximum depth of 90.5 feet bls to define the extent of diesel fuel in soil in the vicinity of the former tank location. H+A drilled three angle soil borings to collect soil samples from beneath the former tank location at depths between 44 feet to 85 feet bls.

Fuel hydrocarbons were detected in soil samples collected between land surface and a depth of approximately 25 feet bls. The greatest concentration of fuel hydrocarbons detected in unexcavated soil samples collected below the depth of excavation by IT Corporation was 2,400 mg/kg in a soil sample collected 21 feet bls (Crone and Collins, 1986). Fuel hydrocarbons were not detected in soil samples collected beneath tank no. 3 from approximately 45 feet bls to 85 feet bls. Toluene was detected in two soil samples collected beneath tank no. 3 at concentrations of 0.010 mg/kg and 0.0063 mg/kg at approximately 83 feet bls respectively.

In 1985, groundwater was reportedly encountered in an IT Corporation soil boring at a depth of approximately 90 feet bls. No groundwater samples were collected in conjunction with the investigation at tank no. 3. The CRWQCB has required HAC to evaluate groundwater quality near the former location of tank no. 3 because of concern regarding 1) the concentrations of toluene detected in soil samples collected near the water table; and 2) the possibility of diesel fuel migration to the water table from unremediated soil beneath the electrical substation (Wiedlin, 1990).

2.0 REGIONAL HYDROGEOLOGIC CONDITIONS

The site is located in the city of Torrance, California, and lies within the West Coast Basin, a sub-unit of the groundwater basin which underlies the Coastal Plain of Los Angeles County. The Coastal Plain is underlain by a thick sequence of Quaternary and Tertiary age sediments which overlie a basement complex comprised of metamorphic and igneous rocks.

The West Coast Basin extends from Long Beach to Santa Monica and is bounded by the Pacific Ocean on the west and the Newport-Inglewood uplift on the east. Groundwater in the West Coast Basin is produced primarily from a series of deep alluvial aquifers occurring within the Lakewood and San Pedro Formations (H&M, 1983b).

2.1 HYDROGEOLOGIC UNITS

The Gage aquifer and the Silverado aquifer underlie the site. Both the Gage and Silverado aquifers are areally extensive. The Silverado aquifer is the source of most groundwater pumped in the West Coast Basin.

Near the site, the Gage aquifer occurs from the water table to a depth of about 200 feet bls (H&M, 1983b). The Gage aquifer is about 100 feet thick and is comprised mostly of sand. This stratigraphic interval is also equivalent to the Gardena aquifer. The Gage aquifer designation has been applied here based on site-specific lithologic descriptions and the geographic location of the site relative to the published distribution of the Gage and Gardena aquifers (California Department of Water Resources [CDWR], 1961). The Gage aquifer is not utilized as a producing aquifer in the Torrance area.

Near the site, the Silverado aquifer underlies the Gage aquifer and is encountered at a depth of about 250 feet bls. Beneath the site, the two aquifers are separated by about 40 feet of clay (H&M, 1983b). This clay unit appears to

be present north, south, and west of the site and pinches out to the east (H&M, 1983b) (Appendix A). The Gage and Silverado aquifers appear to merge east of the site.

The Silverado aquifer is the most heavily pumped aquifer in the West Coast Basin. In 1945, approximately 90 percent of the total groundwater pumped in the Torrance-Inglewood area was derived from the Silverado aquifer (Poland, et al, 1959). Historically, nearly all industrial and municipal pumpage was from the Silverado aquifer (Poland, et al, 1959). Wells currently pumping in the site vicinity withdraw groundwater from the Silverado aquifer (CDWR, 1989).

2.2 MOVEMENT AND OCCURRENCE OF GROUNDWATER

Extensive pumping of groundwater in the early 1900's lowered water levels in the West Coast Basin to below sea level, which induced groundwater in the coastal area to flow toward the east. This allowed sea water to begin migrating eastward which degraded the fresh water aquifers of the basin. In the 1960's, a fresh water injection barrier was constructed along the coastline about 1.5 miles northwest of the site to prevent the landward migration of salt water. The operation of the barrier in conjunction with controlling groundwater extractions appears to have stabilized salt water intrusion and has maintained an eastward groundwater flow direction from the barrier toward the pumping centers east of the site.

Regional water level contour maps of the Silverado aquifer indicate that the direction of groundwater flow in the vicinity of the site has varied between northeast and southeast.

Groundwater was encountered at the site in 1983 and 1985 in two soil borings. The depth to groundwater in the soil borings was approximately 90 feet bls to 100 feet bls (H&M, 1983b; Collins, 1986). The current depth to groundwater at the site is not known because water level measurements from soil

borings are approximate and groundwater levels may change over time. Based on the change in water levels measured in West Coast Basin Water Master observation wells, water levels may have risen on the order of 5 feet since 1985 (Bookman-Edmonston Engineering, Inc., 1989).

3.0 PROPOSED SOIL AND GROUNDWATER ASSESSMENT

A soil and groundwater assessment is proposed to evaluate the soil and groundwater quality beneath the site and to provide data on the hydrogeologic units, the depth to groundwater, and the direction of groundwater flow at the site. The proposed work consists of drilling and sampling three soil borings and installing and sampling four to six groundwater monitor wells to be completed at the water table (Figure 2).

3.1 SOIL ASSESSMENT

Additional soil assessment work is proposed at the former locations of tanks no. 1 and no. 2 to evaluate the potential occurrence of VOCs in the soil beneath former tank no. 1. Three soil borings will be drilled and sampled near tanks no. 1 and no. 2. Because the location of former tank no. 1 is now inside Building No. 232, a low clearance auger drill rig is proposed to complete soil borings S-1 and S-2. The low clearance auger drill rig has a depth capability of approximately 40 feet bls and a height clearance requirement of approximately 10.5 feet.

The objective of tank no. 1 soil borings S-1 and S-2 is to collect soil samples below the depth at which the greatest VOC concentration was detected in soil samples collected in 1983. Soil samples will be collected at 5-foot depth intervals from approximately land surface to the depth capacity of the drill rig. Soil samples will be analyzed for VOCs using EPA Method 8240 (Table 1). Soil samples will be held in cold storage pending the results of the groundwater chemical analyses (Table 1). Additional analysis may be performed based on the results of the groundwater chemical analysis. The soil sampling work is proposed based on the assumption that the inside of Building No. 232 has adequate clearance for the auger drill rig.

Soil samples will also be collected adjacent to the location of former tank no. 2 to evaluate the potential occurrence of VOCs in soil beneath the former tank (Figure 3). The samples will be collected from the pilot borehole of monitor well MW-1 which will also be designated as soil boring S-3. Soil samples will be collected at 5-foot intervals from approximately land surface to the water table.

Soil samples will be collected for chemical analyses using California modified split spoon drive samplers with three 6-inch inner brass sleeves. The 6-inch brass sleeves are 2 inches in diameter. Teflon sheets will be promptly placed over the end of the brass tube which contains the soil sample to be submitted to the laboratory for chemical analysis. The teflon sheets will be held in place with plastic end caps which will be secured with tape. The completed self-adhesive sample label will be secured using clear tape. The soil samples will be placed in a zip-lock bag and stored on ice.

Soil borings S-1 and S-2 will be abandoned with a sand-cement grout. The grout will be poured into the open hole from land surface.

Soil sampling equipment will be decontaminated between sampling points using a nonphosphate soap wash, thorough rinsing with tap water, and a final distilled water rinse.

Black vinyl tape will be attached to the sample caps to prevent possible contamination or accidental opening of the samples during transfer. Lithologic logs will be prepared based on drive samples collected from soil borings and continuous core samples collected from monitor wells. These lithologic logs will include description of color, grain size, plasticity, and degree of induration of materials encountered. Records of penetration rates, casing schedules, and other pertinent observations will be recorded. All drilling and logging will be supervised by an experienced geologist.

3.2 GROUNDWATER ASSESSMENT

Additional groundwater assessment work is proposed to evaluate groundwater quality up and down gradient of the three former underground storage tank locations. Three to six groundwater monitor wells will be completed to approximately 15 feet below the regional water table. Four monitor wells are proposed at this time (Figure 2). The monitor well locations were selected to provide adequate separation and geometry to permit reliable evaluation of the direction of groundwater flow. Monitor wells MW-1 through MW-3 will be installed, surveyed, and water levels measured to determine direction of groundwater flow. Based on the direction of groundwater flow at the site, monitor well MW-4 will be constructed at the upgradient end of the site. Up to two additional monitor wells may be installed to ensure that representative groundwater quality data are obtained down gradient from the three former tank locations. Any additional monitor wells, will be installed immediately after the direction of groundwater flow is determined.

3.2.1 Monitor Well Design and Construction

Proposed monitor well construction materials, drilling techniques, well development, pump selection, and pump installation are described.

The depth to first groundwater at the site is expected to be about 90 to 100 feet bls. The monitor well screen intervals will be 20 feet in length with approximately 2 to 5 feet of screen above the water table.

Nominal 4-inch diameter factory-slotted polyvinyl chloride (PVC) screen with 0.030-inch slots will be installed in each well. Factory cleaned PVC well screen and casing will be shipped in sealed plastic wrap. Nominal 4-inch, flush-threaded schedule 40 PVC blank casing will be installed above the screen to land surface (Figure 3). A filter pack of Monterey No. 3 sand or its equivalent will be installed to approximately 2 feet above the screen. A fine-

grained sand will be placed over the filter pack to prevent the migration of the overlying grout into the screened interval. A sand-cement grout will be placed in the well annulus from the fine-grained sand to land surface. Utility vaults with vandal-resistant aluminum or steel lids will be installed at the surface over each well. Vaults will be set approximately 1 inch above grade to minimize entry of surface water.

A hollow stem auger drill rig will be used to construct the shallow monitor wells. Pilot boreholes will be drilled with a 6-inch outside diameter (OD) hollow stem auger with continuous core capability. Boreholes will be lithologically logged by inspecting auger cuttings and soil samples obtained from drive samples and/or core barrels (Section 3.1). Monitor well MW-1 will be logged using drive samplers rather than continuous core because the pilot borehole will also serve as soil boring S-3. Approximately 3 feet out of every 5 feet of soil drilled at soil boring S-3 will be sampled for lithologic logging purposes using a drive sampler. After the pilot borehole has been constructed, the hollow stem auger string will be removed and a larger diameter hole will be reamed using a 10-inch OD hollow stem auger. The large diameter hollow stem auger will be equipped with a wooden plug to prevent flowing sand from entering the inside of the hollow stem auger. Downhole drilling equipment will be steam cleaned before use in each monitor well.

Filter pack, fine-grained sand and the sand-cement grout will be placed by gravity feed directly into the annulus between the well casing and the hollow stem auger. To prevent sand locking inside the hollow stem, the auger will be slowly lifted from the hole as the filter pack is emplaced.

The hollow stem auger drilling method can be a rapid and effective means of collecting soil samples and installing shallow monitor wells under certain conditions. However, one of several limitations includes difficulties caused by flowing sand. In some cases, the potential for flowing sand conditions can be minimized if the hydraulic head difference between the inside of the auger and the groundwater in the formation can be reduced or reversed. The hydraulic head

difference can be minimized by limiting the depth penetrated below the water table. The hydraulic head difference can also be minimized by adding fresh water inside the hollow stem auger to overcome the hydrostatic pressure outside the auger.

The length of well screen set below the water table may be less than presently proposed if sands below the water table are unstable. To reduce the tendency for sand to flow, it may be necessary to add fresh tap water to the augers. This will maintain a water level inside the auger which is higher than the water table outside the auger. The amount of fresh tap water introduced will be kept to a minimum. After well completion, a volume of water greater than the volume of water added during the completion will be removed from the well.

Following completion, each shallow zone monitor well will be swabbed and bailed until the production of fine-grained sediments is minimal. If the well capacity is sufficient, final well development will be achieved by installing a temporary submersible pump and pumping until the discharge clears. Discharge rates will be estimated volumetrically. Water level recovery will be measured and recorded after development.

3.2.2 Groundwater Sampling

Groundwater samples will be collected from each monitor well. Proposed analytical methods, sampling procedures, quality assurance sampling, documentation, and sampling frequency are presented.

3.2.2.1 Analytical Methods

Groundwater samples will be analyzed for VOCs, total petroleum hydrocarbons (TPH), base metals/acid organics (BNAs), cyanide, trace metals, and nitrate (Table 1). VOCs and TPH have been selected for groundwater chemical analyses

because these compounds were reportedly stored in the former tanks located at the site. BNAs, cyanide, and trace metals will be analyzed to verify the concentrations of these compounds detected in the groundwater sample bailed from the soil boring near tank no. 1 in 1983 (H&M, 1983b). Nitrate will be analyzed because it was detected above the Federal Maximum Contaminant Level in the groundwater sample bailed from the soil boring in 1983 (H&M, 1983b).

3.2.2.2 Groundwater Sampling Procedures

Groundwater samples will be collected with dedicated electric submersible pumps. The pumps will have a nominal flow rate of 5 gallons per minute (gpm) which should be sufficient to purge the wells within approximately 10 minutes.

The wells will be pumped until at least three casing volumes of fluid are removed from the wells or until the parameters of electrical conductance (EC), pH, and temperature have stabilized. EC, pH, and temperature of well discharge will be frequently measured to verify that these parameters have stabilized prior to collection of samples.

The following will be performed during each sampling round:

1. Measure the water level with an electric sounder to the nearest 0.01 foot.

2. Pump the well until at least three casing volumes have been removed or EC, pH, and temperature have stabilized prior to collecting samples.

3. Collect groundwater samples from the discharge in appropriate sample containers (Table 2). Rinse nonpreserved sample containers with the well discharge prior to sample collection and label properly in the field. Preserved sample containers will not be pre-rinsed.

4. Record all pertinent data in field notebook during each sampling round. Pertinent data include:

   .. depth to static water level
   .. time that pumping begins
   .. time of sample collection
   .. the pump discharge rate
   .. the field parameters EC, pH, and temperature
   .. time that pumping stopped

Field measurements obtained during the sampling activities will include water levels, discharge rates, EC, temperature, and pH. A pH meter, conductivity meter and field thermometer will be used when purging monitor wells to assist in collection of representative groundwater samples. To ensure accuracy, the instruments will be calibrated periodically. Probes will be thoroughly rinsed with distilled water before each measurement. All field measurements will be recorded in the field notebook.

One field duplicate sample and one field blank will be submitted for each sampling round and analyzed for VOCs, TPH, BNAs, cyanide, trace metals, and nitrate. One trip blank will be submitted for each sampling round and analyzed for VOCs only.

An initial water sample will be collected from each monitor well after installation of the pumps. A second water sample will be collected approximately two weeks after the initial sampling. These data will be used to assess groundwater quality.

Documentation of chain-of-custody is required from the time of collection to the reporting of analytical results to ensure integrity of the samples (Appendix B).

4.0 HEALTH AND SAFETY/WASTE MANAGEMENT

A health and safety plan will be prepared to ensure safe working conditions during implementation of the proposed assessment field program.

Drill cuttings and purge water will be stored in Department of Transportation approved containers until the appropriate disposal procedures have been identified.

5.0 ESTIMATED PROJECT SCHEDULE

A project schedule has been prepared to identify the necessary steps and the estimated time required to fulfill the CRWQCB requirement (CRWQCB, 1990) (Figure 4). The actual time required to complete the assessment as defined in this work plan is subject to subcontractor availability, drilling conditions, client approval, and agency responsiveness.

Subject to HAC authorization, H+A will be prepared to start the field investigation on March 18, 1991, provided that CRWQCB approves the work plan within 30 days of submittal. If CRWQCB approval or HAC authorization is delayed beyond March 6, 1991, H+A will prepare to start the field investigation within 4 weeks of HAC authorization.

6.0 REFERENCES CITED

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TABLE 1

SUMMARY OF ANALYTICAL PROCEDURES

ANALYTES	ANALYTICAL METHOD NUMBER
Soil	
Volatile organic compounds	EPA Method 8240
Total petroleum hydrocarbons(a)	Modified EPA Method 8015
Base neutrals and acid organics(a)	EPA Method 8270
Trace metals(a)	Priority Metals Suite
Cyanide(a)	EPA Method 9010
Groundwater	
Volatile organic compounds	EPA Method 8240
Total petroleum hydrocarbons	Modified EPA Method 8015
Base neutrals and acid organics	EPA Method 8270
Trace metals	Priority Metals Suite
Nitrate	EPA Method 353.2
Cyanide	EPA Method 9010

(a) Optional analyses that may be performed pending the groundwater analytical results

EPA = U.S. Environmental Protection Agency

TABLE 2

SAMPLE HANDLING PROCEDURES

TYPE OF ANALYSIS (Analytical Method)	SAMPLE CONTAINER	SAMPLE VOLUME	PRESERVATION METHOD	MAXIMUM HOLDING TIME
Soil				
Volatile organic compounds (EPA Method 624/8240)	Brass tube	2-inch x 6-inch no head space	Cool to 4° C	14 Days
Groundwater				
Volatile organic compounds (EPA Method 624/8240)	Two 40-ml glass vials, teflon-lined septum	Vials filled completely, no head space	Cool to 4° C HCL to pH less than 2	14 days
Base/Neutral and acid organics (EPA Method 625/8270)	Two 1-liter amber glass bottles with teflon-lined caps	Bottle filled to neck	Cool, 4° C	7 days until extraction
Trace metals (Priority Metals)	One 500-ml polyethylene	Bottle filled to neck	Cool to 4° C HNO_3 to pH less than 2	6 months
Nitrate (EPA Method 353.2)	One 4-oz polyethylene bottle	Bottle filled to neck	Cool to 4° C	28 days

EPA = U.S. Environmental Protection Agency
HCL = Hydrochloric acid
HNO_3 = Nitric acid
H_2SO_4 = Sulfuric acid
ml = milliliter
oz = Ounce
NaOH = Sodium hydroxide
°C = Degrees Celsius

TABLE 2
SAMPLE HANDLING PROCEDURES
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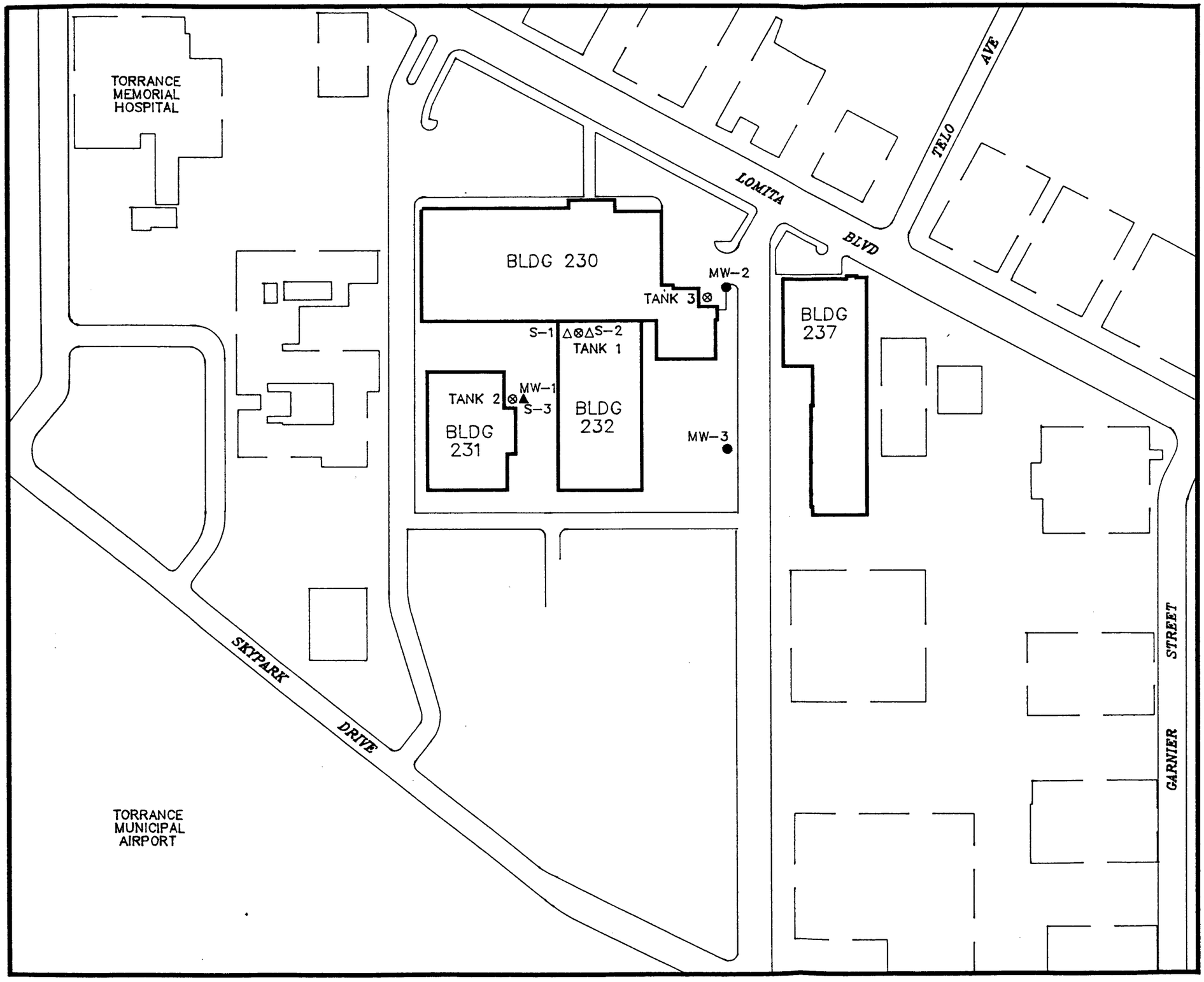
TYPE OF ANALYSIS (Analytical Method)	SAMPLE CONTAINER	SAMPLE VOLUME	PRESERVATION METHOD	MAXIMUM HOLDING TIME
Groundwater				
Cyanide (EPA Method 9010)	One 4-oz polyethylene bottle	Bottle filled to neck	Cool to 4° C NaOH to pH greater than 12	14 days

EPA = U.S. Environmental Protection Agency
HCL = Hydrochloric acid
HNO_3 = Nitric acid
H_2SO_4 = Sulfuric acid
ml = milliliter
oz = Ounce
NaOH = Sodium hydroxide
°C = Degrees Celsius

850/F01

FIGURE 1. SITE LOCATION

HARGIS + ASSOCIATES, INC.



EXPLANATION

MW-2 ●	PROPOSED MONITOR WELL LOCATION
S-1 △	PROPOSED SOIL BORING LOCATION
MW-1 S-3 ▲	PROPOSED MONITOR WELL AND SOIL BORING LOCATION
⊗ TANK 1	LOCATION OF REMOVED UNDERGROUND STORAGE TANK
▭	HUGHES AIRCRAFT COMPANY BUILDING

0 200 400
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

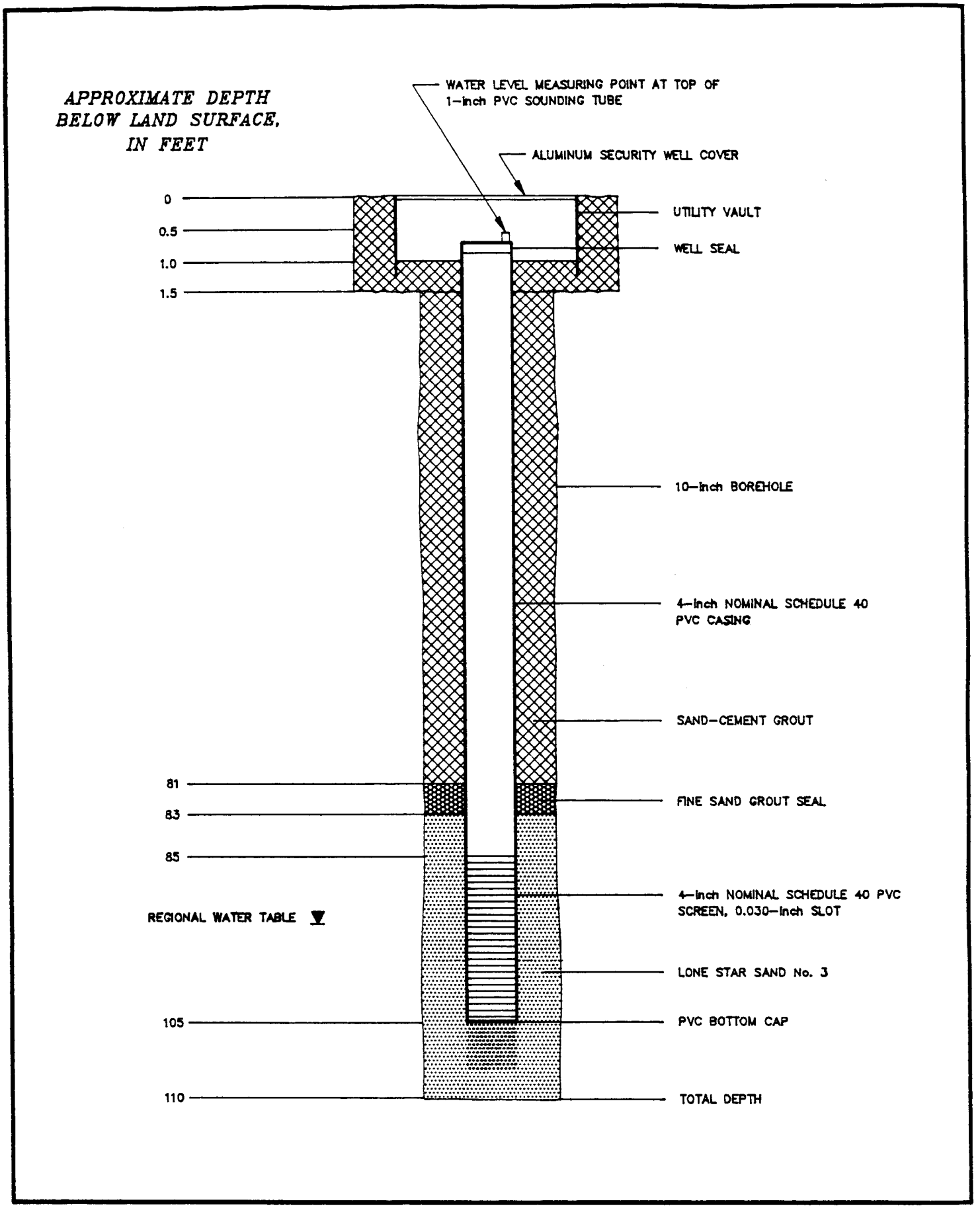
PROPOSED MONITOR WELLS AND SOIL BORINGS

HARGIS + ASSOCIATES, INC.

1/9

FIGURE 2

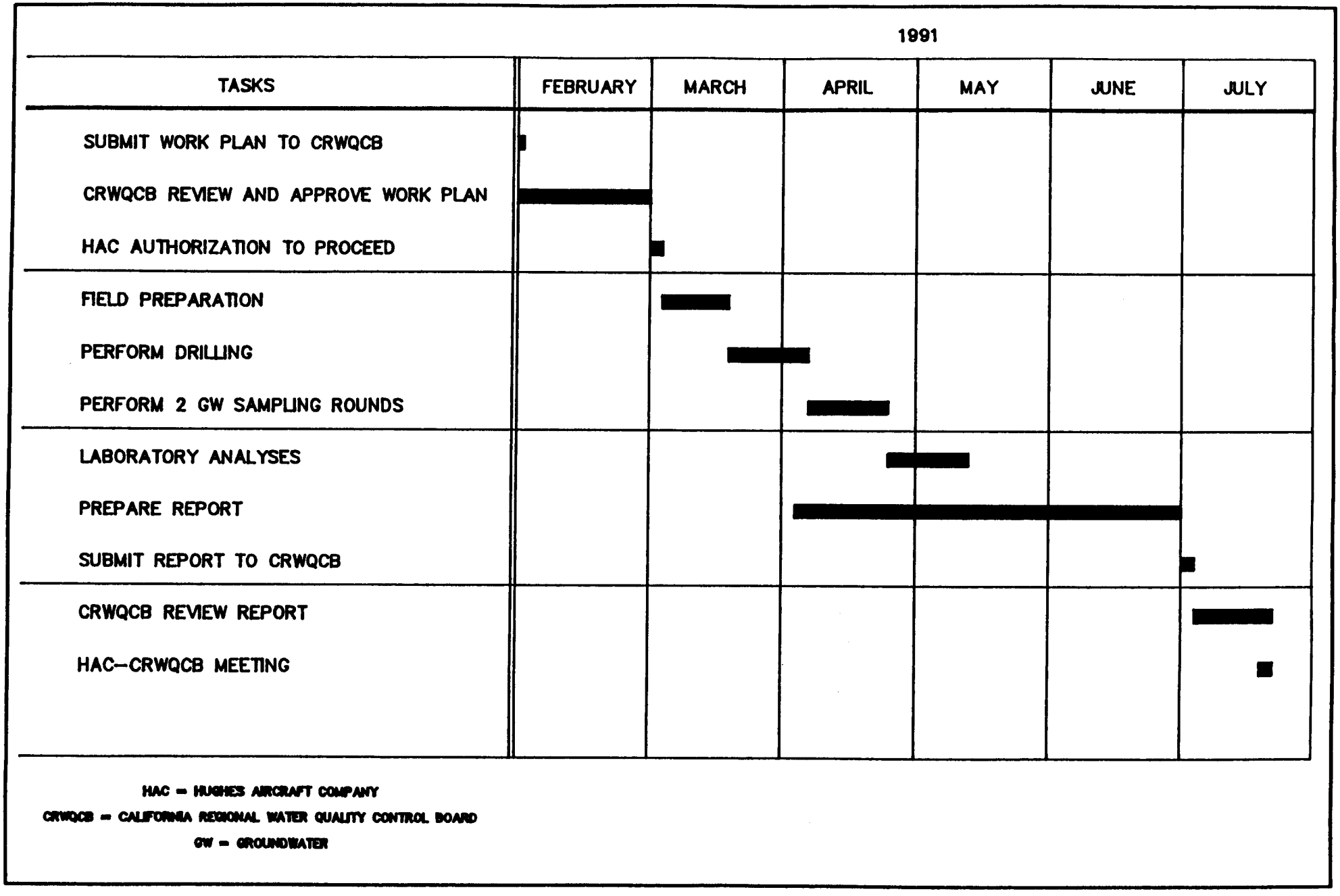
PREPARED BY MPW REVIEWED BY R.G.M. 850\F02



850\F03

FIGURE 3. PROPOSED MONITOR WELL CONSTRUCTION DIAGRAM

HARGIS + ASSOCIATES, INC.



850\F04

FIGURE 4. ESTIMATED PROJECT SCHEDULE

HARGIS + ASSOCIATES, INC.

APPENDIX A

DATA FROM 1983 SOLVENT TANK INVESTIGATION

APPENDIX A

DATA FROM 1983 SOLVENT TANK INVESTIGATION

Note: Tables and Figures in this appendix were originally published in a report prepared by Hargis & Montgomery, Inc., 1983b. Investigation of Groundwater Quality and Regional Hydrogeologic Conditions, Hughes Aircraft Company, Electron Dynamics Division, Torrance, California. Prepared for Hughes Aircraft Company, Torrance, California; August 29, 1983.

TABLE 1

CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

ORGANIC COMPOUND (micrograms/kilogram)	TEST HOLE T-1 SAMPLE DEPTH, FEET						TEST HOLE T-2 SAMPLE DEPTH, FEET			TEST HOLE T-3 SAMPLE DEPTH, FEET			TEST HOLE T-4 SAMPLE DEPTH, FEET		
	5	8	22	31	39	49	11	20	30	10	20	30	10	20	3
ACETONE[i/]	82	64	ND	520	30	ND	ND	ND	ND	ND	ND	ND	76	46	18
CHLOROBENZENE	ND	ND	ND	740	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
CHLOROFORM	22	21	25	ND	ND	23	20	ND	22	ND	ND	ND	ND	ND	
1,1-DICHLOROETHYLENE	ND	ND	37	1,200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
ETHYLBENZENE	ND	ND	ND	610	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
METHYLENE CHLORIDE	54	ND	59	340	72	ND	ND	ND	28	ND	ND	28	ND	22	
TETRACHLOROETHYLENE	780	300	8,600	440,000	62	69	25	ND	160	ND	ND	270	41	21	
TOLUENE	ND	ND	550	1,200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-TRANS-DICHLOROETHYLENE	570	ND	23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1,1-TRICHLOROETHANE	ND	ND	670	18,000	ND	ND	ND	30	53	ND	ND	ND	ND	ND	
TRICHLOROETHYLENE	840	26	260	19,000	ND	39	82	140	230	ND	ND	ND	ND	ND	
BENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

NOTE: ND = None Detected

1/ - Acetone is not an EPA priority pollutant

All samples from test holes T-1, T-2, T-3, and T-4 were analyzed by RADIAN CORPORATION, Sacramento, California

TABLE 1

CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

	TEST HOLE T-2 ....SAMPLE DEPTH, FEET.....			TEST HOLE T-3 ....SAMPLE DEPTH, FEET.....			TEST HOLE T-4 ....SAMPLE DEPTH, FEET.....			TEST HOLE T-5A .....SAMPLE DEPTH, FEET.....				TEST HOLE T-5B SAMPLE DEPTH, FEET
.....49	11	20	30	10	20	30	10	20	30	25	30	36	75	100
ND	ND	ND	ND	ND	ND	ND	76	46	180	ND	ND	ND	ND	ND
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
23	20	ND	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND	ND	ND	28	ND	ND	28	ND	22	ND	ND	ND	ND	ND	ND
69	25	ND	160	ND	ND	270	41	21	ND	8	3	ND	ND	6
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	34	ND	ND	ND	ND
ND	ND	30	53	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	2
39	82	140	230	ND	ND	ND	ND	ND	25	66	13	1	ND	14
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	3	ND	2
ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	7	ND

All samples from test holes T-1, T-2, T-3, and T-4 were analyzed by RADIAN CORPORATION, Sacramento, California

All samples from test holes T-5A and T-5B were analyzed by Brown and Caldwell, Analytical Services Division, Pasadena, California

TABLE 2

CONCENTRATION OF COMMON IONS IN GROUNDWATER SAMPLES

CONSTITUENT (milligrams per liter)	TEST HOLE T-5B	PLANT SUPPLY WELL
Sodium	198	94
Potassium	2.3	2.6
Calcium	81	31
Magnesium	25	11
Carbonate	0	0
Bicarbonate	328	290
Chloride	184	72
Sulfate	30	1.8
Nitrate (NO_3)	177	0.75
Total Dissolved Solids (evaporated @ 180°C)	705	248
Electrical Conductance (micromhos @ 25°C)	1,330	580

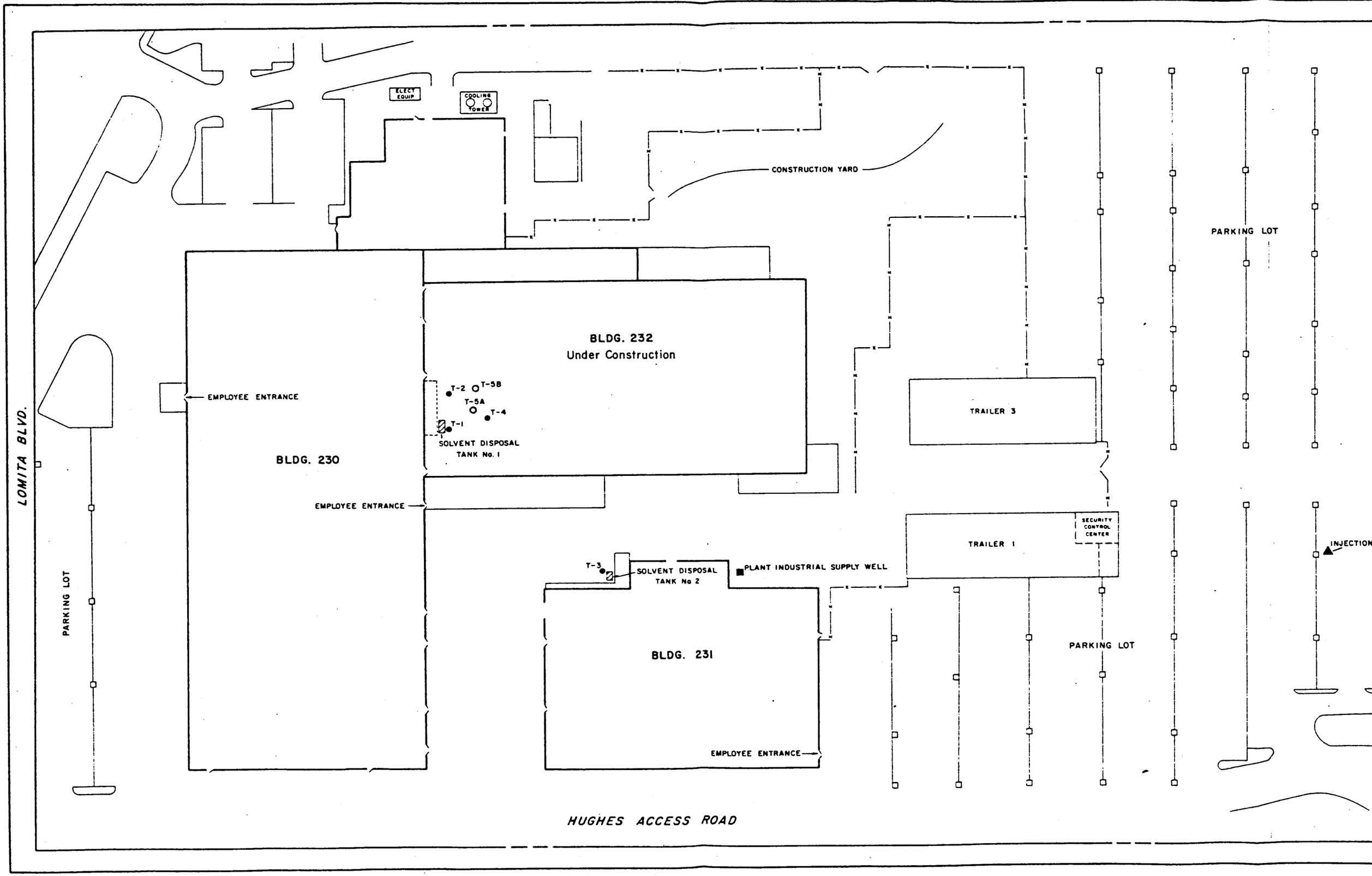
TABLE 3

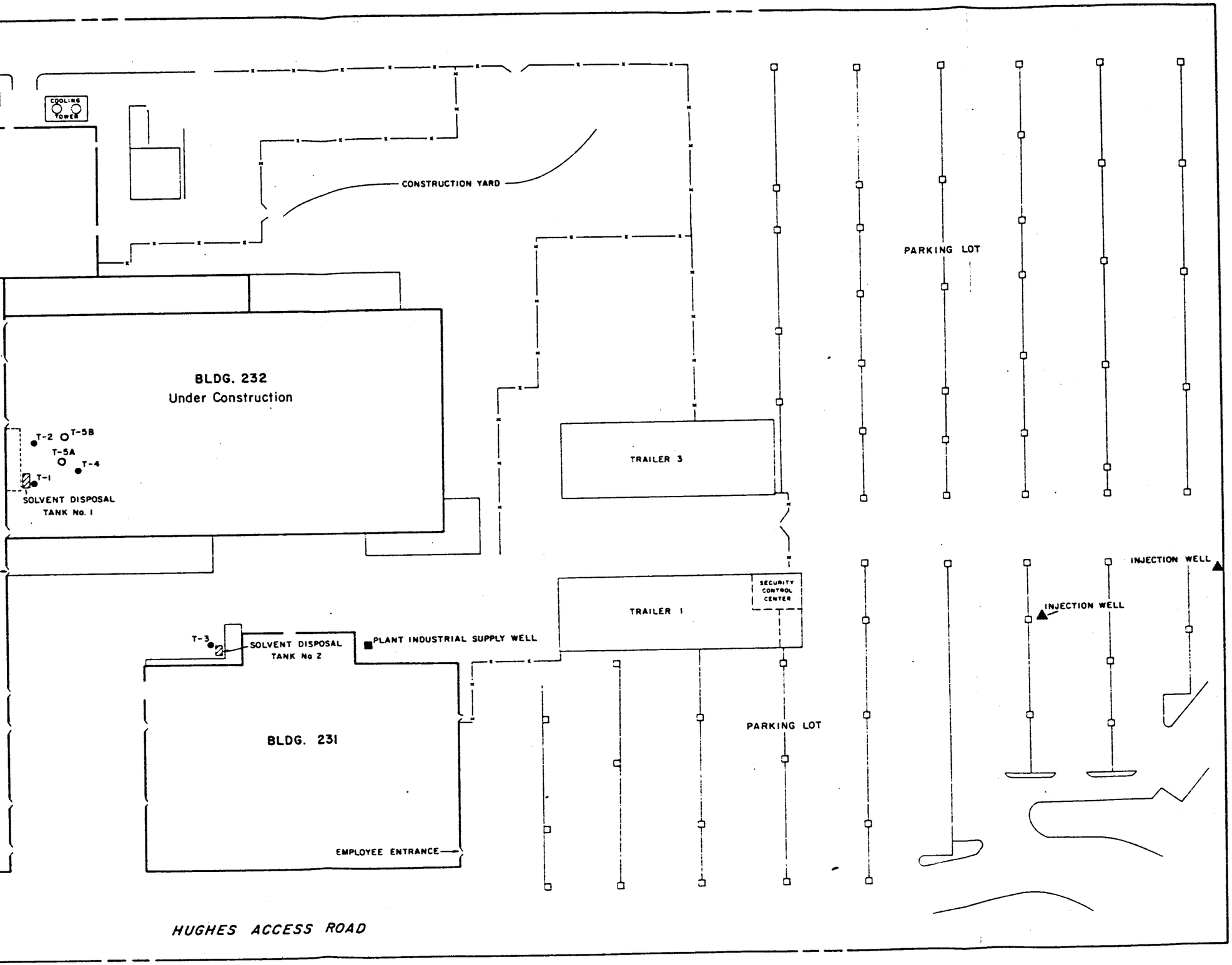
CONCENTRATION OF SELECTED ORGANIC COMPOUNDS,
TRACE METALS, AND CYANIDE DETECTED IN GROUNDWATER SAMPLES

ORGANIC COMPOUNDS (micrograms per liter).	TEST HOLE T-5B	PLANT SUPPLY WELL
Trichloroethylene	65	ND
Trichlorofluoromethane	12	9
Chloroform	ND	12
Tetrachloroethylene	11	ND
1,1,1-Trichloroethane	5	ND
Phenol	7	ND
Hexahydroazepinone	10	ND
TRACE METALS AND CYANIDE (milligrams per liter)		
Thallium	0.004	ND
Antimony	0.020	ND
Arsenic	0.014	ND
Iron	ND	0.09
Manganese	0.09	0.08
Cyanide	0.025	ND

NOTE: ND = None Detected

Analyses performed by Brown and Caldwell,
Analytical Services Division, Pasadena, California


ELECT EQUIP
COOLING TOWER
CONSTRUCTION YARD
PARKING LOT
BLDG. 232
Under Construction
T-2
T-5B
T-5A
T-4
T-1
SOLVENT DISPOSAL TANK No. 1
EMPLOYEE ENTRANCE
BLDG. 230
EMPLOYEE ENTRANCE
TRAILER 3
SECURITY CONTROL CENTER
TRAILER 1
INJECTION
T-3
SOLVENT DISPOSAL TANK No 2
PLANT INDUSTRIAL SUPPLY WELL
BLDG. 231
PARKING LOT
EMPLOYEE ENTRANCE
LOMITA BLVD.
PARKING LOT
HUGHES ACCESS ROAD



EXPLANATION

● TEST HOLE, DRILLED DURING INITIAL INVESTIGATION, JUNE 1, 1983

○ TEST HOLE, DRILLED DURING CURRENT INVESTIGATION, JUNE 13 AND 14, 1983

BASE MAP MODIFIED FROM HUGHES AIRCRAFT COMPANY PLOT PLAN MAP DATED JANUARY 12, 1982

0 40 80 120
FEET

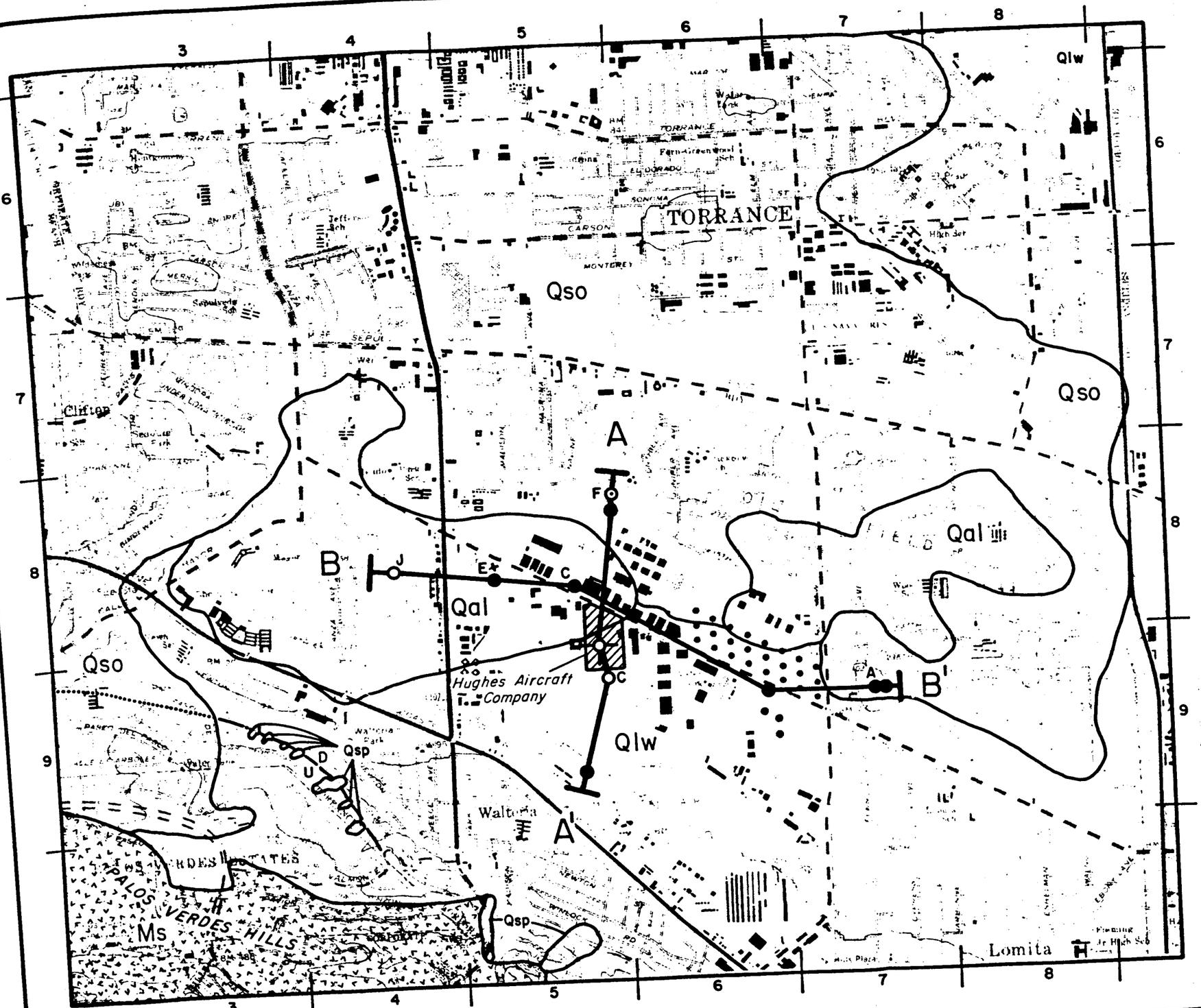
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

LOCATION OF TEST HOLES

HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
TUCSON, ARIZONA

1983

FIGURE 1



Map Sheet No. 7

EXPLA

Holocene

Qal — RECENT ALLUVIAL DEPOSITS
Gravel, sand, silt, and clay. Coarser materials highly permeable.

UNCONFORMITY

Upper Pleistocene

Qso — OLDER DUNE SAND
Fine to medium sand with silt, and gravel lense

UNCONFORMITY

Qlw — LAKEWOOD FORMATION
Terrace cover sands, Palo Verdes sand, and other deposits consisting of silt, sand, and gr
Moderately permeable.

LOCAL UNCONFORMITY

Lower Pleistocene

Qsp — SAN PEDRO FORMATION
Sand, gravel, silt, and clay, thick bodies of s
and gravel yield large quantities of water to

UNCONFORMITY

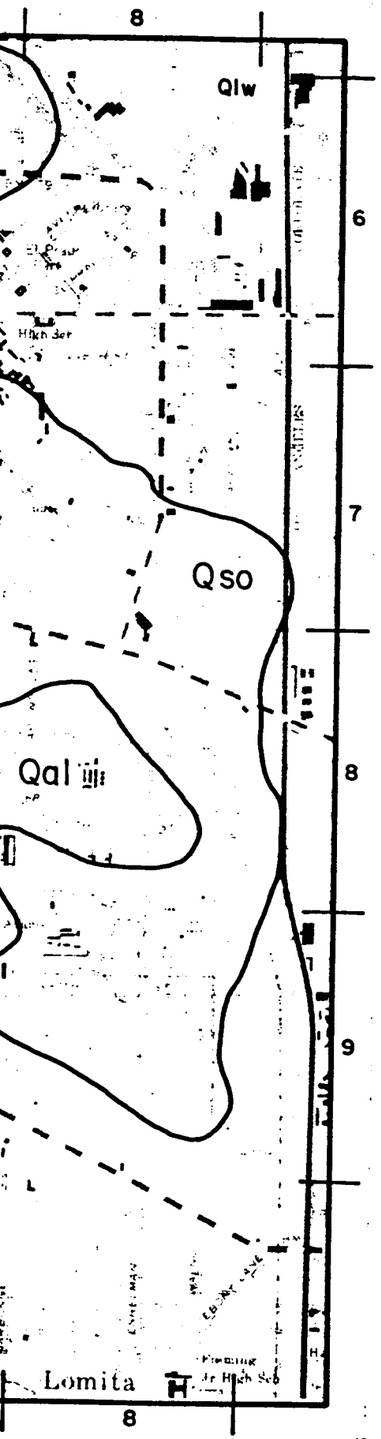
Miocene

Ms — MONTEREY FORMATION
Mudstone, diatomite, and mudstone.

D/U — TRACE OF FAULT
Dashed where inferred, dotted where conce
deposits of Recent Age; U, upthrown side;

CONTACT

NOTE: BASE MAP MODIFIED FROM POLAND AN



EXPLANATION

QUATERNARY

Holocene

Qal — RECENT ALLUVIAL DEPOSITS
Gravel, sand, silt, and clay. Coarser materials highly permeable.

UNCONFORMITY

Upper Pleistocene

Qso — OLDER DUNE SAND
Fine to medium sand with silt, and gravel lenses.

UNCONFORMITY

Qlw — LAKEWOOD FORMATION
Terrace cover sands, Palo Verdes sand, and other deposits consisting of silt, sand, and gravel. Moderately permeable.

LOCAL UNCONFORMITY

Lower Pleistocene

Qsp — SAN PEDRO FORMATION
Sand, gravel, silt, and clay, thick bodies of sand and gravel yield large quantities of water to wells.

UNCONFORMITY

TERTIARY

Miocene

Ms — MONTEREY FORMATION
Mudstone, diatomite, and mudstone.

D/U ..... TRACE OF FAULT
Dashed where inferred, dotted where concealed by deposits of Recent Age; U, upthrown side; D, downthrown side.

CONTACT

NOTE: BASE MAP MODIFIED FROM POLAND AND OTHERS, 1959.

WELLS

- ABANDONED
- TEST HOLE, NEVER PUMPED
- NO RECORD OF ABANDONMENT
- WELL PUMPED

Sources: L.A.C.F.C.D. Well Records and California Dept. of Water Resources Watermaster Report, 1982

A — A'
LINE OF CROSS SECTION

Map Sheet and Grid numbers refer to L.A.C.F.C.D. Well Numbering System (Refer to Appendix D, Figure D-1)

0 2,000 4,000
FEET

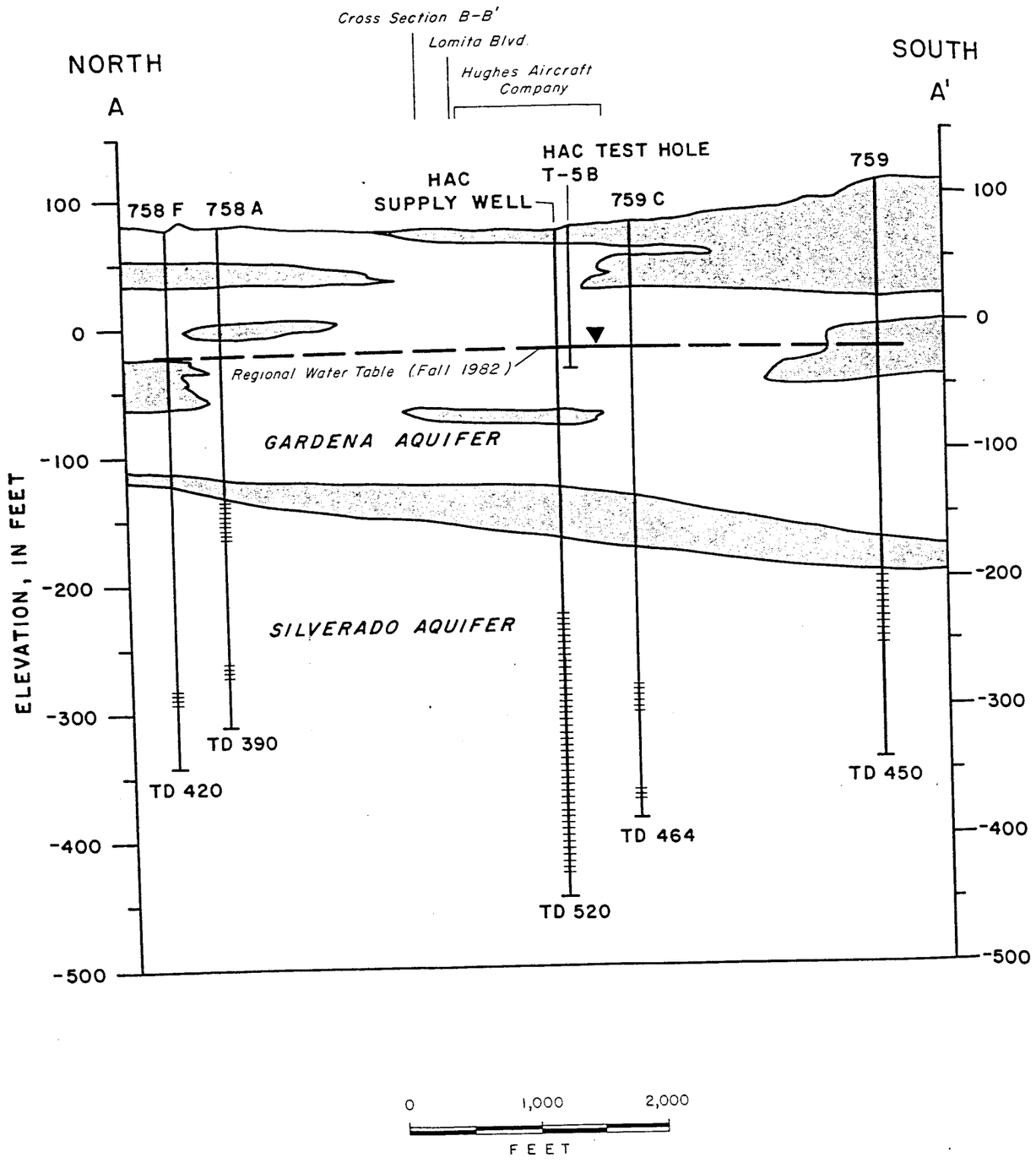
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

GEOLOGIC MAP

HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona

1983

FIGURE 2



EXPLANATION

SAND
Predominately sand with some gravel and clay lenses. Moderate to high permeability.

CLAY
Predominately clay and silt with localized sand lenses. Low permeability.

Well Location

759 C — **IDENTIFIER**
Well numbering system used by L.A.C.F.C.D., Los Angeles, California (Refer to Appendix D, Figure D-1)

PERFORATED INTERVAL

TD 464 — **TOTAL DEPTH**

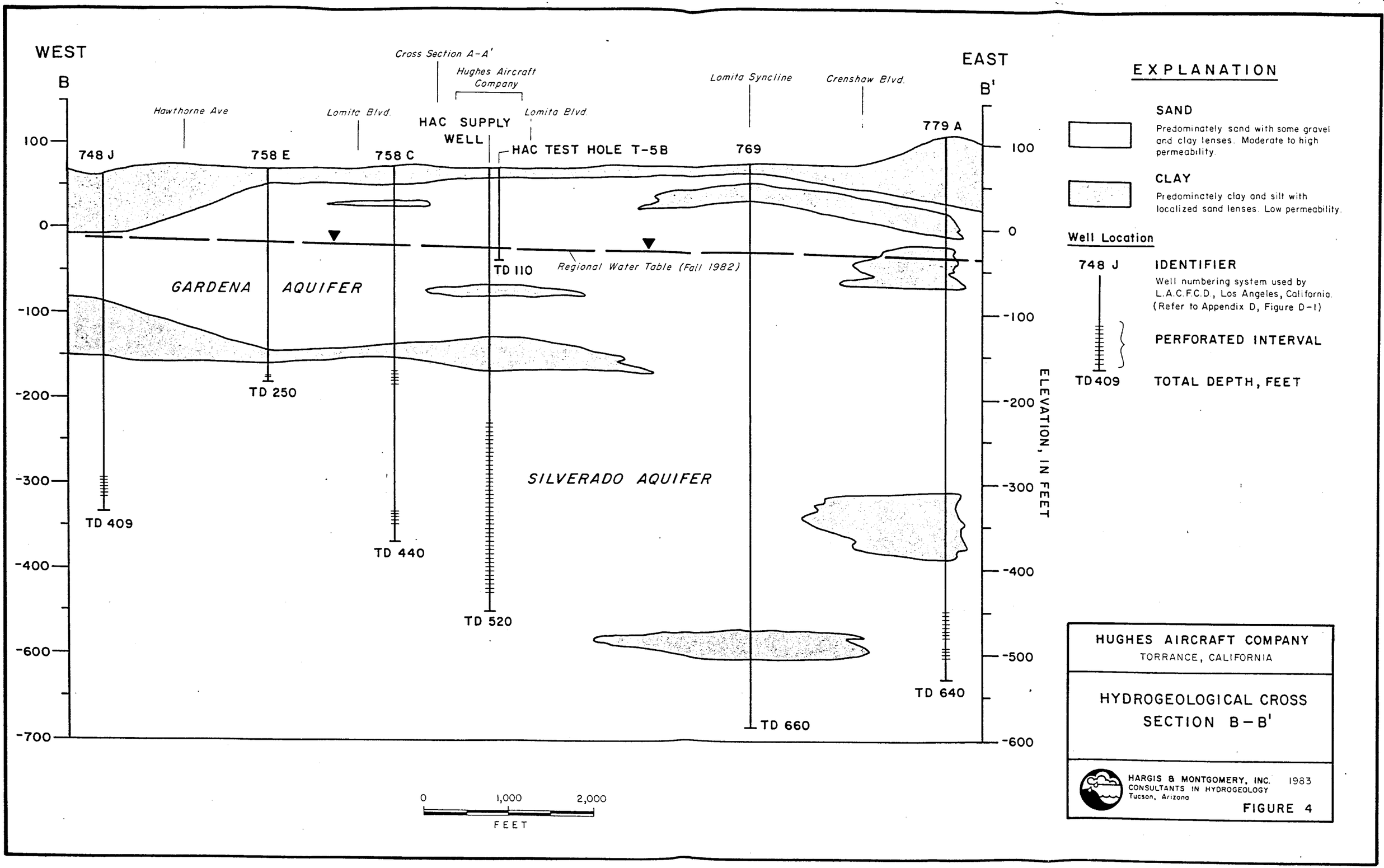
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

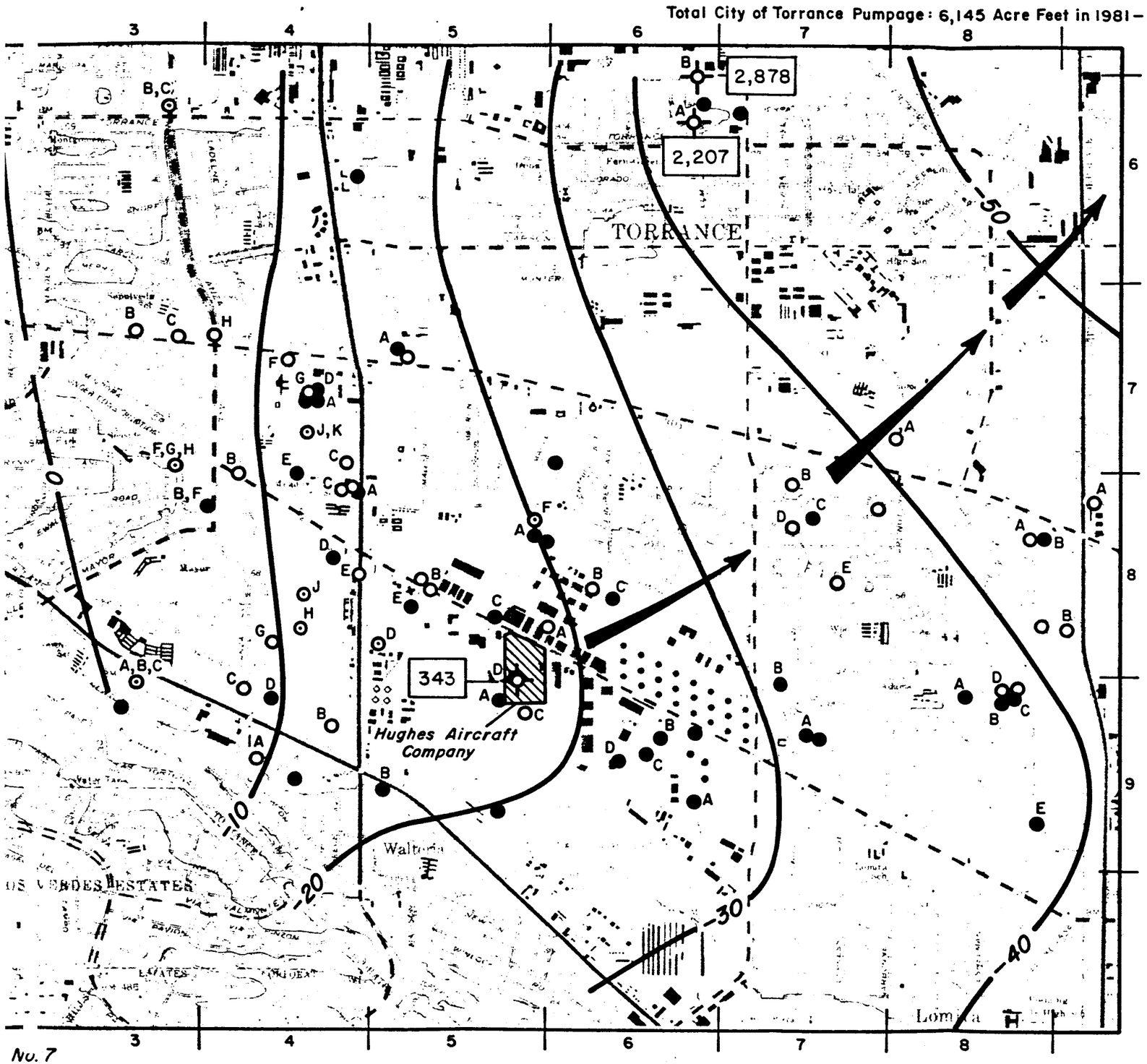
HYDROGEOLOGICAL CROSS SECTION A–A'

HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona

1983

FIGURE 3


WEST
B
EAST
B'
Cross Section A-A'
Hughes Aircraft Company
Hawthorne Ave
Lomita Blvd.
HAC SUPPLY WELL
Lomita Blvd.
Lomita Syncline
Crenshaw Blvd.
748 J
758 E
758 C
HAC TEST HOLE T-5B
769
779 A
100
0
-100
-200
-300
-400
-500
-600
-700
ELEVATION, IN FEET
TD 110
Regional Water Table (Fall 1982)
GARDENA AQUIFER
TD 250
TD 409
TD 440
SILVERADO AQUIFER
TD 520
TD 660
TD 640
0
1,000
2,000
FEET
EXPLANATION
SAND
Predominately sand with some gravel and clay lenses. Moderate to high permeability.
CLAY
Predominately clay and silt with localized sand lenses. Low permeability.
Well Location
748 J
IDENTIFIER
Well numbering system used by L.A.C.F.C.D., Los Angeles, California. (Refer to Appendix D, Figure D-1)
PERFORATED INTERVAL
TD 409
TOTAL DEPTH, FEET
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA
HYDROGEOLOGICAL CROSS SECTION B-B'
HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona
1983
FIGURE 4



EXPLANATION

WELLS

- ● ABANDONED
- ⊙ TEST HOLE, NEVER PUMPED
- ○ NO RECORD OF ABANDONMENT
- ✛ WELL PUMPED DURIING 1981-82
- [2,207] PUMPAGE IN ACRE FEET

—30— WATER LEVEL CONTOUR IN SILVERADO AQUIFER FALL 1982 (From L.A.C.F.C.D., 1982) Minus indicates elevation in feet below Mean Sea Level

→ DIRECTION OF GROUNDWATER MOVEMENT IN SILVERADO AQUIFER

Map Sheet and Grid numbers refer to L.A.C.F.C.D. Well Numbering System (Refer to Appendix D, Figure D-1)

Data obtained from: L.A.C.F.C.D. Well Records and California Dept. of Water Resources Watermaster Report, 1982

0 2,000 4,000
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

REGIONAL WATER LEVEL CONTOURS FALL 1982

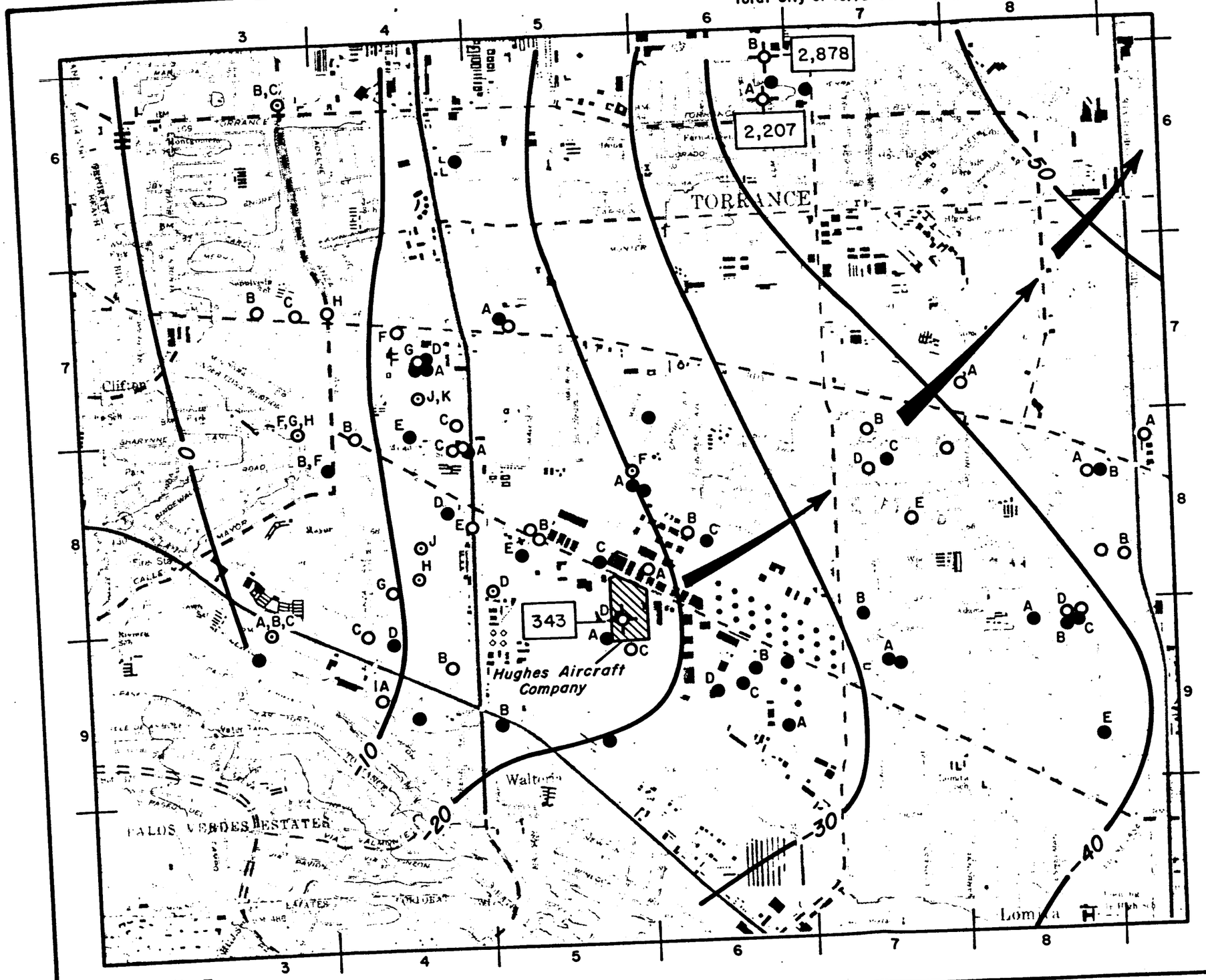
HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona

1983

FIGURE 5

No. 7

Total City of Torrance Pumpage: 6,145 Acre Feet in 1981-82



Map Sheet No. 7

EXPLANATION

WELLS

- ABANDONED
- TEST HOLE, NEVER PUMPED
- NO RECORD OF ABANDONMENT
- WELL PUMPED DURIING 1981-82
- 2,207 PUMPAGE IN ACRE FEET

-30 WATER LEVEL CONTOUR IN SILVERADO AQUIFER FALL 19
L.A.C.F.C.D., 1982) Minus indicates elevation in feet below M

DIRECTION OF GROUNDWATER MOVEMENT IN SILVERA

Map Sheet and Grid numbers refer to L.A.C.F.C.D. Well Numb
(Refer to Appendix D, Figure D-1)

Data obtained from: L.A.C.F.C.D. Well Records and California Dept
Resources Watermaster Report, 1982

0 2,000 4,000
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

REGIONAL WATER LEVEL CONTO
FALL 1982

HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona

FI

APPENDIX B

CHAIN-OF-CUSTODY PROCEDURES

APPENDIX B
CHAIN-OF-CUSTODY PROCEDURES

The chain-of-custody procedure includes sample labels, field log, chain-of-custody forms, and sample transmittal documents. Sample labels will be filled out and attached to sample containers at the time of sampling to prevent misidentification of samples. Sample labels include the following information:

- sample identification
- date and time of collection
- place of collection
- name of collector
- analysis to be performed
- special instructions

A field log will be maintained to record observations and information obtained during sampling. The field log includes:

- location of sample point
- number of samples collected
- description of sample point and sample methods
- date and time of collection
- sample identification
- field observations
- the field parameters pH, temperature, and EC

The chain-of-custody form will be included with all samples delivered to the laboratory. The chain-of-custody form includes:

- sample identification
- date samples
- time sampled
- type of sample container
- type of analyses requested.

Any instructions for special handling, storage, or disposition of the sample will be included on the chain-of-custody form. A sample transmittal letter will be attached to the chain-of-custody form.

Photocopies of all documents relating to sample chain-of-custody during the assessment will be retained.

EXHIBIT "B"

April 24, 1991

REVISED
SOIL AND GROUNDWATER ASSESSMENT WORK PLAN
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

HARGIS+ASSOCIATES, INC.

HARGIS + ASSOCIATES, INC.

2223 Avenida De La Playa, Suite 300
La Jolla, California 92037
(619) 454-0165
Telecopier (619) 454-5839

Peter T. Gunson
J.D. Mohrbacher, P.E.
Christopher G.A. Ross, P.G.

April 24, 1991

VIA UPS

Dr. Michael Yalch
HUGHES AIRCRAFT COMPANY
Electron Dynamics Division
3100 West Lomita Boulevard
Torrance, CA 90509

Re: Transmittal of Revised Soil and Groundwater Assessment Work Plan, Hughes Aircraft Company, Torrance, California

Dear Dr. Yalch:

Transmitted herewith are two (2) copies of our revised work plan entitled:

Revised
Soil and Groundwater Assessment Work Plan
Hughes Aircraft Company
Torrance, California

Our previous work plan dated January 30, 1991 has been revised in accordance with our discussions. Hargis + Associates, Inc. has been advised that during your meeting with Regional Water Quality Control Board (RWQCB) personnel in March of this year, the necessity of drilling soil borings inside Building 232 to investigate soil conditions in the vicinity of former 3,000 gallon waste solvent tank No. 1 was discussed. RWQCB personnel indicated to you that they did not consider it necessary to sample the soil beneath the building at this time. The construction of monitor wells downgradient of former tank No. 1 and adjacent to former tank No. 2 should provide an indication of whether the former waste solvent tanks impacted groundwater quality. Accordingly the work plan has been revised to omit soil sampling beneath Building 232 in the vicinity of tank No. 1, the former 3,000 gallon waste solvent.

Other Offices:
Tucson, AZ
Mesa, AZ
Manhattan Beach, CA
Burbank, CA

If you have any questions or require further discussion, please contact me.

Sincerely,

HARGIS + ASSOCIATES, INC.

Peter T. Quinlan
Associate

PTQ/tlm

Enclosure

cc: Gary L. Rafferty, Counsel

yalch05.850

REVISED
SOIL AND GROUNDWATER ASSESSMENT WORK PLAN
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

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1.2	PREVIOUS INVESTIGATIONS	2
1.2.1	Tanks No. 1 and No. 2	2
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2.1	HYDROGEOLOGIC UNITS	6
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2	SAMPLE HANDLING PROCEDURES

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ILLUSTRATIONS

Figure

1 SITE LOCATION

2 PROPOSED MONITOR WELLS AND SOIL BORING

3 PROPOSED MONITOR WELL CONSTRUCTION DIAGRAM

4 ESTIMATED PROJECT SCHEDULE

APPENDICES

Appendix

A DATA FROM 1983 SOLVENT TANK INVESTIGATION

B CHAIN-OF-CUSTODY PROCEDURES

REVISED
SOIL AND GROUNDWATER ASSESSMENT WORK PLAN
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

1.0 INTRODUCTION

This work plan has been prepared at the request of the Hughes Aircraft Company, Electron Dynamics Division (HAC) to evaluate soil and groundwater quality at the Electron Dynamics Division site located at 3100 W. Lomita Boulevard, Torrance, California (the site) (Figure 1). HAC requested that Hargis + Associates, Inc. (H+A) prepare this work plan to address groundwater quality issues referred to in a California Regional Water Quality Control Board (CRWQCB) letter pertaining to a former diesel fuel underground storage tank previously located at the site (CRWQCB, 1990). HAC also requested that the work plan to address groundwater and soil quality issues pertaining to two former underground solvent storage tanks previously located on the site. HAC requested this additional soil and groundwater work to confirm soil and groundwater quality in the vicinity of the former solvent tanks and to integrate the solvent tank assessment with the diesel fuel tank assessment required by the CRWQCB.

This work plan has been prepared to outline procedures for obtaining soil and groundwater data. These data will be used to evaluate the hydrogeologic conditions at the site and to evaluate the potential for groundwater contamination and provide information regarding potential on- and off-site sources.

1.1 BACKGROUND

HAC originally began operations at the site in 1966. Prior to that time, the site had been used as farm land. Historically, two buried steel tanks were used to store used industrial solvents at the site. Waste solvents were

periodically pumped out of the tanks and then disposed of at a licensed landfill. Tank no. 1 was located immediately south of Building no. 230 and was reported to have a capacity of approximately 3,000 gallons (Figure 2). This tank was reportedly installed in 1967. Tank no. 2 was located east of Building No. 231 and was reported to have a capacity of slightly more than 500 gallons (Figure 2). HAC personnel have indicated that tank no. 2 was installed in about 1974 (Hargis & Montgomery [H&M], 1983a). In 1983, tanks no. 1 and no. 2 were removed by IT Corporation and inspected by David Bacharowski and Al Novak of the CRWQCB (Yalch, 1991). Subsequently, Building No. 232 was constructed over the former tank no. 1 location.

Diesel fuel for an emergency electrical generator was stored in a third tank, designated in this report as tank no. 3, located adjacent to Building No. 230 (Figure 2). In 1985, tank no. 3 was removed by IT Corporation. An electrical substation was constructed over the former tank location.

1.2 PREVIOUS INVESTIGATIONS

In 1983, soil and groundwater conditions in the vicinity of tanks no. 1 and 2 were investigated by Hargis + Montgomery, Inc., (H&M). In 1985, soil conditions in the vicinity of tank no. 3 were investigated by IT Corporation. In 1988, the CRWQCB requested that additional soil sampling be performed at tank no. 3. Additional soil data were obtained and evaluated by H+A in 1989 (H+A, 1989).

1.2.1 Tanks No. 1 and No. 2

In 1983, a soil investigation was conducted at tanks no. 1 and no. 2 (H&M, 1983a and b). Four soil borings were drilled near tank no. 1 (Appendix A). Total depths for three of these borings ranged between approximately 30 and 49 feet below land surface (bls) (H&M, 1983b). The fourth soil boring was drilled

to a depth of approximately 110 feet. Seventeen soil samples were collected from the four soil borings near tank no. 1 and were analyzed for volatile organic compounds (VOCs). Tetrachloroethylene (PCE), trichloroethylene (TCE), and 1,1,1-trichloroethane (TCA) were the most frequently detected VOCs in soil samples collected near tank no. 1 (H&M, 1983b). The highest concentration of VOCs detected was 440,000 milligrams per kilogram (mg/kg) of PCE in a soil sample collected at 31 feet bls in soil boring T-1 (Appendix A).

One soil boring was drilled near tank no. 2 to a depth of 30 feet bls. Three soil samples were collected from the soil boring near tank no. 2 and were analyzed for VOCs. VOCs were detected in only one of the three soil samples collected. PCE and methylene chloride were detected at concentrations of 270 mg/kg and 28 mg/kg, respectively, in the soil sample collected at 30 feet bls (Appendix A).

Groundwater samples were collected from the 110-foot soil boring drilled near tank no. 1 and from the industrial water supply well located on the site (Appendix A). Groundwater samples were analyzed for VOCs, trace metals, and common ions. The water from the industrial water supply well was reportedly used to operate a heat exchanger for industrial cooling and was returned to the groundwater system using two injection wells (H&M, 1983b). All three wells were subsequently deactivated in 1985. The groundwater sample collected from the soil boring was collected from just below the water table. The groundwater sample collected from the industrial water supply well was representative of deeper groundwater because the well is perforated between 300 and 500 feet bls.

The industrial water supply well was resampled by the Los Angeles County Sanitation District (LACSD) in 1986. The LACSD apparently sampled the well as part of a regional groundwater quality investigation. VOCs were not detected in the groundwater sample collected by the LACSD (McTaggart, 1990).

The VOCs TCE, trichlorofluoroethane, PCE, and TCA were detected in the groundwater sample collected from the soil boring near tank no. 1. TCE,

trichlorofluoromethane, PCE, and TCA were detected at concentrations of 65 micrograms per liter (ug/l), 12 ug/l, 11 ug/l, and 5 ug/l, respectively (H&M, 1983b) (Appendix A). In addition, nitrate as NO_3 was detected at a concentration of 177 milligrams per liter (mg/l) (H&M, 1983b) (Appendix A).

The VOCs chloroform and trichlorofluoromethane were detected in the water sample collected from the industrial water supply well. Chloroform and trichlorofluoromethane were detected at concentrations of 12 ug/l and 9 ug/l, respectively (Appendix A).

1.2.2 Tank No. 3

In 1985, series of soil investigations were conducted at tank no. 3 by IT Corporation and in 1989 by H+A (Collins, 1985; H+A, 1989). In September 1985, tank no. 3 was removed and soil containing diesel fuel was excavated. Subsequently an electrical substation was constructed at the former tank location. After the tank removal, IT Corporation drilled one angle and six vertical soil borings to a maximum depth of 90.5 feet bls to define the extent of diesel fuel in soil in the vicinity of the former tank location. H+A drilled three angle soil borings to collect soil samples from beneath the former tank location at depths between 44 feet to 85 feet bls.

Fuel hydrocarbons were detected in soil samples collected between land surface and a depth of approximately 25 feet bls. The greatest concentration of fuel hydrocarbons detected in unexcavated soil samples collected below the depth of excavation by IT Corporation was 2,400 mg/kg in a soil sample collected 21 feet bls (Crone and Collins, 1986). Fuel hydrocarbons were not detected in soil samples collected beneath tank no. 3 from approximately 45 feet bls to 85 feet bls. Toluene was detected in two soil samples collected beneath tank no. 3 at concentrations of 0.010 mg/kg and 0.0063 mg/kg at approximately 83 feet bls respectively.

In 1985, groundwater was reportedly encountered in an IT Corporation soil boring at a depth of approximately 90 feet bls. No groundwater samples were collected in conjunction with the investigation at tank no. 3. The CRWQCB has required HAC to evaluate groundwater quality near the former location of tank no. 3 because of concern regarding 1) the concentrations of toluene detected in soil samples collected near the water table; and 2) the possibility of diesel fuel migration to the water table from unremediated soil beneath the electrical substation (Wiedlin, 1990).

2.0 REGIONAL HYDROGEOLOGIC CONDITIONS

The site is located in the city of Torrance, California, and lies within the West Coast Basin, a sub-unit of the groundwater basin which underlies the Coastal Plain of Los Angeles County. The Coastal Plain is underlain by a thick sequence of Quaternary and Tertiary age sediments which overlie a basement complex comprised of metamorphic and igneous rocks.

The West Coast Basin extends from Long Beach to Santa Monica and is bounded by the Pacific Ocean on the west and the Newport-Inglewood uplift on the east. Groundwater in the West Coast Basin is produced primarily from a series of deep alluvial aquifers occurring within the Lakewood and San Pedro Formations (H&M, 1983b).

2.1 HYDROGEOLOGIC UNITS

The Gage aquifer and the Silverado aquifer underlie the site. Both the Gage and Silverado aquifers are areally extensive. The Silverado aquifer is the source of most groundwater pumped in the West Coast Basin.

Near the site, the Gage aquifer occurs from the water table to a depth of about 200 feet bls (H&M, 1983b). The Gage aquifer is about 100 feet thick and is comprised mostly of sand. This stratigraphic interval is also equivalent to the Gardena aquifer. The Gage aquifer designation has been applied here based on site-specific lithologic descriptions and the geographic location of the site relative to the published distribution of the Gage and Gardena aquifers (California Department of Water Resources [CDWR], 1961). The Gage aquifer is not utilized as a producing aquifer in the Torrance area.

Near the site, the Silverado aquifer underlies the Gage aquifer and is encountered at a depth of about 250 feet bls. Beneath the site, the two aquifers are separated by about 40 feet of clay (H&M, 1983b). This clay unit appears to

be present north, south, and west of the site and pinches out to the east (H&M, 1983b) (Appendix A). The Gage and Silverado aquifers appear to merge east of the site.

The Silverado aquifer is the most heavily pumped aquifer in the West Coast Basin. In 1945, approximately 90 percent of the total groundwater pumped in the Torrance-Inglewood area was derived from the Silverado aquifer (Poland, et al, 1959). Historically, nearly all industrial and municipal pumpage was from the Silverado aquifer (Poland, et al, 1959). Wells currently pumping in the site vicinity withdraw groundwater from the Silverado aquifer (CDWR, 1989).

2.2 MOVEMENT AND OCCURRENCE OF GROUNDWATER

Extensive pumping of groundwater in the early 1900's lowered water levels in the West Coast Basin to below sea level, which induced groundwater in the coastal area to flow toward the east. This allowed sea water to begin migrating eastward which degraded the fresh water aquifers of the basin. In the 1960's, a fresh water injection barrier was constructed along the coastline about 1.5 miles northwest of the site to prevent the landward migration of salt water. The operation of the barrier in conjunction with controlling groundwater extractions appears to have stabilized salt water intrusion and has maintained an eastward groundwater flow direction from the barrier toward the pumping centers east of the site.

Regional water level contour maps of the Silverado aquifer indicate that the direction of groundwater flow in the vicinity of the site has varied between northeast and southeast.

Groundwater was encountered at the site in 1983 and 1985 in two soil borings. The depth to groundwater in the soil borings was approximately 90 feet bls to 100 feet bls (H&M, 1983b; Collins, 1986). The current depth to groundwater at the site is not known because water level measurements from soil

borings are approximate and groundwater levels may change over time. Based on the change in water levels measured in West Coast Basin Water Master observation wells, water levels may have risen on the order of 5 feet since 1985 (Bookman-Edmonston Engineering, Inc., 1989).

3.0 PROPOSED SOIL AND GROUNDWATER ASSESSMENT

A soil and groundwater assessment is proposed to evaluate the soil and groundwater quality beneath the site and to provide data on the hydrogeologic units, the depth to groundwater, and the direction of groundwater flow at the site. The proposed work consists of drilling and sampling one soil borings and installing and sampling four to six groundwater monitor wells to be completed at the water table (Figure 2).

3.1 SOIL ASSESSMENT

Additional soil assessment work is proposed at the location of former tank no. 2 to evaluate the potential occurrence of VOCs in the soil beneath the former tank. One soil borings will be drilled and sampled near tank no. 2. Because the location of former tank no. 1 is now inside Building No. 232, and in accordance with discussion with the RWQCB, no soil borings are proposed to investigate the soil in the vicinity of former tank no. 1 at the present time.

Soil samples will also be collected adjacent to the location of former tank no. 2 to evaluate the potential occurrence of VOCs in soil beneath the former tank (Figure 3). The samples will be collected from the pilot borehole of monitor well MW-1 which will also be designated as soil boring S-1. Soil samples will be collected at 5-foot intervals from approximately land surface to the water table.

Soil samples will be collected for chemical analyses using California modified split spoon drive samplers with three 6-inch inner brass sleeves. The 6-inch brass sleeves are 2 inches in diameter. Teflon sheets will be promptly placed over the end of the brass tube which contains the soil sample to be submitted to the laboratory for chemical analysis. The teflon sheets will be held in place with plastic end caps which will be secured with tape. The

completed self-adhesive sample label will be secured using clear tape. The soil samples will be placed in a zip-lock bag and stored on ice.

Soil sampling equipment will be decontaminated between sampling points using a nonphosphate soap wash, thorough rinsing with tap water, and a final distilled water rinse.

Black vinyl tape will be attached to the sample caps to prevent possible contamination or accidental opening of the samples during transfer. Lithologic logs will be prepared based on drive samples collected from soil borings and continuous core samples collected from monitor wells. These lithologic logs will include description of color, grain size, plasticity, and degree of induration of materials encountered. Records of penetration rates, casing schedules, and other pertinent observations will be recorded. All drilling and logging will be supervised by an experienced geologist.

3.2 GROUNDWATER ASSESSMENT

Additional groundwater assessment work is proposed to evaluate groundwater quality up and down gradient of the three former underground storage tank locations. Three to six groundwater monitor wells will be completed to approximately 15 feet below the regional water table. Four monitor wells are proposed at this time (Figure 2). The monitor well locations were selected to provide adequate separation and geometry to permit reliable evaluation of the direction of groundwater flow. Monitor wells MW-1 through MW-3 will be installed, surveyed, and water levels measured to determine direction of groundwater flow. Based on the direction of groundwater flow at the site, monitor well MW-4 will be constructed at the upgradient end of the site. Up to two additional monitor wells may be installed to ensure that representative groundwater quality data are obtained down gradient from the three former tank locations. Any additional monitor wells, will be installed immediately after the direction of groundwater flow is determined.

3.2.1 Monitor Well Design and Construction

Proposed monitor well construction materials, drilling techniques, well development, pump selection, and pump installation are described.

The depth to first groundwater at the site is expected to be about 90 to 100 feet bls. The monitor well screen intervals will be 20 feet in length with approximately 2 to 5 feet of screen above the water table.

Nominal 4-inch diameter factory-slotted polyvinyl chloride (PVC) screen with 0.030-inch slots will be installed in each well. Factory cleaned PVC well screen and casing will be shipped in sealed plastic wrap. Nominal 4-inch, flush-threaded schedule 40 PVC blank casing will be installed above the screen to land surface (Figure 3). A filter pack of Monterey No. 3 sand or its equivalent will be installed to approximately 2 feet above the screen. A fine-grained sand will be placed over the filter pack to prevent the migration of the overlying grout into the screened interval. A sand-cement grout will be placed in the well annulus from the fine-grained sand to land surface. Utility vaults with vandal-resistant aluminum or steel lids will be installed at the surface over each well. Vaults will be set approximately 1 inch above grade to minimize entry of surface water.

A hollow stem auger drill rig will be used to construct the shallow monitor wells. Pilot boreholes will be drilled with a 6-inch outside diameter (OD) hollow stem auger with continuous core capability. Boreholes will be lithologically logged by inspecting auger cuttings and soil samples obtained from drive samples and/or core barrels (Section 3.1). Monitor well MW-1 will be logged using drive samplers rather than continuous core because the pilot borehole will also serve as soil boring S-1. Approximately 3 feet out of every 5 feet of soil drilled at soil boring S-1 will be sampled for lithologic logging purposes using a drive sampler. After the pilot borehole has been constructed, the hollow stem auger string will be removed and a larger diameter hole will be reamed using a 10-inch OD hollow stem auger. The large diameter hollow stem

auger will be equipped with a wooden plug to prevent flowing sand from entering the inside of the hollow stem auger. Downhole drilling equipment will be steam cleaned before use in each monitor well.

Filter pack, fine-grained sand and the sand-cement grout will be placed by gravity feed directly into the annulus between the well casing and the hollow stem auger. To prevent sand locking inside the hollow stem, the auger will be slowly lifted from the hole as the filter pack is emplaced.

The hollow stem auger drilling method can be a rapid and effective means of collecting soil samples and installing shallow monitor wells under certain conditions. However, one of several limitations includes difficulties caused by flowing sand. In some cases, the potential for flowing sand conditions can be minimized if the hydraulic head difference between the inside of the auger and the groundwater in the formation can be reduced or reversed. The hydraulic head difference can be minimized by limiting the depth penetrated below the water table. The hydraulic head difference can also be minimized by adding fresh water inside the hollow stem auger to overcome the hydrostatic pressure outside the auger.

The length of well screen set below the water table may be less than presently proposed if sands below the water table are unstable. To reduce the tendency for sand to flow, it may be necessary to add fresh tap water to the augers. This will maintain a water level inside the auger which is higher than the water table outside the auger. The amount of fresh tap water introduced will be kept to a minimum. After well completion, a volume of water greater than the volume of water added during the completion will be removed from the well.

Following completion, each shallow zone monitor well will be swabbed and bailed until the production of fine-grained sediments is minimal. If the well capacity is sufficient, final well development will be achieved by installing a temporary submersible pump and pumping until the discharge clears. Discharge

rates will be estimated volumetrically. Water level recovery will be measured and recorded after development.

3.2.2 Groundwater Sampling

Groundwater samples will be collected from each monitor well. Proposed analytical methods, sampling procedures, quality assurance sampling, documentation, and sampling frequency are presented.

3.2.2.1 Analytical Methods

Groundwater samples will be analyzed for VOCs, total petroleum hydrocarbons (TPH), base metals/acid organics (BNAs), cyanide, trace metals, and nitrate (Table 1). VOCs and TPH have been selected for groundwater chemical analyses because these compounds were reportedly stored in the former tanks located at the site. BNAs, cyanide, and trace metals will be analyzed to verify the concentrations of these compounds detected in the groundwater sample bailed from the soil boring near tank no. 1 in 1983 (H&M, 1983b). Nitrate will be analyzed because it was detected above the Federal Maximum Contaminant Level in the groundwater sample bailed from the soil boring in 1983 (H&M, 1983b).

3.2.2.2 Groundwater Sampling Procedures

Groundwater samples will be collected with dedicated electric submersible pumps. The pumps will have a nominal flow rate of 5 gallons per minute (gpm) which should be sufficient to purge the wells within approximately 10 minutes.

The wells will be pumped until at least three casing volumes of fluid are removed from the wells or until the parameters of electrical conductance (EC), pH, and temperature have stabilized. EC, pH, and temperature of well discharge

will be frequently measured to verify that these parameters have stabilized prior to collection of samples.

The following will be performed during each sampling round:

1. Measure the water level with an electric sounder to the nearest 0.01 foot.

2. Pump the well until at least three casing volumes have been removed or EC, pH, and temperature have stabilized prior to collecting samples.

3. Collect groundwater samples from the discharge in appropriate sample containers (Table 2). Rinse nonpreserved sample containers with the well discharge prior to sample collection and label properly in the field. Preserved sample containers will not be pre-rinsed.

4. Record all pertinent data in field notebook during each sampling round. Pertinent data include:

   .. depth to static water level
   .. time that pumping begins
   .. time of sample collection
   .. the pump discharge rate
   .. the field parameters EC, pH, and temperature
   .. time that pumping stopped

Field measurements obtained during the sampling activities will include water levels, discharge rates, EC, temperature, and pH. A pH meter, conductivity meter and field thermometer will be used when purging monitor wells to assist in collection of representative groundwater samples. To ensure accuracy, the instruments will be calibrated periodically. Probes will be thoroughly rinsed

with distilled water before each measurement. All field measurements will be recorded in the field notebook.

One field duplicate sample and one field blank will be submitted for each sampling round and analyzed for VOCs, TPH, BNAs, cyanide, trace metals, and nitrate. One trip blank will be submitted for each sampling round and analyzed for VOCs only.

An initial water sample will be collected from each monitor well after installation of the pumps. A second water sample will be collected approximately two weeks after the initial sampling. These data will be used to assess groundwater quality.

Documentation of chain-of-custody is required from the time of collection to the reporting of analytical results to ensure integrity of the samples (Appendix B).

4.0 HEALTH AND SAFETY/WASTE MANAGEMENT

A health and safety plan will be prepared to ensure safe working conditions during implementation of the proposed assessment field program.

Drill cuttings and purge water will be stored in Department of Transportation approved containers until the appropriate disposal procedures have been identified.

5.0 ESTIMATED PROJECT SCHEDULE

A project schedule has been prepared to identify the necessary steps and the estimated time required to fulfill the CRWQCB requirement (CRWQCB, 1990) (Figure 4). The actual time required to complete the assessment as defined in this work plan is subject to subcontractor availability, drilling conditions, client approval, and agency responsiveness. Subject to HAC authorization, H+A will prepare to start the field investigation within 4 weeks of authorization.

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TABLE 1

SUMMARY OF ANALYTICAL PROCEDURES

ANALYTES	ANALYTICAL METHOD NUMBER
Soil	
Volatile organic compounds	EPA Method 8240
Total petroleum hydrocarbons(a)	Modified EPA Method 8015
Base neutrals and acid organics(a)	EPA Method 8270
Trace metals(a)	Priority Metals Suite
Cyanide(a)	EPA Method 9010
Groundwater	
Volatile organic compounds	EPA Method 8240
Total petroleum hydrocarbons	Modified EPA Method 8015
Base neutrals and acid organics	EPA Method 8270
Trace metals	Priority Metals Suite
Nitrate	EPA Method 353.2
Cyanide	EPA Method 9010

(a) Optional analyses that may be performed pending the groundwater analytical results

EPA = U.S. Environmental Protection Agency

TABLE 2

SAMPLE HANDLING PROCEDURES

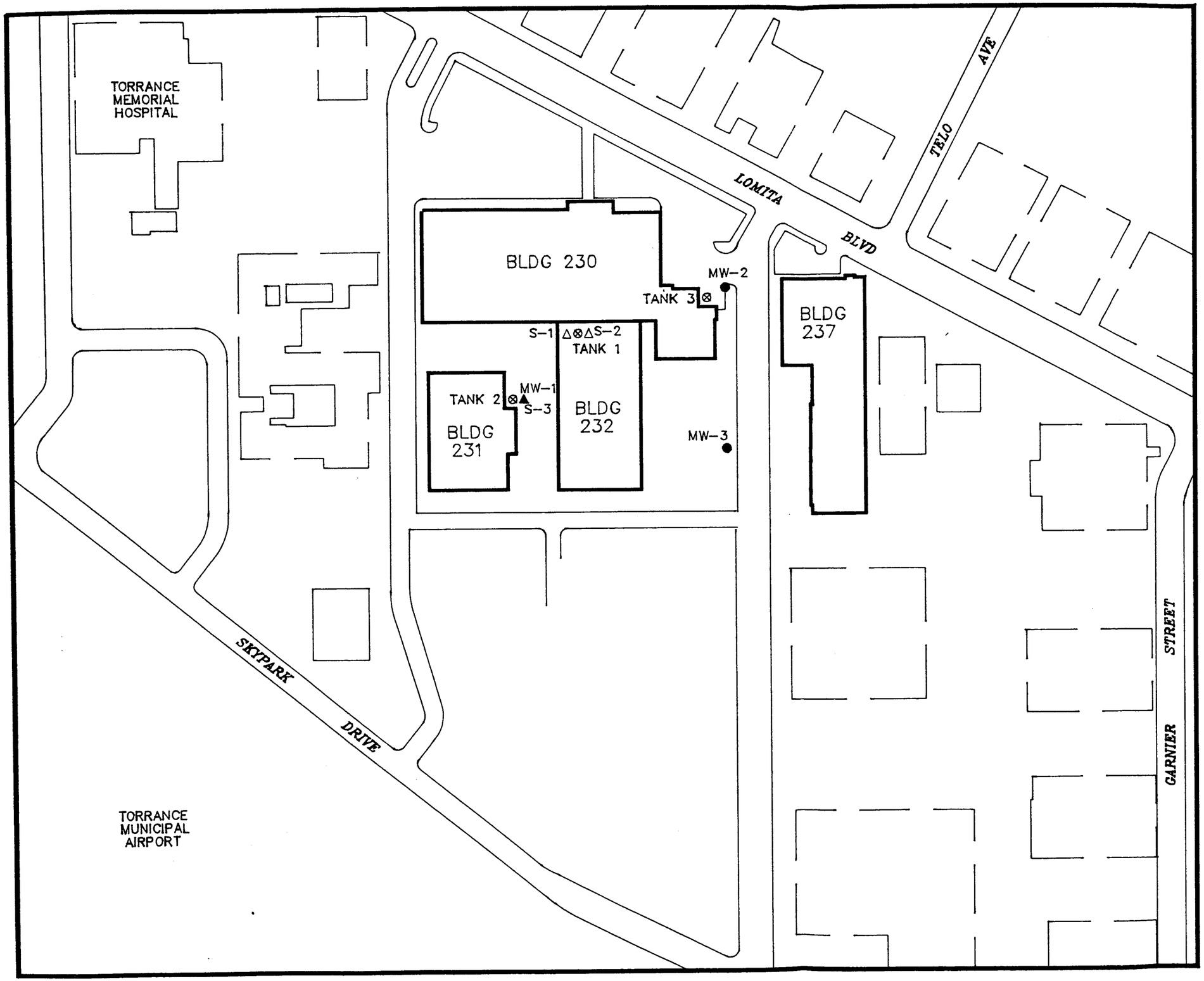
TYPE OF ANALYSIS (Analytical Method)	SAMPLE CONTAINER	SAMPLE VOLUME	PRESERVATION METHOD	MAXIMUM HOLDING TIME
Soil				
Volatile organic compounds (EPA Method 624/8240)	Brass tube	2-inch x 6-inch no head space	Cool to 4° C	14 Days
Groundwater				
Volatile organic compounds (EPA Method 624/8240)	Two 40-ml glass vials, teflon-lined septum	Vials filled completely, no head space	Cool to 4° C HCL to pH less than 2	14 days
Base/Neutral and acid organics (EPA Method 625/8270)	Two 1-liter amber glass bottles with teflon-lined caps	Bottle filled to neck	Cool, 4° C	7 days until extraction
Trace metals (Priority Metals)	One 500-ml polyethylene	Bottle filled to neck	Cool to 4° C HNO_3 to pH less than 2	6 months
Nitrate (EPA Method 353.2)	One 4-oz polyethylene bottle	Bottle filled to neck	Cool to 4° C	28 days

EPA = U.S. Environmental Protection Agency
HCL = Hydrochloric acid
HNO_3 = Nitric acid
H_2SO_4 = Sulfuric acid
ml = milliliter
oz = Ounce
NaOH = Sodium hydroxide
°C = Degrees Celsius

TABLE 2
SAMPLE HANDLING PROCEDURES
Page 2

TYPE OF ANALYSIS (Analytical Method)	SAMPLE CONTAINER	SAMPLE VOLUME	PRESERVATION METHOD	MAXIMUM HOLDING TIME
Groundwater				
Cyanide (EPA Method 9010)	One 4-oz polyethylene bottle	Bottle filled to neck	Cool to 4° C NaOH to pH greater than 12	14 days

EPA = U.S. Environmental Protection Agency
HCL = Hydrochloric acid
HNO_3 = Nitric acid
H_2SO_4 = Sulfuric acid
ml = milliliter
oz = Ounce
NaOH = Sodium hydroxide
°C = Degrees Celsius



EXPLANATION

MW-2 ●	PROPOSED MONITOR WELL LOCATION
S-1 △	PROPOSED SOIL BORING LOCATION
MW-1 S-3 ▲	PROPOSED MONITOR WELL AND SOIL BORING LOCATION
⊗ TANK 1	LOCATION OF REMOVED UNDERGROUND STORAGE TANK
▭	HUGHES AIRCRAFT COMPANY BUILDING

N

0 200 400

FEET

HUGHES AIRCRAFT COMPANY

TORRANCE, CALIFORNIA

PROPOSED MONITOR WELLS AND SOIL BORINGS

HARGIS + ASSOCIATES, INC.

1/9

FIGURE

PREPARED BY MPW REVIEWED BY R.G.M. 850\F02

850/F01

FIGURE 1. SITE LOCATION

HARGIS + ASSOCIATES, INC.

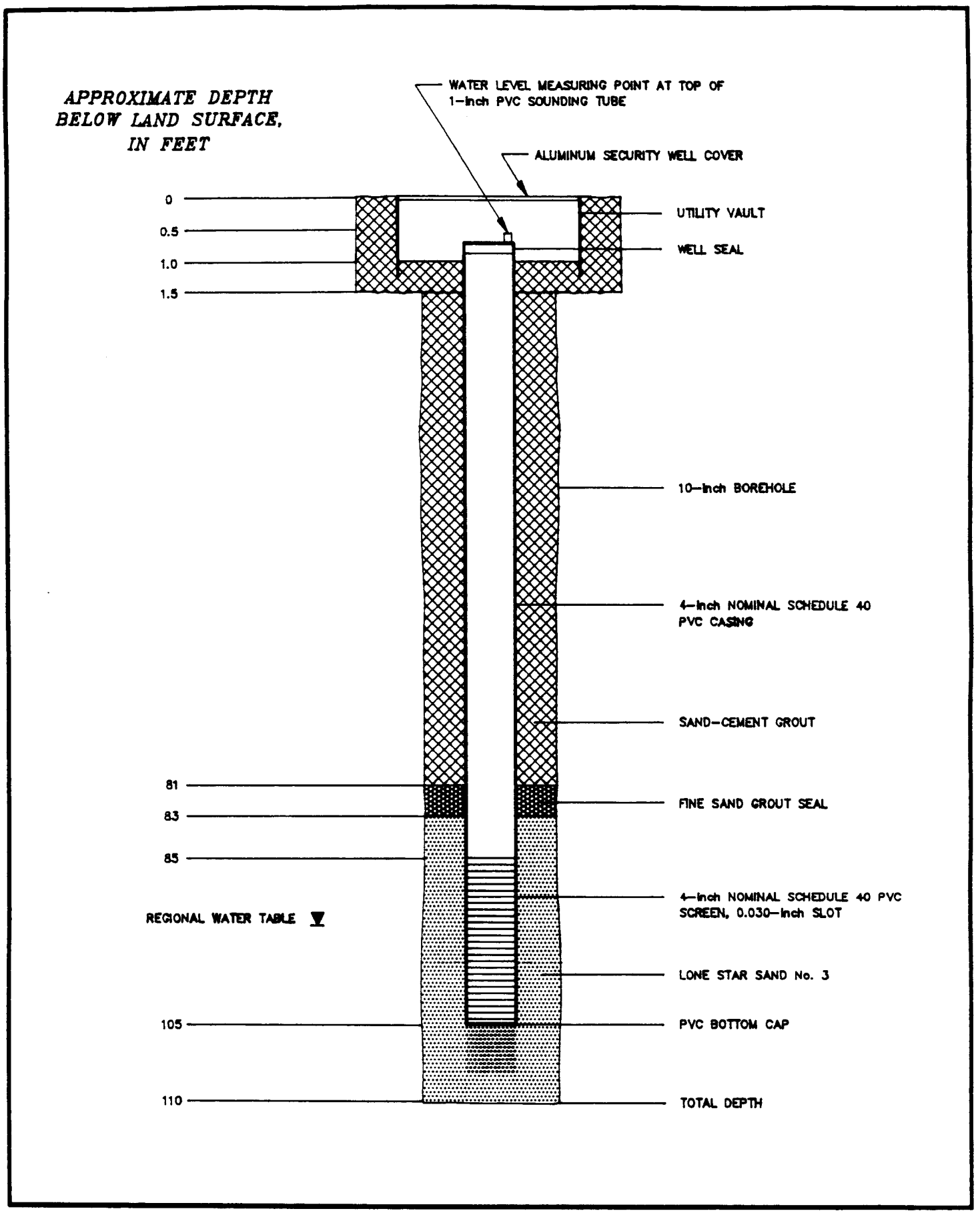


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FIGURE 3. PROPOSED MONITOR WELL CONSTRUCTION DIAGRAM

HARGIS + ASSOCIATES, INC.

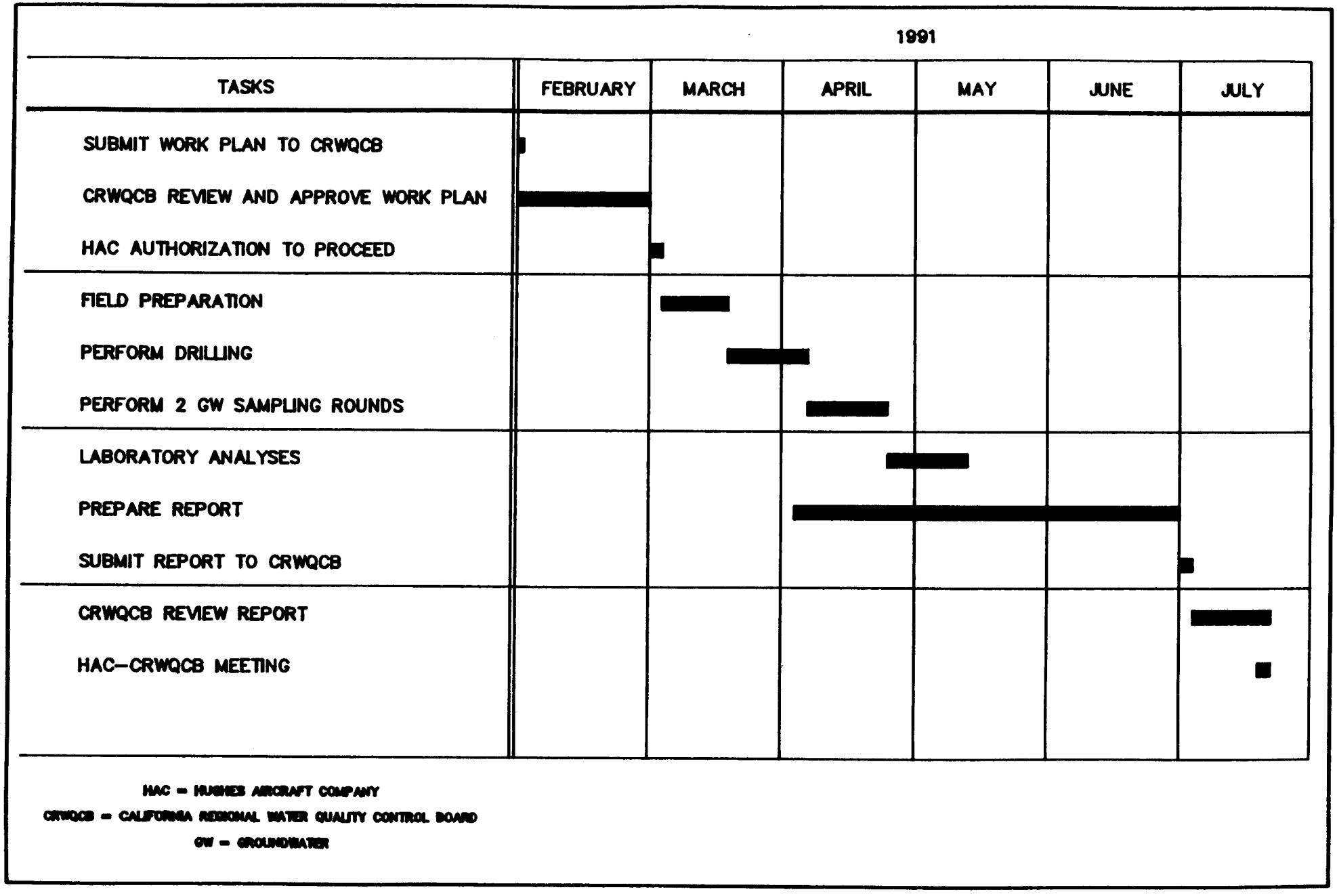

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FIGURE 4. ESTIMATED PROJECT SCHEDULE

HARGIS + ASSOCIATES, INC.

APPENDIX A

DATA FROM 1983 SOLVENT TANK INVESTIGATION

APPENDIX A

DATA FROM 1983 SOLVENT TANK INVESTIGATION

Note: Tables and Figures in this appendix were originally published in a report prepared by Hargis & Montgomery, Inc., 1983b. Investigation of Groundwater Quality and Regional Hydrogeologic Conditions, Hughes Aircraft Company, Electron Dynamics Division, Torrance, California. Prepared for Hughes Aircraft Company, Torrance, California; August 29, 1983.

TABLE 1

CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

ORGANIC COMPOUND (micrograms/kilogram)	TEST HOLE T-1 SAMPLE DEPTH, FEET						TEST HOLE T-2 SAMPLE DEPTH, FEET			TEST HOLE T-3 SAMPLE DEPTH, FEET			TEST HOLE T-4 SAMPLE DEPTH, FEE		
	5	8	22	31	39	49	11	20	30	10	20	30	10	20	[illegible]
ACETONE[1/]	82	64	ND	520	30	ND	ND	ND	ND	ND	ND	ND	76	46	1
CHLOROBENZENE	ND	ND	ND	740	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
CHLOROFORM	22	21	25	ND	ND	23	20	ND	22	ND	ND	ND	ND	ND	
1,1-DICHLOROETHYLENE	ND	ND	37	1,200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
ETHYLBENZENE	ND	ND	ND	610	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
METHYLENE CHLORIDE	54	ND	59	340	72	ND	ND	ND	28	ND	ND	28	ND	22	
TETRACHLOROETHYLENE	780	300	8,600	440,000	62	69	25	ND	160	ND	ND	270	41	21	
TOLUENE	ND	ND	550	1,200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,2-TRANS-DICHLOROETHYLENE	570	ND	23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
1,1,1-TRICHLOROETHANE	ND	ND	670	18,000	ND	ND	ND	30	53	ND	ND	ND	ND	ND	
TRICHLOROETHYLENE	840	26	260	19,000	ND	39	82	140	230	ND	ND	ND	ND	ND	
BENZENE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	
TRICHLOROFLUOROMETHANE	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	

NOTE: ND = None Detected

1/ - Acetone is not an EPA priority pollutant

All samples from test holes T-1, T-2, T-3, and T-4 were analyzed by RADIAN CORPORATION, Sacramento, California

TABLE 1

CONCENTRATION OF VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

.....		TEST HOLE T-2 ....SAMPLE DEPTH, FEET.....			TEST HOLE T-3 ....SAMPLE DEPTH, FEET.....			TEST HOLE T-4 ....SAMPLE DEPTH, FEET.....			TEST HOLE T-5A .....SAMPLE DEPTH, FEET.....				TEST HOLE T-5B SAMPLE DEPTH, FEET
9	49	11	20	30	10	20	30	10	20	30	25	30	36	75	100
0	ND	ND	ND	ND	ND	ND	ND	76	46	180	ND	ND	ND	ND	ND
0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
0	23	20	ND	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND
0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2	ND	ND	ND	28	ND	ND	28	ND	22	ND	ND	ND	ND	ND	ND
2	69	25	ND	160	ND	ND	270	41	21	ND	8	3	ND	ND	6
0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	34	ND	ND	ND	ND
0	ND	ND	30	53	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	2
0	39	82	140	230	ND	ND	ND	ND	ND	25	66	13	1	ND	14
0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	3	ND	2
0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	7	ND

All samples from test holes T-1, T-2, T-3, and T-4 were analyzed by RADIAN CORPORATION, Sacramento, California

All samples from test holes T-5A and T-5B were analyzed by Brown and Caldwell, Analytical Services Division, Pasadena, California

TABLE 2

CONCENTRATION OF COMMON IONS IN GROUNDWATER SAMPLES

CONSTITUENT (milligrams per liter)	TEST HOLE T-5B	PLANT SUPPLY WELL
Sodium	198	94
Potassium	2.3	2.6
Calcium	81	31
Magnesium	25	11
Carbonate	0	0
Bicarbonate	328	290
Chloride	184	72
Sulfate	30	1.8
Nitrate (NO_3)	177	0.75
Total Dissolved Solids (evaporated @ 180°C)	705	248
Electrical Conductance (micromhos @ 25°C)	1,330	580

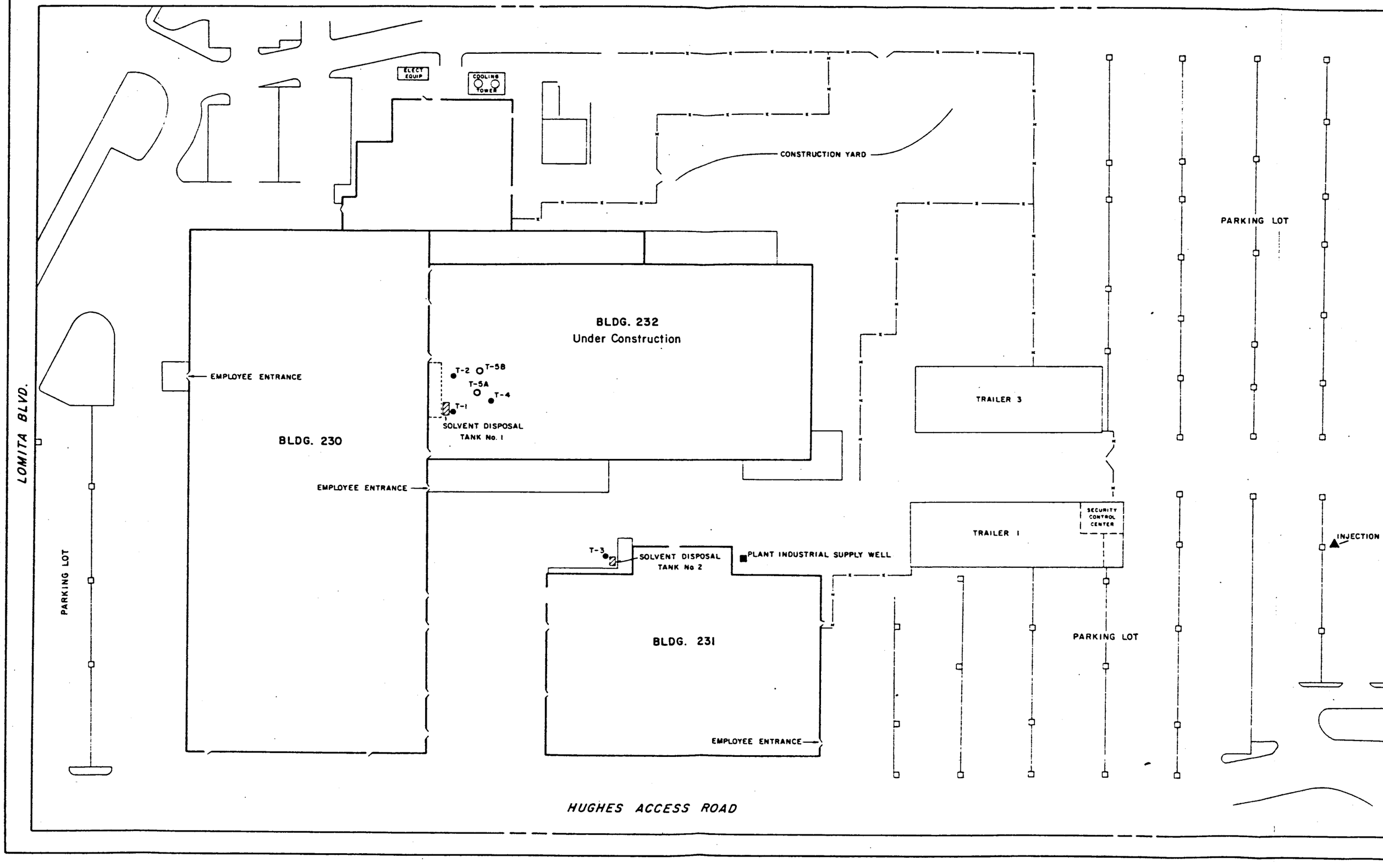
TABLE 3

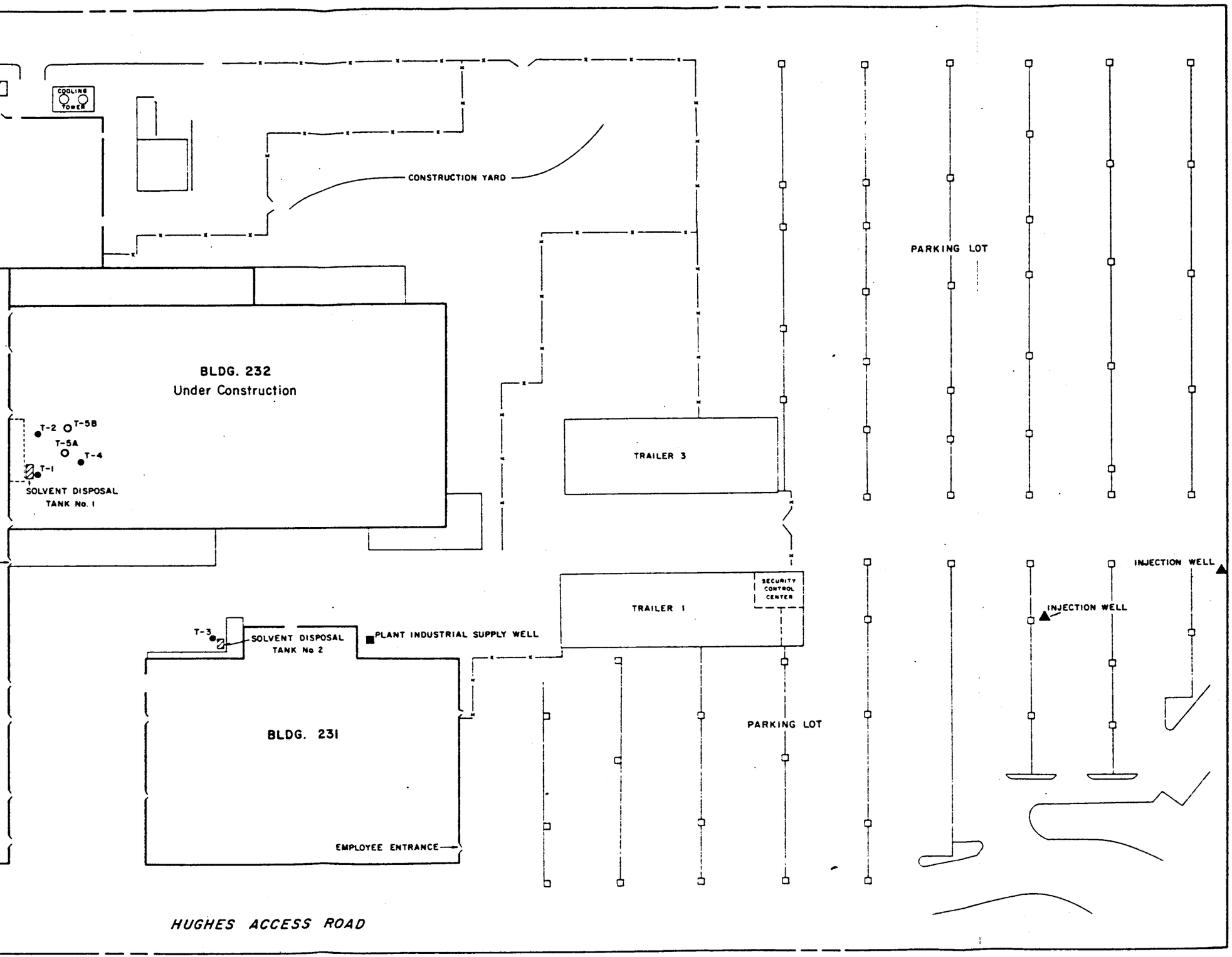
CONCENTRATION OF SELECTED ORGANIC COMPOUNDS,
TRACE METALS, AND CYANIDE DETECTED IN GROUNDWATER SAMPLES

ORGANIC COMPOUNDS (micrograms per liter).	TEST HOLE T-5B	PLANT SUPPLY WELL
Trichloroethylene	65	ND
Trichlorofluoromethane	12	9
Chloroform	ND	12
Tetrachloroethylene	11	ND
1,1,1-Trichloroethane	5	ND
Phenol	7	ND
Hexahydroazepinone	10	ND
TRACE METALS AND CYANIDE (milligrams per liter)		
Thallium	0.004	ND
Antimony	0.020	ND
Arsenic	0.014	ND
Iron	ND	0.09
Manganese	0.09	0.08
Cyanide	0.025	ND

NOTE: ND = None Detected

Analyses performed by Brown and Caldwell,
Analytical Services Division, Pasadena, California


ELECT EQUIP
COOLING TOWER
CONSTRUCTION YARD
PARKING LOT
BLDG. 232
Under Construction
EMPLOYEE ENTRANCE
T-2
T-5B
T-5A
T-4
T-1
SOLVENT DISPOSAL TANK No. 1
TRAILER 3
BLDG. 230
EMPLOYEE ENTRANCE
SECURITY CONTROL CENTER
TRAILER 1
INJECTION
T-3
SOLVENT DISPOSAL TANK No 2
PLANT INDUSTRIAL SUPPLY WELL
BLDG. 231
PARKING LOT
EMPLOYEE ENTRANCE
LOMITA BLVD.
PARKING LOT
HUGHES ACCESS ROAD



EXPLANATION

● TEST HOLE, DRILLED DURING INITIAL INVESTIGATION, JUNE 1, 1983

○ TEST HOLE, DRILLED DURING CURRENT INVESTIGATION, JUNE 13 AND 14, 1983

BASE MAP MODIFIED FROM HUGHES AIRCRAFT COMPANY PLOT PLAN MAP DATED JANUARY 12, 1982

0 40 80 120
FEET

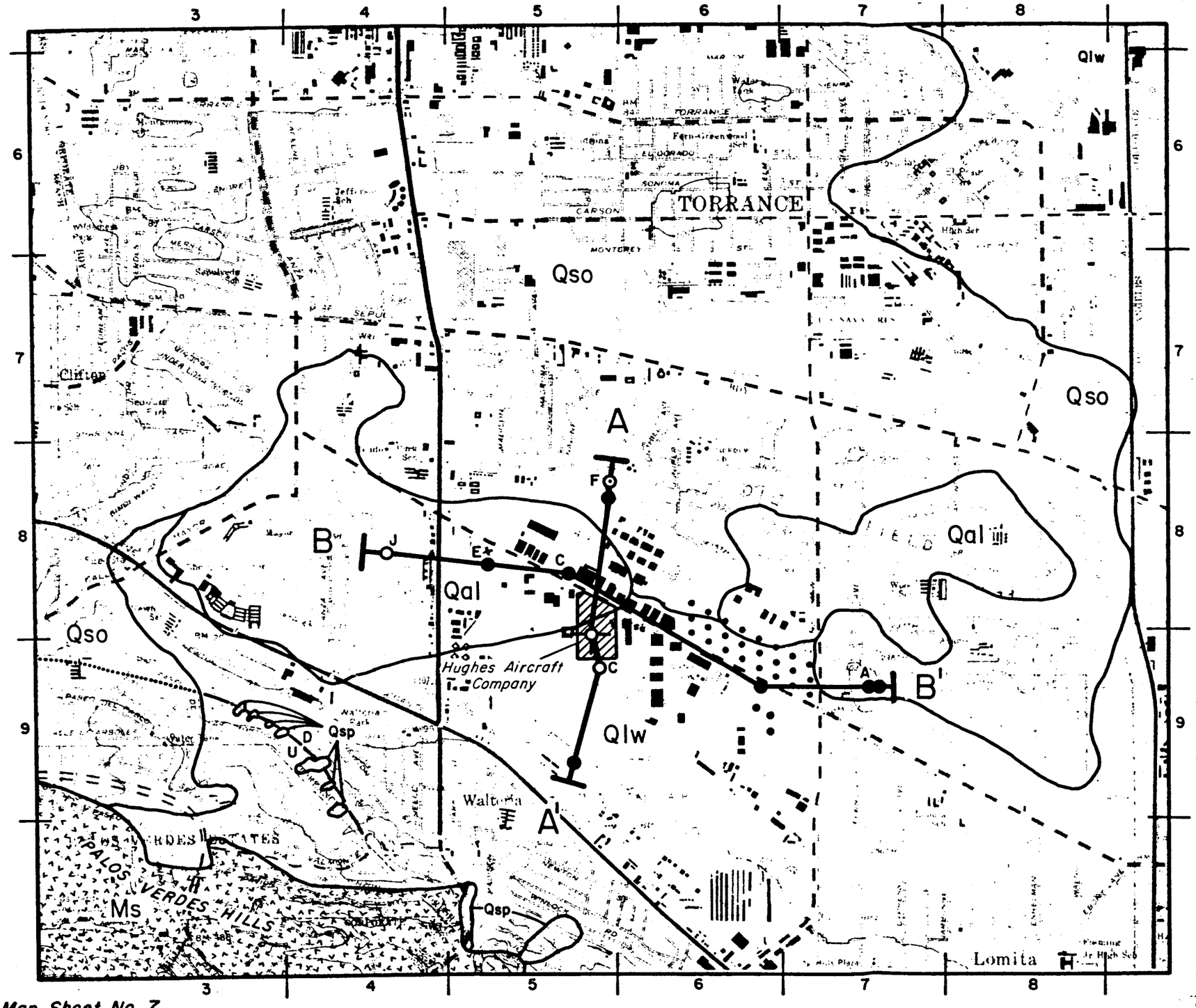
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

LOCATION OF TEST HOLES

HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
TUCSON, ARIZONA

1983

FIGURE 1



Map Sheet No. 7

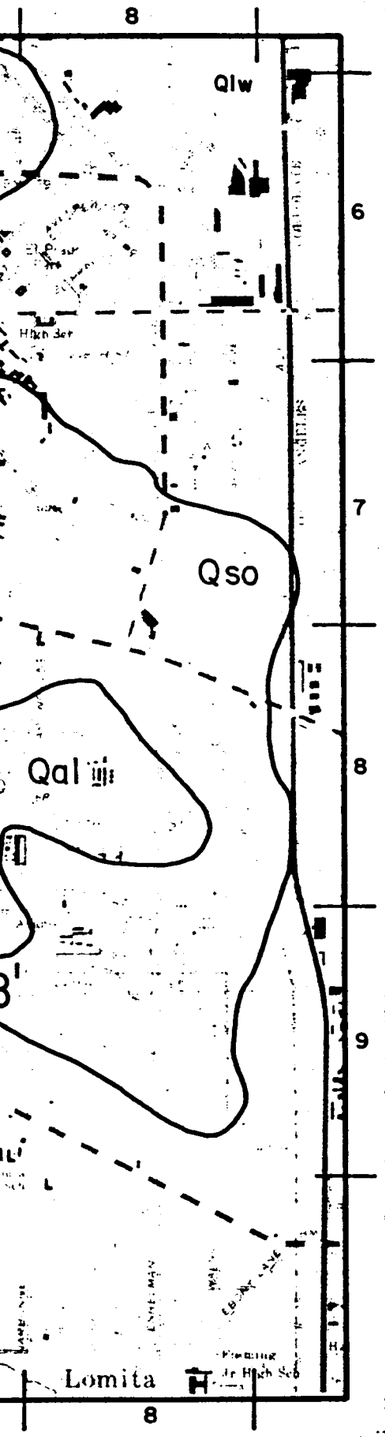
EXPL

Holocene	Qal	**RECENT ALLUVIAL DEPOSITS** Gravel, sand, silt, and clay. Coarser materials highly permeable.
		UNCONFORMITY
Upper Pleistocene	Qso	**OLDER DUNE SAND** Fine to medium sand with silt, and gravel lens
		UNCONFORMITY
	Qlw	**LAKEWOOD FORMATION** Terrace cover sands, Palo Verdes sand, and other deposits consisting of silt, sand, and gr Moderately permeable.
		LOCAL UNCONFORMITY
Lower Pleistocene	Qsp	**SAN PEDRO FORMATION** Sand, gravel, silt, and clay, thick bodies of sa and gravel yield large quantities of water to
		UNCONFORMITY
Miocene	Ms	**MONTEREY FORMATION** Mudstone, diatomite, and mudstone.

— D/U ····· **TRACE OF FAULT** Dashed where inferred, dotted where conceal deposits of Recent Age; U, upthrown side; D

——— **CONTACT**

NOTE: BASE MAP MODIFIED FROM POLAND AND



EXPLANATION

QUATERNARY

Holocene

Qal — RECENT ALLUVIAL DEPOSITS
Gravel, sand, silt, and clay. Coarser materials highly permeable.

UNCONFORMITY

Upper Pleistocene

Qso — OLDER DUNE SAND
Fine to medium sand with silt, and gravel lenses.

UNCONFORMITY

Qlw — LAKEWOOD FORMATION
Terrace cover sands, Palo Verdes sand, and other deposits consisting of silt, sand, and gravel. Moderately permeable.

LOCAL UNCONFORMITY

Lower Pleistocene

Qsp — SAN PEDRO FORMATION
Sand, gravel, silt, and clay, thick bodies of sand and gravel yield large quantities of water to wells.

UNCONFORMITY

TERTIARY

Miocene

Ms — MONTEREY FORMATION
Mudstone, diatomite, and mudstone.

D/U — TRACE OF FAULT
Dashed where inferred, dotted where concealed by deposits of Recent Age; U, upthrown side; D, downthrown side.

CONTACT

NOTE: BASE MAP MODIFIED FROM POLAND AND OTHERS, 1959.

WELLS

- ABANDONED
- TEST HOLE, NEVER PUMPED
- NO RECORD OF ABANDONMENT
- WELL PUMPED

Sources: L.A.C.F.C.D. Well Records and California Dept. of Water Resources Watermaster Report, 1982

A — A'
LINE OF CROSS SECTION

Map Sheet and Grid numbers refer to L.A.C.F.C.D. Well Numbering System (Refer to Appendix D, Figure D-1)

0 — 2,000 — 4,000
FEET

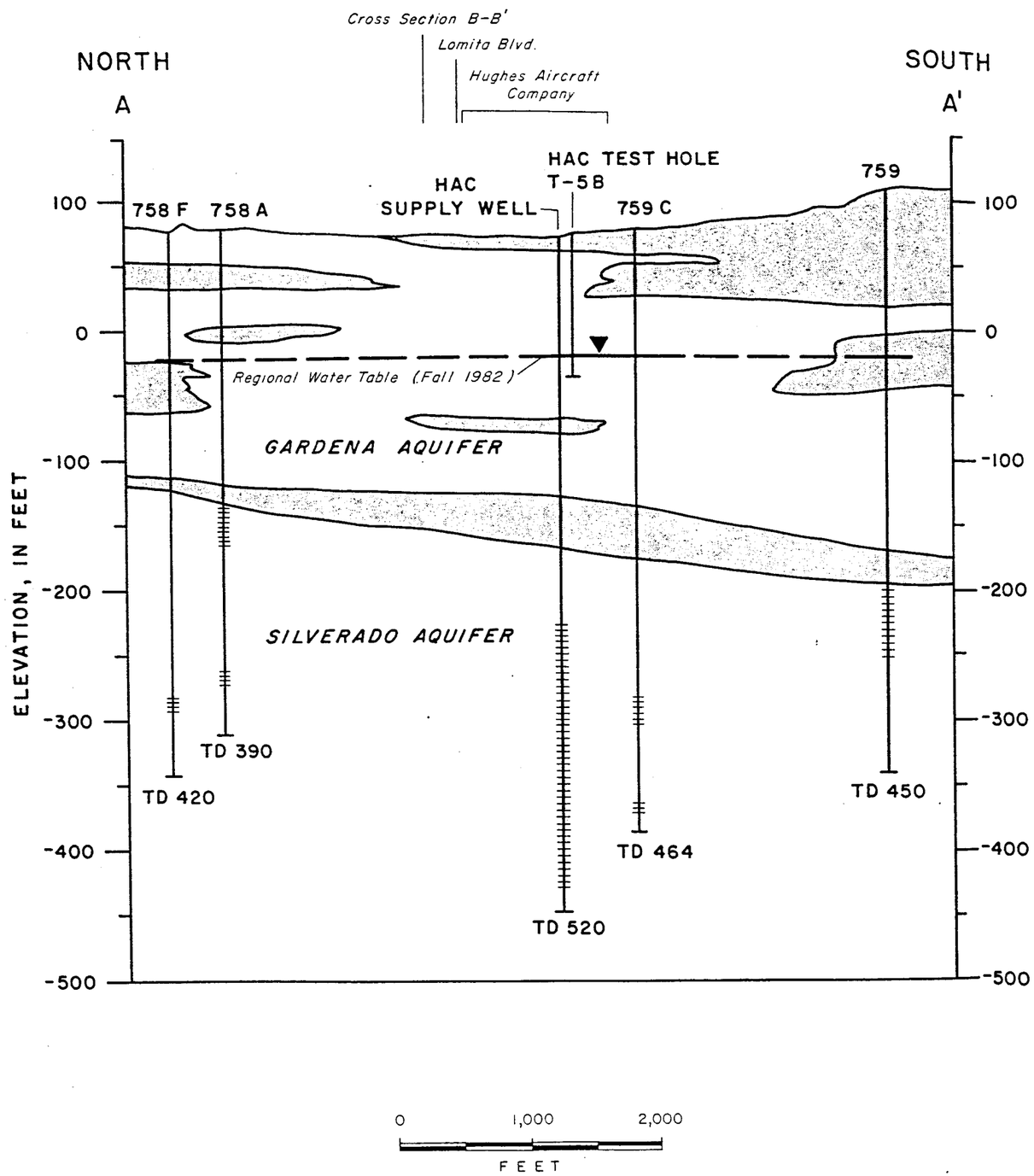
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

GEOLOGIC MAP

HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona

1983

FIGURE 2



EXPLANATION

SAND
Predominately sand with some gravel and clay lenses. Moderate to high permeability.

CLAY
Predominately clay and silt with localized sand lenses. Low permeability.

Well Location

759 C — **IDENTIFIER**
Well numbering system used by L.A.C.F.C.D., Los Angeles, California (Refer to Appendix D, Figure D-1)

PERFORATED INTERVAL

TD 464 — **TOTAL DEPTH**

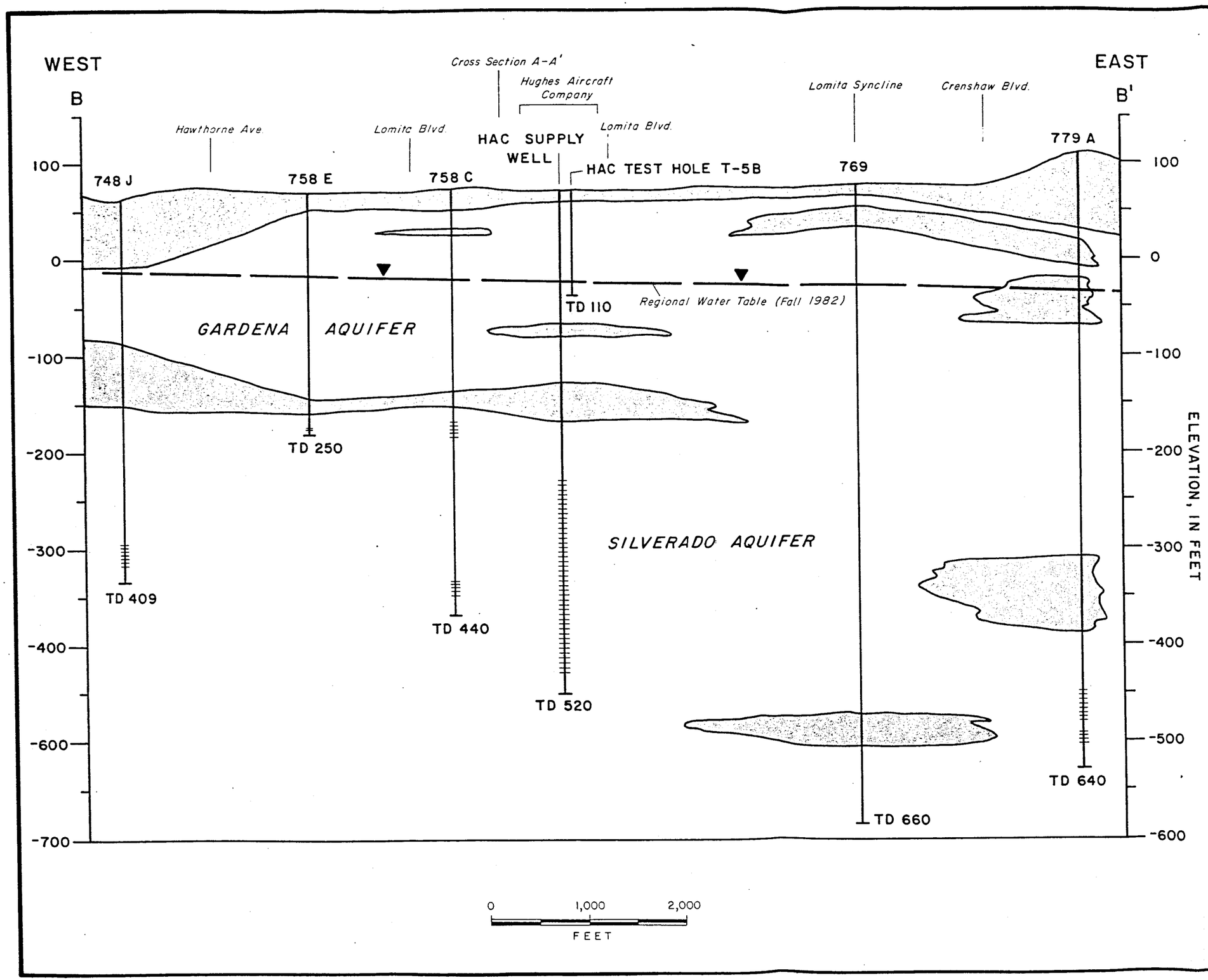
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

HYDROGEOLOGICAL CROSS SECTION A–A'

HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona

1983

FIGURE 3



EXPLANATION

SAND
Predominately sand with some gravel and clay lenses. Moderate to high permeability.

CLAY
Predominately clay and silt with localized sand lenses. Low permeability.

Well Location

748 J — **IDENTIFIER**
Well numbering system used by L.A.C.F.C.D., Los Angeles, California. (Refer to Appendix D, Figure D-1)

PERFORATED INTERVAL

TD409 — **TOTAL DEPTH, FEET**

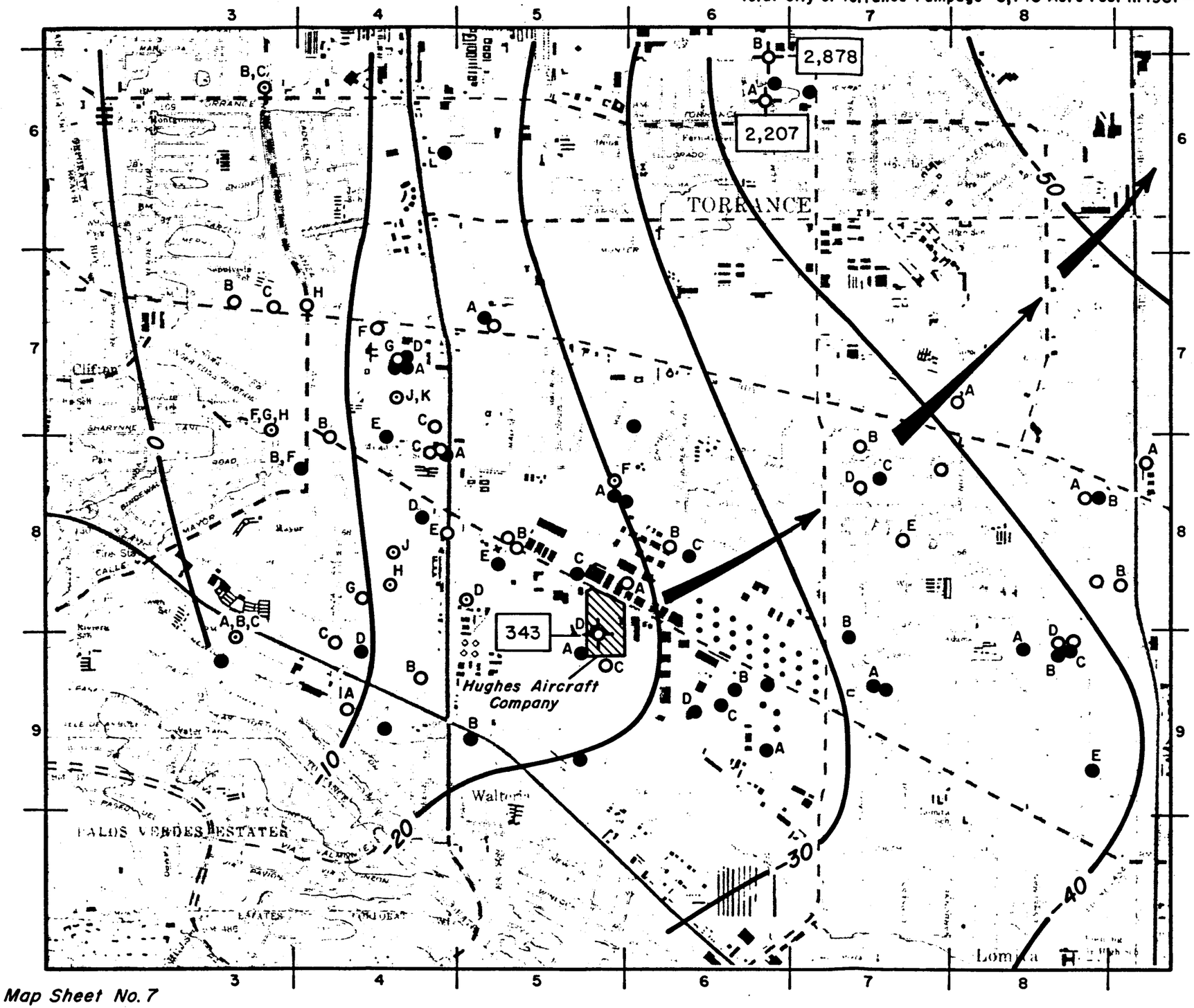
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

HYDROGEOLOGICAL CROSS SECTION B-B'

HARGIS & MONTGOMERY, INC. 1983
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona

FIGURE 4

Total City of Torrance Pumpage: 6,145 Acre Feet in 1981-82



Map Sheet No. 7

EXPLANATION

WELLS

- ● ABANDONED
- ⊙ TEST HOLE, NEVER PUMPED
- ○ NO RECORD OF ABANDONMENT
- ⊕ WELL PUMPED DURIING 1981-82
- 2,207 PUMPAGE IN ACRE FEET

—30— WATER LEVEL CONTOUR IN SILVERADO AQUIFER FALL 1
L.A.C.F.C.D., 1982) Minus indicates elevation in feet below M

→ DIRECTION OF GROUNDWATER MOVEMENT IN SILVERA

Map Sheet and Grid numbers refer to L.A.C.F.C.D. Well Numl
(Refer to Appendix D, Figure D-1)

Data obtained from: L.A.C.F.C.D. Well Records and California Dept.
Resources Watermaster Report, 1982

0 2,000 4,000
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

REGIONAL WATER LEVEL CONTOU
FALL 1982

HARGIS & MONTGOMERY, INC.
CONSULTANTS IN HYDROGEOLOGY
Tucson, Arizona

FIG

APPENDIX B

CHAIN-OF-CUSTODY PROCEDURES

APPENDIX B
CHAIN-OF-CUSTODY PROCEDURES

The chain-of-custody procedure includes sample labels, field log, chain-of-custody forms, and sample transmittal documents. Sample labels will be filled out and attached to sample containers at the time of sampling to prevent misidentification of samples. Sample labels include the following information:

- sample identification
- date and time of collection
- place of collection
- name of collector
- analysis to be performed
- special instructions

A field log will be maintained to record observations and information obtained during sampling. The field log includes:

- location of sample point
- number of samples collected
- description of sample point and sample methods
- date and time of collection
- sample identification
- field observations
- the field parameters pH, temperature, and EC

The chain-of-custody form will be included with all samples delivered to the laboratory. The chain-of-custody form includes:

- sample identification
- date samples
- time sampled
- type of sample container
- type of analyses requested.

Any instructions for special handling, storage, or disposition of the sample will be included on the chain-of-custody form. A sample transmittal letter will be attached to the chain-of-custody form.

Photocopies of all documents relating to sample chain-of-custody during the assessment will be retained.

EXHIBIT "C"

October 25, 1991

GROUNDWATER ASSESSMENT
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

HARGIS+ASSOCIATES, INC.

HARGIS + ASSOCIATES, INC.

2223 Avenida de la Playa, Suite 300
La Jolla, California 92037
619 454-0165
Telecopier 619 454-5929

October 25, 1991

VIA FEDERAL EXPRESS

PRIVELEDGED AND CONFIDENTIAL

Dr. Michael Yalch
HUGHES AIRCRAFT COMPANY
Electron Dynamics Division
3100 West Lomita Boulevard
Torrance, CA 90509

Re: Transmittal of Groundwater Assessment

Dear Dr. Yalch:

Enclosed are two copies of our final report entitled:

Groundwater Assessment
Hughes Aircraft Company
Torrance, California

The assessment provided data on the distribution of volatile organic compounds (VOCs) and the direction of groundwater flow. These data indicate that the two former spent solvent tanks may have been a source of VOCs to the groundwater. If you have any questions or require further discussion, please contact me.

Sincerely,

HARGIS + ASSOCIATES, INC.

Roger A. Niemeyer
Associate

Matthew P. Wiedlin
Project Hydrogeologist

MPW:jah

Enclosure

cc: Gary L. Rafferty, Esq.

yalch06.850

Other Offices:

GROUNDWATER ASSESSMENT
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

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1 SITE LOCATION

2 SITE PLAN

3 LOCAL HYDROGEOLOGIC CROSS SECTION

4 LOCATION OF REGIONAL HYDROGEOLOGIC CROSS SECTION

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9 ESTIMATED SCHEDULE FOR PROPOSED ASSESSMENT WORK

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A HARGIS & MONTGOMERY, INC., PREVIOUS INVESTIGATION RESULTS, 1983

B LITHOLOGIC LOGS

C LABORATORY REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION FOR WATER SAMPLES

D FIELD PROCEDURES FOR PROPOSED WORK

ACRONYMS AND ABBREVIATIONS

ATI	Analytical Technologies, Inc.
bls	Below land surface
BNA	Base neutral/acid organic
CDWR	California Department of Water Resources
CRWQCB	California Regional Water Quality Control Board
1,1-DCE	1,1-Dichloroethylene
EC	Electric conductivity
EPA	U.S. Environmental Protection Agency
FID	Flame ionization detector
gpm	Gallons per minute
HAC	Hughes Aircraft Company
H+A	Hargis + Associates, Inc.
H&M	Hargis + Montgomery, Inc.
LACSD	Los Angeles County Sanitation District
MCL	California Maximum Contaminant Level
mg/kg	Milligrams per kilogram
mg/l	Milligrams per liter
msl	Mean sea level
OD	Outside diameter
PCE	Tetrachloroethylene
PVC	Polyvinyl chloride
1,1,1-TCA	1,1,1-Trichloroethane
TCE	Trichloroethylene
TFH	Total fuel hydrocarbons
the site	Hughes Aircraft Company, Electron Dynamics Division
ug/kg	Micrograms per kilogram
VOC	Volatile organic compound

GROUNDWATER ASSESSMENT
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

EXECUTIVE SUMMARY

This report presents and summarizes the results of the groundwater assessment performed for the Hughes Aircraft Company (HAC), Electron Dynamics Division located at 3100 West Lomita Boulevard, Torrance, California (the site). The purpose of this assessment was to comply with direction from the California Regional Water Quality Control Board (CRWQCB) to evaluate groundwater quality and other hydrogeologic conditions at the site including lithology, depth to groundwater, and direction of groundwater flow (CRWQCB, 1990). This report summarizes previous assessments and the scope of the present assessment, describes drilling and groundwater sampling procedures, provides the results of the assessment and conclusions and recommendations based on the assessment results.

In 1983, soil and groundwater conditions in the vicinity of two spent solvent tanks (Tanks Nos. 1 and 2) were investigated by Hargis & Montgomery, Inc. In 1985, soil conditions at a former diesel tank (Tank No. 3) location were investigated by IT Corporation. In 1989, additional soil data were obtained at the former Tank No. 3 location and were evaluated by Hargis + Associates, Inc. (H+A).

Pursuant to direction from the CRWQCB on March 28, 1991, the following activities were performed during the present assessment:

- Four groundwater monitor wells were drilled with a hollow stem auger drill rig to evaluate groundwater quality upgradient and downgradient of the three former tank locations (Figure 2).

.. Water levels were measured in each monitor well to determine groundwater flow direction and hydraulic gradient at the site.

.. Two groundwater samples were collected from each monitor well for chemical analysis. The samples were analyzed for volatile organic compounds (VOCs), fuel hydrocarbons, base neutrals/acid organics (BNAs), trace metals, nitrate, and cyanide.

The site is located in the City of Torrance, California, and lies within the West Coast Basin. Near the site, the Gage aquifer occurs at a depth of about 85 feet below land surface (bls). The Silverado aquifer underlies the Gage aquifer and is encountered at a depth of about 250 feet bls. The Silverado aquifer is the source of most groundwater pumped in the West Coast Basin.

Groundwater at the site occurs in an unconfined aquifer at approximately 84 to 88 feet bls. This aquifer appears to correlate with the Gage aquifer. The direction of groundwater flow at the site is to the east.

Analytical results of groundwater samples collected during the period from July 11 to 23, 1991, indicated that VOCs, fuel hydrocarbons, trace metals, and nitrate are present in groundwater underlying the site. Trichloroethylene (TCE), tetrachloroethylene (PCE), total chromium and nitrate have been detected in groundwater samples at concentrations exceeding their respective Maximum Contaminant Levels (MCLs). The highest concentration of TCE was 1,000 micrograms per liter (ug/l). The highest concentration of PCE was 53 ug/l. The highest concentration of total chromium was 0.14 milligrams per liter (mg/l). Fuel hydrocarbons were detected near the laboratory detection limit in both groundwater samples collected from one monitor well. Nitrate concentrations ranged from 56 mg/l to 32 mg/l. Cyanide concentrations did not exceed the laboratory detection limit of 0.01 mg/l.

TCE and PCE are designated as the site compounds of concern (COCs). The presence of trace metals, including total chromium, in groundwater samples collected from on-site monitor wells and the upgradient monitor well, indicates that the concentrations of trace metals observed may be representative of background water quality. Although the data indicate that chromium concentrations may be representative of background water quality, the detection of total chromium at a concentration exceeding the MCL downgradient of one of the former solvent tanks indicates that further assessment of chromium is warranted. The presence of nitrate in groundwater samples collected from the on-site monitor wells and the upgradient monitor well indicates that the nitrate concentrations observed may be representative of background water quality.

Further assessment is necessary to delineate the vertical and horizontal extent of COCs in the groundwater. Seven shallow monitor wells to be completed in two steps are proposed. Five shallow monitor wells would be installed initially. Based on the initial groundwater analytical results from these monitor wells and the results reported herein, up to two additional shallow monitor wells might be installed within 2 months following the installation of the initial five monitor wells. It is proposed that one deep monitor well be installed following the installation and sampling of the proposed shallow monitor wells. Prior to drilling the deep monitor well, an exploratory boring would be drilled to define the lithology below 100 feet bls and to design the deep monitor well.

Initial groundwater samples would be collected from each newly installed monitor well shortly after the well is developed. Initial groundwater samples would be analyzed for halogenated and aromatic VOCs, fuel hydrocarbons, and total chromium. Additional groundwater samples would be collected and water levels would be measured quarterly. Groundwater samples collected during quarterly monitoring would be analyzed for halogenated VOCs and total chromium.

A groundwater remediation system will be designed for the interim treatment of groundwater pumped from monitor well MW-2. The interim remediation system will include the following: extraction of groundwater from monitor well MW-2, treatment of the extracted groundwater using the selected treatment technology, and reuse of the treated groundwater as cooling tower makeup water. Treatment technologies will be evaluated using three criteria: 1) effectiveness in reducing VOC concentrations in the extracted groundwater in order to comply with air emission goals, 2) implementability at the site, and 3) capital and operation and maintenance costs. Ozonation of cooling water is currently being evaluated by HAC for use at the site. It may be feasible to treat groundwater extracted from monitor well MW-2 using this technology and use the treated water on-site. If it is determined that ozonation would not reduce VOC concentrations in groundwater enough to comply with air emission goals, the implementation of ultraviolet oxidation or liquid phase carbon adsorption on groundwater extracted from monitor well MW-2 would be evaluated.

GROUNDWATER ASSESSMENT
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

1.0 INTRODUCTION

This report presents and summarizes the results of the groundwater assessment performed for the Hughes Aircraft Company (HAC), Electron Dynamics Division located at 3100 West Lomita Boulevard, Torrance, California (the site) (Figure 1). The scope of the assessment was originally proposed in the Work Plan and Revised Work Plan prepared by Hargis + Associates, Inc. (H+A) concerning groundwater quality issues directed by the California Regional Water Quality Control Board (CRWQCB) to be undertaken (H+A, 1991a and 1991b; CRWQCB, 1990 and 1991). This assessment focused on the area around Building Nos. 230, 231, and 232 where one diesel fuel and two solvent underground storage tanks were previously located (Figure 2). The purpose of this assessment was to evaluate groundwater quality and other hydrogeologic conditions at the site including lithology, depth to groundwater, and direction of groundwater flow. This report summarizes the previous assessment and the scope of the present assessment, describes drilling and groundwater sampling procedures, and provides the results of the assessment and conclusions and recommendations based on the assessment results.

1.1 BACKGROUND

HAC originally began operations at the site in 1967. Prior to that time, the site had been used as farm land. HAC installed two buried steel tanks at the site to store spent industrial solvents. Tank No. 1 was located immediately south of Building No. 230 and was reported by HAC personnel to have a capacity of approximately 3,000 gallons (Figure 2). This tank was reportedly installed in 1967. Tank No. 2 was located east of Building No. 231 and was reported to have a capacity of slightly more than 500 gallons (Figure 2). HAC personnel have

indicated that Tank No. 2 was installed in about 1974 (Hargis & Montgomery, Inc. [H&M], 1983a).

Periodic chemical analysis of fluid samples obtained from the tanks by HAC during the period from December 1981 to February 1983 indicated the presence of organic compounds and trace metals (H&M, 1983a). Laboratory analyses indicated that acetone, methanol, tetrachloroethylene (PCE), and trichloroethylene (TCE) were the principal organic compounds detected in fluid samples collected from Tank No. 1. TCE was the principal organic compound detected in fluid samples collected from Tank No. 2. Acetone and methanol comprised approximately 11 to 35 percent of the fluid volume stored in Tank No. 2 (H&M, 1983a).

The trace metals, lead, chromium, and zinc, were detected at concentrations as great as 18.9 milligrams per liter (mg/l), 9.9 mg/l, and 83.3 mg/l, respectively, in fluid samples collected from Tank No. 1 during the period from December 1981 to February 1983. Lead, chromium, and zinc were detected at concentrations as great as 4.21 mg/l, 2.05 mg/l, and 128 mg/l, respectively, in fluid samples collected from Tank No. 2. Lead and chromium were not consistently detected in fluid samples collected from either tank. No data have been obtained concerning the chemical composition of fluids stored in the tanks prior to December 1981 (H&M, 1983a).

In 1983, Tanks Nos. 1 and 2 were removed by IT Corporation and inspected by David Bacharowski and Al Novak of the CRWQCB (HAC, 1991). Subsequently, Building No. 232 was constructed over the former Tank No. 1 location.

Diesel fuel for an emergency electrical generator was stored in a third tank, designated in this report as Tank No. 3. Tank No. 3 is located adjacent to Building No. 230 (Figure 2). In 1985, Tank No. 3 was removed by IT Corporation. An electrical substation was subsequently constructed over the former tank location.

1.2 PREVIOUS INVESTIGATIONS

In 1983, soil and groundwater conditions in the vicinity of Tanks Nos. 1 and 2 were investigated by H&M. In 1985, soil conditions at the former Tank No. 3 location were investigated by IT Corporation. In 1989, additional soil data were obtained at the former Tank No. 3 location and were evaluated by H+A (H+A, 1989). The results of these investigations are summarized.

1.2.1 Tanks Nos. 1 and 2

In 1983, a soil investigation was conducted at Tank Nos. 1 and 2 (H&M, 1983a and 1983b) (Appendix A). Four soil borings were drilled near Tank No. 1 (Appendix A). Total depths for three of these borings ranged between approximately 30 and 49 feet below land surface (bls) (H+A, 1983b). The fourth soil boring was drilled to a depth of approximately 110 feet. Seventeen soil samples were collected from the four soil borings near Tank No. 1 and were analyzed for volatile organic compounds (VOCs). PCE, TCE, and 1,1,1-trichloroethane (1,1,1-TCA) were the most frequently detected VOCs in soil samples collected near Tank No. 1 (H&M, 1983b). The highest concentration of VOCs detected was 440,000 micrograms per kilogram (ug/kg) of PCE in a soil sample collected at 31 feet bls in soil boring T-1 (Appendix A).

One soil boring was drilled near Tank No. 2 to a depth of 30 feet bls in 1983. Three soil samples were collected from the soil boring near Tank No. 2 and were analyzed for VOCs. VOCs were detected in one of the three soil samples collected at 30 feet bls. PCE and methylene chloride were detected at concentrations of 270 ug/kg and 28 ug/kg, respectively, in the soil sample collected at 30 feet bls (Appendix A).

In 1983, groundwater sample was collected from the 110-foot hollow stem auger soil boring drilled near Tank No. 1 using a bailer. TCE, trichlorofluoromethane, PCE, and 1,1,1-TCA were detected in the groundwater

sample collected from this soil boring at concentrations of 65 micrograms per liter (ug/l), 12 ug/l, 11 ug/l, and 5 ug/l, respectively (H&M, 1983b) (Appendix A). In addition, nitrate as nitrogen was detected at a concentration of 177 mg/l (H&M, 1983b).

A groundwater sample was also collected in 1983 from the industrial water supply well located on the site. This groundwater sample was representative of deeper groundwater because the well is perforated between 300 and 500 feet bls. The water from the industrial water supply well was reportedly used to operate a heat exchanger for industrial cooling and was returned to the groundwater system using two injection wells (H&M, 1983b). All three wells were deactivated in 1985.

Chloroform and trichlorofluoromethane were detected in the water sample collected from the industrial water supply well in 1983. Chloroform and trichlorofluoromethane were detected at concentrations of 12 ug/l and 9 ug/l, respectively (Appendix A).

The industrial water supply well was resampled by the Los Angeles County Sanitation District (LACSD) in 1986 after the well was deactivated. The LACSD apparently sampled the well as part of a regional groundwater quality investigation. VOCs were reportedly not detected in the groundwater sample collected by the LACSD (McTaggart, 1990).

1.2.2 Tank No. 3

In 1985, a series of soil investigations were conducted at Tank No. 3 by IT Corporation and in 1989 by H+A (IT Corporation, 1985; H+A, 1989). In September 1985, Tank No. 3 was removed and soil containing diesel fuel was excavated. Subsequently, an electrical substation was constructed at the former tank location. After the tank removal, and at the request of CRWQCB, IT Corporation drilled one angle and six vertical soil borings to a maximum depth

of 90.5 feet bls to define the extent of diesel fuel in soil in the vicinity of the former tank location. Pursuant to the CRWQCB request, H+A drilled three additional soil borings to assure that samples were collected beneath the former tank location at depths between 44 and 85 feet bls.

Fuel hydrocarbons were detected in soil samples collected between land surface and a depth of approximately 25 feet bls. The greatest concentration of fuel hydrocarbons detected in soil samples collected below the excavation was 2,400 milligrams per kilogram (mg/kg) in a soil sample collected at a depth of 21 feet bls (IT Corporation, 1986). Fuel hydrocarbons were not detected in soil samples collected from beneath Tank No. 3 at depths between approximately 45 and 85 feet bls. Toluene was detected at concentrations of 0.010 mg/kg and 0.0063 mg/kg in two soil samples collected from beneath Tank No. 3 at approximately 83 feet bls.

In 1985, groundwater was reportedly encountered in an IT Corporation soil boring at a depth of approximately 90 feet bls. No groundwater samples were collected during the investigation at Tank No. 3.

1.3 SCOPE OF ASSESSMENT

Pursuant to approval by the CRWQCB of the work plan, the following activities were performed during the July 1991 assessment (CRWQCB, 1991):

- Four groundwater monitor wells were drilled to evaluate groundwater quality upgradient and downgradient of the three former tank locations (Figure 2). Monitor wells were installed with a CME 75 high torque hollow stem auger drill rig.

- Water levels were measured in each monitor well to determine groundwater flow direction and hydraulic gradient at the site.

- Groundwater samples were collected from all monitor wells and delivered to Analytical Technologies, Inc. (ATI) laboratories for chemical analysis. The samples were analyzed for VOCs, fuel hydrocarbons, base neutrals/acid organics (BNAs), trace metals, nitrate, and cyanide. Field duplicate, field blank, and trip blank samples were also collected and analyzed according to quality assurance/quality control procedures outlined in the Work Plan.

The original scope of work outlined in the January 30, 1991 Work Plan was modified as follows:

- Drilling of soil borings S-1 and S-2 adjacent to the former Tank No. 1 location was indefinitely postponed with the approval of the CRWQCB due to the difficulties associated with drilling inside Building No. 232.

- Soil samples were not collected from monitor well MW-1/soil boring S-3 because drilling access could not be obtained within the area immediately around the former Tank No. 2 location. Drilling access was prevented by the presence of underground pipelines to the east, a block wall to the north, and the outside wall of Building No. 231 to the west of the former Tank No. 2 location. The location of monitor well MW-1 was moved approximately 80 feet southeast of the former Tank No. 2 location to avoid underground pipelines.

2.0 FIELD PROCEDURES

The following section describes the field procedures employed during this groundwater assessment. The field procedures included drilling soil borings, constructing four monitor wells, measuring groundwater levels in monitor wells, and collecting groundwater samples.

2.1 DRILLING PROCEDURES

A hollow stem auger drill rig was used to drill and construct four monitor wells during the period from July 8 to July 12, 1991. Well boreholes were drilled with a 6-inch outside diameter (OD) hollow stem auger with continuous core capability. Well boreholes were lithologically logged by inspecting auger cuttings and soil samples obtained from core barrels (Appendix B). The lithologic logs describe color, grain size, and plasticity of materials encountered.

After the well boreholes had been drilled and logged, the 6-inch borehole were reamed using a 10-inch OD hollow stem auger. Downhole drilling equipment was steam cleaned before use in each boring.

A flame ionization detector (FID) was used to measure volatile organic vapor concentrations in ambient air and soil samples. FID readings and other pertinent observations were recorded in the field notebook. Drilling and logging activities were directed by an H+A geologist.

2.2 MONITOR WELL CONSTRUCTION

Four monitor wells, MW-1 through MW-4, were constructed at the site. Monitor wells MW-1 and MW-2 were sited near the former locations of Tanks Nos. 2 and 3, respectively. Monitor well MW-3 was sited southeast of the former

locations of Tanks Nos. 1 through 3, in the assumed downgradient direction of groundwater flow. Monitor well MW-4 was sited northwest of the former tank locations in the assumed upgradient direction of groundwater flow. The direction of groundwater flow was assumed to be to the southeast based on reported water level elevations from monitor wells at the Unocal Torrance Tank Farm located approximately 0.5 miles southeast of the site at West Lomita Boulevard (Engineering Enterprise, Inc., 1989).

The well depth was determined by a H+A geologist based on hydrogeologic conditions and previously reported water levels at the site. The monitor well screen intervals were 30 feet, pursuant to the Title 23 of the California Code of Regulations, Subchapter 16, Sections 2647 and 2648, with approximately 2 to 13 feet of screen above the water table. Factory cleaned polyvinyl chloride (PVC) well screen and casing were shipped to the site in sealed plastic wrap. Nominal 4-inch diameter, factory-slotted PVC screen with 0.030-inch slots was installed in monitor wells MW-2, MW-3, and MW-4 (Table 1). A filter pack of Monterey No. 3 sand was installed to approximately 2 feet above the screen in these wells. Nominal 4-inch diameter PVC screen with 0.010-inch slots and a filter pack of Monterey No. 2 were installed in monitor well MW-1. Nominal 4-inch, flush-threaded schedule 40 PVC blank casing was installed in the wells above the screen to approximately 1.5 feet above land surface. About a 4-foot layer of bentonite pellets was placed over the filter pack to reduce the hydraulic conductivity of the annular space above the filter pack.

Volclay grout was placed in the wells annulus from the top of the bentonite seal to 1 foot bls. Concrete was placed in the annulus from the top of the Volclay grout to land surface (Table 1). Above-grade utility vaults with vandal-resistant aluminum lids were installed over each well.

Following completion, each monitor well was swabbed, bailed, and pumped until the production of fine-grained sediment was minimal. Final well development was achieved by installing a dedicated submersible pump in each monitor well, and pumping until the discharge cleared. A 3/4-inch diameter PVC

sounding tube was installed in each well for measuring water levels. Water level drawdown during development pumping and recovery after development was measured and recorded in the field notebook. Discharge rates were estimated by measuring the amount of time required to fill a 55-gallon drum.

2.3 WATER LEVEL MEASUREMENT

Monitor well reference point elevations were surveyed on July 16, 1991 (Table 2). The top of the sounding tube was used as a reference point for each monitor well. Water levels in the monitor wells at the site were measured on July 23, 1991. Water levels were measured using a flat tape electric sounder.

2.4 GROUNDWATER SAMPLE COLLECTION

Groundwater samples were collected from monitor wells during two sampling rounds. The first round groundwater samples were collected immediately after installation of the dedicated pumps, on July 11, 1991 from monitor well MW-4, on July 12, 1991 from monitor well MW-2, and on July 15, 1991 from monitor wells MW-3 and MW-1. The second groundwater sampling round was completed on July 23, 1991.

Prior to sampling, the wells were pumped until at least three casing volumes of water were removed from the wells, and until the parameters of electrical conductivity (EC), pH, and temperature stabilized. Field measurements obtained during the sampling activities included water levels, discharge rates, EC, temperature, and pH. A pH meter and EC meter were used when purging monitor wells to assist in collection of representative groundwater samples. The pH and EC meters were calibrated daily.

Groundwater samples collected from the wells were analyzed for VOCs using U.S. Environmental Protection Agency (EPA) Method 8240, total fuel hydrocarbons

(TFH) using modified EPA Method 8015, BNAs using EPA Method 8270, Priority trace metal, using appropriate EPA Methods, nitrate as nitrogen using EPA Method 353.2, and cyanide using EPA Method 9010.

One field duplicate sample was submitted for each sampling round and analyzed for VOCs, TFH, BNAs, cyanide, trace metals, and nitrate. The field duplicate sample for the first round was collected from monitor well MW-3 on July 15, 1991. A field duplicate sample for the second round was collected from monitor well MW-2 on July 23, 1991. One field blank for each sampling round was analyzed for VOCs, TFH, and BNAs. One trip blank was submitted for each sampling round and analyzed for VOCs.

3.0 ASSESSMENT RESULTS

The following provides regional and local geologic data, regional and local hydrogeologic data, and site-specific groundwater quality data.

3.1 GEOLOGIC CONDITIONS

Regional geology and local geologic conditions are presented in this section. Regional geology is described based on published information. Local geologic conditions are described based on lithologic logs prepared from the information collected during drilling activities conducted on the site.

3.1.1 Regional Geology

The site is located in the City of Torrance, California, and lies within the West Coast Basin. The basin is bounded on the north by the Ballona Escarpment, on the east by the Newport-Inglewood Uplift, on the southwest by the Palos Verdes Hills, and on the west by the Pacific Ocean (California Department of Water Resources [CDWR], 1961).

The stratigraphy of the West Coast Basin includes Quaternary age continental and marine deposits and Tertiary age marine sediments that overlie a basement complex of igneous and metamorphic rocks. The geologic units of hydrogeologic interest are, from oldest to youngest, the Pico Formation, the San Pedro Formation, the Lakewood Formation, older dune sand, alluvium, and active dune sand (CDWR, 1961).

Tertiary age marine sediments in the West Coast Basin underlie the Pleistocene age deposits and include the Pliocene age Pico and Repetto Formations and the Miocene Puente and Monterey Shale Formations. These formations are

almost entirely of marine origin and consist of sandstone, siltstone, mudstone, diatomite, and siliceous shale.

The lower Pleistocene age San Pedro Formation unconformably overlies the Pico Formation. The San Pedro Formation consists of unconsolidated to semiconsolidated gravel, sand, silt, and clay. These sediments are marine and continental in origin and attain a maximum thickness of approximately 1,000 feet.

The upper Pleistocene age Lakewood Formation unconformably overlies the San Pedro Formation. Marine and continental sediments comprising the Lakewood Formation consist of gravel, sand, sandy silt, silt, and clay; these sediments attain a maximum thickness greater than 400 feet. The Recent age deposits lie conformably on the Lakewood Formation and comprise alluvium and active dune sand that are typically present at surface outcrops throughout the basin (Poland, et al., 1959).

3.1.2 Local Geologic Conditions

Lithologic logs of pilot borings drilled during this assessment indicate that the soil at the site generally consists of top soil represented by sand, silty sand, and gravel to approximately 3.5 feet bls; black slightly moist, firm to stiff, very cohesive clay to approximately 10 feet bls; silty and clayey sand and clayey silt interbedded with sand to approximately 45 feet bls; and relatively homogeneous, varicolored, very fine- to fine-grained, micaceous sand to approximately 110 feet bls (Figure 3; Appendix B). The sediments encountered at the site below the water table appear to correlate with the Lakewood Formation (CDWR, 1961).

3.2 HYDROGEOLOGIC CONDITIONS

This section contains the description of regional hydrogeology including hydrogeologic units and movement and occurrence of groundwater, and site hydrogeologic conditions.

3.2.1 Regional Hydrogeology

Groundwater in the West Coast Basin is produced primarily from a series of deep alluvial aquifers occurring within the Lakewood and San Pedro Formations (H&M, 1983b).

3.2.1.1 Hydrogeologic Units

The Gage aquifer and the Silverado aquifer are the regional hydrogeologic units that underlie the site (CDWR, 1961). Both the Gage and Silverado aquifers are areally extensive. The Silverado aquifer is the source of most groundwater pumped in the West Coast Basin.

Near the site, the Gage aquifer occurs from the water table to a depth of about 200 feet bls (H&M, 1983b) (Figures 4 and 5). The Gage aquifer is about 100 feet thick and is comprised mostly of sand. This stratigraphic interval is also equivalent to the Gardena aquifer. The Gage aquifer designation has been applied here based on site-specific lithologic descriptions and the geographic location of the site relative to the published distribution of the Gage and Gardena aquifers (CDWR, 1961). The Gage aquifer is not utilized as a producing aquifer in the Torrance area.

Near the site, the Silverado aquifer underlies the Gage aquifer and is encountered at a depth of about 250 feet bls. In the vicinity of the site, the two aquifers are reportedly separated by approximately 40 feet of clay (H&M,

1983b) (Figure 5). This clay unit appears to be present north, south, and west of the site and pinches out to the east where the Gage and Silverado aquifers appear to merge (CDWR, 1961).

The Silverado aquifer is the most heavily pumped aquifer in the West Coast Basin. Historically, nearly all industrial and municipal pumpage was from the Silverado aquifer (Poland, et al, 1959). Wells currently pumping in the site vicinity withdraw groundwater from the Silverado aquifer (CDWR, 1989).

3.2.1.2 Movement and Occurrence of Groundwater

Extensive pumping of groundwater in the early 1900's lowered water levels in the West Coast Basin to below sea level, which induced groundwater in the coastal area to flow to the east. This allowed sea water to migrate eastward degrading the fresh water aquifers of the basin. In the 1960's, a fresh water injection barrier was constructed along the coastline about 1.5 miles northwest of the site to prevent the landward migration of salt water. The operation of the barrier in conjunction with controlling groundwater extractions appears to have stabilized salt water intrusion and has maintained an eastward groundwater flow direction from the barrier toward the pumping centers east of the site.

3.2.2 Local Hydrogeologic Conditions

Groundwater beneath the site occurs in an unconfined aquifer at approximately 84 to 88 feet bls. This aquifer appears to correlate with the Gage aquifer (CDWR, 1961). Based on water levels measured in monitor wells on July 23, 1991, water level elevations ranged from approximately -9.9 to -8.9 feet mean sea level (msl) (Table 2). Based on these data, the direction of groundwater flow beneath the site is to the east (Figure 6). The hydraulic gradient is approximately 0.0018 or a water table elevation change in the direction of groundwater flow of 1.8 feet per 1,000 horizontal feet.

During well development, monitor wells MW-2, MW-3, and MW-4 were pumped at flow rates of 15, 18, and 30 gallons per minute (gpm), respectively. After approximately 20 minutes of pumping, the water level in monitor well MW-4 decreased approximately 5 feet, and the water levels in monitor wells MW-2 and MW-3 decreased approximately 4 feet.

3.3 CHEMICAL QUALITY OF GROUNDWATER

Analytical results of groundwater samples collected during two sampling rounds in the period from July 11 to July 23, 1991, indicated that VOCs, TFH, trace metals, and nitrate are present in groundwater underlying the site (Appendix C).

The site is located within the West Coast Basin. The beneficial uses of groundwater in the West Coast Basin are municipal, agricultural, and industrial (CRWQCB, 1989). According to the CRWQCB policy, groundwater cleanup to concentrations equivalent to the California Maximum Contaminant Levels (MCLs) for drinking water may be required (Table 3).

3.3.1 Volatile Organic Compounds and Total Fuel Hydrocarbons

VOCs detected in groundwater samples collected during July 1991 from monitor wells MW-1, MW-2, and MW-3 were: TCE, 1,1,1-TCA, PCE, and 1,1-dichloroethylene (1,1-DCE) (Table 4; Figure 7). TFH were detected in two groundwater samples collected in July 1991 from monitor well MW-2.

TCE was detected in groundwater samples collected from monitor wells MW-1 through MW-3. The highest concentration of TCE was 1,000 ug/l in a groundwater sample collected from monitor well MW-2. Monitor well MW-2 is located approximately 300 feet east of former Tank No. 1, and 40 feet southeast of former Tank No. 3. TCE was not detected in two groundwater samples collected from

monitor well MW-4, located northwest of former Tank Nos. 1 through 3. The MCL for TCE in drinking water is 5 ug/l (Marshack, 1991) (Table 3). Concentrations of TCE detected in groundwater samples collected from monitor well MW-1 and MW-2 exceeded the MCL for TCE in drinking water (Table 4; Figure 7).

1,1,1-TCA was detected in two groundwater samples collected from monitor well MW-1 at a concentration of 3 ug/l (Table 4; Figure 7). Monitor well MW-1 is located approximately 80 feet southeast of former Tank No. 2. The MCL for 1,1,1-TCA in drinking water is 200 ug/l (Table 3). The concentration of 1,1,1-TCA detected in the groundwater samples collected from monitor well MW-1 did not exceed the MCL for 1,1,1-TCA in drinking water.

PCE was detected in groundwater samples collected from monitor wells MW-1, and MW-2. The highest concentration of PCE was 53 ug/l in a groundwater sample collected from monitor well MW-2 (Table 4; Figure 7). The MCL for PCE in drinking water is 5 ug/l (Marshack, 1991). Concentrations of PCE detected in groundwater samples collected from monitor wells MW-1 and MW-2 exceeded the MCL for PCE in drinking water (Table 3; Figure 6).

1,1-DCE was detected in the second groundwater sample collected from monitor well MW-1 at concentration of 3 ug/l (Table 4; Figure 7). The MCLs for 1,1-DCE in drinking water is 6 ug/l (Marshack, 1991). The concentration of 1,1-DCE detected in the groundwater sample collected from monitor well MW-1 did not exceed the MCLs for 1,1-DCE in drinking water.

TFH in the gasoline range were detected in two groundwater samples collected from monitor well MW-2 at concentrations of 0.56 ug/l and 0.55 ug/l (Table 4; Figure 7). No MCL has been established for fuel hydrocarbons in drinking water.

3.3.2 Base Neutral/Acid Organic Compounds

Groundwater samples collected during July 1991 from four monitor wells at the site were analyzed for BNAs. BNA concentrations did not exceed the laboratory detection limit of 10 to 50 ug/l (Appendix C).

3.3.3 Trace Metals

The trace metals detected in groundwater samples collected from four monitor wells at the site during July 1991 were arsenic, chromium, copper, nickel, lead, selenium, and zinc (Table 5; Appendix C). With the exception of chromium, concentrations of these trace metals did not exceed MCLs for drinking water (Table 3).

Total chromium was detected in groundwater samples collected from four monitor wells at the site, including monitor well MW-4 which is located upgradient of Tank Nos. 1, 2, and 3 (Table 5; Appendix C). The highest concentration of chromium was 0.14 mg/l, detected in a groundwater sample collected on July 23, 1991 from monitor well MW-1. The MCL for chromium in drinking water is 0.05 mg/l (Table 3). The concentration of total chromium detected in a groundwater sample collected from monitor well MW-1 during the second sampling round on July 23, 1991, exceeded the MCL for total chromium in drinking water. However, the concentration of total chromium detected in the groundwater sample collected from monitor well MW-1 during the first sampling round on July 15, 1991, and the concentrations of total chromium detected in groundwater samples collected from the other monitor wells did not exceed the MCL for total chromium in drinking water.

3.3.4 Nitrate

Nitrate was detected in groundwater samples collected during the period from July 11 to July 23, 1991, from four monitor wells at the site (Table 5; Appendix C). The concentrations of nitrate reported as nitrogen in these samples were similar, ranging from 56 mg/l in groundwater samples collected from monitor wells MW-2 and MW-4 to 32 mg/l in a groundwater sample collected from monitor well MW-1. The MCL for nitrate as nitrogen in drinking water is 10 mg/l (Table 3). The concentrations of nitrate detected in groundwater samples collected from the four monitor wells at the site exceeded the MCL for nitrate in drinking water.

3.3.5 Cyanide

Groundwater samples collected during the period from July 11 to July 23, 1991 from four monitor wells at the site were analyzed for cyanide. Cyanide concentrations did not exceed the laboratory detection limit of 0.01 mg/l (Table 5; Appendix C).

4.0 CONCLUSIONS

Based on the lithologic, water level, and water quality data obtained during the July 1991 groundwater assessment the following are concluded:

1. The direction of groundwater flow at the site in July 1991 was to the east.

2. In groundwater samples collected from monitor well MW-2, TFH in the gasoline range slightly exceeded the 0.5 ug/l laboratory detection limit. Monitor well MW-2 is located adjacent to the former diesel Tank No. 3. Because no hydrocarbons in the diesel range were detected in the groundwater samples, it is not certain that Tank No. 3 was the source of fuel hydrocarbons.

3. The presence of trace metals including total chromium in groundwater samples collected from upgradient monitor well MW-4, as well as the other monitor wells on-site, indicates that these trace metals may be representative of background water quality.

4. The presence of nitrate in groundwater samples collected from monitor well MW-4 and the similarity of nitrate concentrations in all monitor wells indicate a potential for an off-site, non-point source of nitrate in groundwater. Nitrate in groundwater could be the result of the previous agricultural activity in the site vicinity.

5. TCE, PCE, and total chromium have been detected in groundwater samples collected from monitor wells downgradient of former Tank Nos. 1, 2, and 3 at concentrations exceeding their respective MCLs. TCE and PCE are designated as the site compounds of concern (COCs). The vertical and horizontal extent of the COCs were not fully defined during the July 1991 groundwater assessment. Although the data indicate that chromium concentrations may be representative of background water quality, the

detection of total chromium at a concentration exceeding the MCL, downgradient of one of the former solvent tanks, indicates that further assessment of chromium is warranted.

5.0 RECOMMENDATIONS

Based on the results of the July 1991 groundwater assessment and previous investigation results, further groundwater assessment and interim groundwater remediation are recommended.

5.1 GROUNDWATER ASSESSMENT

Further assessment is necessary to delineate the vertical and horizontal extent of COCs in groundwater. Construction and sampling of additional monitor wells is recommended to further define the vertical and horizontal distribution of COCs in groundwater.

5.1.1 Shallow Monitor Well Installation

The following section proposes shallow monitor well locations and describes the rationale for the locations. Well design specifications and well development plans have been summarized (Appendix D).

Seven shallow monitor wells to be completed in two steps are proposed. A hollow stem auger drill rig would be used to construct the shallow monitor wells. Shallow monitor well design and construction would be similar to that of monitor wells MW-1 through MW-4. Shallow monitor well locations are proposed based on the current understanding of the lateral distribution of COCs and the direction of groundwater flow (Figure 8).

Five shallow monitor wells would be initially installed. Based on the initial groundwater analytical results from these monitor wells and the results reported herein, up to two additional shallow monitor wells might be installed within 2 months following the installation of the initial 5 monitor wells. The initial five shallow monitor wells would be located as follows:

- 350 feet west and 600 feet east of former Tank No. 1 to characterize the distribution of COCs upgradient and downgradient of former Tanks Nos. 1 and 2;

- 400 feet south and 400 feet northeast of former Tank No. 1; and

- at the corner of West Lomita Boulevard and Telo Avenue to characterize the lateral distribution of COCs.

Two additional shallow monitor wells might be installed east of Building No. 237 and near the intersection of West Lomita Boulevard and Garnier Street based on the water quality and water level data obtained from the five proposed monitor wells (Figure 8).

5.1.2 Deep Monitor Well Installation

Following the installation and sampling of the proposed shallow monitor wells, one deep monitor well is proposed. Prior to drilling the deep monitor well, an exploratory boring would be drilled to define the lithology below 100 feet bls and to design the deep monitor well. Both the deep monitor well and the exploratory boring would be constructed using a mud rotary drill rig.

The exploratory boring would be drilled to a depth of approximately 250 feet bls, lithologically and geophysically logged, and pressure cemented from the bottom to land surface. The deep monitor well would be constructed based on the lithologic and geophysical logs obtained from the exploratory boring.

The objective of the deep monitor well is to characterize the vertical distribution of COCs beneath the site. The deep monitor well would be located downgradient of the area where the highest COC concentrations were detected in groundwater samples. Therefore, the actual location of the deep monitor well would be selected after the results of the proposed shallow monitor wells were

evaluated. To expedite the assessment, the first groundwater samples analyzed for VOCs would be analyzed within a 2 to 5 days.

5.1.3 Groundwater Monitoring

Initial groundwater samples would be collected from each newly installed monitor well shortly after the well is developed. Initial groundwater samples would be analyzed for VOCs using EPA Method 8240, TFH using modified EPA Method 8015, and total chromium using EPA Method 6010.

Groundwater samples would be collected and water levels would be measured quarterly. Groundwater samples collected during quarterly monitoring would be analyzed for halogenated VOCs using EPA Method 8010 and total chromium using EPA Method 6010. Additionally, groundwater samples collected from monitor well MW-2, located adjacent to Tank No. 3, would be analyzed for TFH using modified EPA Method 8015 and benzene, toluene, ethylbenzene, and xylenes using EPA Method 8020.

5.2 INTERIM GROUNDWATER REMEDIATION

A groundwater remediation system will be designed for the interim treatment of groundwater pumped from monitor well MW-2. Interim groundwater remediation will be implemented to provide hydraulic control to mitigate VOC migration and to provide data on the response of the aquifer to remedial pumping. The groundwater treated during interim remediation will be recycled for reuse at the site for existing processes which may include cooling tower makeup water. Makeup water is water added to the recirculating stream of cooling water to replace the volume of water lost to evaporation in the cooling towers.

A step-drawdown aquifer test followed by a constant discharge aquifer test will be conducted on shallow monitor well MW-2 in order to select the optimal flow rate for constant discharge aquifer tests and interim remediation.

5.2.1 Air Emission Goals

Groundwater used in the cooling tower will be treated to achieve air emission goals established by the South Coast Air Quality Management District (SCAQMD). These goals are currently being developed by the SCAQMD.

5.2.2 Description of the Remediation Interim System

The interim remediation system will include the following: extraction of groundwater from monitor well MW-2, treatment of the extracted groundwater using the selected treatment technology, and reuse of the treated groundwater as cooling tower makeup water. The interim remediation system is expected to be designed to treat groundwater at an influent flow rate of approximately 20 gallons per minute (gpm). Approximately 25 to 35 gpm of municipal water is currently used as cooling tower makeup water. The 20 gpm of treated groundwater would partially offset the use of municipal water. Based on analytical results from groundwater samples collected from monitor well MW-2, the initial concentration of VOCs in the remediation system influent will be approximately 1,000 ug/l of TCE and 50 ug/l of PCE (Table 4).

Treatment technologies will be evaluated using three criteria: 1) effectiveness in reducing VOC concentrations in the extracted groundwater in order to comply with air emission goals, 2) implementability at the site, and 3) capital and operation and maintenance costs. The treatment technologies which may be evaluated include ozonation, ultraviolet (UV) oxidation, and liquid phase carbon adsorption.

Ozonation of cooling water is currently being evaluated for use at the site. Ozonation involves the introduction of ozone into cooling water to control biological activity and corrosion (Rice, et al., 1986). Introduction of ozone into cooling water, including makeup water from monitor well MW-2, would reduce the concentrations of the VOCs in the groundwater extracted from monitor well MW-2 through oxidation destruction. The degree to which VOCs would be reduced would be determined by evaluating case studies and by performing a treatability test. The treatability test would be performed to ensure compliance with the air emission goals.

If it is determined that ozonation would not reduce VOC concentrations in groundwater enough to comply with air emission goals, the implementation of UV oxidation or liquid phase carbon adsorption would be evaluated. UV oxidation and liquid phase carbon adsorption are effective treatment technologies for the removal of VOCs from groundwater (Nyer, 1985; Lewis, et al., 1990).

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TABLE 1

MONITOR WELL CONSTRUCTION DATA

WELL IDENTIFIER	DATE CONSTRUCTED	LAND SURFACE ELEVATION (feet msl)	REFERENCE POINT ELEVATION (feet msl)	TOTAL DEPTH (feet bls)	SCREENED INTERVAL (feet bls)	FILTER PACK (feet bls)	BENTONITE PELLETS (feet bls)	VOLCLAY GROUT (feet bls)	CONCRETE (feet bls)
MW-1	07/12/91	78.75	79.30	105	75-105	68-105	64-68	2-64	0-2
MW-2	07/10/91	75.53	77.22	113	83-113	77.5-113	73-77.5	2-73	0-2
MW-3	07/11/91	76.06	77.90	105	75-105	69-105	66-69	2-66	0-2
MW-4	07/09/91	74.72	75.62	113	83-113	77-113	73-77	2-73	0-2

msl = Mean sea level
bls = Below land surface

TABLE 3

MAXIMUM CONTAMINANT LEVELS FOR COMPOUNDS IN DRINKING WATER

ORGANIC COMPOUNDS (micrograms per liter)	CALIFORNIA MCL
Trichloroethylene (TCE)	5
1,1,1-Trichloroethane (1,1,1-TCA)	200
Tetrachloroethylene (PCE)	5
1,1-Dichloroethylene (1,1-DCE)	6
Fuel hydrocarbons	none established

INORGANIC COMPOUNDS (milligrams per liter)	
Arsenic	0.05
Chromium (total)	0.05
Copper	1.3
Nickel	0.1
Lead	0.05
Selenium	0.01
Zinc	5(a)
Nitrate (as nitrogen)	10

(a) Secondary MCL

MCL = Maximum Contaminant Level

Drinking Water Standards

TABLE 4

ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS
AND FUEL HYDROCARBONS IN GROUNDWATER SAMPLES

WELL IDENTIFIER	SAMPLE DATE	.....Concentrations in micrograms per liter.....				
		.....EPA Method 8240.....				Modified EPA ...Method 8015...
		TCE	1,1,1-TCA	PCE	1,1-DCE	TOTAL FUEL HYDROCARBONS
MW-1	07/15/91	180	3	22	<2	<0.50
	07/23/91	200	3	23	3	<0.50
MW-2	07/12/91	650	<5	30	<5	0.56
	07/23/91	1,000	<5	53	<5	0.55
MW-3	07/15/91	2	<1	<1	<1	<0.50
	07/23/91	1	<1	<1	<1	<0.50
MW-4	07/11/91	<1	<1	<1	<1	<0.50
	07/23/91	<1	<1	<1	<1	<0.50

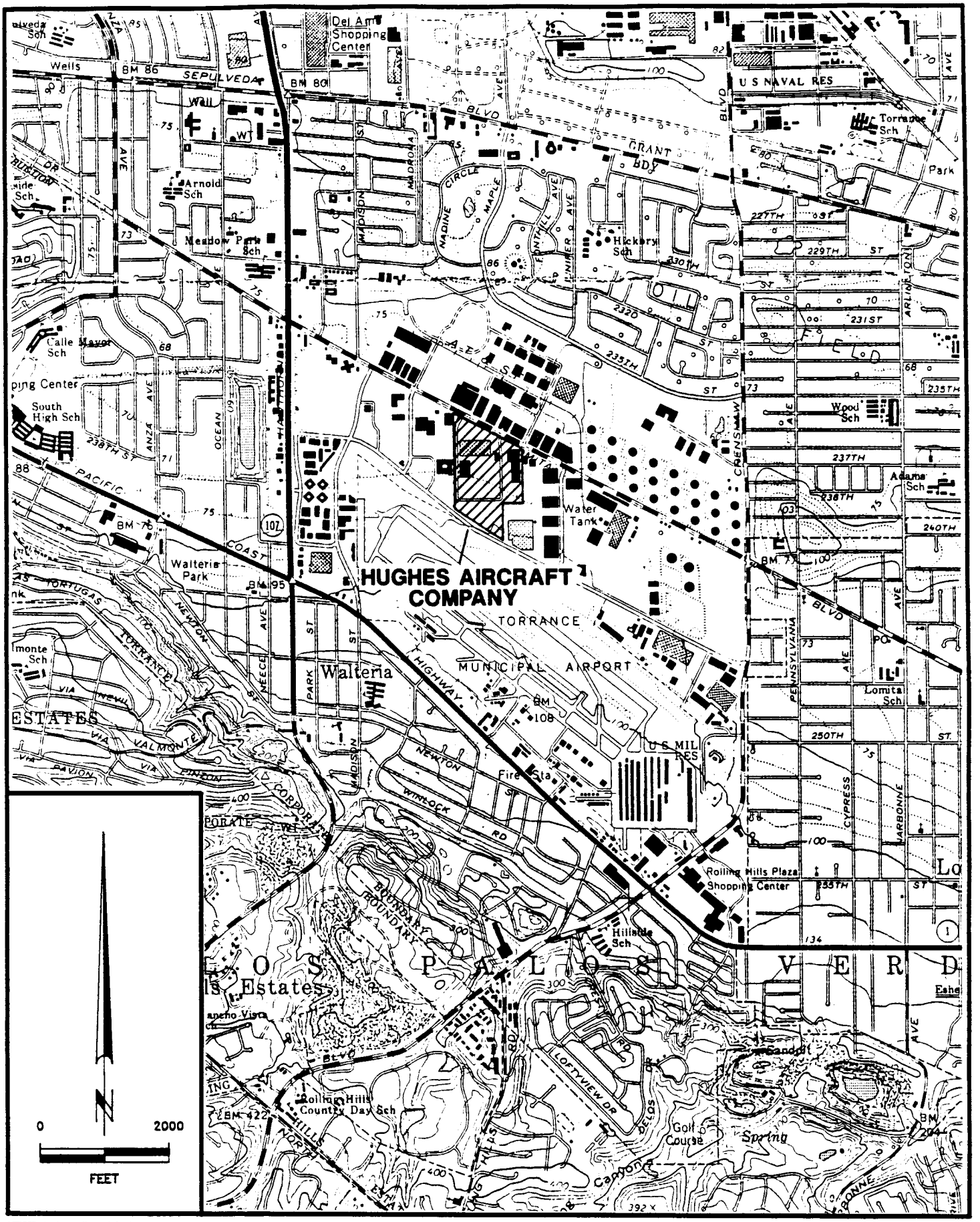
EPA = U.S. Environmental Protection Agency
TCE = Trichloroethylene
1,1,1-TCA = 1,1,1-Trichloroethane
PCE = Tetrachloroethylene
1,1-DCE = 1,1-Dichloroethylene

TABLE 5

ANALYTICAL RESULTS FOR INORGANIC COMPOUNDS IN GROUNDWATER SAMPLES

WELL IDENTIFIER	SAMPLE DATE	Concentrations in milligrams per liter													EPA Method 353.2	EPA Method 9010
		Priority Trace Metals														
		Ag	As	Be	Cd	Cr	Cu	Hg	Ni	Pb	Sb	Se	Tl	Zn	Nitrate	Cyanide
MW-1	07/15/91	<0.01	<0.002	<0.005	<0.005	0.02	<0.02	<0.0005	<0.01	0.013	<0.03	0.002	<0.002	0.21	30.7	<0.01
	07/23/91	<0.01	<0.002	<0.005	<0.005	0.14	<0.02	<0.0005	0.01	0.043	<0.03	<0.002	<0.002	0.34	32.0	<0.01
MW-2	07/12/91	<0.01	<0.002	<0.005	<0.005	0.04	<0.02	<0.0005	0.02	0.009	<0.03	0.004	<0.002	0.28	54.0	<0.01
	07/23/91	<0.01	0.003	<0.005	<0.005	0.02	<0.02	<0.0005	0.01	0.012	<0.03	0.004	<0.002	0.45	56.0	<0.01
MW-3	07/15/91	<0.01	<0.002	<0.005	<0.005	0.02	0.03	<0.0005	0.03	0.024	<0.03	0.003	<0.002	0.24	33.3	<0.01
	07/23/91	<0.01	0.003	<0.005	<0.005	0.05	0.06	<0.0005	<0.01	0.024	<0.03	0.004	<0.002	0.28	36.0	<0.01
MW-4	07/11/91	<0.01	0.002	<0.005	<0.005	0.03	<0.02	<0.0005	<0.01	0.026	<0.03	0.005	<0.002	0.65	56.0	<0.01
	07/23/91	<0.01	0.003	<0.005	<0.005	0.02	<0.02	<0.0005	0.01	0.015	<0.03	0.003	<0.002	0.74	51.0	<0.01

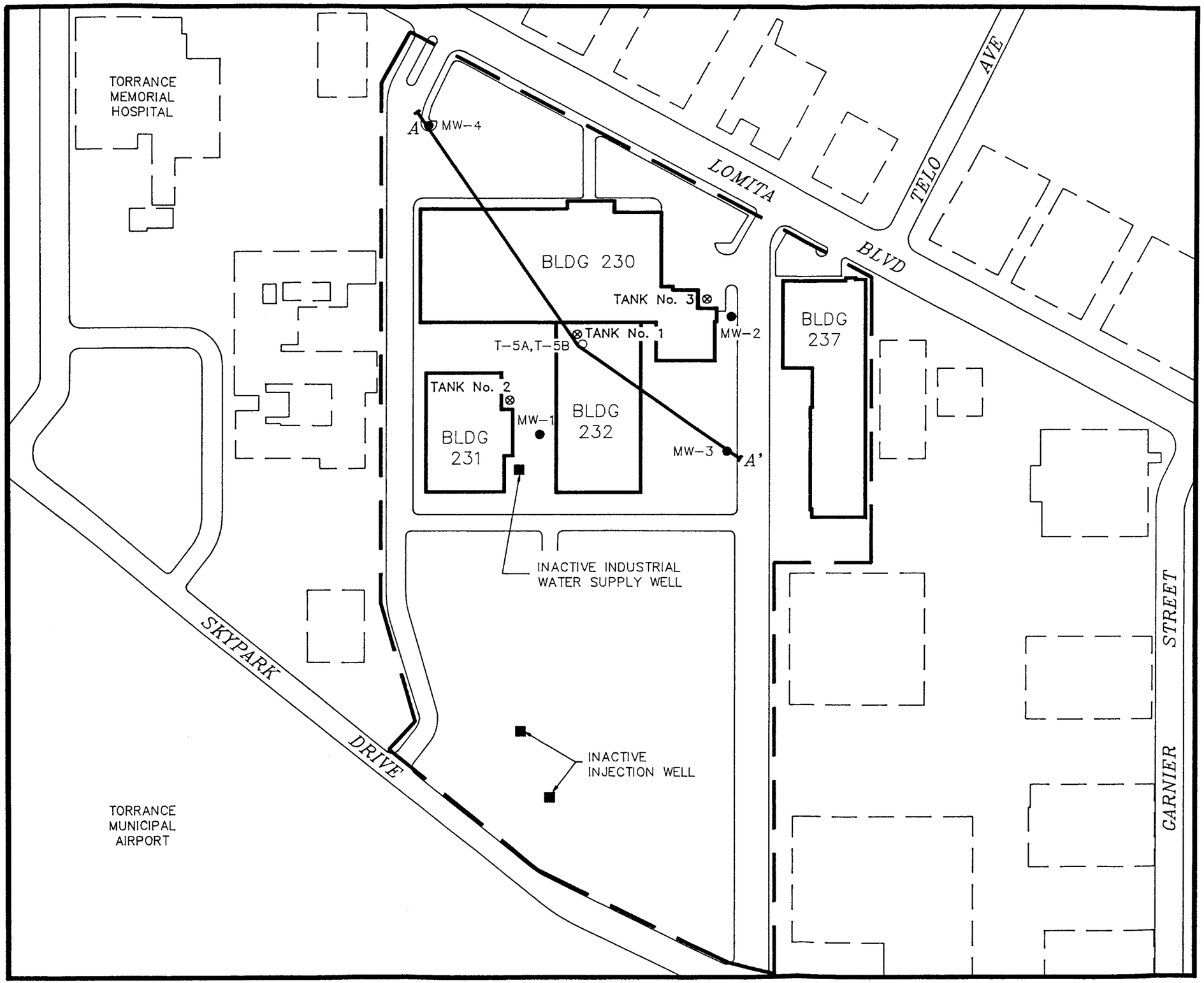
EPA = U.S. Environmental Protection Agency
Ag = Silver
As = Arsenic
Be = Beryllium
Cd = Cadmium
Cr = Chromium
Cu = Copper
Hg = Mercury
Ni = Nickel
Pb = Lead
Sb = Antimony
Se = Selenium
Tl = Thallium
Zn = Zinc



850\0502\F01

FIGURE 1. SITE LOCATION

HARGIS + ASSOCIATES, INC.



EXPLANATION

MW-2 ● MONITOR WELL LOCATION

T-5A,T-5B ○ FORMER SOIL BORING LOCATION

TANK No. 1 ⊗ FORMER UNDERGROUND STORAGE TANK LOCATION

▭ HUGHES AIRCRAFT COMPANY BUILD

— — HUGHES AIRCRAFT COMPANY PROPERTY BOUNDARY

A ├──┤ A' HYDROGEOLOGIC CROSS SECTION

0 200 400
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

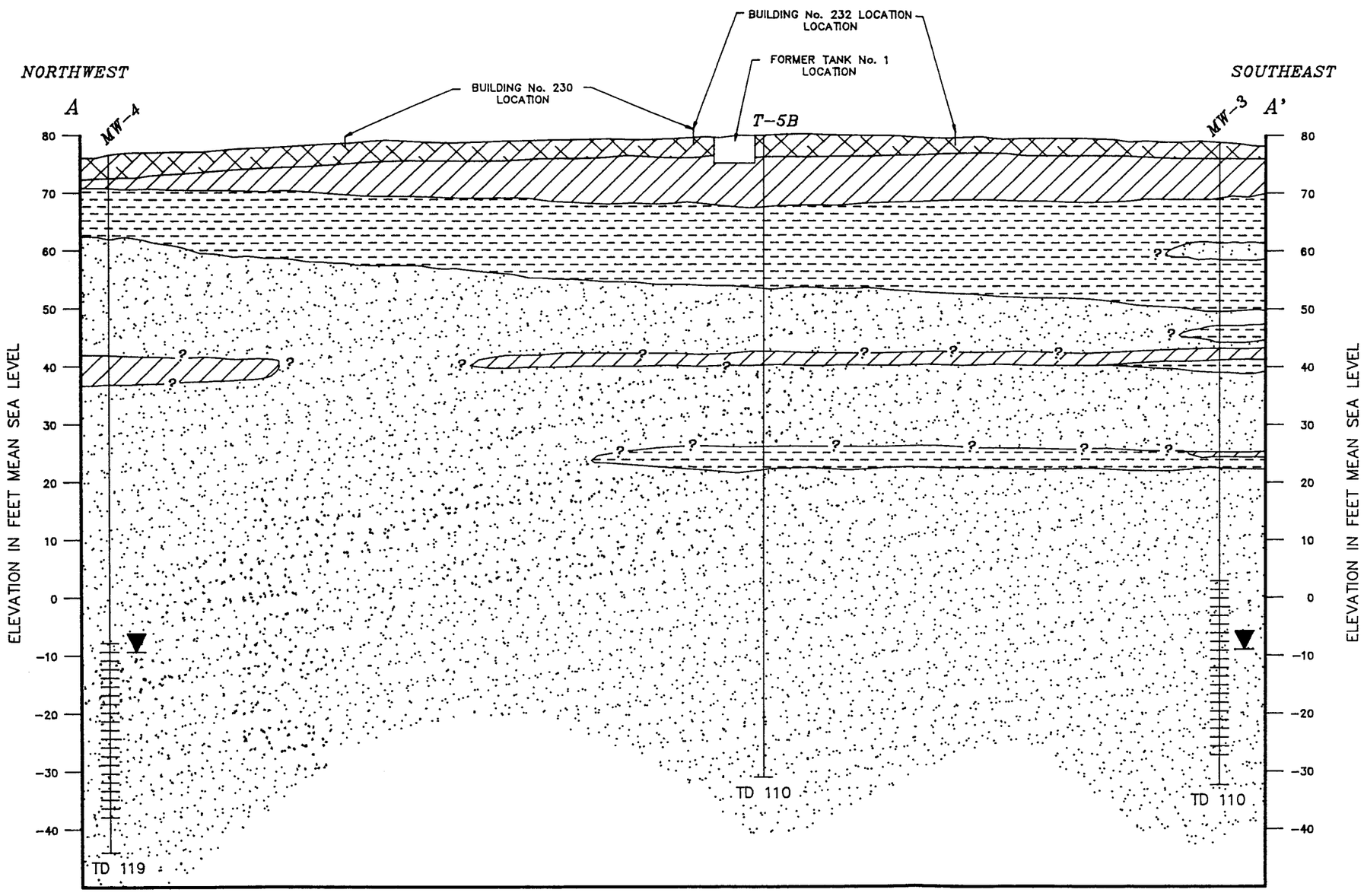
SITE PLAN

HARGIS + ASSOCIATES, INC.

8/9

FIGURE

PREP BY NVR REV BY WPW RPT NO. _____ HAC850\F02



EXPLANATION

TOP SOIL OR FILL

PREDOMINANTLY CLAY

PREDOMINANTLY SILTY AND CLAYEY SAND

PREDOMINANTLY FINE – GRAINED SAND

MW-3 WELL IDENTIFIER

STATIC WATER LEVEL; JULY 23, 1991

SCREENED INTERVAL

TD 110 TOTAL DEPTH, IN FEET BELOW LAND SURFACE

T-5B SOIL BORING, COMPLETED AND ABANDONED JULY, 1983

—?— CONTACT, DASHED WHERE APPROXIMATE, QUERIED WHERE INFERRED

0 100 200
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

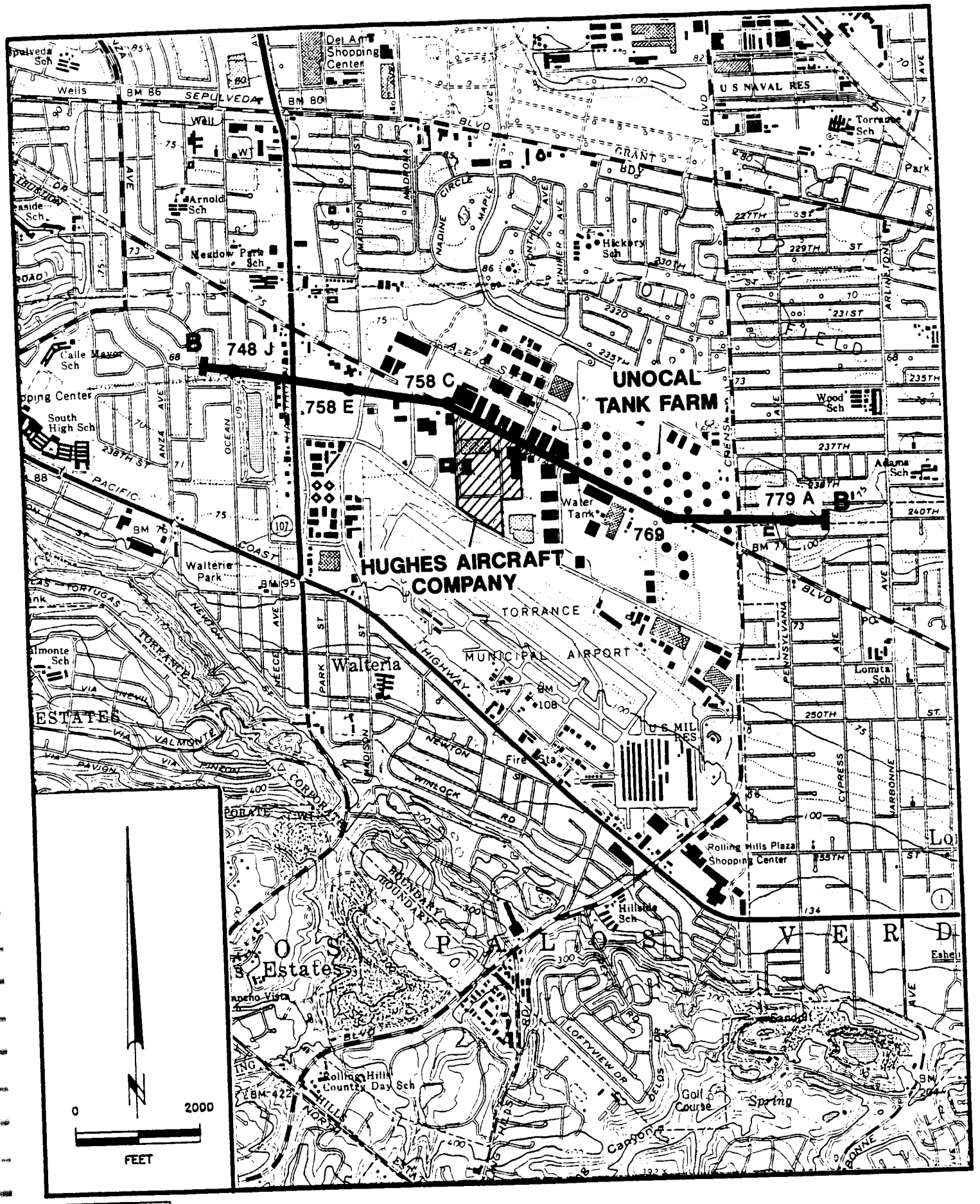
LOCAL HYDROGEOLOGIC CROSS SECTION

HARGIS + ASSOCIATES, INC.

8/9

FIGURE

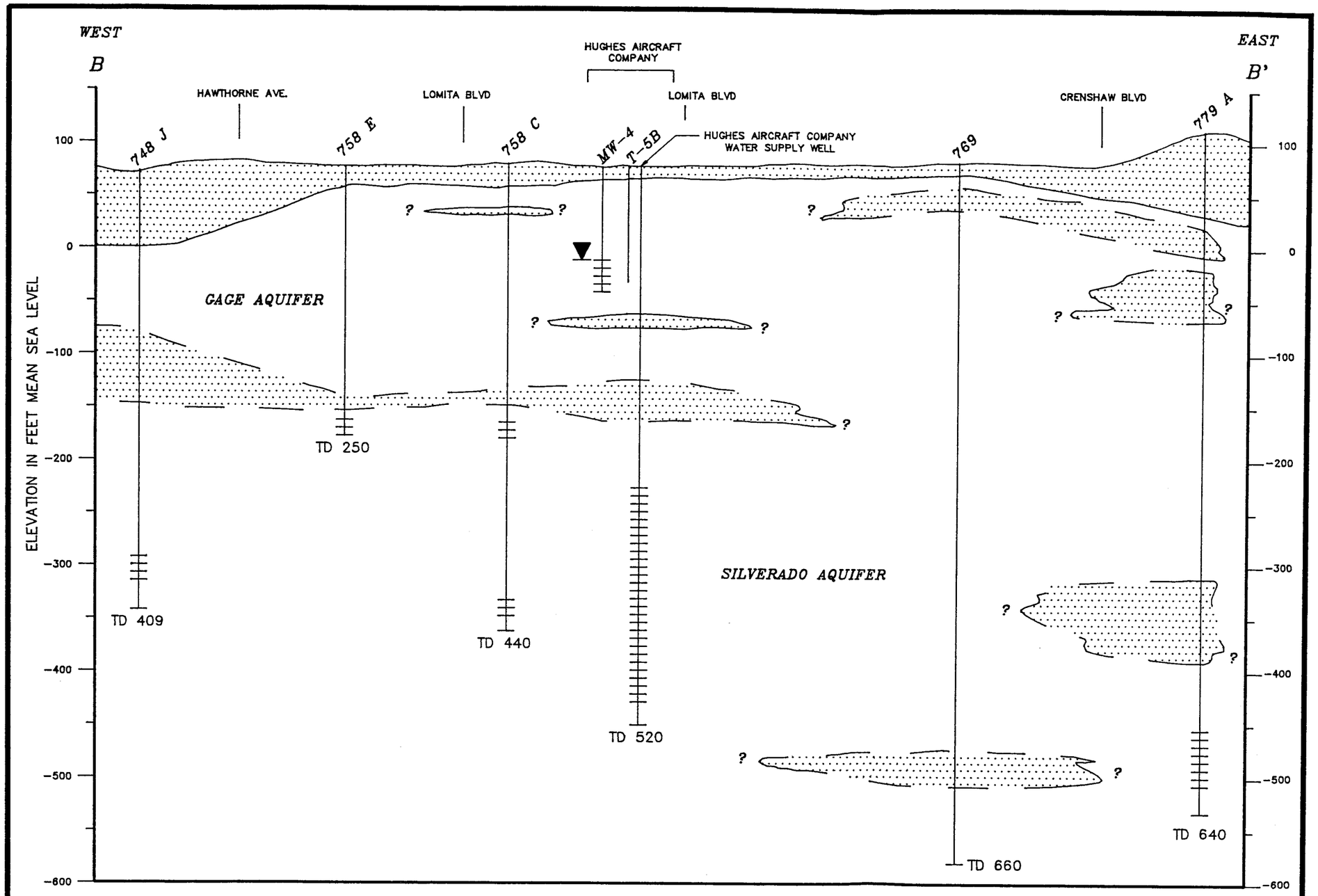
PREP BY NVR REV BY WPW RPT REPORT NO. 850\D502\F



850\0502\F04

FIGURE 4. LOCATION OF REGIONAL HYDROGEOLOGIC CROSS SECTION

HARGIS + ASSOCIATES, INC.



MODIFIED FROM HARGIS & MONGOMERY, INC. 1983

EXPLANATION

PREDOMINATELY SAND WITH SOME GRAVEL AND CLAY LENSES

PREDOMINATELY CLAY AND SILT WITH LOCALIZED SAND LENSES

748 J — WELL IDENTIFIER
WELL NUMBERING SYSTEM USED BY DEPARTMEN OF PUBLIC WORKS, LOS ANGELES COUNTY

STATIC WATER LEVEL; JULY 23, 1991

PERFORATED INTERVAL

TD 409 — TOTAL DEPTH, IN FEET BELOW LAND SURFACE

T-5B — SOIL BORING

—?— CONTACT, DASHED WHERE APPROXIMATE, QUERIED WHERE INFERRED

0 1,000 2,000
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

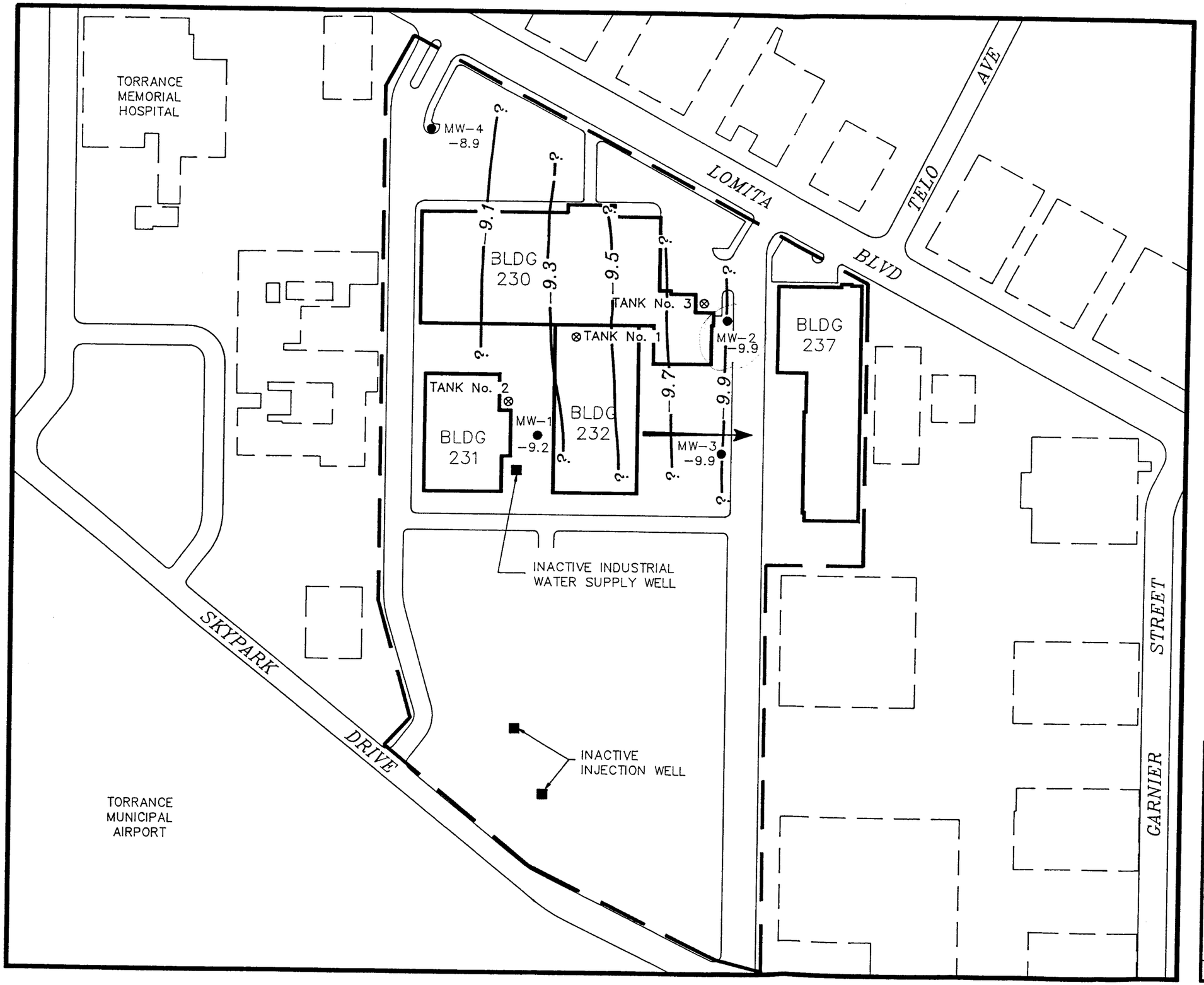
REGIONAL HYDROGEOLOGIC CROSS SECTION

HARGIS + ASSOCIATES, INC.

8/9

FIGURE 5

PREP BY NVR REV BY WPW RPT REPORT NO. 850\D502\F0



EXPLANATION

MW-2 — WELL IDENTIFIER

-9.9 — WATER LEVEL ELEVATION IN FEET MEAN SEA LEVEL

TANK No. 1 — FORMER UNDERGROUND STORAGE TANK LOCATION

HUGHES AIRCRAFT COMPANY BUILD

HUGHES AIRCRAFT COMPANY

-9.9 — CONTOURS OF EQUAL WATER LEVEL ELEVATION, DASHED WHERE APPROXIMATE, QUERIED WHERE INFERRED

PROPERTY BOUNDARY

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: WATER LEVELS MEASURED JULY 23, 1991

0 200 400
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

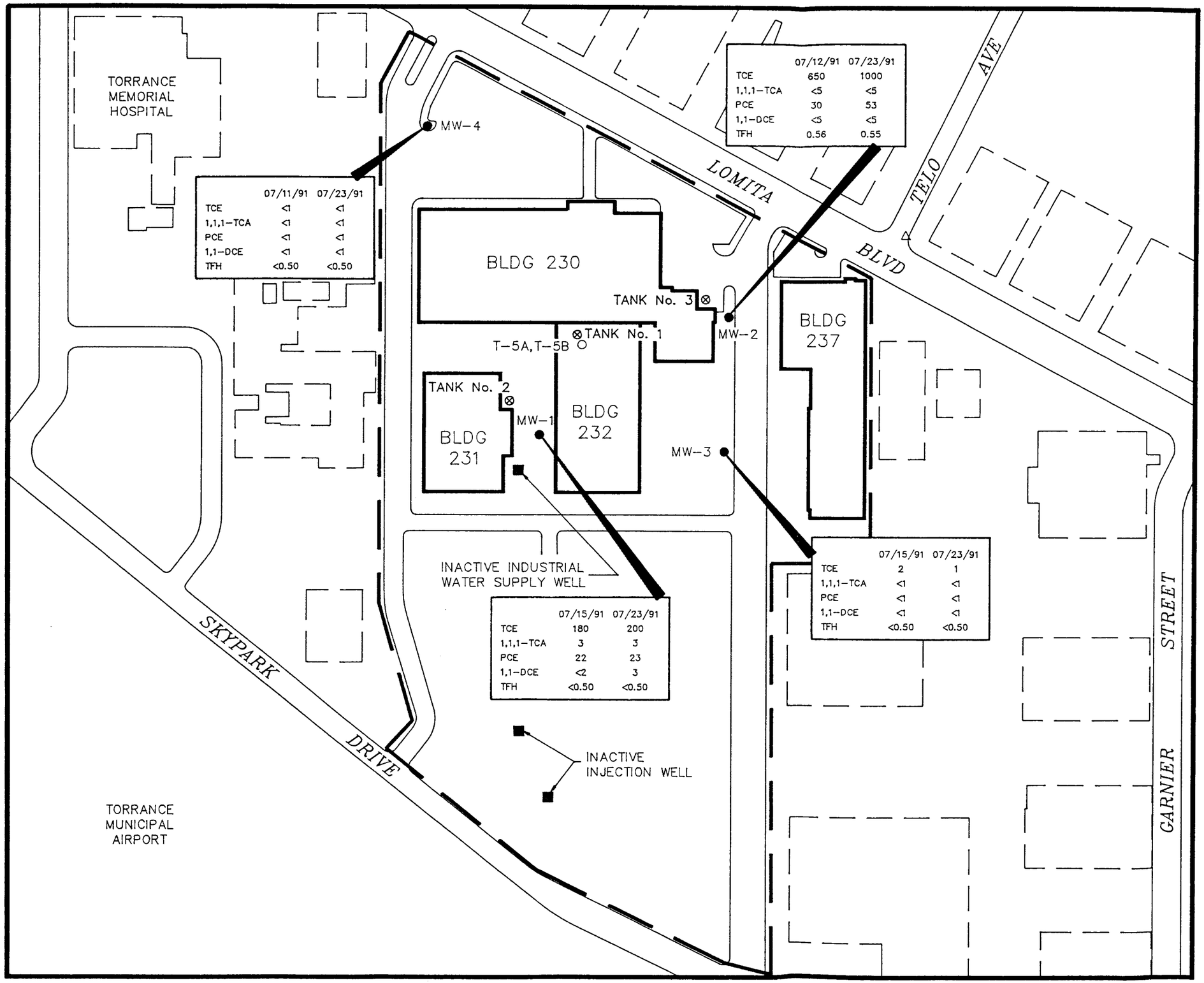
WATER LEVEL ELEVATIONS

HARGIS + ASSOCIATES, INC.

8/91

FIGURE 6

PREP BY NVR REV BY MPW RPT NO. HAC850\F06_



EXPLANATION

MW-2 ● MONITOR WELL LOCATION

T-5A,T-5B ○ FORMER SOIL BORING LOCATION

TANK No. 1 ⊗ FORMER UNDERGROUND STORAGE TANK LOCATION

HUGHES AIRCRAFT COMPANY BUILD

HUGHES AIRCRAFT COMPANY PROPERTY BOUNDARY

CONCENTRATION IN MICROGRAMS PER LITER OF

	07/11/91	07/23/91	
TCE	<1	<1	– TRICHLOROETHYLENE
1,1,1-TCA	<1	<1	– 1,1,1-TRICHLOROETHANE
PCE	<1	<1	– TETRACHLOROETHYLENE
1,1-DCE	<1	<1	– DICHLOROETHYLENE
TFH	<0.50	<0.50	– TOTAL FUEL HYDROCARBONS

0 200 400
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

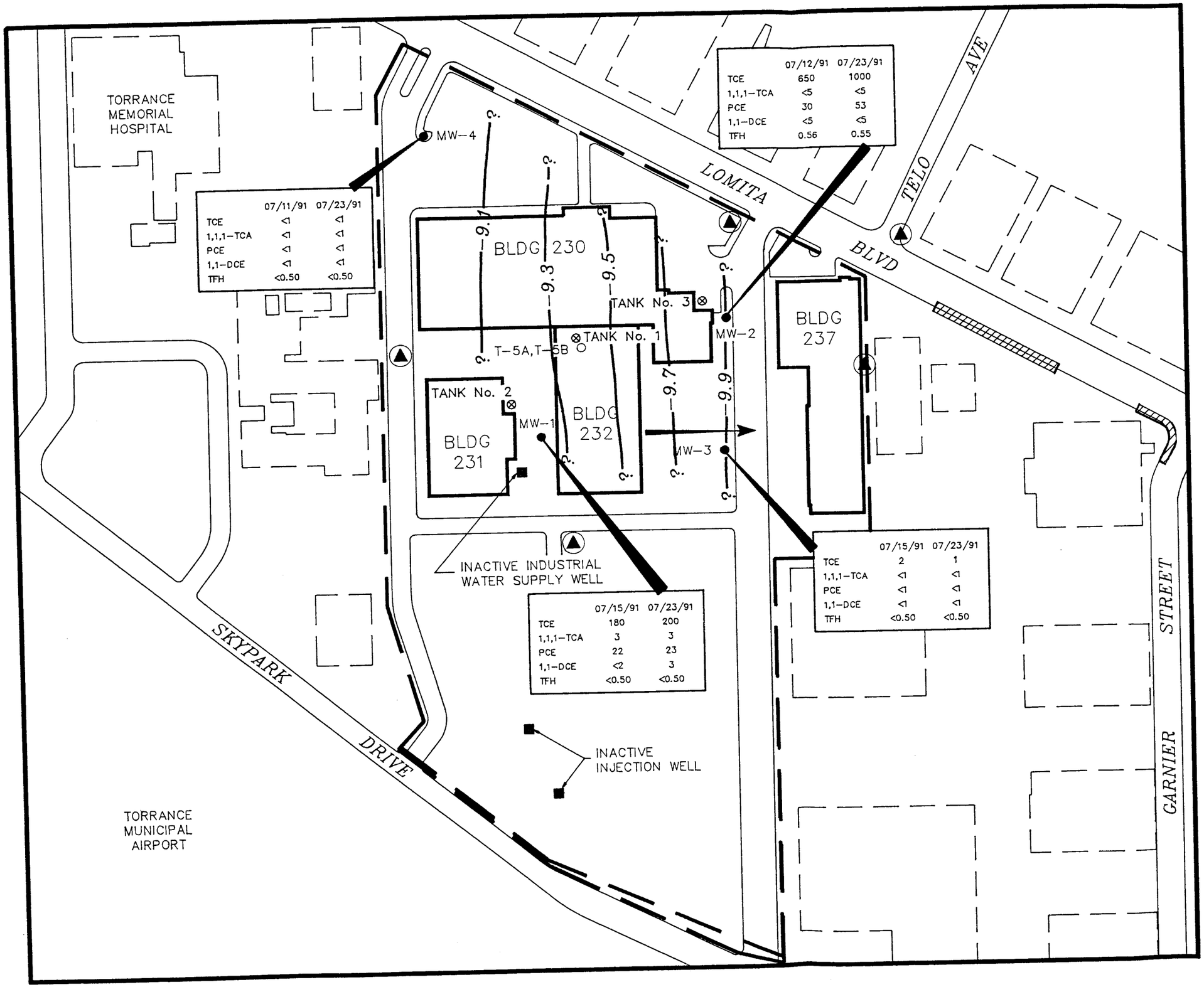
VOLATILE ORGANIC COMPOUNDS AND FUEL HYDROCARBONS IN GROUNDWATER

HARGIS + ASSOCIATES, INC.

8/9

FIGURE 7

PREP BY NVR REV BY WPW RPT NO. 850\D502\F



EXPLANATION

- PROPOSED SHALLOW MONITOR WELL FIRST PHASE
- POTENTIAL LOCATION OF ADDITIONAL SHALLOW MONITOR WELL
- MW-2 — MONITOR WELL LOCATION
- T-5A,T-5B — FORMER SOIL BORING LOCATION
- TANK NO. 1 — FORMER UNDERGROUND STORAGE TANK LOCATION
- HUGHES AIRCRAFT COMPANY BUILDIN
- HUGHES AIRCRAFT COMPANY PROPERTY BOUNDARY

CONCENTRATION IN MICROGRAMS PER LITER OF

	07/11/91	07/23/91	
TCE	<1	<1	– TRICHLOROETHYLENE
1,1,1-TCA	<1	<1	– 1,1,1-TRICHLOROETHANE
PCE	<1	<1	– TETRACHLOROETHYLENE
1,1-DCE	<1	<1	– DICHLOROETHYLENE
TFH	<0.50	<0.50	– TOTAL FUEL HYDROCARBONS

0 200 400
FEET

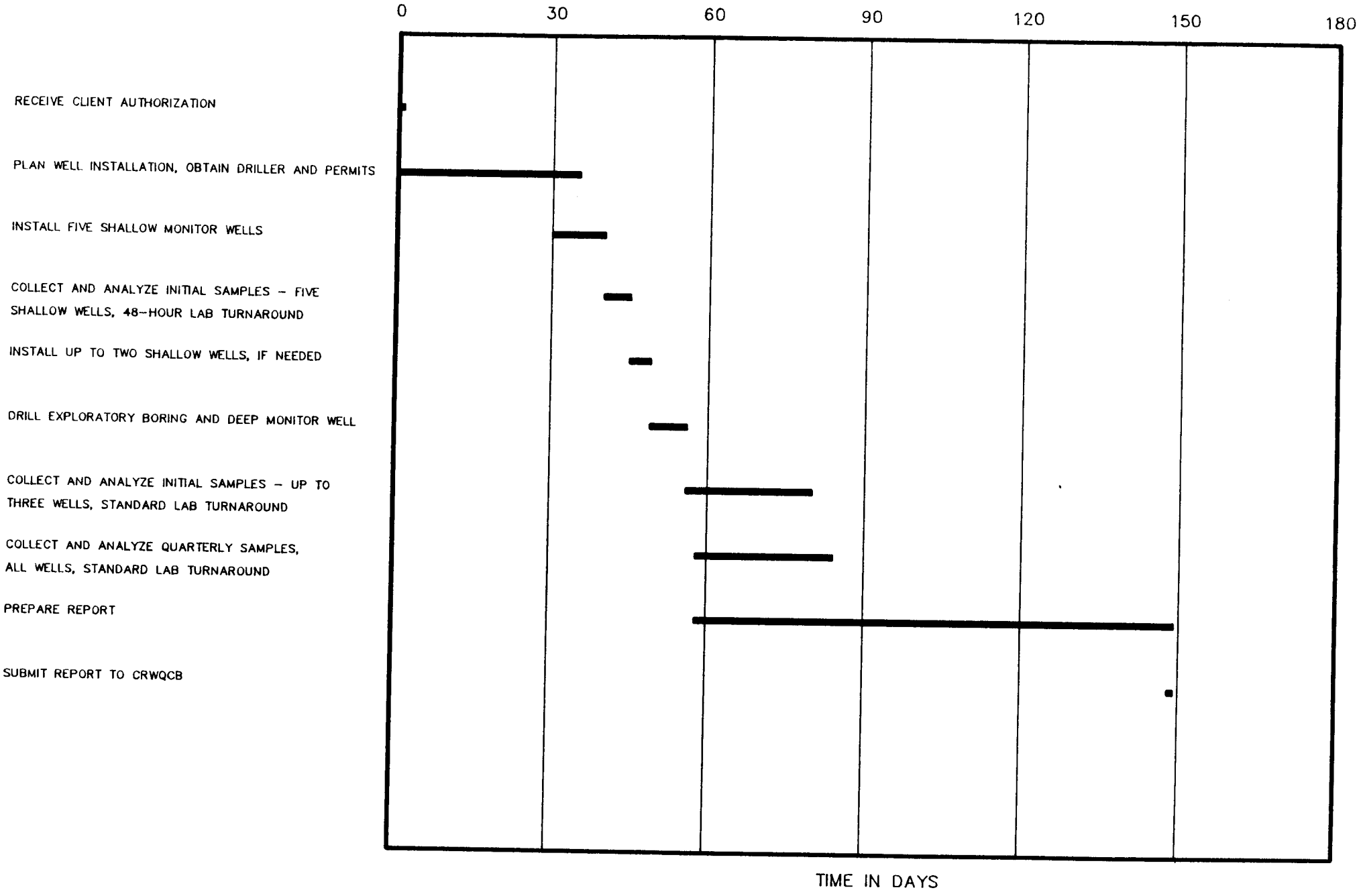
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

PROPOSED MONITOR WELLS

10/

FIGURE

PREP BY NVR REV BY WLPW RPT NO. 850\D502



850\D502\F09

FIGURE 9. ESTIMATED SCHEDULE FOR PROPOSED ASSESSMENT WORK

HARGIS + ASSOCIATES, INC.

APPENDIX A

HARGIS & MONTGOMERY, INC.

PREVIOUS INVESTIGATION RESULTS, 1983

APPENDIX A
HARGIS & MONTGOMERY, INC.
PREVIOUS INVESTIGATION RESULTS, 1983

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A-1 CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

A-2 CONCENTRATIONS OF COMMON IONS IN GROUNDWATER SAMPLES

A-3 CONCENTRATIONS OF SELECTED ORGANIC COMPOUNDS, TRACE METALS, AND CYANIDE IN GROUNDWATER SAMPLES

ILLUSTRATIONS

Figure

A-1 TEST HOLE LOCATION MAP

Note: Tables and figures in this appendix were originally published in a report prepared by Hargis & Montgomery, Inc., 1983. Investigation of Groundwater Quality and Regional Hydrogeologic Conditions, Hughes Aircraft Company, Electron Dynamics Division, Torrance, California. Prepared for Hughes Aircraft Company, Torrance, California; August 29, 1983.

TABLE A-1

CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS IN SOIL SAMPLES

ORGANIC COMPOUND (micrograms/kilogram)	TEST HOLE T-1 .....SAMPLE DEPTH, FEET BLS.....						TEST HOLE T-2 SAMPLE DEPTH FEET BLS			TEST HOLE T-3 SAMPLE DEPTH FEET BLS			TEST HOLE T-4 SAMPLE DEPTH FEET BLS			TEST HOLE T-5A AND 5B ...SAMPLE DEPTH, FEET BLS....				
	5	8	22	31	39	49	11	20	30	10	20	30	10	20	30	25	30	36	75	100
Acetone	82	64	ND	520	30	ND	ND	ND	ND	ND	ND	ND	76	46	180	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	740	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	22	21	25	ND	ND	23	20	ND	22	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	ND	ND	37	1,200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	2	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	610	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	54	ND	59	340	72	ND	ND	ND	28	ND	ND	28	ND	22	ND	ND	ND	ND	ND	ND
Tetrachloroethylene	780	300	8,600	440,000	62	69	25	ND	160	ND	ND	270	41	21	ND	8	3	ND	ND	6
Toluene	ND	ND	550	1,200	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-trans-Dichloroethylene	570	ND	23	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	34	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	670	18,000	ND	ND	ND	30	53	ND	ND	ND	ND	ND	ND	ND	ND	ND	3	2
Trichloroethylene	840	26	260	19,000	ND	39	82	140	230	ND	ND	ND	ND	ND	25	66	13	1	ND	14
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	9	3	ND	2
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	8	7	ND

NOTES: All samples from test holes T-1 through T-4 were analyzed by Radian Corporation, Sacramento, California;
All samples from test holes T-5A and T-5B were analyzed by Brown and Caldwell, Analytical Services Division, Pasadena, California;
Acetone is not an EPA priority pollutant

BLS = Below land surface
ND = Not detected

TABLE A-2

CONCENTRATIONS OF COMMON IONS IN GROUNDWATER SAMPLES

CONSTITUENT (milligrams per liter)	TEST HOLE T-5B	INDUSTRIAL WATER SUPPLY WELL
Sodium	198	94
Potassium	2.3	2.6
Calcium	81	31
Magnesium	25	11
Carbonate	0	0
Bicarbonate	328	290
Chloride	184	72
Sulfate	30	1.8
Nitrate (NO_3)	177	0.75
Total dissolved solids (evaporated at 180°C)	705	248
Electrical conductivity (micromhos at 25°C)	1,330	580

TABLE A-3

CONCENTRATIONS OF SELECTED ORGANIC COMPOUNDS,
TRACE METALS, AND CYANIDE DETECTED IN GROUNDWATER SAMPLES

CONSTITUENT (micrograms per liter)	TEST HOLE T-5B	INDUSTRIAL WATER SUPPLY WELL
Trichloroethylene	65	ND
Trichlorofluoromethane	12	9
Chloroform	ND	12
Tetrachloroethylene	11	ND
1,1,1-Trichloroethane	5	ND
Phenol	7	ND
Hexahydroazepinone	10	ND
TRACE METALS AND CYANIDE (milligrams per liter)		
Thallium	0.004	ND
Antimony	0.020	ND
Arsenic	0.014	ND
Iron	ND	0.09
Manganese	0.09	0.08
Cyanide	0.025	ND

NOTE: Analyses performed by Brown and Caldwell, Analytical Services Division, Pasadena, California

ND = Not detected

APPENDIX B

LITHOLOGIC LOGS

APPENDIX B
LITHOLOGIC LOGS

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Table	
B-1	LITHOLOGIC LOG FOR MONITOR WELL MW-1
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B-3	LITHOLOGIC LOG FOR MONITOR WELL MW-3
B-4	LITHOLOGIC LOG FOR MONITOR WELL MW-4

TABLE B-1

LITHOLOGIC LOG FOR MONITOR WELL MW-1

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0 - 3.5	TOP SOIL		
3.5 - 6	CLAY	CL	Black (2.5YR 2.5/0), firm to stiff, moderately plastic, very cohesive.
6 - 8	SILTY CLAY	CL	Dark grayish brown (10YR 4/2), slightly plastic, slightly cohesive, blocky; trace organic material.
8 - 9	SILTY SAND	SM	Dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6), slightly moist, fine to medium, poorly sorted; silt is nonplastic, slightly cohesive; no odor.
9 - 18.5	CLAYEY SILT	ML	Dark grayish brown (10YR 4/2), slightly moist, slightly plastic, slightly cohesive, blocky; trace fine to medium sand; no odor.
18.5 - 24	SILTY SAND	SM	Light yellowish brown (10YR 6/4) to yellowish brown (10YR 5/8), very fine to medium; slightly moist, nonplastic, slightly cohesive; trace clay; no odor.
24 - 33.5	SILTY SAND	SM	Strong brown (7.5YR 5/8), very fine to coarse; moist, nonplastic, moderately cohesive; no odor.
33.5 - 36	SAND	SP	Very pale brown (10YR 7/4), slightly moist, very fine to fine, well sorted; trace mafics; interbedded oxidized laminations; no odor.
36 - 37	SILTY SAND	SM	Brownish yellow (10YR 6/8), very fine to medium, micaceous; slightly moist, nonplastic, slightly cohesive; no odor.

(a) Unified Soil Classification System
ASTM D-2487

TABLE B-1 (continued)
LITHOLOGIC LOG FOR MONITOR WELL MW-1

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
37 - 40	SAND	SP	Very pale brown (10YR 7/4), slightly moist, very fine to fine, well sorted, micaceous.
40 - 41	SAND	SP	Brownish yellow (10YR 6/6), slightly moist, very fine to coarse, poorly sorted, micaceous; no odor.
41 - 45	SILTY SAND	SM	Brownish yellow (10YR 6/8) to olive yellow (2.5Y 6/8), very fine to fine, micaceous; slightly moist, nonplastic, slightly cohesive; no odor.
45 - 49	SAND	SP	Olive yellow (2.5Y 6/4), slightly moist, very fine to fine, well sorted, micaceous; trace mafics; no odor.
51 - 54	CLAYEY SAND	CL	Light yellowish brown (2.5Y 6/4), very fine to fine.
54 - 56	SAND	SP	Brownish yellow (10YR 6/4), slightly moist, very fine to fine, well sorted, micaceous; no odor. From 55.5 to 56 feet, sand is very fine to medium.
56 - 57	CLAYEY SAND	SC	Light yellowish brown (2.5Y 6/4), very fine to medium, micaceous; moist, nonplastic, slightly cohesive; trace mafics; no odor.

(a) Unified Soil Classification System
ASTM D-2487

TABLE B-1 (continued)
LITHOLOGIC LOG FOR MONITOR WELL MW-1

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
57 - 60.5	SILTY SAND	SM	Brownish yellow (10YR 6/6), very fine to fine, micaceous; slightly moist, nonplastic, slightly cohesive; trace mica; no odor. From 60 to 60.5 feet, clayey sand is light yellowish brown (2.5Y 6/4), very fine to medium, micaceous; slightly moist, nonplastic, slightly cohesive.
60.5 - 70.5	SAND	SP	Brownish yellow (10YR 6/6), slightly moist, very fine to fine, well sorted, micaceous, trace mafics; no odor. From 70 to 70.5 feet, color change to pale yellow (2.5Y 7/4); oxidation stains.
70.5 - 110	SAND	SP	Brownish yellow (10YR 6/6), very fine to fine, well sorted, micaceous. From 79 to 84 feet, trace silt; trace black organic material. From 85 to 87 feet, sand is damp. At 87 feet sand is wet. At 90 sand is saturated.

TOTAL DEPTH OF BORING = 110 FEET

(a) Unified Soil Classification System
ASTM D-2487

TABLE B-2

LITHOLOGIC LOG FOR MONITOR WELL MW-2

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0 - 30(b)	SILTY SAND	SM	Yellowish brown (10YR 5/6), fine to coarse.
30 - 35	SILTY SAND	SM	Olive yellow (2.5Y 6/6), very fine to fine; silt is non plastic, slightly cohesive.
35 - 40	SAND	SP	Yellow (2.5Y 7/6), very fine.
40 - 50	SAND	SP	Olive yellow (2.5Y 6/6), very fine to fine.
50 - 75	SILTY SAND	SM	Yellow (2.5Y 7/6), very fine to fine.
75 - 85	SAND	SP	Olive yellow (2.5Y 6/6), very fine to fine.
85 - 90.1	SILTY SAND	SM	Brownish yellow (10YR 6/6), saturated, very fine to coarse, micaceous; silt is nonplastic, slightly cohesive; trace mafics; coarse sand content increasing with depth; no odor. From 90 to 90.1 feet, silty sand is light yellowish brown (2.5Y 6/4) to brownish yellow (10YR 6/6), very fine to fine, micaceous; clay is slightly plastic, moderately cohesive; no odor.
90.1 - 96	SAND	SP	Brownish yellow (10YR 6/6), very fine to fine, well sorted, micaceous; trace mafics.

(a) Unified Soil Classification System
ASTM D-2487

(b) For detailed lithologic data in the immediate vicinity of the monitor well MW-2, refer to Hargis + Associates, Inc., 1989. Soil Investigation at a Former Underground Tank Location, Hughes Aircraft Company, 3100 W. Lomita Boulevard, Torrance, California. Prepared for Hughes Aircraft Company, Torrance, California; April 20, 1989

TABLE B-2 (continued)
LITHOLOGIC LOG FOR MONITOR WELL MW-2

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
96 - 97	SILTY SAND	SM	Yellowish brown (10YR 5/8), very fine to fine, micaceous; silt is nonplastic, slightly cohesive; trace mafics; no odor.
97 - 100	SAND	SP	Varicolored, fine to coarse, poorly sorted, predominantly quartz.
100 - 109	SILTY SAND	SM	Pale brown (10YR 6/3), very fine to fine; silt is nonplastic, slightly cohesive; no odor. From 101 to 104 feet, color change to olive brown (2.5Y 5/6). From 104 to 109 feet, color change to yellowish brown (10YR 5/4).
109 - 114	SAND	SP	Varicolored, fine to coarse, poorly sorted, micaceous.

TOTAL DEPTH OF BORING = 114 FEET

(a) Unified Soil Classification System
ASTM D-2487

(b) For detailed lithologic data in the immediate vicinity of the monitor well MW-2, refer to Hargis + Associates, Inc., 1989. Soil Investigation at a Former Underground Tank Location, Hughes Aircraft Company, 3100 W. Lomita Boulevard, Torrance, California. Prepared for Hughes Aircraft Company, Torrance, California; April 20, 1989

TABLE B-3

LITHOLOGIC LOG FOR MONITOR WELL MW-3

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0 - 1.5	TOP SOIL SAND AND GRAVEL		
1.5 - 2.5	SAND	SP	Brownish yellow (10YR 6/8), slightly moist, very fine to fine; trace fine gravel; no odor.
2.5 - 5	CLAY	CL	Black (2.5YR 2.5/0), slightly moist, stiff, moderately plastic, very cohesive; no odor.
5 - 9	SILTY CLAY	CL	Dark grayish brown (10YR 4/2), slightly moist, slightly plastic, blocky; trace roots.
			At 7.5 feet, color change to grayish brown (10YR 5/2).
9 - 14	SILTY SAND	SM	Light yellowish brown (2.5Y 6/4), very fine to fine; silt is slightly moist, nonplastic, noncohesive; no odor.
14 - 16	SILTY SAND	SM	Brownish yellow (10YR 6/8), very fine to medium, oxidized; silt is slightly moist, nonplastic, slightly cohesive; no odor.
16 - 17.5	CLAYEY SILTY SAND	SC/SM	Pale brown (10YR 6/3) to brownish yellow (10YR 6/8), very fine to medium, oxidized; silt and clay are slightly moist, nonplastic, moderately cohesive; no odor.
17.5 - 20	SAND	SP	Yellowish brown (10YR 5/6), very fine to medium, slightly moist, poorly sorted; no odor.

(a) Unified Soil Classification System
ASTM D-2487

TABLE B-3 (continued)
LITHOLOGIC LOG FOR MONITOR WELL MW-3

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
20 - 29	SILTY SAND	SM	Strong brown (7.5YR 4/6), very fine to coarse, poorly sorted; slightly moist, nonplastic, slightly cohesive; no odor. At 24 feet, color change to brownish yellow (10YR 6/8).
29 - 31.5	SAND	SP	Brownish yellow (10YR 6/8) to olive yellow (2.5Y 6/6), slightly moist, very fine to medium, oxidized; trace silt; no odor.
31.5 - 34	CLAYEY SAND	SC	Clayey sand, olive yellow (2.5Y 6/6), very fine to fine; slightly moist, slightly plastic, moderately cohesive, oxidized; no odor.
34 - 35.5	SAND	SW	Pale yellow (2.5Y 4/4) to brownish yellow (10YR 6/8), slightly moist, very fine to coarse, predominantly quartz; oxidized laminations; trace mafics; no odor.
35.5 - 36.5	SILTY CLAY	CL	Yellowish brown (10YR 6/8) to light yellowish brown (2.5Y 6/4), moderately plastic, moderately cohesive.
36.5 - 39	SILTY SAND	SM	Yellowish brown (10YR 6/8) to light yellowish brown (2.5Y 6/4), slightly moist, nonplastic, slightly cohesive; no odor.
39 - 44	SAND	SP	Pale yellow (2.5Y 7/4), slightly moist, very fine to fine, well sorted; trace mafics; no odor.

(a) Unified Soil Classification System
ASTM D-2487

TABLE B-3 (continued)
LITHOLOGIC LOG FOR MONITOR WELL MW-3

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
44 - 49	SAND	SP	Olive yellow (2.5Y 6/6), slightly moist, very fine to fine, well sorted, micaceous; trace mafics; no odor. From 48.5 to 49 feet, sand is fine to medium.
49 - 53.5	SAND	SP	Pale yellow (2.5Y 7/4), slightly moist, very fine to fine, well sorted; trace silt.
53.5 - 54	SANDY CLAY	CL	Brownish yellow (10YR 6/8) to light yellowish brown (2.5Y 6/4), slightly moist, nonplastic, moderately cohesive; sand is very fine to fine.
54 - 55.5	CLAYEY SAND SILTY SAND	SC/SM	Brownish yellow (10YR 6/8) to light yellowish brown (2.5Y 6/4), very fine to fine; slightly moist, nonplastic, moderately cohesive.
55.5 - 60.5	SAND	SP	Pale yellow (2.5Y 7/4), slightly moist, very fine to fine, well sorted; trace silt; trace mafics; no odor. From 60 to 60.5 feet, color change to pale yellow (2.3Y 7/4).
60.5 - 62.5	SAND	SP	Brownish yellow (10YR 6/6); trace black organic stains.
62.5 - 69	SAND	SP	Pale yellow (2.5Y 7/4), slightly moist, very fine to fine, well sorted, micaceous; trace mafics; no odor.

(a) Unified Soil Classification System
ASTM D-2487

TABLE B-3 (continued)
LITHOLOGIC LOG FOR MONITOR WELL MW-3

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
69 - 84	SAND	SP	Brownish yellow (10YR 6/8), very fine to fine, well sorted, micaceous; trace silt; silt is nonplastic, noncohesive. From 72 to 74 feet, black organic stains.
84 - 92.5	SAND	SP	Yellowish brown (10YR 5/6), damp, very fine to fine.
92.5 - 110	SAND	SP	Yellowish brown (10YR 5/4), wet, very fine to fine.

TOTAL DEPTH OF BORING = 110 FEET

(a) Unified Soil Classification System
ASTM D-2487

TABLE B-4

LITHOLOGIC LOG FOR MONITOR WELL MW-4

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0 - 3.5	TOP SOIL CLAYEY SAND	SC	Yellowish brown (10YR 5/6), very fine to medium, well sorted; clay is slightly moist, moderately cohesive; no odor.
3.5 - 5.5	CLAY	CL	Black (2.5 YR 2.5/0), slightly moist, firm to stiff, moderately plastic, very cohesive; no odor.
5.5 - 14	SILTY SAND	SM	Yellowish brown (10YR 5/4), very fine to fine, well sorted; silt is nonplastic, slightly cohesive; no odor.
14 - 18.5	SILTY SAND	SM	Strong brown (7.5YR 5/8); trace brownish oxidation, very fine to fine, well sorted; silt is not plastic, slightly cohesive; no odor.
18.5 - 23	SAND	SW	Reddish yellow (7.5YR 6/8) to strong brown (7.5YR 5/2), very fine to coarse, poorly sorted, subangular to subrounded, predominantly quartz.
23 - 24	SAND	SP	Very pale brown (10YR 8/3), very fine to medium; trace coarse sand; trace mafics.
24 - 25.5	SAND	SP	Yellowish brown (10YR 5/6),slightly moist, very fine to medium; trace mafics.
25.5 - 34	SAND	SP	White (10 YR 8/2), dry, very fine; trace mafics.
34 - 36	SILTY SAND SANDY SILT	SM	Light brownish gray (10YR 6/2) to brownish yellow (10YR 5/6), very fine to fine, poorly sorted; slightly moist, nonplastic, slightly cohesive; no odor.

(a) Unified Soil Classification System
ASTM D-2487

TABLE B-4 (continued)
LITHOLOGIC LOG FOR MONITOR WELL MW-4

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
36 - 39	CLAYEY SAND SILTY SAND	SC/SM	Light brownish gray (10YR 6/2) to brownish yellow (10YR 5/6), slightly moist, very fine to fine, slightly plastic, moderately cohesive; no odor.
39 - 44	SAND	SP	Pale yellow (2.3Y 7/2), dry, very fine, well sorted, trace mafics.
44 - 46	SAND	SP	Light yellowish brown (2.5Y 6/4), very fine to fine; trace mafics.
46 - 49	SAND	SP	Pale yellow (2.5Y 7/4) to olive yellow (2.5Y 6/6), slightly moist to dry, very fine to medium, poorly sorted; no odor.
49 - 54	SAND	SP	Olive yellow (2.5Y 6/6) to olive brown (2.5Y 5/6), slightly moist to dry, very fine to fine, trace mafics; trace mica.
54 - 105	SAND	SP	Light olive brown (2.5Y 5/6), wet at 90 feet, very fine to fine.
105 - 119	SAND	SP	Light olive brown (2.5Y 5/6), wet, fine to medium, some mica.

TOTAL DEPTH OF BORING = 119 FEET

(a) Unified Soil Classification System
ASTM D-2487

APPENDIX C

LABORATORY REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION FOR WATER SAMPLES

AnalyticalTechnologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

850
K026
KLP

ATI I.D.: 107219

July 31, 1991

HARGIS & ASSOCIATES, INC.
2223 AVENIDA DE LA PLAYA, SUITE 300
LA JOLLA, CA 92037

Project Name: HAC-TORRANCE
Project # : 850

Attention: MATT WIEDLIN

RECEIVED
AUG 02 1991
HARGIS + ASSOCIATES, INC.
LA JOLLA, CA

Analytical Technologies, Inc. has received the following sample(s):

Date Received	Quantity	Matrix
July 12, 1991	4	WATER

The sample(s) were analyzed with EPA methodology or equivalent methods as specified in the enclosed analytical schedule. The symbol for "less than" indicates a value below the reportable detection limit. Please see the attached sheet for the sample cross reference table.

The results of these analyses and the quality control data are enclosed.

SUSAN M. SNYDER
SENIOR PROJECT MANAGER

KENNETH WAHL
LABORATORY MANAGER

cc: RUSH BOYNTON
HARGIS & ASSOCIATES, INC.
111 N. SEPULVEDA BLVD. #350
MANHATTAN BEACH, CA 90266

AnalyticalTechnologies,Inc.

SAMPLE CROSS REFERENCE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

Report Date: July 31, 1991
ATI I.D. : 107219

ATI #	Client Description	Matrix	Date Collected
1	MW4	WATER	11-JUL-91
2	MW2	WATER	12-JUL-91
3	WB-1	WATER	11-JUL-91
4	TB-1	WATER	12-JUL-91

---TOTALS---

Matrix	# Samples
WATER	4

ATI STANDARD DISPOSAL PRACTICE

The sample(s) from this project will be disposed of in twenty-one (21) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

AnalyticalTechnologies,Inc.

ANALYTICAL SCHEDULE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D.: 107219

Analysis	Technique/Description
EPA 353.2 (NITRATE-NITRITE AS NITROGEN)	COLORIMETRIC
EPA 6010 (ANTIMONY)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BERYLLIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CADMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (COPPER)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (NICKEL)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SILVER)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (ZINC)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 7060 (ARSENIC)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7421 (LEAD)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7471 (MERCURY)	ATOMIC ABSORPTION/COLD VAPOR
EPA 7740 (SELENIUM)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7841 (THALLIUM)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 8240 (GC/MS FOR VOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 9012 (TOTAL CYANIDE)	COLORIMETRIC
MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)	GC/FLAME IONIZATION DETECTOR

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D.: 107219

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	MW4	WATER	11-JUL-91	12-JUL-91
2	MW2	WATER	12-JUL-91	12-JUL-91

Parameter	Units	1	2
TOTAL CYANIDE	MG/L	<0.01	<0.01
NITRATE-NITRITE AS NITROGEN	MG/L	56.0	54.0

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

DUP/MS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850 ATI I.D. : 107219
Project Name: HAC-TORRANCE

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
NITRATE-NITRITE AS NITROGEN	107224-01	MG/L	8.8	8.9	1	46.2	40.0	94
TOTAL CYANIDE	107258-07	MG/L	<0.01	<0.01	0	0.52	0.50	104

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

BLANK SPIKE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
NITRATE-NITRITE AS NITROGEN	15178	MG/L	<0.05	1.94	2.00	97
TOTAL CYANIDE	15130	MG/L	<0.01	0.46	0.50	92

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D.: 107219

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	MW4	WATER	11-JUL-91	12-JUL-91
2	MW2	WATER	12-JUL-91	12-JUL-91

Parameter	Units	1	2
SILVER	MG/L	<0.01	<0.01
ARSENIC	MG/L	0.002	<0.002
BERYLLIUM	MG/L	<0.005	<0.005
CADMIUM	MG/L	<0.005	<0.005
CHROMIUM	MG/L	0.03	0.04
COPPER	MG/L	<0.02	<0.02
MERCURY	MG/L	<0.0005	<0.0005
NICKEL	MG/L	<0.01	0.02
LEAD	MG/L	0.026	0.009
ANTIMONY	MG/L	<0.03	<0.03
SELENIUM	MG/L	0.005	0.004
THALLIUM	MG/L	<0.002	<0.002
ZINC	MG/L	0.65	0.28

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
ANTIMONY	107233-03	MG/L	<0.03	<0.03	0	2.0	2.0	100
ARSENIC	107233-03	MG/L	<0.002	<0.002	0	2.1	2.0	105
BERYLLIUM	107233-03	MG/L	<0.005	<0.005	0	2.1	2.0	105
CADMIUM	107233-03	MG/L	<0.005	<0.005	0	1.7	2.0	85
CHROMIUM	107233-03	MG/L	<0.01	<0.01	0	2.1	2.0	105
COPPER	107233-03	MG/L	<0.02	<0.02	0	2.1	2.0	105
LEAD	107233-03	MG/L	<0.002	<0.002	0	2.1	2.0	105
MERCURY	107313-02	MG/L	<0.0005	<0.0005	0	0.0050	0.0050	100
NICKEL	107233-03	MG/L	<0.01	<0.01	0	2.1	2.0	105
SELENIUM	107233-03	MG/L	<0.002	<0.002	0	1.3	1.2	108
SILVER	107233-03	MG/L	<0.01	<0.01	0	2.0	2.0	100
THALLIUM	107233-03	MG/L	<0.002	<0.002	0	1.9	2.0	95
ZINC	107233-03	MG/L	<0.05	<0.05	0	2.1	2.0	105

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
ANTIMONY	15138	MG/L	<0.03	1.9	2.0	95
ARSENIC	15151	MG/L	<0.002	1.9	2.0	95
BERYLLIUM	15138	MG/L	<0.005	2.0	2.0	100
CADMIUM	15291	MG/L	<0.005	1.6	2.0	80
CHROMIUM	15138	MG/L	<0.01	2.0	2.0	100
COPPER	15138	MG/L	<0.02	2.0	2.0	100
LEAD	15337	MG/L	<0.002	2.1	2.0	105
MERCURY	15208	MG/L	<0.0005	0.0050	0.0050	100
NICKEL	15138	MG/L	<0.01	2.0	2.0	100
SELENIUM	15152	MG/L	<0.002	1.3	1.2	108
SILVER	15138	MG/L	<0.01	1.9	2.0	95
THALLIUM	15141	MG/L	<0.002	1.9	2.0	95
ZINC	15139	MG/L	<0.05	2.0	2.0	100

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107219
Project # : 850
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW4	WATER	11-JUL-91	15-JUL-91	17-JUL-91	1.00
2	MW2	WATER	12-JUL-91	15-JUL-91	17-JUL-91	1.00
3	WB-1	WATER	11-JUL-91	15-JUL-91	17-JUL-91	1.00

Parameter	Units	1	2	3
FUEL HYDROCARBONS	MG/L	<0.50	0.56	<0.50
HYDROCARBON RANGE		-	C6-C7	-
HYDROCARBONS QUANTITATED USING		-	GASOLINE	-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank I.D. : 13487
Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: 15-JUL-91
Date Analyzed : 16-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
FUEL HYDROCARBONS	MG/L	<0.50
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
MSMSD # : 18457
Client : HARGIS & ASSOCIATES,INC.

Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: 15-JUL-91
Date Analyzed : 16-JUL-91
Sample Matrix : WATER
REF I.D. : 107242-01

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
FUEL HYDROCARBONS	MG/L	<0.50	10.0	9.2	92	8.7	87	6

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank Spike #: 15086
Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name : HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: 15-JUL-91
Date Analyzed : 16-JUL-91
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
FUEL HYDROCARBONS	MG/L	<0.50	8.2	10.0	82

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107219
Project # : 850
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW4	WATER	11-JUL-91	N/A	22-JUL-91	1.00
2	MW2	WATER	12-JUL-91	N/A	22-JUL-91	5.00
3	WB-1	WATER	11-JUL-91	N/A	22-JUL-91	1.00

Parameter	Units	1	2	3
CHLOROMETHANE	UG/L	<10	<50	<10
VINYL CHLORIDE	UG/L	<1	<5	<1
BROMOMETHANE	UG/L	<10	<50	<10
CHLOROETHANE	UG/L	<1	<5	<1
ACETONE	UG/L	<20	<100	<20
1,1-DICHLOROETHENE	UG/L	<1	<5	<1
METHYLENE CHLORIDE	UG/L	<5	<25	<5
CARBON DISULFIDE	UG/L	<1	<5	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<5	<1
VINYL ACETATE	UG/L	<10	<50	<10
1,1-DICHLOROETHANE	UG/L	<1	<5	<1
CIS-1,2-DICHLOROETHENE	UG/L	<1	<5	<1
CHLOROFORM	UG/L	<1	<5	<1
2-BUTANONE (MEK)	UG/L	<20	<100	<20
1,1,1-TRICHLOROETHANE	UG/L	<1	<5	<1
CARBON TETRACHLORIDE	UG/L	<1	<5	<1
1,2-DICHLOROETHANE	UG/L	<1	<5	<1
BENZENE	UG/L	<1	<5	<1
TRICHLOROETHENE	UG/L	<1	650	<1
1,2-DICHLOROPROPANE	UG/L	<1	<5	<1
BROMODICHLOROMETHANE	UG/L	<1	<5	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<50	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<5	<1
TOLUENE	UG/L	<2	<10	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<5	<1
2-HEXANONE (MBK)	UG/L	<10	<50	<10
1,1,2-TRICHLOROETHANE	UG/L	<1	<5	<1
TETRACHLOROETHENE	UG/L	<1	30	<1
DIBROMOCHLOROMETHANE	UG/L	<1	<5	<1
CHLOROBENZENE	UG/L	<1	<5	<1
ETHYLBENZENE	UG/L	<1	<5	<1
XYLENES (TOTAL)	UG/L	<1	<5	<1
STYRENE	UG/L	<1	<5	<1
BROMOFORM	UG/L	<5	<25	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<1	<5	<1
SURROGATES				
1,2-DICHLOROETHANE-D4	%	105	89	99
TOLUENE-D8	%	98	96	106
BFB	%	96	97	107

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D.: 107219
Project # : 850
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
1	NONE DETECTED	N/A	N/A
2	NONE DETECTED	N/A	N/A
3	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107219
Project # : 850
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	TB-1	WATER	12-JUL-91	N/A	22-JUL-91	1.00

Parameter	Units	4
CHLOROMETHANE	UG/L	<10
VINYL CHLORIDE	UG/L	<1
BROMOMETHANE	UG/L	<10
CHLOROETHANE	UG/L	<1
ACETONE	UG/L	<20
1,1-DICHLOROETHENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
CARBON DISULFIDE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
VINYL ACETATE	UG/L	<10
1,1-DICHLOROETHANE	UG/L	<1
CIS-1,2-DICHLOROETHENE	UG/L	<1
CHLOROFORM	UG/L	<1
2-BUTANONE (MEK)	UG/L	<20
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
1,2-DICHLOROETHANE	UG/L	<1
BENZENE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TOLUENE	UG/L	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
CHLOROBENZENE	UG/L	<1
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
STYRENE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<1
SURROGATES		
1,2-DICHLOROETHANE-D4	%	110
TOLUENE-D8	%	98
BFB	%	98

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D.: 107219
Project # : 850
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
4	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 13623
Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: N/A
Date Analyzed : 22-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
VINYL CHLORIDE	UG/L	<1
BROMOMETHANE	UG/L	<10
CHLOROETHANE	UG/L	<1
ACETONE	UG/L	<20
1,1-DICHLOROETHENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
CARBON DISULFIDE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
VINYL ACETATE	UG/L	<10
1,1-DICHLOROETHANE	UG/L	<1
CIS-1,2-DICHLOROETHENE	UG/L	<1
CHLOROFORM	UG/L	<1
2-BUTANONE (MEK)	UG/L	<20
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
1,2-DICHLOROETHANE	UG/L	<1
BENZENE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TOLUENE	UG/L	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
CHLOROBENZENE	UG/L	<1
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
STYRENE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<1
SURROGATES		
1,2-DICHLOROETHANE-D4	%	109
TOLUENE-D8	%	97
BFB	%	98

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK
ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 13623 ATI I.D. : 107219
Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

Parameters	Units	Results
NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 18732
Client : HARGIS & ASSOCIATES,INC.

Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: N/A
Date Analyzed : 21-JUL-91
Sample Matrix : WATER
REF I.D. : 107224-01

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
1,1-DICHLOROETHENE	UG/L	<5	200	140	70	140	70	0
BENZENE	UG/L	<5	250	220	88	220	88	0
TRICHLOROETHENE	UG/L	960	220	1100	64	1100	64	0
TOLUENE	UG/L	<10	250	250	100	240	96	4
CHLOROBENZENE	UG/L	<5	250	270	108	270	108	0

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 18885
Client : HARGIS & ASSOCIATES,INC.

Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: N/A
Date Analyzed : 20-JUL-91
Sample Matrix : WATER
REF I.D. : 107227-01

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
1,1-DICHLOROETHENE	UG/L	<1	40	29	73	29	73	0
BENZENE	UG/L	<1	50	45	90	45	90	0
TRICHLOROETHENE	UG/L	<1	45	39	87	40	89	3
TOLUENE	UG/L	<2	50	48	96	51	102	6
CHLOROBENZENE	UG/L	<1	50	52	104	52	104	0

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 15309
Client : HARGIS & ASSOCIATES, INC.
Project # : 850
Project Name : HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: N/A
Date Analyzed : 22-JUL-91
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
1,1-DICHLOROETHENE	UG/L	<1	25	40	62
BENZENE	UG/L	<1	43	50	86
TRICHLOROETHENE	UG/L	<1	39	45	87
TOLUENE	UG/L	<2	49	50	98
CHLOROBENZENE	UG/L	<1	52	50	104

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107219
Project # : 850
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW4	WATER	11-JUL-91	16-JUL-91	29-JUL-91	1.00
2	MW2	WATER	12-JUL-91	16-JUL-91	29-JUL-91	1.00
3	WB-1	WATER	11-JUL-91	16-JUL-91	29-JUL-91	1.00

Parameter	Units	1	2	3
N-NITROSODIMETHYLAMINE	UG/L	<10	<10	<10
PHENOL	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107219
Project # : 850
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW4	WATER	11-JUL-91	16-JUL-91	29-JUL-91	1.00
2	MW2	WATER	12-JUL-91	16-JUL-91	29-JUL-91	1.00
3	WB-1	WATER	11-JUL-91	16-JUL-91	29-JUL-91	1.00

Parameter	Units	1	2	3
4-NITROPHENOL	UG/L	<50	<50	<50
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
PHENANTHRENE	UG/L	<10	<10	<10
ANTHRACENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
PYRENE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10
SURROGATES				
NITROBENZENE-D5	%	61	58	53
2-FLUOROBIPHENYL	%	100	102	95
TERPHENYL-D14	%	113	108	114
PHENOL-D6	%	51	43	54
2-FLUOROPHENOL	%	81	77	92
2,4,6-TRIBROMOPHENOL	%	81	77	71

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D.: 107219
Project # : 850
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
1	NONE DETECTED	N/A	N/A
2	NONE DETECTED	N/A	N/A
3	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 13711
Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: 16-JUL-91
Date Analyzed : 25-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
N-NITROSODIMETHYLAMINE	UG/L	<10
PHENOL	UG/L	<10
ANILINE	UG/L	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10
2-CHLOROPHENOL	UG/L	<10
1,3-DICHLOROBENZENE	UG/L	<10
1,4-DICHLOROBENZENE	UG/L	<10
BENZYL ALCOHOL	UG/L	<10
1,2-DICHLOROBENZENE	UG/L	<10
2-METHYLPHENOL	UG/L	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<10
4-METHYLPHENOL	UG/L	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10
HEXACHLOROETHANE	UG/L	<10
NITROBENZENE	UG/L	<10
ISOPHORONE	UG/L	<10
2-NITROPHENOL	UG/L	<10
2,4-DIMETHYLPHENOL	UG/L	<10
BENZOIC ACID	UG/L	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10
2,4-DICHLOROPHENOL	UG/L	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10
NAPHTHALENE	UG/L	<10
4-CHLOROANILINE	UG/L	<10
HEXACHLOROBUTADIENE	UG/L	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10
2-METHYLNAPHTHALENE	UG/L	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50
2-CHLORONAPHTHALENE	UG/L	<10
2-NITROANILINE	UG/L	<50
DIMETHYLPHTHALATE	UG/L	<10
ACENAPHTHYLENE	UG/L	<10
2,6-DINITROTOLUENE	UG/L	<10
3-NITROANILINE	UG/L	<50
ACENAPHTHENE	UG/L	<10
2,4-DINITROPHENOL	UG/L	<50
4-NITROPHENOL	UG/L	<50
DIBENZOFURAN	UG/L	<10
2,4-DINITROTOLUENE	UG/L	<10
DIETHYLPHTHALATE	UG/L	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10
FLUORENE	UG/L	<10
4-NITROANILINE	UG/L	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 13711
Client : HARGIS & ASSOCIATES,INC.
Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: 16-JUL-91
Date Analyzed : 25-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
N-NITROSODIPHENYLAMINE	UG/L	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10
HEXACHLOROBENZENE	UG/L	<10
PENTACHLOROPHENOL	UG/L	<50
PHENANTHRENE	UG/L	<10
ANTHRACENE	UG/L	<10
DI-N-BUTYLPHTHALATE	UG/L	<10
FLUORANTHENE	UG/L	<10
PYRENE	UG/L	<10
BUTYLBENZYLPHTHALATE	UG/L	<10
3,3'-DICHLOROBENZIDINE	UG/L	<20
BENZO(a)ANTHRACENE	UG/L	<10
CHRYSENE	UG/L	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10
DI-N-OCTYLPHTHALATE	UG/L	<10
BENZO(b)FLUORANTHENE	UG/L	<10
BENZO(k)FLUORANTHENE	UG/L	<10
BENZO(a)PYRENE	UG/L	<10
INDENO(1,2,3-cd)PYRENE	UG/L	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10
BENZO(g,h,i)PERYLENE	UG/L	<10
SURROGATES		
NITROBENZENE-D5	%	72
2-FLUOROBIPHENYL	%	66
TERPHENYL-D14	%	72
PHENOL-D6	%	48
2-FLUOROPHENOL	%	80
2,4,6-TRIBROMOPHENOL	%	76

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 19172
Client : HARGIS & ASSOCIATES,INC.

Project # : 850
Project Name: HAC-TORRANCE

ATI I.D. : 107219
Date Extracted: 16-JUL-91
Date Analyzed : 29-JUL-91
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
PHENOL	UG/L	<10	200	150	75	140	70	7
2-CHLOROPHENOL	UG/L	<10	200	140	70	130	65	7
1,4-DICHLOROBENZENE	UG/L	<10	100	67	67	65	65	3
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	56	56	49	49	13
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	71	71	72	72	1
4-CHLORO-3-METHYLPHENOL	UG/L	<10	200	140	70	120	60	15
ACENAPHTHENE	UG/L	<10	100	78	78	70	70	11
4-NITROPHENOL	UG/L	<50	400	610	152*F	550	138*F	10
2,4-DINITROTOLUENE	UG/L	<10	100	83	83	54	54	42*F
PENTACHLOROPHENOL	UG/L	<50	400	300	75	340	85	12
PYRENE	UG/L	<10	100	90	90	80	80	12

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

*F RESULT OUTSIDE OF ATI'S QUALITY CONTROL LIMITS

CHAIN OF CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE _____ PAGE ___ OF ___

PROJECT NAME: HAC-~~GSG~~ Torrance

PROJECT No./TASK No.: ~~841~~ 850

PROJECT MANAGER: ~~Gary Vargas~~ Matt Wiedlin — **FAX No.** (619) 454-5839

QA MANAGER: Kathryn Parker — **FAX No.** (619) 454-5839

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SAMPLER (PRINTED):

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Bakersfield, CA 93318
(805) 327-4911 Dan Shultz

	LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX: Soil	MATRIX: Ground-water	MATRIX: Surface water		PRESERVATION: HCl	HNO3	NaOH	H2SO4	Ice	Glass bottle	SAMPLE CONTAINERS: 40 ml glass VOA vials	1 liter amber glass bottle	500-ml polyethylene	4-oz polyethylene	4-oz polyethylene	ANALYSES REQUESTED: ~~8010~~ 8015 TPH	8240/624 VOCs	8270 BNA	Trace Metals	Nitrate 353.2	Cyanide		ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S: Low (>ND-20)	Medium (20-100)	High (100+)	SPECIAL HANDLING	REMARKS
1		MW4	07/11/91	5:45 pm		✓			✓				✓	2						✓							✓				Metals
		"	"	"		✓			✓						2						✓						✓				SB, As, Be, Cd
		"	"	"		✓										1						✓					✓				Cr, Cu, Pb, Hg
		"	"	"		✓				✓							1						✓				✓				Ni, Se, Ag, Ti
		"	"	"		✓					[redacted]	✓						1						✓			✓				Zn
		"	"	"		✓					✓								1						✓		✓				
03		WB-1	07/11/91	5:45pm		✓			✓					2						✓							✓				
		"	"	"		✓			✓						2						✓						✓				
		"	"	"		✓										1					[redacted]	✓					✓				
04		TB-1	07/12/91	—		✓			✓						2	[redacted]					✓	[redacted]					✓				
05		MW2	07/12/91	4 pm		✓			✓					2						✓							✓				
		"	"	"		✓			✓						2						✓						✓				
		"	"	"		✓										2						✓					✓				
		"	"	4		✓				✓							1						✓				✓				
		"	"	"		✓						✓						1						✓			✓				
		"	"	"		✓					✓								1						✓		✓				

Total number of Containers per analysis:

Total No. of Containers: _____

Relinquished by:	Date	Received by:	Date
N. Rayfman	07/12/91		
Company	Time 9:00 pm	Company	Time
Relinquished by:	Date	Received by:	Date 7/12/91
Company	Time	Laboratory	Time 8:55

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- ☑ No. of containers correct
- ☑ received good condition/cold
- ☑ custody seals secure
- ☑ conforms to COC document

Shipment Method: _____

Send Results to: _____

- ☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
- ☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
- ☐ 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165
- ☐ 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992
- ☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

AnalyticalTechnologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D.: 107258

August 07, 1991

HARGIS & ASSOCIATES, INC.
2223 AVENIDA DE LA PLAYA, SUITE 300
LA JOLLA, CA 92037

Project Name: HAC-TORRANCE
Project # : 850.2

Attention: MATT WIEDLIN

Analytical Technologies, Inc. has received the following sample(s):

Date Received	Quantity	Matrix
July 15, 1991	4	SOIL
July 15, 1991	4	WATER

The sample(s) were analyzed with EPA methodology or equivalent methods as specified in the enclosed analytical schedule. The symbol for "less than" indicates a value below the reportable detection limit. Please see the attached sheet for the sample cross reference table.

The results of these analyses and the quality control data are enclosed.

SUSAN M. SNYDER
SENIOR PROJECT MANAGER

KENNETH WAHL
LABORATORY MANAGER

cc: RUSH BOYNTON
HARGIS & ASSOCIATES, INC.
111 N. SEPULVEDA BLVD. #350
MANHATTAN BEACH, CA 90266

Analytical Technologies, Inc.

SAMPLE CROSS REFERENCE

Client : HARGIS & ASSOCIATES, INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Report Date: August 07, 1991
ATI I.D. : 107258

ATI #	Client Description	Matrix	Date Collected
1	COMP MW1	SOIL	15-JUL-91
2	COMP MW2	SOIL	15-JUL-91
3	COMP MW3	SOIL	15-JUL-91
4	COMP MW4	SOIL	15-JUL-91
5	MW1	WATER	15-JUL-91
6	MW-3	WATER	15-JUL-91
7	MW-300	WATER	15-JUL-91
8	TB-2	WATER	15-JUL-91

---TOTALS---

Matrix	# Samples
SOIL	4
WATER	4

ATI STANDARD DISPOSAL PRACTICE

The sample(s) from this project will be disposed of in twenty-one (21) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

AnalyticalTechnologies,Inc.

ANALYTICAL SCHEDULE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D.: 107258

Analysis	Technique/Description
EPA 353.2 (NITRATE-NITRITE AS NITROGEN)	COLORIMETRIC
EPA 6010 (ANTIMONY)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BERYLLIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CADMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (COPPER)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (NICKEL)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SILVER)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (ZINC)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 7060 (ARSENIC)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7421 (LEAD)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7471 (MERCURY)	ATOMIC ABSORPTION/COLD VAPOR
EPA 7740 (SELENIUM)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7841 (THALLIUM)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 8010/8020 (HALOGENATED/AROMATIC VOLATILES)	GC/PHOTO IONIZATION/ELEC.COND. DETECTOR
EPA 8240 (GC/MS FOR VOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 9012 (TOTAL CYANIDE)	COLORIMETRIC
MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)	GC/FLAME IONIZATION DETECTOR

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D.: 107258

Sample #	Client ID	Matrix	Date Sampled	Date Received
5	MW1	WATER	15-JUL-91	15-JUL-91
6	MW-3	WATER	15-JUL-91	15-JUL-91
7	MW-300	WATER	15-JUL-91	15-JUL-91

Parameter	Units	5	6	7
TOTAL CYANIDE	MG/L	<0.01	<0.01	<0.01
NITRATE-NITRITE AS NITROGEN	MG/L	30.7	33.3	34.2

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

DUP/MS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
NITRATE-NITRITE AS NITROGEN	107275-01	MG/L	4.5	4.7	4	23.9	20.0	97
NITRATE-NITRITE AS NITROGEN	107306-01	MG/L	<0.05	<0.05	0	1.9	2.0	95
TOTAL CYANIDE	107258-07	MG/L	<0.01	<0.01	0	0.52	0.50	104

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

BLANK SPIKE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
NITRATE-NITRITE AS NITROGEN	15178	MG/L	<0.05	1.94	2.00	97
NITRATE-NITRITE AS NITROGEN	15389	MG/L	<0.05	1.94	2.00	97
TOTAL CYANIDE	15130	MG/L	<0.01	0.46	0.50	92

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D.: 107258

Sample #	Client ID	Matrix	Date Sampled	Date Received
5	MW1	WATER	15-JUL-91	15-JUL-91
6	MW-3	WATER	15-JUL-91	15-JUL-91
7	MW-300	WATER	15-JUL-91	15-JUL-91

Parameter	Units	5	6	7
SILVER	MG/L	<0.01	<0.01	<0.01
ARSENIC	MG/L	<0.002	<0.002	<0.002
BERYLLIUM	MG/L	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.005	<0.005	<0.005
CHROMIUM	MG/L	0.02	0.02	0.05
COPPER	MG/L	<0.02	0.03	<0.02
MERCURY	MG/L	<0.0005	<0.0005	<0.0005
NICKEL	MG/L	<0.01	0.03	0.02
LEAD	MG/L	0.013	0.024	0.098
ANTIMONY	MG/L	<0.03	<0.03	<0.03
SELENIUM	MG/L	0.002	0.003	0.003
THALLIUM	MG/L	<0.002	<0.002	<0.002
ZINC	MG/L	0.21	0.24	0.22

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
ANTIMONY	107256-04	MG/L	<0.03	<0.03	0	1.8	2.0	90
ARSENIC	107275-01	MG/L	<0.002	<0.002	0	1.9	2.0	95
BERYLLIUM	107256-04	MG/L	<0.005	<0.005	0	1.8	2.0	90
CADMIUM	107256-04	MG/L	<0.005	<0.005	0	1.7	2.0	85
CHROMIUM	107256-04	MG/L	<0.01	<0.01	0	1.7	2.0	85
COPPER	107256-04	MG/L	<0.02	<0.02	0	1.9	2.0	95
LEAD	107275-01	MG/L	0.007	0.004	55	2.1	2.0	105
MERCURY	107273-01	MG/L	<0.0005	<0.0005	0	0.0046	0.0050	92
NICKEL	107256-04	MG/L	<0.01	<0.01	0	1.8	2.0	90
SELENIUM	107275-01	MG/L	<0.002	<0.002	0	1.2	1.2	100
SILVER	107256-04	MG/L	<0.01	<0.01	0	1.6	2.0	80
THALLIUM	107275-01	MG/L	<0.002	<0.002	0	1.9	2.0	95
ZINC	107256-04	MG/L	<0.05	<0.05	0	1.8	2.0	90

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
ANTIMONY	15332	MG/L	<0.03	1.9	2.0	95
ARSENIC	15413	MG/L	<0.002	1.9	2.0	95
BERYLLIUM	15332	MG/L	<0.005	2.0	2.0	100
CADMIUM	15332	MG/L	<0.005	1.9	2.0	95
CHROMIUM	15332	MG/L	<0.01	1.9	2.0	95
COPPER	15332	MG/L	<0.02	2.0	2.0	100
LEAD	15435	MG/L	<0.002	2.0	2.0	100
MERCURY	15461	MG/L	<0.0005	0.0044	0.0050	88
NICKEL	15332	MG/L	<0.01	1.9	2.0	95
SELENIUM	15432	MG/L	<0.002	1.1	1.2	92
SILVER	15332	MG/L	<0.01	1.6	2.0	80
THALLIUM	15412	MG/L	<0.002	2.1	2.0	105

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : EPA 8010/8020 (HALOGENATED/AROMATIC VOLATILES)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	COMP MW1	SOIL	15-JUL-91	16-JUL-91	17-JUL-91	1.00
2	COMP MW2	SOIL	15-JUL-91	16-JUL-91	18-JUL-91	1.00
3	COMP MW3	SOIL	15-JUL-91	16-JUL-91	17-JUL-91	1.00

Parameter	Units	1	2	3
BENZENE	MG/KG	<0.025	<0.025	<0.025
BROMODICHLOROMETHANE	MG/KG	<0.01	<0.01	<0.01
BROMOFORM	MG/KG	<0.05	<0.05	<0.05
BROMOMETHANE	MG/KG	<0.01	<0.01	<0.01
CARBON TETRACHLORIDE	MG/KG	<0.01	<0.01	<0.01
CHLOROBENZENE	MG/KG	<0.025	<0.025	<0.025
CHLOROETHANE	MG/KG	<0.01	<0.01	<0.01
CHLOROFORM	MG/KG	<0.01	<0.01	<0.01
CHLOROMETHANE	MG/KG	<0.01	<0.01	<0.01
DIBROMOCHLOROMETHANE	MG/KG	<0.01	<0.01	<0.01
1,2-DICHLOROBENZENE	MG/KG	<0.025	<0.025	<0.025
1,3-DICHLOROBENZENE	MG/KG	<0.025	<0.025	<0.025
1,4-DICHLOROBENZENE	MG/KG	<0.025	<0.025	<0.025
DICHLORODIFLUOROMETHANE	MG/KG	<0.05	<0.05	<0.05
1,1-DICHLOROETHANE	MG/KG	<0.01	<0.01	<0.01
1,2-DICHLOROETHANE	MG/KG	<0.01	<0.01	<0.01
1,1-DICHLOROETHENE	MG/KG	<0.01	<0.01	<0.01
CIS-1,2-DICHLOROETHENE	MG/KG	<0.01	<0.01	<0.01
TRANS-1,2-DICHLOROETHENE	MG/KG	<0.01	<0.01	<0.01
1,2-DICHLOROPROPANE	MG/KG	<0.01	<0.01	<0.01
CIS-1,3-DICHLOROPROPENE	MG/KG	<0.01	<0.01	<0.01
TRANS-1,3-DICHLOROPROPENE	MG/KG	<0.01	<0.01	<0.01
ETHYLBENZENE	MG/KG	<0.025	<0.025	<0.025
METHYLENE CHLORIDE	MG/KG	<0.1	<0.1	<0.1
1,1,2,2-TETRACHLOROETHANE	MG/KG	<0.01	<0.01	<0.01
TETRACHLOROETHENE	MG/KG	<0.01	<0.01	<0.01
TOLUENE	MG/KG	<0.025	<0.025	<0.025
1,1,1-TRICHLOROETHANE	MG/KG	<0.01	<0.01	<0.01
1,1,2-TRICHLOROETHANE	MG/KG	<0.01	<0.01	<0.01
TRICHLOROETHENE	MG/KG	<0.01	<0.01	<0.01
TRICHLOROFLUOROMETHANE	MG/KG	<0.1	<0.1	<0.1
VINYL CHLORIDE	MG/KG	<0.01	<0.01	<0.01
XYLENES (TOTAL)	MG/KG	<0.05	<0.05	<0.05
SURROGATES				
BROMOFLUOROBENZENE (ELCD)	%	93	82	107
BROMOFLUOROBENZENE (PID)	%	103	100	103

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : EPA 8010/8020 (HALOGENATED/AROMATIC VOLATILES)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	COMP MW4	SOIL	15-JUL-91	16-JUL-91	17-JUL-91	1.00

Parameter	Units	4
BENZENE	MG/KG	<0.025
BROMODICHLOROMETHANE	MG/KG	<0.01
BROMOFORM	MG/KG	<0.05
BROMOMETHANE	MG/KG	<0.01
CARBON TETRACHLORIDE	MG/KG	<0.01
CHLOROBENZENE	MG/KG	<0.025
CHLOROETHANE	MG/KG	<0.01
CHLOROFORM	MG/KG	<0.01
CHLOROMETHANE	MG/KG	<0.01
DIBROMOCHLOROMETHANE	MG/KG	<0.01
1,2-DICHLOROBENZENE	MG/KG	<0.025
1,3-DICHLOROBENZENE	MG/KG	<0.025
1,4-DICHLOROBENZENE	MG/KG	<0.025
DICHLORODIFLUOROMETHANE	MG/KG	<0.05
1,1-DICHLOROETHANE	MG/KG	<0.01
1,2-DICHLOROETHANE	MG/KG	<0.01
1,1-DICHLOROETHENE	MG/KG	<0.01
CIS-1,2-DICHLOROETHENE	MG/KG	<0.01
TRANS-1,2-DICHLOROETHENE	MG/KG	<0.01
1,2-DICHLOROPROPANE	MG/KG	<0.01
CIS-1,3-DICHLOROPROPENE	MG/KG	<0.01
TRANS-1,3-DICHLOROPROPENE	MG/KG	<0.01
ETHYLBENZENE	MG/KG	<0.025
METHYLENE CHLORIDE	MG/KG	<0.1
1,1,2,2-TETRACHLOROETHANE	MG/KG	<0.01
TETRACHLOROETHENE	MG/KG	<0.01
TOLUENE	MG/KG	<0.025
1,1,1-TRICHLOROETHANE	MG/KG	<0.01
1,1,2-TRICHLOROETHANE	MG/KG	<0.01
TRICHLOROETHENE	MG/KG	<0.01
TRICHLOROFLUOROMETHANE	MG/KG	<0.1
VINYL CHLORIDE	MG/KG	<0.01
XYLENES (TOTAL)	MG/KG	<0.05
SURROGATES		
BROMOFLUOROBENZENE (ELCD)	%	90
BROMOFLUOROBENZENE (PID)	%	94

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8010/8020 (HALOGENATED/AROMATIC VOLATILES)
Blank I.D. : 13470
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 16-JUL-91
Date Analyzed : 17-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
BENZENE	MG/KG	<0.025
BROMODICHLOROMETHANE	MG/KG	<0.01
BROMOFORM	MG/KG	<0.05
BROMOMETHANE	MG/KG	<0.01
CARBON TETRACHLORIDE	MG/KG	<0.01
CHLOROBENZENE	MG/KG	<0.025
CHLOROETHANE	MG/KG	<0.01
CHLOROFORM	MG/KG	<0.01
CHLOROMETHANE	MG/KG	<0.01
DIBROMOCHLOROMETHANE	MG/KG	<0.01
1,2-DICHLOROBENZENE	MG/KG	<0.025
1,3-DICHLOROBENZENE	MG/KG	<0.025
1,4-DICHLOROBENZENE	MG/KG	<0.025
DICHLORODIFLUOROMETHANE	MG/KG	<0.05
1,1-DICHLOROETHANE	MG/KG	<0.01
1,2-DICHLOROETHANE	MG/KG	<0.01
1,1-DICHLOROETHENE	MG/KG	<0.01
CIS-1,2-DICHLOROETHENE	MG/KG	<0.01
TRANS-1,2-DICHLOROETHENE	MG/KG	<0.01
1,2-DICHLOROPROPANE	MG/KG	<0.01
CIS-1,3-DICHLOROPROPENE	MG/KG	<0.01
TRANS-1,3-DICHLOROPROPENE	MG/KG	<0.01
ETHYLBENZENE	MG/KG	<0.025
METHYLENE CHLORIDE	MG/KG	<0.1
1,1,2,2-TETRACHLOROETHANE	MG/KG	<0.01
TETRACHLOROETHENE	MG/KG	<0.01
TOLUENE	MG/KG	<0.025
1,1,1-TRICHLOROETHANE	MG/KG	<0.01
1,1,2-TRICHLOROETHANE	MG/KG	<0.01
TRICHLOROETHENE	MG/KG	<0.01
TRICHLOROFLUOROMETHANE	MG/KG	<0.1
VINYL CHLORIDE	MG/KG	<0.01
XYLENES (TOTAL)	MG/KG	<0.05
SURROGATES		
BROMOFLUOROBENZENE (ELCD)	%	92
BROMOFLUOROBENZENE (PID)	%	114

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : EPA 8010/8020 (HALOGENATED/AROMATIC VOLATILES)
MSMSD # : 18439
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 16-JUL-91
Date Analyzed : 18-JUL-91
Sample Matrix : SOIL
REF I.D. : 107258-04

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
BENZENE	MG/KG	<0.025	0.500	0.34	68	0.34	68	0
CHLOROBENZENE	MG/KG	<0.025	0.200	0.15	75	0.15	75	0
CHLOROFORM	MG/KG	<0.010	0.200	0.16	80	0.17	85	6
1,1-DICHLOROETHENE	MG/KG	<0.010	0.200	0.13	65	0.11	55	17
TETRACHLOROETHENE	MG/KG	<0.010	0.200	0.16	80	0.16	80	0
TOLUENE	MG/KG	<0.025	0.500	0.36	72	0.36	72	0
TRICHLOROETHENE	MG/KG	<0.010	0.200	0.16	80	0.16	80	0

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8010/8020 (HALOGENATED/AROMATIC VOLATILES)
Blank Spike #: 15066
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 16-JUL-91
Date Analyzed : 16-JUL-91
Sample Matrix : SOIL

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	MG/KG	<0.025	0.47	0.500	94
CHLOROBENZENE	MG/KG	<0.025	0.20	0.200	100
CHLOROFORM	MG/KG	<0.010	0.18	0.200	90
1,1-DICHLOROETHENE	MG/KG	<0.010	0.17	0.200	85
TETRACHLOROETHENE	MG/KG	<0.010	0.19	0.200	95
TOLUENE	MG/KG	<0.025	0.49	0.500	98
TRICHLOROETHENE	MG/KG	<0.010	0.19	0.200	95

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
5	MW1	WATER	15-JUL-91	17-JUL-91	17-JUL-91	1.00
6	MW-3	WATER	15-JUL-91	17-JUL-91	17-JUL-91	1.00
7	MW-300	WATER	15-JUL-91	17-JUL-91	17-JUL-91	1.00

Parameter	Units	5	6	7
FUEL HYDROCARBONS	MG/L	<0.50	<0.50	<0.50
HYDROCARBON RANGE		-	-	-
HYDROCARBONS QUANTITATED USING		-	-	-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	COMP MW1	SOIL	15-JUL-91	16-JUL-91	16-JUL-91	1.00
2	COMP MW2	SOIL	15-JUL-91	16-JUL-91	16-JUL-91	1.00
3	COMP MW3	SOIL	15-JUL-91	16-JUL-91	16-JUL-91	1.00

Parameter	Units	1	2	3
FUEL HYDROCARBONS	MG/KG	<5.0	<5.0	<5.0
HYDROCARBON RANGE		-	-	-
HYDROCARBONS QUANTITATED USING		-	-	-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	COMP MW4	SOIL	15-JUL-91	17-JUL-91	16-JUL-91	1.00

Parameter	Units	4
FUEL HYDROCARBONS	MG/KG	<5.0
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank I.D. : 13473
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 16-JUL-91
Date Analyzed : 16-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
FUEL HYDROCARBONS	MG/KG	<5.0
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank I.D. : 13516
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 17-JUL-91
Date Analyzed : 17-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
FUEL HYDROCARBONS	MG/L	<0.50
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
MSMSD # : 18184
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 11-JUL-91
Date Analyzed : 11-JUL-91
Sample Matrix : SOIL
REF I.D. : REAGENT SOIL

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
FUEL HYDROCARBONS	MG/KG	<5.0	100	89	89	86	86	3

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
MSMSD # : 18597
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 17-JUL-91
Date Analyzed : 17-JUL-91
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
FUEL HYDROCARBONS	MG/L	<0.50	10.0	7.9	79	7.2	72	9

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank Spike #: 15071
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 16-JUL-91
Date Analyzed : 16-JUL-91
Sample Matrix : SOIL

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
FUEL HYDROCARBONS	MG/KG	<5.0	85	100	85

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank Spike #: 15147
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 17-JUL-91
Date Analyzed : 17-JUL-91
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
FUEL HYDROCARBONS	MG/L	<0.50	7.1	10.0	71

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
5	MW1	WATER	15-JUL-91	N/A	24-JUL-91	2.00
6	MW-3	WATER	15-JUL-91	N/A	24-JUL-91	1.00
7	MW-300	WATER	15-JUL-91	N/A	24-JUL-91	1.00

Parameter	Units	5	6	7
CHLOROMETHANE	UG/L	<20	<10	<10
VINYL CHLORIDE	UG/L	<2	<1	<1
BROMOMETHANE	UG/L	<20	<10	<10
CHLOROETHANE	UG/L	<2	<1	<1
ACETONE	UG/L	<40	<20	<20
1,1-DICHLOROETHENE	UG/L	<2	<1	<1
METHYLENE CHLORIDE	UG/L	<10	<5	<5
CARBON DISULFIDE	UG/L	<2	<1	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<2	<1	<1
VINYL ACETATE	UG/L	<20	<10	<10
1,1-DICHLOROETHANE	UG/L	<2	<1	<1
CIS-1,2-DICHLOROETHENE	UG/L	<2	<1	<1
CHLOROFORM	UG/L	<2	<1	<1
2-BUTANONE (MEK)	UG/L	<40	<20	<20
1,1,1-TRICHLOROETHANE	UG/L	3	<1	<1
CARBON TETRACHLORIDE	UG/L	<2	<1	<1
1,2-DICHLOROETHANE	UG/L	<2	<1	<1
BENZENE	UG/L	<2	<1	<1
TRICHLOROETHENE	UG/L	180	2	2
1,2-DICHLOROPROPANE	UG/L	<2	<1	<1
BROMODICHLOROMETHANE	UG/L	<2	<1TR	<1TR
4-METHYL-2-PENTANONE (MIBK)	UG/L	<20	<10	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<2	<1	<1
TOLUENE	UG/L	<4	<2	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<2	<1	<1
2-HEXANONE (MBK)	UG/L	<20	<10	<10
1,1,2-TRICHLOROETHANE	UG/L	<2	<1	<1
TETRACHLOROETHENE	UG/L	22	<1	<1
DIBROMOCHLOROMETHANE	UG/L	<2	<1TR	<1
CHLOROBENZENE	UG/L	<2	<1	<1
ETHYLBENZENE	UG/L	<2	<1	<1
XYLENES (TOTAL)	UG/L	<2	<1	<1
STYRENE	UG/L	<2	<1	<1
BROMOFORM	UG/L	<10	<5	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<2	<1	<1
SURROGATES				
1,2-DICHLOROETHANE-D4	%	100	115	103
TOLUENE-D8	%	106	104	105
BFB	%	102	103	99

TR COMPOUND DETECTED AT AN UNQUANTIFIABLE TRACE LEVEL

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D.: 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
5	FREON 113	UG/L	16*P
6	NONE DETECTED	N/A	N/A
7	NONE DETECTED	N/A	N/A

*P A STANDARD WAS USED TO QUANTITATE THIS VALUE.

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
8	TB-2	WATER	15-JUL-91	N/A	24-JUL-91	1.00

Parameter	Units	8
CHLOROMETHANE	UG/L	<10
VINYL CHLORIDE	UG/L	<1
BROMOMETHANE	UG/L	<10
CHLOROETHANE	UG/L	<1
ACETONE	UG/L	<20
1,1-DICHLOROETHENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
CARBON DISULFIDE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
VINYL ACETATE	UG/L	<10
1,1-DICHLOROETHANE	UG/L	<1
CIS-1,2-DICHLOROETHENE	UG/L	<1
CHLOROFORM	UG/L	<1
2-BUTANONE (MEK)	UG/L	<20
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
1,2-DICHLOROETHANE	UG/L	<1
BENZENE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TOLUENE	UG/L	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
CHLOROBENZENE	UG/L	<1
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
STYRENE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<1
SURROGATES		
1,2-DICHLOROETHANE-D4	%	97
TOLUENE-D8	%	101
BFB	%	98

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D.: 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
8	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 13658
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: N/A
Date Analyzed : 24-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
VINYL CHLORIDE	UG/L	<1
BROMOMETHANE	UG/L	<10
CHLOROETHANE	UG/L	<1
ACETONE	UG/L	<20
1,1-DICHLOROETHENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5TR
CARBON DISULFIDE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
VINYL ACETATE	UG/L	<10
1,1-DICHLOROETHANE	UG/L	<1
CIS-1,2-DICHLOROETHENE	UG/L	<1
CHLOROFORM	UG/L	<1
2-BUTANONE (MEK)	UG/L	<20
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
1,2-DICHLOROETHANE	UG/L	<1
BENZENE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TOLUENE	UG/L	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
CHLOROBENZENE	UG/L	<1
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
STYRENE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<1
SURROGATES		
1,2-DICHLOROETHANE-D4	%	105
TOLUENE-D8	%	101
BFB	%	101

TR COMPOUND DETECTED AT AN UNQUANTIFIABLE TRACE LEVEL

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK
ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 13658 ATI I.D. : 107258
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Parameters	Units	Results
NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 18960
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: N/A
Date Analyzed : 24-JUL-91
Sample Matrix : WATER
REF I.D. : 107258-07

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
1,1-DICHLOROETHENE	UG/L	<1	40	29	72	30	75	3
BENZENE	UG/L	<1	50	47	94	47	94	0
TRICHLOROETHENE	UG/L	2	45	44	93	43	91	2
TOLUENE	UG/L	<2	50	52	104	52	104	0
CHLOROBENZENE	UG/L	<1	50	55	110	56	112	2

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 15354
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: N/A
Date Analyzed : 24-JUL-91
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
1,1-DICHLOROETHENE	UG/L	<1	27	40	68
BENZENE	UG/L	<1	43	50	86
TRICHLOROETHENE	UG/L	<1	38	45	84
TOLUENE	UG/L	<2	48	50	96
CHLOROBENZENE	UG/L	<1	52	50	104

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
5	MW1	WATER	15-JUL-91	18-JUL-91	01-AUG-91	1.00
6	MW-3	WATER	15-JUL-91	18-JUL-91	01-AUG-91	1.00
7	MW-300	WATER	15-JUL-91	18-JUL-91	01-AUG-91	1.00

Parameter	Units	5	6	7
N-NITROSODIMETHYLAMINE	UG/L	<10	<10	<10
PHENOL	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
5	MW1	WATER	15-JUL-91	18-JUL-91	01-AUG-91	1.00
6	MW-3	WATER	15-JUL-91	18-JUL-91	01-AUG-91	1.00
7	MW-300	WATER	15-JUL-91	18-JUL-91	01-AUG-91	1.00

Parameter	Units	5	6	7
4-NITROPHENOL	UG/L	<50	<50	<50
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
PHENANTHRENE	UG/L	<10	<10	<10
ANTHRACENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
PYRENE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10
SURROGATES				
NITROBENZENE-D5	%	44	35*T	50
2-FLUOROBIPHENYL	%	72	44	84
TERPHENYL-D14	%	108	72	120
PHENOL-D6	%	54	25	62
2-FLUOROPHENOL	%	92	46	94
2,4,6-TRIBROMOPHENOL	%	85	87	93

*T SURROGATE RECOVERY IS OUTSIDE QC CONTROL LIMITS. NO CORRECTIVE ACTION INDICATED BY METHOD.

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES, INC. ATI I.D.: 107258
Project # : 850.2
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
5	NONE DETECTED	N/A	N/A
6	NONE DETECTED	N/A	N/A
7	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 13869
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 18-JUL-91
Date Analyzed : 01-AUG-91
Dil. Factor : 1.00

Parameters	Units	Results
N-NITROSODIMETHYLAMINE	UG/L	<10
PHENOL	UG/L	<10
ANILINE	UG/L	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10
2-CHLOROPHENOL	UG/L	<10
1,3-DICHLOROBENZENE	UG/L	<10
1,4-DICHLOROBENZENE	UG/L	<10
BENZYL ALCOHOL	UG/L	<10
1,2-DICHLOROBENZENE	UG/L	<10
2-METHYLPHENOL	UG/L	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<10
4-METHYLPHENOL	UG/L	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10
HEXACHLOROETHANE	UG/L	<10
NITROBENZENE	UG/L	<10
ISOPHORONE	UG/L	<10
2-NITROPHENOL	UG/L	<10
2,4-DIMETHYLPHENOL	UG/L	<10
BENZOIC ACID	UG/L	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10
2,4-DICHLOROPHENOL	UG/L	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10
NAPHTHALENE	UG/L	<10
4-CHLOROANILINE	UG/L	<10
HEXACHLOROBUTADIENE	UG/L	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10
2-METHYLNAPHTHALENE	UG/L	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50
2-CHLORONAPHTHALENE	UG/L	<10
2-NITROANILINE	UG/L	<50
DIMETHYLPHTHALATE	UG/L	<10
ACENAPHTHYLENE	UG/L	<10
2,6-DINITROTOLUENE	UG/L	<10
3-NITROANILINE	UG/L	<50
ACENAPHTHENE	UG/L	<10
2,4-DINITROPHENOL	UG/L	<50
4-NITROPHENOL	UG/L	<50
DIBENZOFURAN	UG/L	<10
2,4-DINITROTOLUENE	UG/L	<10
DIETHYLPHTHALATE	UG/L	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10
FLUORENE	UG/L	<10
4-NITROANILINE	UG/L	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 13869
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 18-JUL-91
Date Analyzed : 01-AUG-91
Dil. Factor : 1.00

Parameters	Units	Results
N-NITROSODIPHENYLAMINE	UG/L	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10
HEXACHLOROBENZENE	UG/L	<10
PENTACHLOROPHENOL	UG/L	<50
PHENANTHRENE	UG/L	<10
ANTHRACENE	UG/L	<10
DI-N-BUTYLPHTHALATE	UG/L	<10
FLUORANTHENE	UG/L	<10
PYRENE	UG/L	<10
BUTYLBENZYLPHTHALATE	UG/L	<10
3,3'-DICHLOROBENZIDINE	UG/L	<20
BENZO(a)ANTHRACENE	UG/L	<10
CHRYSENE	UG/L	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10
DI-N-OCTYLPHTHALATE	UG/L	<10
BENZO(b)FLUORANTHENE	UG/L	<10
BENZO(k)FLUORANTHENE	UG/L	<10
BENZO(a)PYRENE	UG/L	<10
INDENO(1,2,3-cd)PYRENE	UG/L	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10
BENZO(g,h,i)PERYLENE	UG/L	<10
SURROGATES		
NITROBENZENE-D5	%	54
2-FLUOROBIPHENYL	%	80
TERPHENYL-D14	%	106
PHENOL-D6	%	66
2-FLUOROPHENOL	%	95
2,4,6-TRIBROMOPHENOL	%	71

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK
ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 13869 ATI I.D. : 107258
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Parameters	Units	Results
NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 19519
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107258
Date Extracted: 18-JUL-91
Date Analyzed : 01-AUG-91
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
PHENOL	UG/L	<10	200	150	75	150	75	0
2-CHLOROPHENOL	UG/L	<10	200	160	80	150	75	6
1,4-DICHLOROBENZENE	UG/L	<10	100	68	68	71	71	4
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	45	45	39	39*F	14
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	79	79	80	80	1
4-CHLORO-3-METHYLPHENOL	UG/L	<10	100	160	80	140	70	13
ACENAPHTHENE	UG/L	<10	100	72	72	78	78	8
4-NITROPHENOL	UG/L	<50	400	620	155	590	148	5
2,4-DINITROTOLUENE	UG/L	<10	100	60	60	60	60	0
PENTACHLOROPHENOL	UG/L	<50	400	460	115	460	115	0
PYRENE	UG/L	<10	100	89	89	100	100	12

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

*F RESULT OUTSIDE OF ATI'S QUALITY CONTROL LIMITS

CUSTODY RECORD AND ANALYSIS REQUEST FORM

PROJECT NAME: HAC Torrance

PROJECT No./TASK No.: 850.2

PROJECT MANAGER: FAX No.:

QA MANAGER: Matt Wiedlin FAX No.:

SAMPLER (SIGNATURE): N. Raykhman

SAMPLER (PRINTED): Natalia Raykhman

DATE: PAGE 1 OF 1

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS Gross Gas	SAMPLE CONTAINERS 7/16/91	SAMPLE CONTAINERS 8010/8020	ANALYSES REQUESTED 8270 VOCs	ANALYSES REQUESTED 8015 TPH	ANALYSES REQUESTED CCR Metals	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S	SPECIAL HANDLING	LABORATORY INFORMATION
	Comp MW 1	07/15/91	19.00	V							V	1			V	V	V			
	Comp MW 2	"	"	V							V	1			V	V	V			
	Comp MW 3	"	"	V							V	1			V	V	V			
	Comp MW 4	"	"	V							V	1			V	V	V			
		*	*																	

Donot analyze for metals until this OKs. Decision to analyze for metals will come after receiving organic results

MW 7/16/91

107258

REMARKS

WPL

Mw 1 1 week turnaround ~~48 hr~~ turn ground

MW-2 QUALIFY TPH using diesel standard

MW-1, MW-3, + MW-4 NOT SURE OF ORIGIN

Total number of Containers per analysis:

Total No. of Containers: 4

Relinquished by:	Date	Received by:	Date
N. Raykhman	07/15/91		
Company	Time	Company	Time
Relinquished by	Date	Received by: [signature]	Date 7/15/91
	Time	Laboratory: ATT Sample Co	Time 7:50 pm
Company			

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only), sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:

[ ] No. of containers correct [ ] received good condition/cold

[ ] custody seals secure [ ] conforms to COC document

Shipment Method: HAND DELIVERY

Send Results to: ~~MATT WIEDLIN~~

[ ] 3305 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300

[ ] 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888

[✓] MATT WIEDLIN 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165

[✓] RUSH BOYNTON 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992

[ ] 1616 W. BURBANK BLVD. No. E BURBANK, CA 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

JUL 16 '91 13:24 619 454-8862 P.2

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 7/15/91 PAGE 1 OF 1

PROJECT NAME: HAC Torrance
PROJECT No./TASK No.:
PROJECT MANAGER:
FAX No.:
QA MANAGER: Matt Wiedlin
FAX No.:
SAMPLER (SIGNATURE): N. Raykhman
SAMPLER (PRINTED): Natalia Raykhman

LABORATORY INFORMATION: 850.2

107258

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS glass jar	ANALYSES REQUESTED 8240 VOCs	ANALYSES REQUESTED 8015 TPH	ANALYSES REQUESTED CCR metals	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S	SPECIAL HANDLING	REMARKS
01	Comp MW 1	07/15/91	19:00	V							V	1	V	V	V			
02	Comp MW 2	"	"	V							V	1	V	V	V			48 hr
03	Comp MW 3	"	"	V							V	1	V	V	V			turn ground
04	Comp MW 4	"	"	V							V	1	V	V	V			
		*	*															MW-2 QUATIFY
																		TPH using
																		diesel standard
																		MW-1, MW-3,
																		+ MW-4 NOT
																		SURE OF ORGIN

Total number of Containers per analysis:

Total No. of Containers: 4

Relinquished by:	Date	Received by:	Date
N. Raykhman	07/15/91		
Company	Time	Company	Time
Relinquished by	Date	Received by: [signature]	Date 7/15/91
	Time	ATT Sample Laboratory	Time 7:50 pm
Company			

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- ☐ No. of containers correct
- ☐ received good condition/cold
- ☐ custody seals secure
- ☐ conforms to COC document

Shipment Method: HAND DELIVERY

Send Results to: [redacted]

- ☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
- ☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
- ☑ MATT WIEDLIN 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165
- ☑ RUSH BOYNTON 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992
- ☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 7/15/91 PAGE 1 OF 1

PROJECT NAME: HAC Torrance
PROJECT No./TASK No.: 850
PROJECT MANAGER: Matt Wiedlin
FAX No.:
QA MANAGER:
FAX No.:
SAMPLER (SIGNATURE): N. Raykhman
SAMPLER (PRINTED): Natalia Raykhman

SAMPLE CONTAINERS: glass bottle; 40 ml glass vials; 1 liter amber glass; 500-ml polyethylene; 4-oz polyethylene; 4-oz polyethylene

ANALYSES REQUESTED: 8015 TPH; 8240/624 VOCs; 8270 BNA; Trance Metals; Nitrate 353.2; Cyanide

ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S

SPECIAL HANDLING

LABORATORY INFORMATION

10788

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	glass bottle	40 ml glass vials	1 liter amber glass	500-ml polyethylene	4-oz polyethylene	4-oz polyethylene	8015 TPH	8240/624 VOCs	8270 BNA	Trance Metals	Nitrate 353.2	Cyanide	REMARKS
05	MW1	07/15/91	18:20		✓		✓				✓	1						✓						Metals
↓	"	"	"		✓		✓				✓		2						✓					Sb, As, Be,
	"	"	"		✓						✓			2						✓				Cd, Cr, Cu,
	"	"	"		✓			✓			✓				1						✓			Pb, Hg, Ni,
	"	"	"		✓					✓	✓					1						✓		Se, Ag, Ti,
	"	"	"		✓				✓		✓						1						✓	Zn

Total number of Containers per analysis:

Total No. of Containers: 8 (26 TOTAL)

Relinquished by:	Date	Received by:	Date
N. Raykhman	Time		Time
Company	07/15/91	Company	

Relinquished by	Date	Received by:	Date
	Time	[signature]	7/15/91
Company		ATI Sample	Time 950 PM
		Laboratory	

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- ☐ No. of containers correct
- ☐ received good condition/cold
- ☑ custody seals secure
- ☐ conforms to COC document

Shipment Method: HAND DELIV.

Send Results to:

- ☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
- ☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
- ✓ MATT WIEDLIN 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165
- ☑ RUSH BOYNTON 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992
- ☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 7/15/9 PAGE 1 OF 1

PROJECT NAME: HAC Torrance
PROJECT No./TASK No.:
PROJECT MANAGER: Matt Wiedlin
FAX No.:
QA MANAGER:
FAX No.:
SAMPLER (SIGNATURE): N. Raykhman
SAMPLER (PRINTED): Natalia Raykhman

LABORATORY INFORMATION: 107258

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX: Soil	MATRIX: Ground-water	MATRIX: Surface water	PRESERVATION: HCl	PRESERVATION: HNO3	PRESERVATION: NaOH	PRESERVATION: H2SO4	PRESERVATION: Ice	SAMPLE CONTAINERS: 40 ml glass VOA vials	SAMPLE CONTAINERS: 1 liter amber glass	SAMPLE CONTAINERS: 500-ml polyethylene	SAMPLE CONTAINERS: 4-oz polyethylene	SAMPLE CONTAINERS: 4-oz polyethylene	ANALYSES REQUESTED: 8015 TPH	ANALYSES REQUESTED: 8240/624 VOCs	ANALYSES REQUESTED: 8270 BNs	ANALYSES REQUESTED: Trace Metals	ANALYSES REQUESTED: Nitrate 353.2	ANALYSES REQUESTED: Cyanide	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S: Low	SPECIAL HANDLING	REMARKS
06	MW-3	07/15/91	13:00		✓		✓				✓	1					✓						✓		Metals:
	"	"	"		✓		✓				✓		2					✓					✓		Sb, As, Be,
	"	"	"		✓						✓			2					✓				✓		Cd, Cr, Cu,
	"	"	"		✓			✓			✓				1					✓			✓		Pb, Hg, Ni,
	"	"	"		✓					✓	✓					1					✓		✓		Se, Ag, Ti,
	"	"	"		✓				✓		✓											✓	✓		Zn
07	MW-300	07/15/91	13:00		✓		✓				✓	1					✓						✓		
	"	"	"		✓		✓				✓		2					✓					✓		Regular
	"	"	"		✓						✓			2					✓				✓		turn around
	"	"	"		✓			✓			✓				1					✓			✓		
	"	"	"		✓					✓	✓					1					✓		✓		
	"	"	"		✓				✓		✓					1						✓	✓		
08	TB-2	07/15/91			✓		✓				✓	2						✓					✓		

Total number of Containers per analysis:

Total No. of Containers: 18

Relinquished by:	Date	Received by:	Date
N. Raykhman	07/15/91		
Company	Time	Company	Time
Relinquished by	Date	Received by:	Date 7/15/91
	Time	Laboratory	Time
Company			

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- ☐ No. of containers correct
- ☐ received good condition/cold
- ☐ custody seals secure
- ☐ conforms to COC document

Shipment Method: HAND DELIV.

Send Results to:
- ☐ 3385 N. CAMPBELL No. 121, TUCSON, AZ 85719 (602) 881-7300
- ☐ 2222 S. DOBSON RD. No. 401, MESA, AZ 85202 (602) 345-0888
- ☑ MATT WIEDLIN 2223 AVENIDA DE LA PLAYA No. 300, LA JOLLA, CA 92037 (619) 454-0165
- ☑ RUSH BOTNION 111 N. SEPULVEDA BLVD. No. 250, MANHATTAN BEACH, CA 90266 (213) 372-7992
- ☐ 1616 W. BURBANK BLVD. No. E, BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

AnalyticalTechnologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

ATI I.D.: 10739

August 16, 1991

HARGIS & ASSOCIATES, INC.
2223 AVENIDA DE LA PLAYA, SUITE 300
LA JOLLA, CA 92037

Project Name: HAC-TORRANCE
Project # : 850.2

Attention: MATT WIEDLIN

Analytical Technologies, Inc. has received the following sample(s):

Date Received	Quantity	Matrix
July 23, 1991	7	WATER

The sample(s) were analyzed with EPA methodology or equivalent methods as specified in the enclosed analytical schedule. The symbol for "less than" indicates a value below the reportable detection limit. Please see the attached sheet for the sample cross reference table.

The results of these analyses and the quality control data are enclosed.

SUSAN M. SNYDER
SENIOR PROJECT MANAGER

for: KENNETH WAHL
LABORATORY MANAGER

cc: RUSH BOYNTON
HARGIS & ASSOCIATES
111 N. SEPUWEDA BLVD.
MANHATTAN BEACH, CA 90266

AnalyticalTechnologies,Inc.

SAMPLE CROSS REFERENCE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Report Date: August 16, 1991
ATI I.D. : 107394

ATI #	Client Description	Matrix	Date Collected
1	MW-1	WATER	23-JUL-91
2	WB-2	WATER	23-JUL-91
3	MW-200	WATER	23-JUL-91
4	MW-3	WATER	23-JUL-91
5	MW-4	WATER	23-JUL-91
6	MW-2	WATER	23-JUL-91
7	TB-3	WATER	23-JUL-91

---TOTALS---

Matrix	# Samples
WATER	7

ATI STANDARD DISPOSAL PRACTICE

The sample(s) from this project will be disposed of in twenty-one (21) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

AnalyticalTechnologies,Inc.

ANALYTICAL SCHEDULE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D.: 1073

Analysis	Technique/Description
EPA 353.2 (NITRATE-NITRITE AS NITROGEN)	COLORIMETRIC
EPA 6010 (ANTIMONY)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (BERYLLIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CADMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (COPPER)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (NICKEL)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (SILVER)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 6010 (ZINC)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 7060 (ARSENIC)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7421 (LEAD)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7471 (MERCURY)	ATOMIC ABSORPTION/COLD VAPOR
EPA 7740 (SELENIUM)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 7841 (THALLIUM)	ATOMIC ABSORPTION/GRAPHITE FURNACE
EPA 8240 (GC/MS FOR VOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)	GC/MASS SPECTROMETER
EPA 9012 (TOTAL CYANIDE)	COLORIMETRIC
MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)	GC/FLAME IONIZATION DETECTOR

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY RESULTS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D.: 10739

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	MW-1	WATER	23-JUL-91	23-JUL-9
3	MW-200	WATER	23-JUL-91	23-JUL-9
4	MW-3	WATER	23-JUL-91	23-JUL-9
5	MW-4	WATER	23-JUL-91	23-JUL-9
6	MW-2	WATER	23-JUL-91	23-JUL-9

Parameter	Units	1	3	4	5	6
TOTAL CYANIDE	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
NITRATE-NITRITE AS NITROGEN	MG/L	32.0	55.0	36.0	51.0	56.0

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

DUP/MS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 10739

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
NITRATE-NITRITE AS NITROGEN	107395-01	MG/L	4.6	4.6	0	24.2	20.0	98
TOTAL CYANIDE	107348-38	MG/L	<0.01	<0.01	0	0.54	0.50	108

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

GENERAL CHEMISTRY - QUALITY CONTROL

BLANK SPIKE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Page

ATI I.D. : 10739

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
NITRATE-NITRITE AS NITROGEN	15389	MG/L	<0.05	1.94	2.00	97
TOTAL CYANIDE	15542	MG/L	<0.01	0.48	0.50	96

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D.: 107394

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	MW-1	WATER	23-JUL-91	23-JUL-91
3	MW-200	WATER	23-JUL-91	23-JUL-91
4	MW-3	WATER	23-JUL-91	23-JUL-91
5	MW-4	WATER	23-JUL-91	23-JUL-91
6	MW-2	WATER	23-JUL-91	23-JUL-91

Parameter	Units	1	3	4	5	6
SILVER	MG/L	<0.01	<0.01	<0.01	<0.01	<0.01
ARSENIC	MG/L	<0.002	0.003	0.003	0.003	0.003
BERYLLIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CADMIUM	MG/L	<0.005	<0.005	<0.005	<0.005	<0.005
CHROMIUM	MG/L	0.14	0.06	0.05	0.02	0.02
COPPER	MG/L	<0.02	<0.02	0.06	<0.02	<0.02
MERCURY	MG/L	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
NICKEL	MG/L	0.01	0.02	<0.01	0.01	0.01
LEAD	MG/L	0.043	0.010	0.024	0.015	0.012
ANTIMONY	MG/L	<0.03	<0.03	<0.03	<0.03	<0.03
SELENIUM	MG/L	<0.002	<0.002	0.004	0.003	0.004
THALLIUM	MG/L	<0.002	<0.002	<0.002	<0.002	<0.002
ZINC	MG/L	0.34	0.34	0.28	0.74	0.45

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
ANTIMONY	107395-01	MG/L	<0.03	<0.03	0	2.0	2.0	100
ARSENIC	107394-01	MG/L	<0.002	<0.002	0	1.8	2.0	90
BERYLLIUM	107395-01	MG/L	<0.005	<0.005	0	2.3	2.0	115
CADMIUM	107395-01	MG/L	<0.005	<0.005	0	2.2	2.0	110
CHROMIUM	107395-01	MG/L	0.01	0.01	0	2.2	2.0	110
COPPER	107395-01	MG/L	<0.02	<0.02	0	2.1	2.0	105
LEAD	107394-01	MG/L	0.043	0.044	2	1.9	2.0	93
MERCURY	107212-01	MG/L	<0.0005	<0.0005	0	0.0047	0.0050	94
NICKEL	107395-01	MG/L	<0.01	<0.01	0	2.1	2.0	105
SELENIUM	107394-01	MG/L	<0.002	0.003	0	0.79	1.2	66
SILVER	107395-01	MG/L	<0.01	<0.01	0	1.8	2.0	90
THALLIUM	107394-01	MG/L	<0.002	<0.002	0	1.4	2.0	70
ZINC	107395-01	MG/L	0.06	0.07	15	2.2	2.0	107

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
ANTIMONY	15614	MG/L	<0.03	2.0	2.0	100
ARSENIC	15548	MG/L	<0.002	1.9	2.0	95
BERYLLIUM	15614	MG/L	<0.005	2.2	2.0	110
CADMIUM	15614	MG/L	<0.005	2.2	2.0	110
CHROMIUM	15614	MG/L	<0.01	2.2	2.0	110
COPPER	15614	MG/L	<0.02	2.1	2.0	105
LEAD	15513	MG/L	<0.002	2.0	2.0	100
MERCURY	15588	MG/L	<0.0005	0.0048	0.0050	96
NICKEL	15614	MG/L	0.04	2.5	2.0	123
SELENIUM	15549	MG/L	<0.002	1.3	1.2	108
SILVER	15614	MG/L	<0.01	1.8	2.0	90
THALLIUM	15586	MG/L	<0.002	1.8	2.0	90
ZINC	15615	MG/L	<0.05	2.2	2.0	110

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Client : HARGIS & ASSOCIATES, INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW-1	WATER	23-JUL-91	24-JUL-91	29-JUL-91	1.00
2	WB-2	WATER	23-JUL-91	24-JUL-91	29-JUL-91	1.00
3	MW-200	WATER	23-JUL-91	24-JUL-91	29-JUL-91	1.00

Parameter	Units	1	2	3
FUEL HYDROCARBONS	MG/L	<0.50	<0.50	0.58
HYDROCARBON RANGE		-	-	C6-C8
HYDROCARBONS QUANTITATED USING		-	-	GASOLINE

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	MW-3	WATER	23-JUL-91	24-JUL-91	29-JUL-91	1.00
5	MW-4	WATER	23-JUL-91	24-JUL-91	29-JUL-91	1.00
6	MW-2	WATER	23-JUL-91	24-JUL-91	29-JUL-91	1.00

Parameter	Units	4	5	6
FUEL HYDROCARBONS	MG/L	<0.50	<0.50	0.55
HYDROCARBON RANGE		-	-	C6-C8
HYDROCARBONS QUANTITATED USING		-	-	GASOLINE

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank I.D. : 13775
Client : HARGIS & ASSOCIATES, INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: 24-JUL-91
Date Analyzed : 29-JUL-91
Dil. Factor : 1.00

Parameters	Units	Results
FUEL HYDROCARBONS	MG/L	<0.50
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
MSMSD # : 19213
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: 24-JUL-91
Date Analyzed : 29-JUL-91
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
FUEL HYDROCARBONS	MG/L	<0.50	10.0	9.5	95	9.8	98	3

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW-1	WATER	23-JUL-91	N/A	02-AUG-91	1.00
2	WB-2	WATER	23-JUL-91	N/A	02-AUG-91	1.00
3	MW-200	WATER	23-JUL-91	N/A	02-AUG-91	5.00

Parameter	Units	1	2	3
CHLOROMETHANE	UG/L	<10	<10	<50
VINYL CHLORIDE	UG/L	<1	<1	<5
BROMOMETHANE	UG/L	<10	<10	<50
CHLOROETHANE	UG/L	<1	<1	<5
ACETONE	UG/L	<20	<20	<100
1,1-DICHLOROETHENE	UG/L	3	<1	<5
METHYLENE CHLORIDE	UG/L	<5	<5	<25
CARBON DISULFIDE	UG/L	<1	<1	<5
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<5
VINYL ACETATE	UG/L	<10	<10	<50
1,1-DICHLOROETHANE	UG/L	<1	<1	<5
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<5
CHLOROFORM	UG/L	<1	<1	<5
2-BUTANONE (MEK)	UG/L	<20	<20	<100
1,1,1-TRICHLOROETHANE	UG/L	3	<1	<5
CARBON TETRACHLORIDE	UG/L	<1	<1	<5
1,2-DICHLOROETHANE	UG/L	<1	<1	<5
BENZENE	UG/L	<1	<1	<5
TRICHLOROETHENE	UG/L	200	<1	930
1,2-DICHLOROPROPANE	UG/L	<1	<1	<5
BROMODICHLOROMETHANE	UG/L	<1	<1	<5
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<50
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<5
TOLUENE	UG/L	<2	<2	<10
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<5
2-HEXANONE (MBK)	UG/L	<10	<10	<50
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<5
TETRACHLOROETHENE	UG/L	23	<1	50
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<5
CHLOROBENZENE	UG/L	<1	<1	<5
ETHYLBENZENE	UG/L	<1	<1	<5
XYLENES (TOTAL)	UG/L	<1	<1	<5
STYRENE	UG/L	<1	<1	<5
BROMOFORM	UG/L	<5	<5	<25
1,1,2,2-TETRACHLOROETHANE	UG/L	<1	<1	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	102	120	116
TOLUENE-D8	%	101	112	109
BFB	%	97	105	102

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8240 (GC/MS FOR VOLATILE ORGANICS) WATER
Client : HARGIS & ASSOCIATES,INC. ATI I.D.: 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
1	NONE DETECTED	N/A	N/A
2	NONE DETECTED	N/A	N/A
3	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	MW-3	WATER	23-JUL-91	N/A	02-AUG-91	1.00
5	MW-4	WATER	23-JUL-91	N/A	02-AUG-91	1.00
6	MW-2	WATER	23-JUL-91	N/A	02-AUG-91	5.00

Parameter	Units	4	5	6
CHLOROMETHANE	UG/L	<10	<10	<50
VINYL CHLORIDE	UG/L	<1	<1	<5
BROMOMETHANE	UG/L	<10	<10	<50
CHLOROETHANE	UG/L	<1	<1	<5
ACETONE	UG/L	<20	<20	<100
1,1-DICHLOROETHENE	UG/L	<1	<1	<5
METHYLENE CHLORIDE	UG/L	<5	<5	<25
CARBON DISULFIDE	UG/L	<1	<1	<5
TRANS-1,2-DICHLOROETHENE	UG/L	<1	<1	<5
VINYL ACETATE	UG/L	<10	<10	<50
1,1-DICHLOROETHANE	UG/L	<1	<1	<5
CIS-1,2-DICHLOROETHENE	UG/L	<1	<1	<5
CHLOROFORM	UG/L	<1	<1	<5
2-BUTANONE (MEK)	UG/L	<20	<20	<100
1,1,1-TRICHLOROETHANE	UG/L	<1	<1	<5
CARBON TETRACHLORIDE	UG/L	<1	<1	<5
1,2-DICHLOROETHANE	UG/L	<1	<1	<5
BENZENE	UG/L	<1	<1	<5
TRICHLOROETHENE	UG/L	1	<1	1000
1,2-DICHLOROPROPANE	UG/L	<1	<1	<5
BROMODICHLOROMETHANE	UG/L	<1	<1	<5
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10	<10	<50
CIS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<5
TOLUENE	UG/L	<2	<2	<10
TRANS-1,3-DICHLOROPROPENE	UG/L	<1	<1	<5
2-HEXANONE (MBK)	UG/L	<10	<10	<50
1,1,2-TRICHLOROETHANE	UG/L	<1	<1	<5
TETRACHLOROETHENE	UG/L	<1	<1	53
DIBROMOCHLOROMETHANE	UG/L	<1	<1	<5
CHLOROBENZENE	UG/L	<1	<1	<5
ETHYLBENZENE	UG/L	<1	<1	<5
XYLENES (TOTAL)	UG/L	<1	<1	<5
STYRENE	UG/L	<1	<1	<5
BROMOFORM	UG/L	<5	<5	<25
1,1,2,2-TETRACHLOROETHANE	UG/L	<1	<1	<5
SURROGATES				
1,2-DICHLOROETHANE-D4	%	117	104	119
TOLUENE-D8	%	106	105	109
BFB	%	100	100	104

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8240 (GC/MS FOR VOLATILE ORGANICS) WATER
Client : HARGIS & ASSOCIATES,INC. ATI I.D.: 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
4	NONE DETECTED	N/A	N/A
5	NONE DETECTED	N/A	N/A
6	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
7	TB-3	WATER	23-JUL-91	N/A	06-AUG-91	1.00

Parameter	Units	7
CHLOROMETHANE	UG/L	<10
VINYL CHLORIDE	UG/L	<1
BROMOMETHANE	UG/L	<10
CHLOROETHANE	UG/L	<1
ACETONE	UG/L	<20
1,1-DICHLOROETHENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
CARBON DISULFIDE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
VINYL ACETATE	UG/L	<10
1,1-DICHLOROETHANE	UG/L	<1
CIS-1,2-DICHLOROETHENE	UG/L	<1
CHLOROFORM	UG/L	<1
2-BUTANONE (MEK)	UG/L	<20
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
1,2-DICHLOROETHANE	UG/L	<1
BENZENE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TOLUENE	UG/L	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
CHLOROBENZENE	UG/L	<1
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
STYRENE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<1
SURROGATES		
1,2-DICHLOROETHANE-D4	%	97
TOLUENE-D8	%	87
BFB	%	101

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

WATER
ATI I.D.: 107394

Sample	Parameters	Units	Results
7	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 13901
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: N/A
Date Analyzed : 02-AUG-91
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
VINYL CHLORIDE	UG/L	<1
BROMOMETHANE	UG/L	<10
CHLOROETHANE	UG/L	<1
ACETONE	UG/L	<20
1,1-DICHLOROETHENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5TR
CARBON DISULFIDE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
VINYL ACETATE	UG/L	<10
1,1-DICHLOROETHANE	UG/L	<1
CIS-1,2-DICHLOROETHENE	UG/L	<1
CHLOROFORM	UG/L	<1
2-BUTANONE (MEK)	UG/L	<20
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
1,2-DICHLOROETHANE	UG/L	<1
BENZENE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TOLUENE	UG/L	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
CHLOROBENZENE	UG/L	<1
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
STYRENE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<1
SURROGATES		
1,2-DICHLOROETHANE-D4	%	103
TOLUENE-D8	%	101
BFB	%	98

TR COMPOUND DETECTED AT AN UNQUANTIFIABLE TRACE LEVEL

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK
ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 13901 ATI I.D. : 107394
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Parameters	Units	Results
NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 13993
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: N/A
Date Analyzed : 06-AUG-91
Dil. Factor : 1.00

Parameters	Units	Results
CHLOROMETHANE	UG/L	<10
VINYL CHLORIDE	UG/L	<1
BROMOMETHANE	UG/L	<10
CHLOROETHANE	UG/L	<1
ACETONE	UG/L	<20
1,1-DICHLOROETHENE	UG/L	<1
METHYLENE CHLORIDE	UG/L	<5
CARBON DISULFIDE	UG/L	<1
TRANS-1,2-DICHLOROETHENE	UG/L	<1
VINYL ACETATE	UG/L	<10
1,1-DICHLOROETHANE	UG/L	<1
CIS-1,2-DICHLOROETHENE	UG/L	<1
CHLOROFORM	UG/L	<1
2-BUTANONE (MEK)	UG/L	<20
1,1,1-TRICHLOROETHANE	UG/L	<1
CARBON TETRACHLORIDE	UG/L	<1
1,2-DICHLOROETHANE	UG/L	<1
BENZENE	UG/L	<1
TRICHLOROETHENE	UG/L	<1
1,2-DICHLOROPROPANE	UG/L	<1
BROMODICHLOROMETHANE	UG/L	<1
4-METHYL-2-PENTANONE (MIBK)	UG/L	<10
CIS-1,3-DICHLOROPROPENE	UG/L	<1
TOLUENE	UG/L	<2
TRANS-1,3-DICHLOROPROPENE	UG/L	<1
2-HEXANONE (MBK)	UG/L	<10
1,1,2-TRICHLOROETHANE	UG/L	<1
TETRACHLOROETHENE	UG/L	<1
DIBROMOCHLOROMETHANE	UG/L	<1
CHLOROBENZENE	UG/L	<1
ETHYLBENZENE	UG/L	<1
XYLENES (TOTAL)	UG/L	<1
STYRENE	UG/L	<1
BROMOFORM	UG/L	<5
1,1,2,2-TETRACHLOROETHANE	UG/L	<1
SURROGATES		
1,2-DICHLOROETHANE-D4	%	99
TOLUENE-D8	%	87
BFB	%	99

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK
ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank I.D. : 13993 ATI I.D. : 107394
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Parameters	Units	Results
NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 19537
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: N/A
Date Analyzed : 01-AUG-91
Sample Matrix : WATER
REF I.D. : 107392-07

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
1,1-DICHLOROETHENE	UG/L	<1	40	39	98	45	113	14
BENZENE	UG/L	<1	50	49	98	51	102	4
TRICHLOROETHENE	UG/L	<1	45	41	91	42	93	2
TOLUENE	UG/L	<2	50	49	98	50	100	2
CHLOROBENZENE	UG/L	<1	50	50	100	52	104	4

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
MSMSD # : 19560
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: N/A
Date Analyzed : 02-AUG-91
Sample Matrix : WATER
REF I.D. : 107394-02

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
1,1-DICHLOROETHENE	UG/L	<1	40	35	88	36	90	3
BENZENE	UG/L	<1	50	50	100	54	108	8
TRICHLOROETHENE	UG/L	<1	45	42	93	46	102	9
TOLUENE	UG/L	<2	50	51	102	56	112	9
CHLOROBENZENE	UG/L	<1	50	52	104	56	112	7

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 15735
Client : HARGIS & ASSOCIATES, INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: N/A
Date Analyzed : 02-AUG-91
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
1,1-DICHLOROETHENE	UG/L	<1	52	40	130
BENZENE	UG/L	<1	57	50	114
TRICHLOROETHENE	UG/L	<1	48	45	107
TOLUENE	UG/L	<2	57	50	114
CHLOROBENZENE	UG/L	<1	59	50	118

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8240 (GC/MS FOR VOLATILE ORGANICS)
Blank Spike #: 15823
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: N/A
Date Analyzed : 06-AUG-91
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
1,1-DICHLOROETHENE	UG/L	<1	41	40	102
BENZENE	UG/L	<1	50	50	100
TRICHLOROETHENE	UG/L	<1	44	45	98
TOLUENE	UG/L	<2	53	50	106
CHLOROBENZENE	UG/L	<1	53	50	106

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW-1	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00
2	WB-2	WATER	23-JUL-91	24-JUL-91	06-AUG-91	1.00
3	MW-200	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00

Parameter	Units	1*	2	3*
N-NITROSODIMETHYLAMINE	UG/L	<10	<10	<10
PHENOL	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50

* SAMPLES APPEAR TO HAVE BEEN CONTAMINATED DURING EXTRACTION. RE-EXTRACTION OCCURED ON 08-AUG-91, PAST HOLDING TIME. NO TARGET COMPOUNDS WERE DETECTED.

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW-1	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00
2	WB-2	WATER	23-JUL-91	24-JUL-91	06-AUG-91	1.00
3	MW-200	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00

Parameter	Units	1	2	3
4-NITROPHENOL	UG/L	<50	<50	<50
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
PHENANTHRENE	UG/L	<10	<10	<10
ANTHRACENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
PYRENE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10
SURROGATES				
NITROBENZENE-D5	%	60	72	42
2-FLUOROBIPHENYL	%	64	104	62
TERPHENYL-D14	%	104	160*T	128
PHENOL-D6	%	21	16	35
2-FLUOROPHENOL	%	123*T	98	130*T
2,4,6-TRIBROMOPHENOL	%	58	131	86

*T SURROGATE RECOVERY IS OUTSIDE QC CONTROL LIMITS. NO CORRECTIVE ACTION INDICATED BY METHOD.

AnalyticalTechnologies,Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS) WATER
Client : HARGIS & ASSOCIATES,INC. ATI I.D.: 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
1	NONE DETECTED	N/A	N/A
2	NONE DETECTED	N/A	N/A
3	NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	MW-3	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00
5	MW-4	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00
6	MW-2	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00

Parameter	Units	4*	5*	6*
N-NITROSODIMETHYLAMINE	UG/L	<10	<10	<10
PHENOL	UG/L	<10	<10	<10
ANILINE	UG/L	<10	<10	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10	<10	<10
2-CHLOROPHENOL	UG/L	<10	<10	<10
1,3-DICHLOROBENZENE	UG/L	<10	<10	<10
1,4-DICHLOROBENZENE	UG/L	<10	<10	<10
BENZYL ALCOHOL	UG/L	<10	<10	<10
1,2-DICHLOROBENZENE	UG/L	<10	<10	<10
2-METHYLPHENOL	UG/L	<10	<10	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<10	<10	<10
4-METHYLPHENOL	UG/L	<10	<10	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	<10	<10
HEXACHLOROETHANE	UG/L	<10	<10	<10
NITROBENZENE	UG/L	<10	<10	<10
ISOPHORONE	UG/L	<10	<10	<10
2-NITROPHENOL	UG/L	<10	<10	<10
2,4-DIMETHYLPHENOL	UG/L	<10	<10	<10
BENZOIC ACID	UG/L	<50	<50	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10	<10	<10
2,4-DICHLOROPHENOL	UG/L	<10	<10	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10	<10	<10
NAPHTHALENE	UG/L	<10	<10	<10
4-CHLOROANILINE	UG/L	<10	<10	<10
HEXACHLOROBUTADIENE	UG/L	<10	<10	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10	<10	<10
2-METHYLNAPHTHALENE	UG/L	<10	<10	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10	<10	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10	<10	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50	<50	<50
2-CHLORONAPHTHALENE	UG/L	<10	<10	<10
2-NITROANILINE	UG/L	<50	<50	<50
DIMETHYLPHTHALATE	UG/L	<10	<10	<10
ACENAPHTHYLENE	UG/L	<10	<10	<10
2,6-DINITROTOLUENE	UG/L	<10	<10	<10
3-NITROANILINE	UG/L	<50	<50	<50
ACENAPHTHENE	UG/L	<10	<10	<10
2,4-DINITROPHENOL	UG/L	<50	<50	<50

*-- SAMPLES APPEAR TO HAVE BEEN CONTAMINATED DURING EXTRACTION. RE-EXTRACTION OCCURED ON 08-AUG-91, PAST HOLDING TIME. NO TARGET COMPOUNDS WERE DETECTED.

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY RESULTS

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
4	MW-3	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00
5	MW-4	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00
6	MW-2	WATER	23-JUL-91	08-AUG-91	13-AUG-91	1.00

Parameter	Units	4	5	6
4-NITROPHENOL	UG/L	<50	<50	<50
DIBENZOFURAN	UG/L	<10	<10	<10
2,4-DINITROTOLUENE	UG/L	<10	<10	<10
DIETHYLPHTHALATE	UG/L	<10	<10	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10	<10	<10
FLUORENE	UG/L	<10	<10	<10
4-NITROANILINE	UG/L	<50	<50	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50	<50	<50
N-NITROSODIPHENYLAMINE	UG/L	<10	<10	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10	<10	<10
HEXACHLOROBENZENE	UG/L	<10	<10	<10
PENTACHLOROPHENOL	UG/L	<50	<50	<50
PHENANTHRENE	UG/L	<10	<10	<10
ANTHRACENE	UG/L	<10	<10	<10
DI-N-BUTYLPHTHALATE	UG/L	<10	<10	<10
FLUORANTHENE	UG/L	<10	<10	<10
PYRENE	UG/L	<10	<10	<10
BUTYLBENZYLPHTHALATE	UG/L	<10	<10	<10
3,3'-DICHLOROBENZIDINE	UG/L	<20	<20	<20
BENZO(a)ANTHRACENE	UG/L	<10	<10	<10
CHRYSENE	UG/L	<10	<10	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10	<10	<10
DI-N-OCTYLPHTHALATE	UG/L	<10	<10	<10
BENZO(b)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(k)FLUORANTHENE	UG/L	<10	<10	<10
BENZO(a)PYRENE	UG/L	<10	<10	<10
INDENO(1,2,3-cd)PYRENE	UG/L	<10	<10	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10	<10	<10
BENZO(g,h,i)PERYLENE	UG/L	<10	<10	<10
SURROGATES				
NITROBENZENE-D5	%	78	30*T	48
2-FLUOROBIPHENYL	%	58	48	72
TERPHENYL-D14	%	110	102	110
PHENOL-D6	%	20	18	34
2-FLUOROPHENOL	%	109	114	110
2,4,6-TRIBROMOPHENOL	%	97	77	81

*T SURROGATE RECOVERY IS OUTSIDE QC CONTROL LIMITS. NO CORRECTIVE ACTION INDICATED BY METHOD.

Analytical Technologies, Inc.

ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Method : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS) WATER
Client : HARGIS & ASSOCIATES, INC. ATI I.D.: 107394
Project # : 850.2
Project Name: HAC-TORRANCE

Sample	Parameters	Units	Results
4	NONE DETECTED	N/A	N/A
5	NONE DETECTED	N/A	N/A
6	UNKNOWN HYDROCARBON	UG/L	40

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 13942
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: 24-JUL-91
Date Analyzed : 04-AUG-91
Dil. Factor : 1.00

Parameters	Units	Results
N-NITROSODIMETHYLAMINE	UG/L	<10
PHENOL	UG/L	<10
ANILINE	UG/L	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10
2-CHLOROPHENOL	UG/L	<10
1,3-DICHLOROBENZENE	UG/L	<10
1,4-DICHLOROBENZENE	UG/L	<10
BENZYL ALCOHOL	UG/L	<10
1,2-DICHLOROBENZENE	UG/L	<10
2-METHYLPHENOL	UG/L	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<10
4-METHYLPHENOL	UG/L	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10
HEXACHLOROETHANE	UG/L	<10
NITROBENZENE	UG/L	<10
ISOPHORONE	UG/L	<10
2-NITROPHENOL	UG/L	<10
2,4-DIMETHYLPHENOL	UG/L	<10
BENZOIC ACID	UG/L	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10
2,4-DICHLOROPHENOL	UG/L	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10
NAPHTHALENE	UG/L	<10
4-CHLOROANILINE	UG/L	<10
HEXACHLOROBUTADIENE	UG/L	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10
2-METHYLNAPHTHALENE	UG/L	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50
2-CHLORONAPHTHALENE	UG/L	<10
2-NITROANILINE	UG/L	<50
DIMETHYLPHTHALATE	UG/L	<10
ACENAPHTHYLENE	UG/L	<10
2,6-DINITROTOLUENE	UG/L	<10
3-NITROANILINE	UG/L	<50
ACENAPHTHENE	UG/L	<10
2,4-DINITROPHENOL	UG/L	<50
4-NITROPHENOL	UG/L	<50
DIBENZOFURAN	UG/L	<10
2,4-DINITROTOLUENE	UG/L	<10
DIETHYLPHTHALATE	UG/L	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10
FLUORENE	UG/L	<10
4-NITROANILINE	UG/L	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 13942
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: 24-JUL-91
Date Analyzed : 04-AUG-91
Dil. Factor : 1.00

Parameters	Units	Results
N-NITROSODIPHENYLAMINE	UG/L	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10
HEXACHLOROBENZENE	UG/L	<10
PENTACHLOROPHENOL	UG/L	<50
PHENANTHRENE	UG/L	<10
ANTHRACENE	UG/L	<10
DI-N-BUTYLPHTHALATE	UG/L	<10
FLUORANTHENE	UG/L	<10
PYRENE	UG/L	<10
BUTYLBENZYLPHTHALATE	UG/L	<10
3,3'-DICHLOROBENZIDINE	UG/L	<20
BENZO(a)ANTHRACENE	UG/L	<10
CHRYSENE	UG/L	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10
DI-N-OCTYLPHTHALATE	UG/L	<10
BENZO(b)FLUORANTHENE	UG/L	<10
BENZO(k)FLUORANTHENE	UG/L	<10
BENZO(a)PYRENE	UG/L	<10
INDENO(1,2,3-cd)PYRENE	UG/L	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10
BENZO(g,h,i)PERYLENE	UG/L	<10
SURROGATES		
NITROBENZENE-D5	%	66
2-FLUOROBIPHENYL	%	78
TERPHENYL-D14	%	82
PHENOL-D6	%	12
2-FLUOROPHENOL	%	82
2,4,6-TRIBROMOPHENOL	%	75

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK
ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 13942 ATI I.D. : 107394
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Parameters	Units	Results
578 ETHYLENE GLYCOL	UG/L	1000

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 14126
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: 08-AUG-91
Date Analyzed : 12-AUG-91
Dil. Factor : 1.00

Parameters	Units	Results
N-NITROSODIMETHYLAMINE	UG/L	<10
PHENOL	UG/L	<10
ANILINE	UG/L	<10
BIS(2-CHLOROETHYL)ETHER	UG/L	<10
2-CHLOROPHENOL	UG/L	<10
1,3-DICHLOROBENZENE	UG/L	<10
1,4-DICHLOROBENZENE	UG/L	<10
BENZYL ALCOHOL	UG/L	<10
1,2-DICHLOROBENZENE	UG/L	<10
2-METHYLPHENOL	UG/L	<10
BIS(2-CHLOROISOPROPYL)ETHER	UG/L	<10
4-METHYLPHENOL	UG/L	<10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10
HEXACHLOROETHANE	UG/L	<10
NITROBENZENE	UG/L	<10
ISOPHORONE	UG/L	<10
2-NITROPHENOL	UG/L	<10
2,4-DIMETHYLPHENOL	UG/L	<10
BENZOIC ACID	UG/L	<50
BIS(2-CHLOROETHOXY)METHANE	UG/L	<10
2,4-DICHLOROPHENOL	UG/L	<10
1,2,4-TRICHLOROBENZENE	UG/L	<10
NAPHTHALENE	UG/L	<10
4-CHLOROANILINE	UG/L	<10
HEXACHLOROBUTADIENE	UG/L	<10
4-CHLORO-3-METHYLPHENOL	UG/L	<10
2-METHYLNAPHTHALENE	UG/L	<10
HEXACHLOROCYCLOPENTADIENE	UG/L	<10
2,4,6-TRICHLOROPHENOL	UG/L	<10
2,4,5-TRICHLOROPHENOL	UG/L	<50
2-CHLORONAPHTHALENE	UG/L	<10
2-NITROANILINE	UG/L	<50
DIMETHYLPHTHALATE	UG/L	<10
ACENAPHTHYLENE	UG/L	<10
2,6-DINITROTOLUENE	UG/L	<10
3-NITROANILINE	UG/L	<50
ACENAPHTHENE	UG/L	<10
2,4-DINITROPHENOL	UG/L	<50
4-NITROPHENOL	UG/L	<50
DIBENZOFURAN	UG/L	<10
2,4-DINITROTOLUENE	UG/L	<10
DIETHYLPHTHALATE	UG/L	<10
4-CHLOROPHENYL-PHENYLETHER	UG/L	<10
FLUORENE	UG/L	<10
4-NITROANILINE	UG/L	<50
2-METHYL-4,6-DINITROPHENOL	UG/L	<50

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 14126
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: 08-AUG-91
Date Analyzed : 12-AUG-91
Dil. Factor : 1.00

Parameters	Units	Results
N-NITROSODIPHENYLAMINE	UG/L	<10
4-BROMOPHENYL-PHENYLETHER	UG/L	<10
HEXACHLOROBENZENE	UG/L	<10
PENTACHLOROPHENOL	UG/L	<50
PHENANTHRENE	UG/L	<10
ANTHRACENE	UG/L	<10
DI-N-BUTYLPHTHALATE	UG/L	<10
FLUORANTHENE	UG/L	<10
PYRENE	UG/L	<10
BUTYLBENZYLPHTHALATE	UG/L	<10
3,3'-DICHLOROBENZIDINE	UG/L	<20
BENZO(a)ANTHRACENE	UG/L	<10
CHRYSENE	UG/L	<10
BIS(2-ETHYLHEXYL)PHTHALATE	UG/L	<10
DI-N-OCTYLPHTHALATE	UG/L	<10
BENZO(b)FLUORANTHENE	UG/L	<10
BENZO(k)FLUORANTHENE	UG/L	<10
BENZO(a)PYRENE	UG/L	<10
INDENO(1,2,3-cd)PYRENE	UG/L	<10
DIBENZ(a,h)ANTHRACENE	UG/L	<10
BENZO(g,h,i)PERYLENE	UG/L	<10
SURROGATES		
NITROBENZENE-D5	%	98
2-FLUOROBIPHENYL	%	62
TERPHENYL-D14	%	56
PHENOL-D6	%	19
2-FLUOROPHENOL	%	110
2,4,6-TRIBROMOPHENOL	%	95

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

REAGENT BLANK
ADDITIONAL COMPOUNDS (SEMI-QUANTITATED)

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
Blank I.D. : 14126 ATI I.D. : 107394
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Parameters	Units	Results
NONE DETECTED	N/A	N/A

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 19616
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: 24-JUL-91
Date Analyzed : 04-AUG-91
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
PHENOL	UG/L	<10	200	82	41	94	47	14
2-CHLOROPHENOL	UG/L	<10	200	154	77	136	68	12
1,4-DICHLOROBENZENE	UG/L	<10	100	60	60	66	66	10
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	36	36*F	48	48	29
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	72	72	84	84	15
4-CHLORO-3-METHYLPHENOL	UG/L	<10	200	156	78	156	78	0
ACENAPHTHENE	UG/L	<10	100	78	78	82	82	5
4-NITROPHENOL	UG/L	<50	400	266	67	376	94	34
2,4-DINITROTOLUENE	UG/L	<10	100	66	66	74	74	11
PENTACHLOROPHENOL	UG/L	<50	400	238	60	238	60	0
PYRENE	UG/L	<10	100	96	96	96	96	0

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

*F RESULT OUTSIDE OF ATI'S QUALITY CONTROL LIMITS

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY/MASS SPECTROSCOPY - QUALITY CONTROL

MSMSD

Test : EPA 8270 (GC/MS FOR SEMIVOLATILE ORGANICS)
MSMSD # : 20163
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 107394
Date Extracted: 08-AUG-91
Date Analyzed : 12-AUG-91
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
PHENOL	UG/L	<10	200	86	43	82	41	5
2-CHLOROPHENOL	UG/L	<10	200	188	94	182	91	3
1,4-DICHLOROBENZENE	UG/L	<10	100	78	78	90	90	14
N-NITROSO-DI-N-PROPYLAMINE	UG/L	<10	100	54	54	50	50	8
1,2,4-TRICHLOROBENZENE	UG/L	<10	100	74	74	80	80	8
4-CHLORO-3-METHYLPHENOL	UG/L	<10	200	180	90	172	86	5
ACENAPHTHENE	UG/L	<10	100	94	94	90	90	4
4-NITROPHENOL	UG/L	<50	400	76	19	64	16	17
2,4-DINITROTOLUENE	UG/L	<10	100	72	72	72	72	0
PENTACHLOROPHENOL	UG/L	<50	400	518	130	532	133	3
PYRENE	UG/L	<10	100	144	144*F	140	140*F	3

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

*F RESULT OUTSIDE OF ATI'S QUALITY CONTROL LIMITS

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 07/23/91 PAGE 1 OF ___

PROJECT NAME: HAC Torrance
PROJECT No./TASK No.: 850.2
PROJECT MANAGER: Matt Wiedlin
FAX No.: 619 454 5839
QA MANAGER:
FAX No.:
SAMPLER (SIGNATURE): N. Raykhman
SAMPLER (PRINTED): RUSH N. BOYNTON / NATALIA RAYKHMAN

LABORATORY INFORMATION: ATI, Inc

107394

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	Time	MATRIX: Soil	Groundwater	Surface water	PRESERVATION: HCl	HNO3	NaOH	H2SO4	Ice	40 ml vials	1 liter amber glass	500 ml polyethylene	4-oz polyethylene	4-oz polyethylene	8240 VOCs	8015 TPH	8270 BNAs	Trace Metals	Nitrate 353.2	Cyanide 9010	REMARKS
05	MW-4	07/23/91	11:00		✓		✓				✓	2					✓						
	"						✓				✓		1					✓					Trace Metals
	"							✓			✓			2					✓				as Priority
	"							✓			✓				1					✓			Metals Suite
	"									✓	✓					1					✓		
	"								✓		✓						1					✓	Please
06	MW-2	07/23/91	12:10				✓					2					✓						use diesel
	"	"	"				✓						1					✓					standard
	"	"	"											2					✓				for MW-2 TPH
	"	"	"					✓							1					✓			sample
	"	"	"							✓						1					✓		analysis
	"	"	"		✓				✓		✓						1					✓	Please indicate
																							quantitation
																							method for
																							other TPH
																							analyses
Total number of Containers per analysis:												4	2	4	2	2	2						

Total No. of Containers: 16

Relinquished by:	Date	Received by:	Date
N. Raykhman	7/23/91	[signature]	7/23
Hargis, Inc	Time	ATI-San Diego, CA	Time 7:40
Company		Company	
Relinquished by:	Date	Received by:	Date
	Time		Time
Company		Laboratory	

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- [ ] No. of containers correct
- [ ] received good condition/cold
- [ ] custody seals secure
- [ ] conforms to COC document

Shipment Method: Hand Delivery

Send Results to:
- [ ] 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
- [ ] 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
- [x] Matt Wiedlin 2223 AVENIDA DE LA PLAYA No. 380 LA JOLLA, CA 92037 (619) 454-0165
- [x] Rush Boynton 111 N. SEPULVEDA BLVD. No. 280 MANHATTAN BEACH, CA 90266 (213) 372-7992
- [ ] 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 07/23/91 PAGE 2 OF ____

PROJECT NAME: HAC Torrance
PROJECT No./TASK No.: 850.2
PROJECT MANAGER: Matt Wiedlin
FAX No.: 619 454-5839
QA MANAGER:
FAX No.:
SAMPLER (SIGNATURE): Rush N. Boynton / N. Raykhman
SAMPLER (PRINTED): RUSH BOYNTON / NATALIA RAYKHMAN

LABORATORY INFORMATION: ATI

107334

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX: Soil	MATRIX: Ground-water	MATRIX: Surface water	PRESERVATION: HCl	PRESERVATION: HNO3	PRESERVATION: NaOH	PRESERVATION: H2SO4	PRESERVATION: Ice	SAMPLE CONTAINERS: 40-ml vials	SAMPLE CONTAINERS: 1 liter amber glass bottle	SAMPLE CONTAINERS: 500-ml poly bottle	SAMPLE CONTAINERS: 4-oz poly	SAMPLE CONTAINERS: 4-oz poly	ANALYSES REQUESTED: 8240 VOCs	ANALYSES REQUESTED: 8015 TPH	ANALYSES REQUESTED: 8270 BNAs	ANALYSES REQUESTED: Trace Metals	ANALYSES REQUESTED: Nitrates	ANALYSES REQUESTED: Cyanide	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S	SPECIAL HANDLING	REMARKS
03	MW-200	07/23	12:20		✓		✓				✓	2					✓								Trace metals - Priority metals suite
	"	"	"				✓						1					✓							
	"	"	"											2					✓						
	"	"	"					✓							1					✓					
	"	"	"							✓						1					✓				
	"	"	"						✓							1						✓			
04	MW-3	07/23/91	14:30				✓					2					✓								
	"	"	"				✓						1					✓							
	"	"	"											2					✓						
	"	"	"					✓							1					✓					
	"	"	"							✓						1					✓				
	"	"	"						✓							1						✓			

Total number of Containers per analysis:

Total No. of Containers: 16

Relinquished by:	Date	Received by:	Date
N. Raykhman	07/23	[signature]	7/23
Harris & Ass, Inc	Time	ATI - SAN DIEGO	Time 7:40
Company		Company	
Relinquished by:	Date	Received by:	Date
	Time		Time
Company		Laboratory	

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- [✓] No. of containers correct
- [✓] received good condition/cold
- [✓] custody seals secure
- [✓] conforms to COC document

Shipment Method: Hand Delivery

Send Results to:

- [ ] 3385 N. CAMPBELL No. 121, TUCSON, AZ 85719 (602) 881-7300
- [ ] 2222 S. DOBSON RD. No. 401, MESA, AZ 85202 (602) 345-0888
- [✓] Matt Wiedlin — 2223 AVENIDA DE LA PLAYA No. 380, LA JOLLA, CA 92037 (619) 454-0165
- [✓] Rush Boynton — 111 N. SEPULVEDA BLVD. No. 280, MANHATTAN BEACH, CA 90266 (213) 372-7992
- [ ] 1616 W. BURBANK BLVD. No. E, BURBANK, CA 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 07/23/91 PAGE 3 OF ___

PROJECT NAME: HAC Torrance
PROJECT No./TASK No.: 850.2
PROJECT MANAGER: Matt Wiedlin
FAX No.:
QA MANAGER:
FAX No.:
SAMPLER (SIGNATURE): Rush N. Raykhman
SAMPLER (PRINTED): Rush N. Raykhman NATALIA RAYKHMAN

LABORATORY INFORMATION: ATI

107394

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS 40-ml vials	SAMPLE CONTAINERS glass bottle	SAMPLE CONTAINERS 1 liter amber glass	SAMPLE CONTAINERS 500 ml poly	SAMPLE CONTAINERS 4-oz poly	SAMPLE CONTAINERS 4-oz poly	ANALYSES REQUESTED 8240 VOCs	ANALYSES REQUESTED 8015 TPH	ANALYSES REQUESTED 8270 BNAS	ANALYSES REQUESTED Trace Metals	ANALYSES REQUESTED Nitrates	ANALYSES REQUESTED Cyanide	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S	SPECIAL HANDLING	REMARKS
01	MW-1	07/23/91	15:20		✓		✓				✓	2						✓								Trace
↓	"	"	"				✓						1						✓							Metals-
	"	"	"											2						✓						-Priority
	"	"	"					✓							1						✓					Pollutant
	"	"	"							✓						1						✓				Metals
↓	"	"	"						✓								1						✓			Suite
02	WB-2	07/23/91	12:25				✓					2						✓								
	"	"	"				✓						1						✓							
↓	"	"	"											2						✓						
~~07~~	TB-3	07/23/91					✓					2						✓								
Total number of Containers per analysis:												6	2	4	1	1	1									

Total No. of Containers: 15

Relinquished by:	Date	Received by:	Date
N. Raykhman	07/23/91	[signature]	7/23
Company: Hargis Inc	Time	Company: ATI-SAN DIEGO CA	Time: 7:40
Relinquished by:	Date	Received by:	Date
Company	Time	Laboratory	Time

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- [x] No. of containers correct
- [x] received good condition/cold
- [x] custody seals secure
- [x] conforms to COC document

Shipment Method: Hand delivery

Send Results to:

- [ ] 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
- [ ] 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
- [x] 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165 — Matt Wiedlin
- [x] 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992 — Rush
- [ ] 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

APPENDIX D

FIELD PROCEDURES FOR PROPOSED WORK

APPENDIX D
FIELD PROCEDURES FOR PROPOSED WORK

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APPENDIX D
FIELD PROCEDURES FOR PROPOSED WORK

1.0 INTRODUCTION

The objectives of installing groundwater monitor wells are to obtain data on geologic conditions, to provide water level information, and to collect and analyze groundwater samples to determine the chemical quality of the groundwater. These activities will be performed in accordance with standard operating procedures for monitor well design and construction, lithologic logging, groundwater level measurement, and groundwater quality sampling. Field personnel will adhere to standard operating procedures in order to ensure quality assurance.

Prior to entering the field, personnel will contact applicable agencies and municipal governments to ensure compliance with regulatory requirements regarding access, drilling, and well construction. Additionally, all field personnel will be familiar with the well construction details before well construction begins.

The drilling and completion of each monitor well will be supervised by a geologist/hydrogeologist responsible for description of lithology, selection of screened intervals, and determination of final well completion depth.

2.0 SHALLOW MONITOR WELL INSTALLATION

Proposed shallow monitor well construction materials, drilling techniques, and well development are described. Five to seven shallow monitor wells are proposed.

The depth to first groundwater at the site is expected to be approximately 85 feet below land surface (bls). The monitor well screen intervals will not exceed 30 feet in length with approximately 10 feet of screen above the water table. Total depth is expected to be approximately 105 feet bls.

A hollow stem auger drill rig will be used to construct the water table monitor wells. Pilot boreholes will be drilled with a 6-inch outside diameter (OD) hollow stem auger with continuous core capability. Boreholes will be lithologically logged by inspecting auger cuttings and soil samples obtained from drive samples and/or core barrels. After the pilot borehole has been constructed, the hollow stem auger string will be removed and a larger diameter hole will be reamed using a 10-inch OD hollow stem auger. The large diameter hollow stem auger will be equipped with a wooden plug to prevent flowing sand from entering the inside of the hollow stem auger. Downhole drilling equipment will be steam cleaned before use in each monitor well.

Nominal 4-inch diameter factory-slotted polyvinyl chloride (PVC) screen with 0.020-inch slots will be installed in each well. Factory cleaned PVC well screen and casing will be shipped in sealed plastic wrap. Nominal 4-inch, flush-threaded schedule 40 PVC blank casing will be installed above the screen to land surface. A filter pack of Monterey No. 1C sand or its equivalent will be installed to approximately 2 feet above the screen. A fine-grained sand will be placed over the filter pack to prevent the migration of the overlying grout into the screened interval. A bentonite grout will be placed in the well annulus from the fine-grained sand to land surface. Filter pack, fine-grained sand and the bentonite grout will be placed by gravity feed directly into the annulus between the well casing and the hollow stem auger. To prevent sand locking inside the

hollow stem, the auger will be slowly lifted from the hole as the filter pack is emplaced. Utility vaults with vandal-resistant aluminum or steel lids will be installed at the surface over each well.

Following completion, each water table monitor well will be swabbed and bailed until the production of fine-grained sediments is minimal. If the well capacity is sufficient, final well development will be achieved by installing a temporary submersible pump and pumping until the discharge clears. Discharge rates will be estimated volumetrically. Water level recovery will be measured and recorded after well development.

Groundwater samples will be collected using dedicated electric submersible pumps. The pumps will have a nominal flow rate of 5 gallons per minute (gpm) which should be sufficient to purge the wells within approximately 10 minutes. Established groundwater sampling procedures will be followed (Hargis + Associates, Inc. [H+A], 1991). The measuring points of each new well will be surveyed to a vertical precision of 0.01 foot and a horizontal precision of 0.1 foot.

3.0 EXPLORATORY BORING DRILLING AND DEEP MONITOR WELL INSTALLATION

The proposed exploratory boring will be drilled and the deep monitor well will be constructed using mud rotary methods. Only high grade bentonite type drilling muds will be used, and the mud must be approved by the on-site geologist prior to use. Drilling mud characteristics will be maintained through periodic monitoring of fluid weight, viscosity, and sand content. Downhole mud rotary drilling equipment will be steam cleaned prior to drilling the exploratory boring. Drill cuttings will be collected frequently during the drilling of the exploratory boring, mud circulation controlled, and drill cutting recirculation minimized in order to provide a reliable lithologic log.

3.1 EXPLORATORY BORING

A nominal 4-inch borehole will be drilled using mud rotary methods. The small-diameter exploratory borehole provides an efficient means of identifying lithologic units for well design. A lithologic description of formation materials encountered during drilling will be recorded in the field notebook. An electrical resistivity and caliper log will be run in the borehole. These geophysical logs obtained from the exploratory boring will be used to further define hydrogeologic contacts and will aid in the identification of the conductor casing interval and well screen interval for the deep monitor wells. The exploratory boring will be abandoned upon completion of the geophysical logging activities by pressure grouting with neat cement from the bottom of the boring using a tremie pipe. Neat cement will be mixed using 5 to 6 gallons of water per sack of cement.

3.2 DEEP MONITOR WELL

For the mud rotary well completion, mild steel conductor casing will be pressure grouted in place with neat cement to 5 to 10 feet above the interval to

be screened. Conductor casing will be installed to stabilize the borehole during well construction and to isolate the screened interval from the overlying units. After the conductor casing is installed, new mud will be mixed and the interval to be screened will be drilled. The potential for cross contamination will be greatly reduced by isolating the overlying units and using fresh drilling mud to complete the borehole below the conductor casing.

The length of well screen will be selected based on exploratory boring data. If the exploratory boring data indicate that a well screen greater than 30 feet in length is appropriate, the California Regional Water Quality Control Board will be notified in advance of monitor well installation. Filter pack will be installed in the monitor well from the bottom of the boring to approximately 2 feet above the screen. Approximately 3 feet of very fine sand will be placed in the annulus above the filter pack. The very fine sand will act as a grout filter to reduce the possibility of grout entering the filter pack.

A well seal will be installed from the top of the grout filter to land surface. The well seal will consist of a high solids bentonite grout such as NL Baroid's Benseal or American Colloid's Volclay Grout. The grout will be mixed following manufacturers' recommendations.

Following completion of the deeper monitor well, its measuring point will be surveyed to a vertical precision of 0.01 foot and a horizontal precision of 0.1 foot.

Groundwater samples will be collected using a dedicated electric submersible pump. The pump will have a nominal flow rate of 5 to 10 gpm. Established groundwater sampling procedures will be followed (H+A, 1991).

4.0 REFERENCES CITED

Hargis + Associates, Inc., 1991. Revised Soil and Groundwater Assessment Work Plan. Prepared for Hughes Aircraft Company, Torrance, California; April 24, 1991.

EXHIBIT "D"

April 14, 1992

QUARTERLY GROUNDWATER MONITORING REPORT
MARCH 1992
HUGHES AIRCRAFT COMPANY
ELECTRON DYNAMICS DIVISION
TORRANCE, CALIFORNIA

HARGIS+ASSOCIATES, INC.

trichloroethane (1,1,1-TCA), tetrachloroethylene (PCE), 1,1-dichloroethene (1,1-DCE), and 1,2-dichloroethane (1,2-DCA) (Table 2; Figure 3). VOCs were not detected in monitor wells MW-3, and MW-4.

TCE was detected in groundwater samples collected from monitor wells MW-1 and MW-2. The highest concentration of TCE was 910 micrograms per liter (ug/l) in a groundwater sample collected from monitor well MW-2. The Maximum Contaminant Level (MCL) established by the Department of Toxic Substances Control (DTSC) for TCE is 5 ug/l. The concentration of TCE detected in the groundwater sample collected from monitor well MW-2 on March 5, 1992, is similar to that detected in the groundwater sample collected from this well in July 1991. However, the concentration of TCE detected in the groundwater sample collected from monitor well MW-1 on March 5, 1992 is less than that detected in groundwater samples collected from this well in July 1991 (Table 2; Figure 3).

1,1,1-TCA was detected in the groundwater sample collected from monitor well MW-2 at a concentration of 2.6 ug/l. The MCL established by DTSC for 1,1,1-TCA is 200 ug/l. The concentration of 1,1,1-TCA in groundwater samples collected from monitor well MW-2 in July 1991 was less than the detection limit of 5 ug/l. Therefore, the results of March 1992 and July 1991 analyses may be considered similar. The concentration of 1,1,1-TCA was less than the detection limit of 0.4 ug/l in the groundwater sample collected from monitor well MW-1 on March 5, 1992. However, 1,1,1-TCA was detected at concentrations of 3 ug/l in groundwater samples collected from this well in July 1991 (Table 2; Figure 3).

PCE was detected in groundwater samples collected from monitor wells MW-1 and MW-2. The highest concentration of PCE was 39 ug/l collected from monitor well MW-2. The MCL established by DTSC for PCE is 5 ug/l. The concentrations of PCE detected in the groundwater sample collected from monitor well MW-2 on March 5, 1992, is similar to that detected in groundwater samples collected from this well in July 1991. However, the concentration of

PCE detected in the groundwater sample collected from monitor well MW-1 on March 5, 1992, 3.2 ug/l, is less than that detected in groundwater samples collected from this well in July 1991 (Table 2; Figure 3).

1,1-DCE was detected in the groundwater sample collected from monitor well MW-2 at a concentration of 13 ug/l. The MCL established by DTSC for 1,1-DCE is 6 ug/l. However, 1,1-DCE was not detected in groundwater samples collected from this well in July 1991 (Table 2; Figure 3). 1,1-DCE was not detected in the groundwater sample collected from monitor well MW-1 on March 5, 1992.

1,2-DCA was detected in groundwater samples collected from monitor wells MW-1 and MW-2. The highest concentration of 1,2-DCA detected was 8.3 ug/l in the groundwater sample collected from monitor well MW-2. The MCL established by DTSC for 1,2-DCA is 0.5 ug/l. 1,2-DCA was not detected in groundwater samples collected from site monitor wells in July 1991 (Table 2; Figure 3).

4.2.2 Total Dissolved Chromium

Total dissolved chromium was detected in groundwater samples collected from monitor wells MW-1 through MW-4 (Table 3; Appendix A). The highest concentration of total dissolved chromium was 0.06 milligram per liter (mg/l), detected in the groundwater sample collected from monitor well MW-2. The MCL established by DTSC for chromium is 0.05 mg/l. The concentrations of total dissolved chromium detected in groundwater samples collected from the four monitor wells on March 5, 1992, are similar to those detected in groundwater samples collected from site monitor wells in July 1991.

5.0 CONCLUSIONS

Based on water level and water quality data obtained during the March 5, 1992 quarterly groundwater monitoring, the following are concluded:

1. The direction of groundwater flow at the site in March 1992 was to the east. The direction of groundwater flow and the hydraulic gradient have not changed compared to July 1991 data.

2. Concentrations of VOCs detected in groundwater samples collected from monitor wells MW-1 and MW-2 on March 5, 1992, are similar to those collected in July 1991. However, comparison of the results of the March 5, 1991 quarterly groundwater sampling with the July 1991 groundwater sampling indicated the following:

   .. Concentrations of TCE, 1,1,1-TCA, and PCE have decreased in monitor well MW-1 since July 1991.

   .. 1,1-DCE was detected in the groundwater sample collected from monitor well MW-2 on March 5, 1992, but 1,1-DCE was not detected in the groundwater sample collected from this well in July 1991.

   .. 1,2-DCA was detected in groundwater samples collected from monitor wells MW-1 and MW-2 on March 5, 1992, but 1,2-DCA was not detected in these wells in July 1991.

3. TFH and BTEX were not detected in the groundwater sample collected from monitor well MW-2 on March 5, 1992. However, TFH were detected in groundwater samples collected from monitor well MW-2 at concentrations near the detection limit in July 1991.

4. Concentrations of total dissolved chromium detected in groundwater samples collected from site monitor wells MW-1 through MW-4 on March 5, 1992, are similar to those collected in July 1991.

6.0 REFERENCES CITED

California Department of Water Resources (CDWR), 1961. Planned Utilization of the Ground Water Basins for the Coastal Plain of Los Angeles County, Appendix A, Ground Water Geology. Bulletin No. 104.

California Regional Water Quality Control Board, Los Angeles (CRWQCB), 1990. Letter from J. Workman addressed to Mr. Jim Weaver, Hughes Aircraft Company, Electron Dynamics Division, re: Soil Site Assessment at Hughes Aircraft Company (ID #905050016), 3100 W. Lomita, Torrance, CA 90505; November 7, 1990.

Hargis + Associates, Inc. (H+A), 1991. Groundwater Assessment, Hughes Aircraft Company, Torrance, California. Prepared for Hughes Aircraft Company, Torrance, California; October 25, 1991.

Hargis & Montgomery, Inc. (H&M), 1983. Investigation of Groundwater Quality and Regional Hydrogeologic Conditions, Hughes Aircraft Company, Electron Dynamics Division, Torrance, California. Prepared for Hughes Aircraft Company, Torrance, California; August 29, 1983.

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April 14, 1992

VIA FEDERAL EXPRESS

Dr. Michael Yalch
HUGHES AIRCRAFT COMPANY
Electron Dynamics Division
3100 West Lomita Boulevard
Torrance, CA 90509

Re: Transmittal of Final March 1992 Quarterly Groundwater Report

Dear Dr. Yalch:

Enclosed are two copies of our final report entitled:

Quarterly Groundwater Monitoring Report
March 1992
Hughes Aircraft Company
Torrance, California

If you have any questions or require further discussion, please contact me.

Sincerely,

HARGIS + ASSOCIATES, INC.

Peter T. Quinlan
Associate

PTQ:jah

Enclosure

cc: Gary L. Rafferty, Esq.

yalch09.850.4

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QUARTERLY GROUNDWATER MONITORING REPORT
MARCH 1992
HUGHES AIRCRAFT COMPANY
ELECTRON DYNAMICS DIVISION
TORRANCE, CALIFORNIA

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QUARTERLY GROUNDWATER MONITORING REPORT
MARCH 1992
HUGHES AIRCRAFT COMPANY
ELECTRON DYNAMICS DIVISION
TORRANCE, CALIFORNIA

1.0 INTRODUCTION

This report presents and summarizes the results of the quarterly groundwater monitoring performed for the Hughes Aircraft Company (HAC), Electron Dynamics Division located at 3100 West Lomita Boulevard, Torrance, California (the site) (Figure 1). Groundwater monitoring at the site is required by the California Regional Water Quality Control Board (CRWQCB) (CRWQCB, 1990). The purpose of the quarterly groundwater monitoring is to evaluate changes in groundwater quality, depths to water, and groundwater flow direction since the time of the previous groundwater assessment performed in July 1991. The quarterly groundwater monitoring was conducted in accordance with the recommendations contained in the Groundwater Assessment Report and included depth to water measurements and groundwater sampling of four site monitor wells (Hargis + Associates, Inc. [H+A], 1991).

2.0 PHYSICAL SETTING

2.1 GEOLOGIC CONDITIONS

The site is located in the city of Torrance, California, and lies within the West Coast Basin. The stratigraphy of the West Coast Basin includes Quaternary age continental and marine deposits and Tertiary age marine sediments that overlie a basement complex of igneous and metamorphic rocks. The geologic units of interest are, from oldest to youngest, the Pico Formation, the San Pedro Formation, the Lakewood Formation, older dune sand, alluvium, and active dune sand (California Department of Water Resources [CDWR], 1961).

The lithology of the sediment beneath the site generally consists of interbedded silt, clay, and sand, which occurs from land surface to approximately 45 feet below land surface (bls). Relatively homogeneous, varicolored, very fine- to fine-grained, micaceous sand occurs from approximately 45 feet bls to the total depth explored of approximately 110 feet bls (H+A, 1991). The sediments encountered at the site below the water table appear to correlate with the Lakewood Formation (CDWR, 1961).

2.2 HYDROGEOLOGIC CONDITIONS

The Gage aquifer and the Silverado aquifer are the regional hydrogeologic units that underlie the site (CDWR, 1961). The Gage aquifer occurs from the water table at approximately 90 feet bls to a depth of approximately 200 feet bls (Hargis & Montgomery, Inc. [H&M], 1983). The Gage aquifer is about 100 feet thick and is composed mostly of sand. The Silverado aquifer underlies the Gage aquifer and occurs at a depth of about 250 feet bls. In the vicinity of the site, the two aquifers are reportedly separated by approximately 40 feet of clay (H&M, 1983). This clay appears to

be present north, south, and west of the site and pinches out to the east where the Gage and Silverado aquifers appear to merge (CDWR, 1961).

Four monitor wells, MW-1 through MW-4, installed at the site were screened in an unconfined aquifer from approximately 75 to 113 feet bls. This aquifer appears to correlate with the Gage aquifer (CDWR, 1961). Based on water levels measured in site monitor wells on July 23, 1991, water level elevations ranged from approximately -9.9 to -8.9 feet mean sea level (msl), and the direction of groundwater flow was to the east (H+A, 1991).

3.0 FIELD PROCEDURES

The following section describes the field procedures employed during the March 1992 quarterly groundwater monitoring. The field procedures included measuring depths to water in monitor wells and collecting groundwater samples.

3.1 WATER LEVEL MEASUREMENT

Water levels were measured in the four site monitor wells prior to collection of groundwater samples on March 5, 1992. Water levels were measured using a flat tape electric sounder. The top of the sounding tube was a surveyed reference point which was used to calculate water level elevations.

3.2 GROUNDWATER SAMPLE COLLECTION

Groundwater samples were collected from the four site monitor wells. Prior to groundwater sampling, the wells were pumped until at least three casing volumes of water were removed from the wells and the parameters of electrical conductivity (EC), pH, and temperature had stabilized. Groundwater samples were collected from site monitor wells using dedicated electric submersible pumps. A GSI Hydac EC, pH, and temperature meter was used for measuring parameters. The meter was calibrated prior to sampling. Monitor well discharge was stored in 55-gallon drums. The drums were labeled with well identifier and time of sampling and set near the monitor well locations for HAC handling.

Groundwater samples from all four monitor wells were collected for analysis of halogenated volatile organic compounds (VOCs) using U.S. Environmental Protection Agency (EPA) Method 8010 and total dissolved chromium using EPA Method 6010. Groundwater samples collected from monitor well MW-2 were also analyzed for total fuel hydrocarbons (TFH) using modified EPA

Method 8015 and aromatic VOCs, benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8020. Groundwater samples for VOCs and TFH analyses were collected in 40-milliliter (ml) vials and preserved in hydrochloric acid. Groundwater samples for total dissolved chromium were collected in 500-ml plastic, non-preserved sampling containers. The samples were transmitted to Environmental Process Technology Laboratory (EPTL) in El Segundo, California, by H+A staff. The samples for total dissolved chromium were filtered and preserved with nitric acid within 24 hours of collection.

Split, duplicate, and blank samples were collected according to H+A quality assurance/quality control procedures. One duplicate and one split groundwater sample were collected during the March 1992 quarterly groundwater monitoring. The duplicate sample MW-100 was collected from monitor well MW-1 and analyzed for VOCs using EPA Method 8010 and total dissolved chromium using EPA Method 6010. The split sample was collected from monitor well MW-2 and analyzed for VOCs using EPA Methods 8010 and 8020, TFH using modified EPA Method 8015, and total dissolved chromium using EPA Method 6010. Split samples were delivered to the Analytical Technology, Inc. (ATI) laboratories in San Diego, California by H+A staff. One field blank sample and one trip blank sample were prepared during the March 1992 quarterly groundwater monitoring using reagent grade water prepared by EPTL. The field blank was prepared in the vicinity of monitor well MW-3 for analysis of VOCs using EPA Method 8010 and total dissolved chromium using EPA Method 6010. The field and trip blank samples accompanied sample shipments to EPTL. One trip blank sample prepared with reagent grade water by ATI, was enclosed with the sample shipment to ATI.

4.0 GROUNDWATER MONITORING RESULTS

Section 4.0 presents the results of the March 1992 quarterly groundwater monitoring. Groundwater monitoring results include depth to water measurements, groundwater flow direction, and chemical quality of groundwater.

4.1 WATER LEVELS

Based on water levels measured in monitor wells on March 5, 1992, water level elevations ranged from approximately -11.0 feet msl in monitor wells MW-2 and MW-3 to -9.7 feet msl in monitor well MW-4 (Table 1). Based on these data, the direction of groundwater flow is to the east, and the hydraulic gradient is approximately 0.002 (Figure 2).

Comparison of depths to water measured during the initial groundwater monitoring on July 23, 1991, with those measured on March 5, 1992, indicates that water levels in all four monitor wells have decreased approximately 1 foot since July 23, 1991.

4.2 CHEMICAL QUALITY OF GROUNDWATER

Analytical results from groundwater samples collected on March 5, 1992, indicated that VOCs and total dissolved chromium are present in groundwater underlying the site (Appendix A). No TFH or BTEX were detected in groundwater samples collected during this quarterly groundwater monitoring.

4.2.1 Volatile Organic Compounds

VOCs detected in groundwater samples collected from monitor wells MW-1, and MW-2 on March 5, 1992 were: trichloroethylene (TCE), 1,1,1-

TABLE 1

WATER LEVEL ELEVATIONS

WELL IDENTIFIER	DATE MEASURED	REFERENCE POINT ELEVATION (feet msl)	DEPTH TO WATER (feet brp)	WATER LEVEL ELEVATION (feet msl)
MW-1	03/05/92	79.30	89.47	-10.17
MW-2	03/05/92	77.22	88.17	-10.95
MW-3	03/05/92	77.90	88.87	-10.97
MW-4	03/05/92	75.62	85.30	-9.68

msl = Mean sea level
brp = Below reference point

TABLE 2

ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS
IN GROUNDWATER SAMPLES

WELL IDENTIFIER	SAMPLE DATE	.....CONCENTRATIONS IN MICROGRAMS PER LITER.....				
		TCE	1,1,1-TCA	PCE	1,1-DCE	1,2-DCA
MW-1	03/05/92	47	<0.4	3.2	<1	4.8
	07/23/91	200	3	23	3	<1
	07/15/91	180	3	22	<2	<2
MW-2	03/05/92	910	2.6	39	13	8.3
	07/23/91	1,000	<5	53	<5	<5
	07/15/91	650	<5	30	<5	<5
MW-3	03/05/92	<0.4	<0.4	<0.7	<1	<0.4
	07/23/92	1	<1	<1	<1	<1
	07/15/91	2	<1	<1	<1	<1
MW-4	03/05/92	<0.4	<0.4	<0.7	<1	<0.4
	07/23/91	<1	<1	<1	<1	<1
	07/15/91	<1	<1	<1	<1	<2

TCE = Trichloroethylene
1,1,1-TCA = 1,1,1-Trichloroethane
PCE = Tetrachloroethylene
1,1-DCE = 1,1-Dichloroethylene
1,2-DCA = 1,2-Dichloroethane
(<) = Less than; numerical value is the Limit of Detection for that compound

TABLE 3

ANALYTICAL RESULTS FOR TOTAL DISSOLVED CHROMIUM
IN GROUNDWATER SAMPLES

WELL IDENTIFIER	SAMPLE DATE	CONCENTRATION OF TOTAL DISSOLVED CHROMIUM (milligrams per liter)
MW-1	03/05/92	0.04
	07/23/92	0.14
	07/15/92	0.02
MW-2	03/05/92	0.06
	07/23/92	0.02
	07/12/92	0.04
MW-3	03/05/92	0.05
	07/23/91	0.05
	07/15/91	0.02
MW-4	03/05/92	0.03
	07/23/92	0.02
	07/11/92	0.03

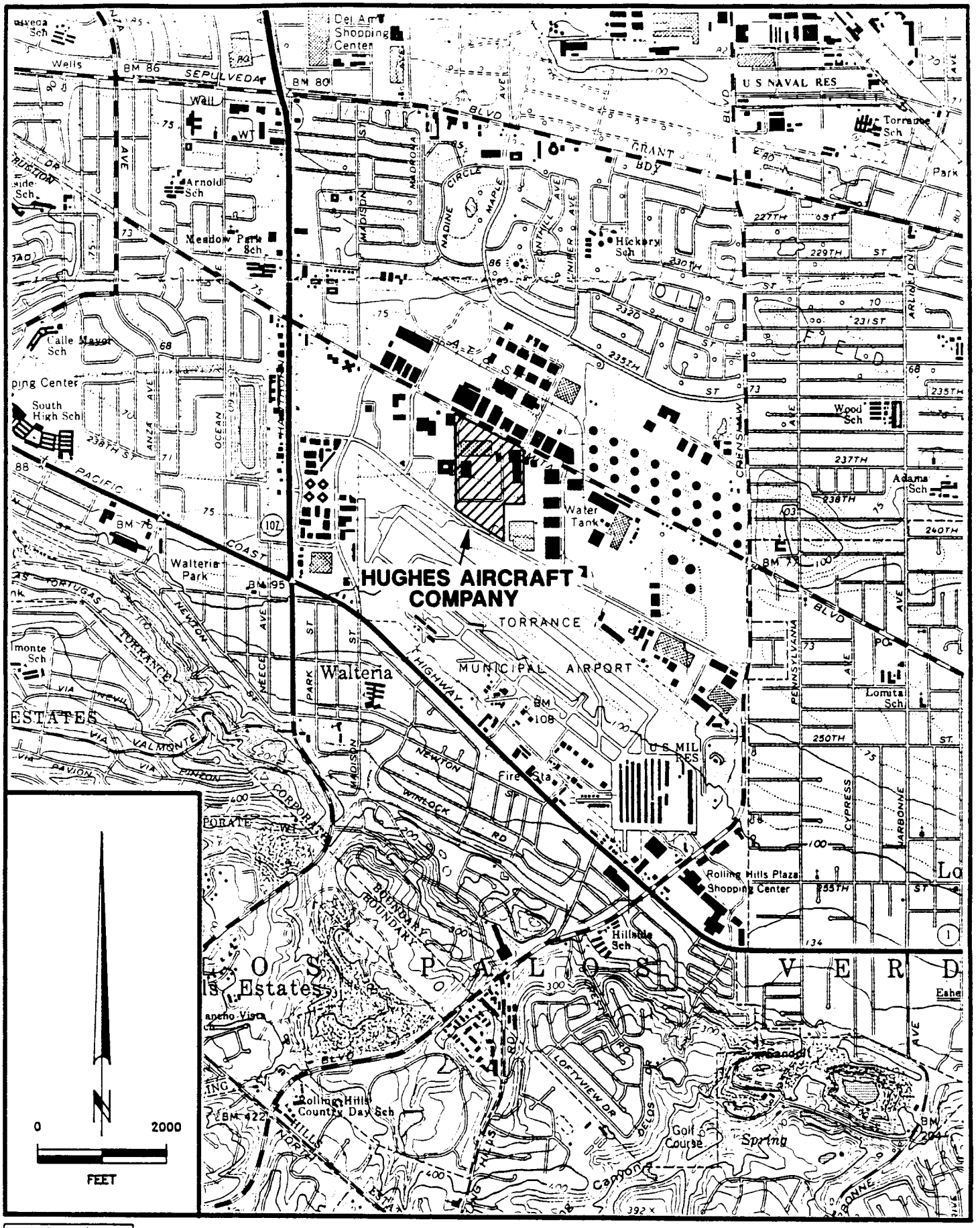

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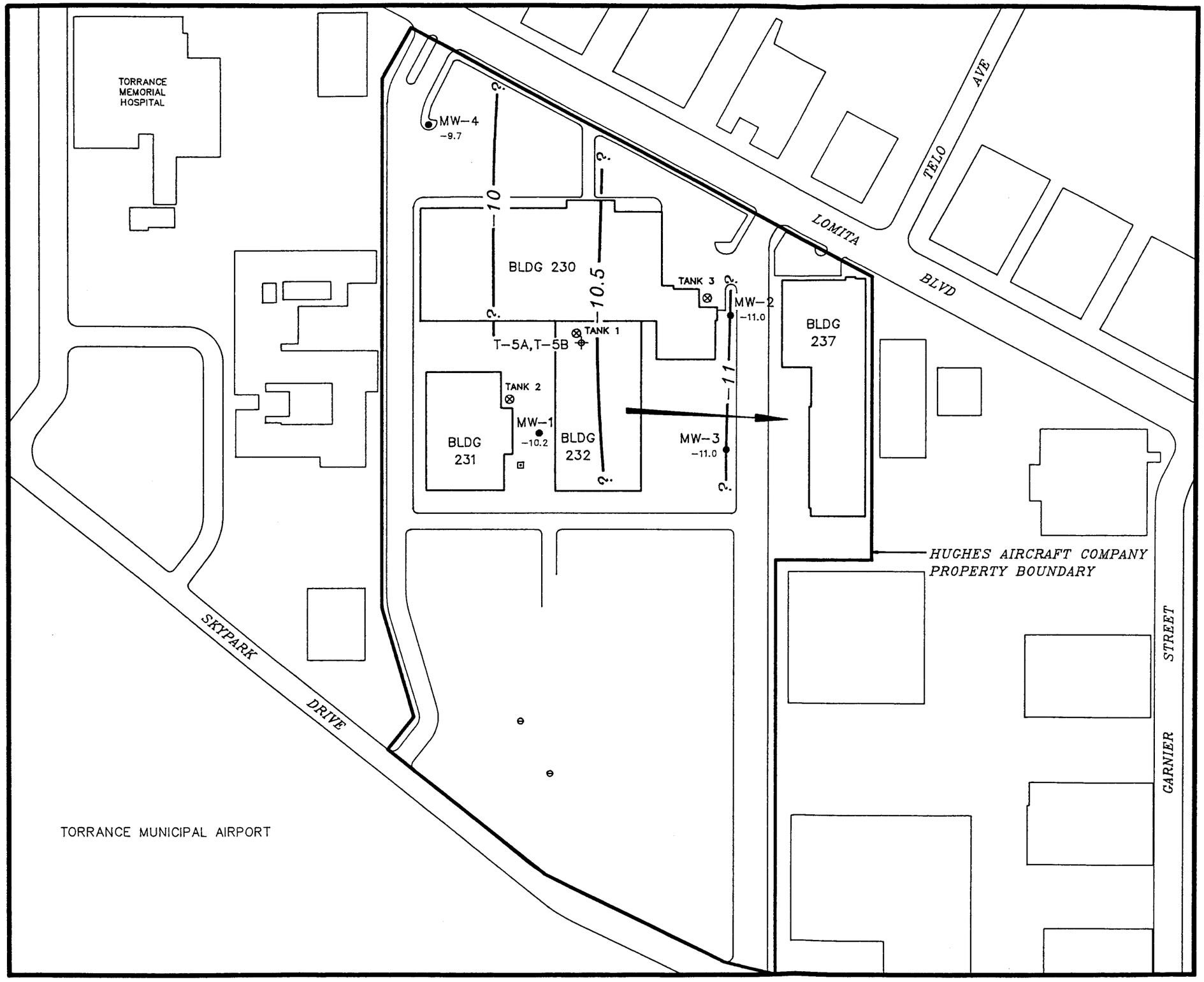
FIGURE 1. SITE LOCATION

HARGIS + ASSOCIATES, INC.



EXPLANATION

MW-2 ● MONITOR WELL

⊡ INACTIVE INDUSTRIAL WATER SUPPLY WELL

⊖ INACTIVE INJECTION WELL

T-5A,T-5B ⌖ FORMER SOIL BORING

TANK 1 ⊗ FORMER UNDERGROUND STORAGE TANK LOCATION

▭ HUGHES AIRCRAFT COMPANY BUILDING

MW-2 ● -10.2 WATER LEVEL ELEVATION, IN FEET MEAN SEA LEVEL

10 — — — — ? CONTOUR OF EQUAL WATER LEVEL ELEVATION IN FEET MEAN SEA LEVEL DASHED WHERE APPROXIMATE, QUERIED WHERE INFERRED

→ APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: WATER LEVELS WERE MEASURED MARCH 5, 1992

N

0 200 400
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

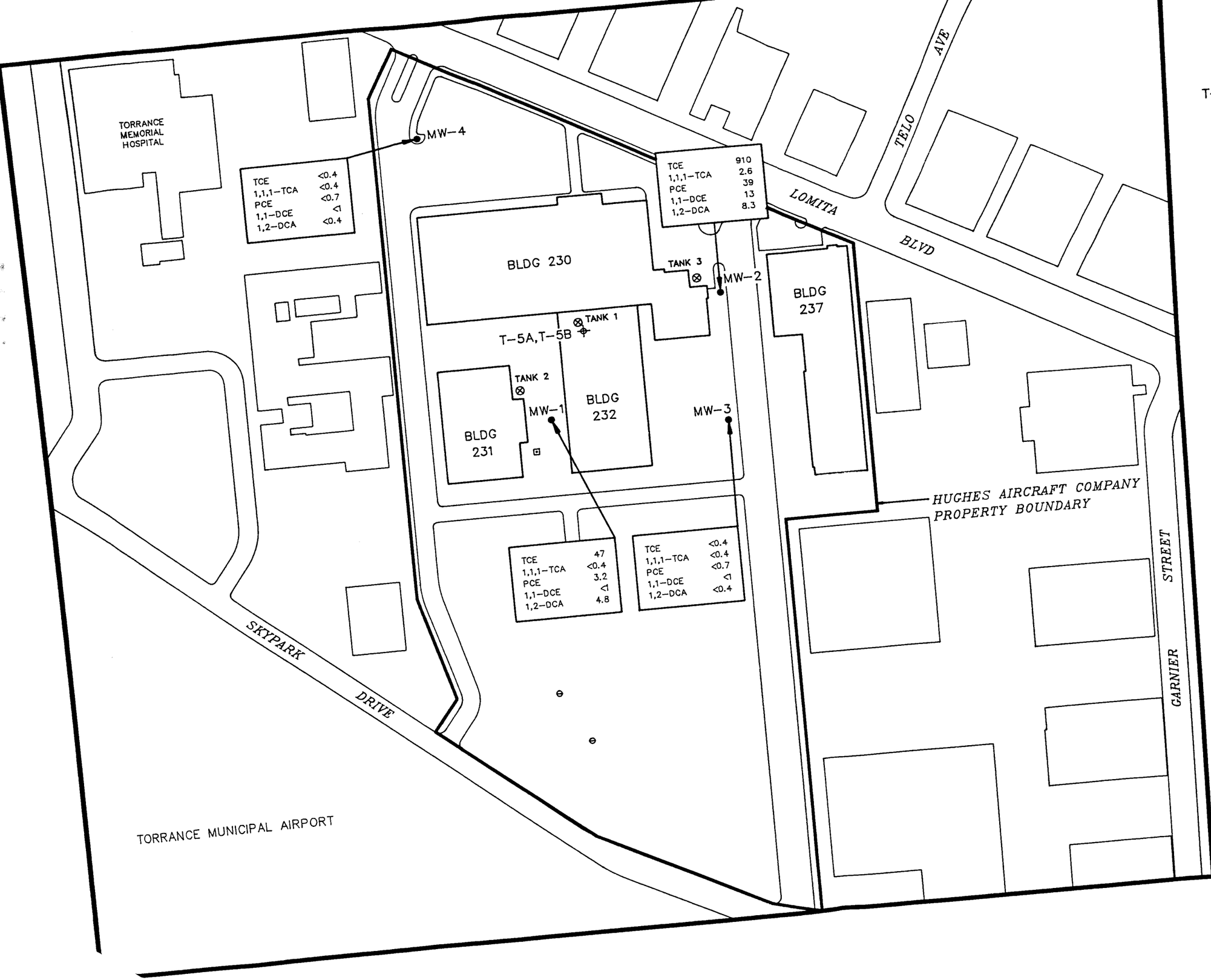
WATER LEVEL ELEVATIONS MARCH 1992

HARGIS + ASSOCIATES, INC.

3/9

FIGURE

PREP BY _____ REV BY _____ RPT NO. _____ 220-0041



MW-1 MONITOR WELL

INACTIVE INDUSTRIAL WATER SUPPLY WELL

INACTIVE INJECTION WELL

T-5A,T-5B FORMER SOIL BORING

TANK 1 FORMER UNDERGROUND STORAGE TANK LOCATION

HUGHES AIRCRAFT COMPANY BUILDING

MW-1
TCE <0.4
1,1,1-TCA <0.4

CONCENTRATION IN MICROGRAMS PER LITER

VOLATILE ORGANIC COMPOUND

TCE = TRICHLOROETHYLENE
1,1,1-TCA = 1,1,1-TRICHLOROETHANE
PCE = TETRACHLOROETHYLENE
1,1-DCE = 1,1-DICHLOROETHYLENE
1,2-DCA = 1,2-DICHLOROETHANE

NOTE: GROUNDWATER SAMPLES WERE COLLECTED FROM SITE MONITOR WELLS ON MARCH 5, 1992

N

0 200 400
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

VOLATILE ORGANIC COMPOUNDS
IN GROUNDWATER
MARCH 1992

HARGIS + ASSOCIATES, INC.

FIGUR

PREP BY _____ REV BY _____ RPT NO. _____ 210-0C

APPENDIX A

LABORATORY REPORTS AND CHAIN-OF-CUSTODY DOCUMENTATION

METHOD 8010 / 601 VOLATILE ORGANICS ANALYSIS DATA SHEET

21

Lab Name: EPTL (HAC / EDSG)

Date Sampled: 3/5/92

Lab Sample ID: MW-2

Date Received: 3/5/92

Lab File ID: 61058

Date Analyzed: 3/6/92

Matrix: (soil / water) WATER

Sample wt / vol : 5 ml

COMPOUND	R. TIME (MIN)	DAILY R.F.	PEAK HEIGHT	DIL.	DET.LIM. (ug/L)	AMT.FOUND (ug/L)
Chloromethane	2.03	4788	–	–	0.7	ND
Bromomethane	3.35	4809	–	–	0.5	↓
Vinyl Chloride	4.26	6769	–	–	1.2	↓
Chloroethane	5.42	10615	–	–	0.7	↓
Methylene Chloride	7.72	12539	–	–	0.4	↓
Trichlorofluoromethane	9.77	10315	16657	–	1.6	1.6
1,1 Dichloroethylene	10.4	12661	164159	–	1	13
1,1 Dichloroethane	11.73	12760	–	–	0.4	ND
trans 1,2 Dichloroethylene	12.38	12543	–	–	0.2	↓
Chloroform	12.99	16959	–	–	0.3	↓
1,2 Dichloroethane	13.71	13419	110991	–	0.4	8.3
1,1,1 Trichloroethane	15.06	13095	34137	–	0.4	2.6
Carbon Tetrachloride	15.45	14168	–	–	0.8	ND
Bromodichloromethane	15.93	10805	–	–	0.3	↓
1,2 Dichloropropane	17.27	11114	–	–	0.3	↓
trans 1,3 Dichloropropene	17.48	16604	–	–	0.1	↓
Trichloroethylene	17.97	14578	198406	6667	0.4	910 *
1,1,2 Trichloroethane	18.75	9250	–	–	0.2	ND
Dibromochloromethane	18.75	9250	–	–	0.2	↓
cis 1,3 Dichloropropene	18.75	9250	–	–	0.2	↓
Bromoform	19.77	4548	–	–	0.3	↓
1,1,2,2 Tetrachloroethane	21.47	4240	–	–	0.7	↓
Tetrachloroethylene	23.6	18555	727160	–	0.7	39
Chlorobenzene	26.04	4745	–	–	0.5	ND
1,3 Dichlorobenzene	40.03	2166	–	–	0.5	↓
1,2 Dichlorobenzene	41.75	2060	–	–	0.5	↓
1,4 Dichlorobenzene	42.1	1970	–	–	0.5	↓
SURG: BROMOCHLOROMETHANE	10.95	8342	99468	–	–	11.9
AMT. SPIKED (ug/L) =	10					
% RECOVERY =	119					

* RESULT FROM [75 µl SAMPLE / 5 ml H_2O] DILUTION

METHOD 8010 / 601 VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EPTL (HAC / EDSG)

Date Sampled: 3/5/92

Lab Sample ID: MW-3

Date Received: 3/5/92

Lab File ID: 61062

Date Analyzed: 3/6/92

Matrix: (soil / water) WATER

Sample wt / vol : 5 ml

COMPOUND	R. TIME (MIN)	DAILY R.F.	PEAK HEIGHT	DIL.	DET.LIM. (ug/L)	AMT.FOUND (ug/L)
Chloromethane	2.03	4788	–	–	0.7	N.D.
Bromomethane	3.35	4809	–	–	0.5	
Vinyl Chloride	4.26	6769	–	–	1.2	
Chloroethane	5.42	10615	–	–	0.7	
Methylene Chloride	7.72	12539	–	–	0.4	
Trichlorofluoromethane	9.77	10315	–	–	1.6	
1,1 Dichloroethylene	10.4	12661	–	–	1	
1,1 Dichloroethane	11.73	12760	–	–	0.4	
trans 1,2 Dichloroethylene	12.38	12543	–	–	0.2	
Chloroform	12.99	16959	–	–	0.3	
1,2 Dichloroethane	13.71	13419	–	–	0.4	
1,1,1 Trichloroethane	15.06	13095	–	–	0.4	
Carbon Tetrachloride	15.45	14168	–	–	0.8	
Bromodichloromethane	15.93	10805	–	–	0.3	
1,2 Dichloropropane	17.27	11114	–	–	0.3	
trans 1,3 Dichloropropene	17.48	16604	–	–	0.1	
Trichloroethylene	17.97	14578	–	–	0.4	
1,1,2 Trichloroethane	18.75	9250	–	–	0.2	
Dibromochloromethane	18.75	9250	–	–	0.2	
cis 1,3 Dichloropropene	18.75	9250	–	–	0.2	
Bromoform	19.77	4548	–	–	0.3	
1,1,2,2 Tetrachloroethane	21.47	4240	–	–	0.7	
Tetrachloroethylene	23.6	18555	–	–	0.7	
Chlorobenzene	26.04	4745	–	–	0.5	
1,3 Dichlorobenzene	40.03	2166	–	–	0.5	
1,2 Dichlorobenzene	41.75	2060	–	–	0.5	
1,4 Dichlorobenzene	42.1	1970	–	–	0.5	
SURG: BROMOCHLOROMETHANE	10.95	8342	80286	–	–	9.6
AMT. SPIKED (ug/L) =	10					
% RECOVERY =	96					

METHOD 8010 / 601 VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EPTL (HAC / EDSG)

Date Sampled: 3/5/92

Lab Sample ID: MW-4

Date Received: 3/5/92

Lab File ID: 61064

Date Analyzed: 3/6/92

Matrix: (soil / water) WATER

Sample wt / vol : 5 ml

COMPOUND	R. TIME (MIN)	DAILY R.F.	PEAK HEIGHT	DIL.	DET.LIM. (ug/L)	AMT.FOUND (ug/L)
Chloromethane	2.03	4788	–	–	0.7	N.D.
Bromomethane	3.35	4809	–	–	0.5	
Vinyl Chloride	4.26	6769	–	–	1.2	
Chloroethane	5.42	10615	–	–	0.7	
Methylene Chloride	7.72	12539	–	–	0.4	
Trichlorofluoromethane	9.77	10315	–	–	1.6	
1,1 Dichloroethylene	10.4	12661	–	–	1	
1,1 Dichloroethane	11.73	12760	–	–	0.4	
trans 1,2 Dichloroethylene	12.38	12543	–	–	0.2	
Chloroform	12.99	16959	–	–	0.3	
1,2 Dichloroethane	13.71	13419	–	–	0.4	
1,1,1 Trichloroethane	15.06	13095	–	–	0.4	
Carbon Tetrachloride	15.45	14168	–	–	0.8	
Bromodichloromethane	15.93	10805	–	–	0.3	
1,2 Dichloropropane	17.27	11114	–	–	0.3	
trans 1,3 Dichloropropene	17.48	16604	–	–	0.1	
Trichloroethylene	17.97	14578	–	–	0.4	
1,1,2 Trichloroethane	18.75	9250	–	–	0.2	
Dibromochloromethane	18.75	9250	–	–	0.2	
cis 1,3 Dichloropropene	18.75	9250	–	–	0.2	
Bromoform	19.77	4548	–	–	0.3	
1,1,2,2 Tetrachloroethane	21.47	4240	–	–	0.7	
Tetrachloroethylene	23.6	18555	–	–	0.7	
Chlorobenzene	26.04	4745	–	–	0.5	
1,3 Dichlorobenzene	40.03	2166	–	–	0.5	
1,2 Dichlorobenzene	41.75	2060	–	–	0.5	
1,4 Dichlorobenzene	42.1	1970	–	–	0.5	
SURG: BROMOCHLOROMETHANE	10.95	8342	77441	–	–	9.3
AMT. SPIKED (ug/L) =	10					
% RECOVERY =	93					

METHOD 8010 / 601 VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EPTL (HAC / EDSG)

Date Sampled: 3/5/92

Lab Sample ID: MW-100

Date Received: 3/5/92

Lab File ID: 61066

Date Analyzed: 3/6/92

Matrix: (soil / water) WATER

Sample wt / vol : 5 ml

COMPOUND	R. TIME (MIN)	DAILY R.F.	PEAK HEIGHT	DIL.	DET.LIM. (ug/L)	AMT.FOUND (ug/L)
Chloromethane	2.03	4788	–	–	0.7	N.D.
Bromomethane	3.35	4809	–	–	0.5	
Vinyl Chloride	4.26	6769	–	–	1.2	
Chloroethane	5.42	10615	–	–	0.7	
Methylene Chloride	7.72	12539	–	–	0.4	
Trichlorofluoromethane	9.77	10315	–	–	1.6	
1,1 Dichloroethylene	10.4	12661	–	–	1	
1,1 Dichloroethane	11.73	12760	–	–	0.4	
trans 1,2 Dichloroethylene	12.38	12543	–	–	0.2	
Chloroform	12.99	16959	–	–	0.3	
1,2 Dichloroethane	13.71	13419	65055	–	0.4	4.8
1,1,1 Trichloroethane	15.06	13095	–	–	0.4	ND
Carbon Tetrachloride	15.45	14168	–	–	0.8	
Bromodichloromethane	15.93	10805	–	–	0.3	
1,2 Dichloropropane	17.27	11114	–	–	0.3	
trans 1,3 Dichloropropene	17.48	16604	–	–	0.1	
Trichloroethylene	17.97	15059	125476	5	0.4	42 *
1,1,2 Trichloroethane	18.75	9250	–	–	0.2	N.D.
Dibromochloromethane	18.75	9250	–	–	0.2	
cis 1,3 Dichloropropene	18.75	9250	–	–	0.2	
Bromoform	19.77	4548	–	–	0.3	
1,1,2,2 Tetrachloroethane	21.47	4240	–	–	0.7	
Tetrachloroethylene	23.6	18555	58565	–	0.7	3.2
Chlorobenzene	26.04	4745	–	–	0.5	N.D.
1,3 Dichlorobenzene	40.03	2166	–	–	0.5	
1,2 Dichlorobenzene	41.75	2060	–	–	0.5	
1,4 Dichlorobenzene	42.1	1970	–	–	0.5	
SURG: BROMOCHLOROMETHANE	10.95	8342	85508	–	–	10.3
AMT. SPIKED (ug/L) =	10					
% RECOVERY =	103					

* RESULT FROM 1:5 DILUTION PERFORMED ON 3/9/92

METHOD 8010 / 601 VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EPTL (HAC / EDSG)

Lab Sample ID: FB

Lab File ID: 61068

Matrix: (soil / water) WATER

Date Sampled: 3/5/92

Date Received: 3/5/92

Date Analyzed: 3/6/92

Sample wt / vol : 5 ml

COMPOUND	R. TIME (MIN)	DAILY R.F.	PEAK HEIGHT	DIL.	DET.LIM. (ug/L)	AMT.FOUND (ug/L)
Chloromethane	2.03	4788	–	–	0.7	N.D.
Bromomethane	3.35	4809	–	–	0.5	
Vinyl Chloride	4.26	6769	–	–	1.2	
Chloroethane	5.42	10615	–	–	0.7	
Methylene Chloride	7.72	12539	–	–	0.4	
Trichlorofluoromethane	9.77	10315	–	–	1.6	
1,1 Dichloroethylene	10.4	12661	–	–	1	
1,1 Dichloroethane	11.73	12760	–	–	0.4	
trans 1,2 Dichloroethylene	12.38	12543	–	–	0.2	
Chloroform	12.99	16959	–	–	0.3	
1,2 Dichloroethane	13.71	13419	–	–	0.4	
1,1,1 Trichloroethane	15.06	13095	–	–	0.4	
Carbon Tetrachloride	15.45	14168	–	–	0.8	
Bromodichloromethane	15.93	10805	–	–	0.3	
1,2 Dichloropropane	17.27	11114	–	–	0.3	
trans 1,3 Dichloropropene	17.48	16604	–	–	0.1	
Trichloroethylene	17.97	14578	–	–	0.4	
1,1,2 Trichloroethane	18.75	9250	–	–	0.2	
Dibromochloromethane	18.75	9250	–	–	0.2	
cis 1,3 Dichloropropene	18.75	9250	–	–	0.2	
Bromoform	19.77	4548	–	–	0.3	
1,1,2,2 Tetrachloroethane	21.47	4240	–	–	0.7	
Tetrachloroethylene	23.6	18555	–	–	0.7	
Chlorobenzene	26.04	4745	–	–	0.5	
1,3 Dichlorobenzene	40.03	2166	–	–	0.5	
1,2 Dichlorobenzene	41.75	2060	–	–	0.5	
1,4 Dichlorobenzene	42.1	1970	–	–	0.5	
SURG: BROMOCHLOROMETHANE	10.95	8342	77298	–	–	9.3
AMT. SPIKED (ug/L) =	10					
% RECOVERY =	93					

METHOD 8010 / 601 VOLATILE ORGANICS ANALYSIS DATA SHEET

Lab Name: EPTL (HAC / EDSG)

Date Sampled: 3/5/92

Lab Sample ID: TB-1

Date Received: 3/5/92

Lab File ID: 61070

Date Analyzed: 3/6/92

Matrix: (soil / water) WATER

Sample wt / vol : 5 ml

COMPOUND	R. TIME (MIN)	DAILY R.F.	PEAK HEIGHT	DIL.	DET.LIM. (ug/L)	AMT.FOUND (ug/L)
Chloromethane	2.03	4788	–	–	0.7	N.D.
Bromomethane	3.35	4809	–	–	0.5	
Vinyl Chloride	4.26	6769	–	–	1.2	
Chloroethane	5.42	10615	–	–	0.7	
Methylene Chloride	7.72	12539	–	–	0.4	
Trichlorofluoromethane	9.77	10315	–	–	1.6	
1,1 Dichloroethylene	10.4	12661	–	–	1	
1,1 Dichloroethane	11.73	12760	–	–	0.4	
trans 1,2 Dichloroethylene	12.38	12543	–	–	0.2	
Chloroform	12.99	16959	–	–	0.3	
1,2 Dichloroethane	13.71	13419	–	–	0.4	
1,1,1 Trichloroethane	15.06	13095	–	–	0.4	
Carbon Tetrachloride	15.45	14168	–	–	0.8	
Bromodichloromethane	15.93	10805	–	–	0.3	
1,2 Dichloropropane	17.27	11114	–	–	0.3	
trans 1,3 Dichloropropene	17.48	16604	–	–	0.1	
Trichloroethylene	17.97	14578	–	–	0.4	
1,1,2 Trichloroethane	18.75	9250	–	–	0.2	
Dibromochloromethane	18.75	9250	–	–	0.2	
cis 1,3 Dichloropropene	18.75	9250	–	–	0.2	
Bromoform	19.77	4548	–	–	0.3	
1,1,2,2 Tetrachloroethane	21.47	4240	–	–	0.7	
Tetrachloroethylene	23.6	18555	–	–	0.7	
Chlorobenzene	26.04	4745	–	–	0.5	
1,3 Dichlorobenzene	40.03	2166	–	–	0.5	
1,2 Dichlorobenzene	41.75	2060	–	–	0.5	
1,4 Dichlorobenzene	42.1	1970	–	–	0.5	
SURG: BROMOCHLOROMETHANE	10.95	8342	81839	–	–	9.8
AMT. SPIKED (ug/L) =	10					
% RECOVERY =	98					

METHOD 8020/602 VOLATILE AROMATICS ANALYSIS DATA SHEET

Lab Name: EPTL (HAC / EDSG)

Date Sampled: 3/5/92

Lab Sample ID: MW-2

Date Received: 3/5/92

Lab File ID: 61060

Date Analyzed: 3/6/92

Matrix: (soil / water) WATER

Sample wt / vol : 5 mL

COMPOUND	R. TIME (MIN)	DAILY R.F.	PEAK HEIGHT	DIL.	DET.LIM. (ug/L)	AMT.FOUND (ug/L)
BENZENE	18.35	37356	0	-	0.5	ND
TOLUENE	24.73	31867	0	-	0.5	
CHLOROBENZENE	25.95	22617	0	-	0.5	
ETHYLBENZENE	28.32	17447	0	-	0.5	
1,3-DICHLOROBENZENE	39.88	5686	0	-	0.5	
1,2-DICHLOROBENZENE	41.35	4884	0	-	0.5	
1,4-DICHLOROBENZENE	42.05	5348	0	-	0.5	✓
SURROGATE:						
BROMOFLUOROBENZENE	31.54	1557504	133566			117
AMT. SPIKED (ug/L) =	120					
% RECOVERY =	97					
RECOVERY LIMITS =	75-125 %					

MODIFIED EPA METHOD 8015 ANALYSIS DATA SHEET

Lab Name: EPTL (HAC/EDSG)
Lab Sample ID: MW-2
Lab File ID: 61059
Matrix: Water

Date Sampled: 3/5/92
Date Received: 3/5/92
Date Analyzed: 3/9/92
Sample wt/vol: – (g/ml) –

EPTL SAMPLE ID	HARGIS SAMPLE ID	TEST METHOD	MATRIX	RESULT (mg/L)	DETECTION LIMIT (mg/L)
61059	MW-2	Mod.8015	WATER	ND	2
Surrogate:	Naphthalene-d8				
Recovery (%)	121				
Recovery Limit:	75 - 125%				

METHOD 6010 INORGANIC ANALYSIS DATA SHEET

Lab Name: EPTL (HAC/EDSG) TB-1, FB
Lab Sample ID: MW-1 & MW-4; MW-100
Lab File ID: 61057, 61061; 61063; 61065
Matrix: Water 61067; 61069; 61071
Method Blank

Date Sampled: 3/5/92
Date Received: 3/6/92
Date Analyzed: 3/6/92

EPTL SAMPLE ID	HARGIS SAMPLE ID	TEST METHOD	METAL	RESULT (mg/L)	DETECTION LIMIT (mg/L)
61057	MW-1	6010	Total Chromium	0.04	0.01
61061	MW-2	6010	Total Chromium	0.06	0.01
61063	MW-3	6010	Total Chromium	0.05	0.01
61065	MW-4	6010	Total Chromium	0.03	0.01
61067	MW-100	6010	Total Chromium	0.04	0.01
61069	FB	6010	Total Chromium	0.02	0.01
61071	TB-2	6010	Total Chromium	0.01	0.01
Method Blank	Method Blank	6010	Total Chromium	ND	0.01
Sample used for	MS/MSD:61057				
SPIKE ADDED (mg/L)	SAMPLE CONC (mg/L)	MS % REC.	MSD % REC.	% RPD	QC LIMITS (%) RPD REC.
0.95	0.04	94	96	2.1	10 80 - 120

HARGIS + ASSOCIATES, INC. **CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM**

DATE 03/05/92 PAGE 1 OF 2

PROJECT NAME: HAC Torrance
PROJECT No./TASK No.: 850.2
PROJECT MANAGER: FAX No.:
QA MANAGER: Matt Wiedlin FAX No.:
SAMPLER (SIGNATURE): N. Rayshman
SAMPLER (PRINTED): Natalie Rayshman, DAVID S. DREWELOW

LABORATORY INFORMATION: EPTL

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS 40 ml vials	SAMPLE CONTAINERS 40 ml vials	SAMPLE CONTAINERS 40 ml vials	SAMPLE CONTAINERS 500 ml or 2x60 ml plastic	ANALYSES REQUESTED 8010 VOCs	ANALYSES REQUESTED 8015 TPH	ANALYSES REQUESTED 8020 BTEX	ANALYSES REQUESTED 6010 Total Chromium	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S 10-100	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S 100-1000	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S >1000	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S <10	SPECIAL HANDLING	REMARKS
61056	MW-1	3/5/92	9:15		✓		✓				✓	2				✓					✓				Samples
61057	"	"	"								✓				1				✓						for 6010
61058	MW-2	"	13:20				✓				✓	2				✓					✓				Total
61059	"	"	"				✓				✓		2				✓								Chromium
61060	"	"	"				✓				✓			2				✓							should
61061	"	"	"								✓				1				✓						be
61062	MW-3	"	11:40				✓				✓	2				✓							✓		filtered
61063	"	"	"								✓				1				✓						within
61064	MW-4	"	14:17				✓				✓	2				✓							✓		24 hr and
61065	"	"	"								✓				1				✓						preserved
61066	MW-100	"	10:15				✓				✓	2				✓									2 week
61067	"	"	"								✓				1				✓						turnaround
61068	FB	"	11:40				✓				✓	2				✓									
61069	"	"	"								✓				1				✓						
Total number of Containers per analysis:												12	2	2	6									Total No. of Containers: 22	

Relinquished by:	Date	Received by:	Date
[signature]	3/5/92	Chary [signature]	3/5/92
H+A	Time 1610	Hac EPTL	Time 1611
Company		Company	

Relinquished by:	Date	Received by:	Date
	Time		Time
Company		Laboratory	

INSTRUCTIONS
1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
☒ No. of containers correct ☒ received good condition/cold
☒ cu[illegible] sea[illegible] pure ☒ [illegible]rms [illegible]DC d[illegible]ent

Shipment Method: Personal Delivery
Send Results to: Matt Wiedlin

☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
☑ 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165
☐ 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992
☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA
[illegible]sine[illegible] [illegible]fice [illegible] Kim[illegible] [illegible]k

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

HARGIS + ASSOCIATES, INC.

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 03/05/92 PAGE 1 OF 2

PROJECT NAME: HAC Torrance
PROJECT No./TASK No.: 850
PROJECT MANAGER:
FAX No.: Matt Wedlin
QA MANAGER:
FAX No.:
SAMPLER (SIGNATURE): N. Raykhman
SAMPLER (PRINTED): N. Raykhman, D. DRIEWELOW

LABORATORY INFORMATION: EPTL

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS 40 ml vials	SAMPLE CONTAINERS 2 x 60 ml plastic	ANALYSES REQUESTED 8010 VOCs	ANALYSES REQUESTED 6010 Total Chrom	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S	SPECIAL HANDLING	REMARKS
61070	TB-1	3/5/91	14:30		V		V				V	2		✓				
61071	"	"	"		V						V		1		✓			6010 -
																		- filter
																		within
																		24 hr
																		~~25~~ 2 weeks
																		turn around
Total number of Containers per analysis:												2	1					Total No. of Containers: 3

Relinquished by:	Date	Received by:	Date
[signature]	3/5	Cheryl [signature]	3/5/92
H+A	Time 1610	HAC EPTL	Time 1611
Company		Company	

Relinquished by:	Date	Received by:	Date
	Time		Time
Company		Laboratory	

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- ☒ No. of containers correct
- ☒ received good condition/cold
- ☒ custody seals secure
- ☒ conforms to COC document

Shipment Method: Personal
Send Results to: Delivery Matt Wedlin

- ☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
- ☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
- ☑ 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165
- ☐ 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992
- ☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL - LABORATORY YELLOW - QA MANAGER PINK - FIELD/TASK MANAGER

METHOD 8010 / 601 VOLATILE ORGANICS ANALYSIS DATA SHEET

20

Lab Name: EPTL (HAC / EDSG)

Date Sampled: 3/5/92

Lab Sample ID: MW-1

Date Received: 3/5/92

Lab File ID: 61056

Date Analyzed: 3/6/92

Matrix: (soil / water) WATER

Sample wt / vol : 5 ml

COMPOUND	R. TIME	DAILY R.F.	PEAK HEIGHT	DIL.	DET.LIM.	AMT.FOUND
	(MIN)			–	(ug/L)	(ug/L)
Chloromethane	2.03	4788	–	–	0.7	N.D.
Bromomethane	3.35	4809	–	–	0.5	
Vinyl Chloride	4.26	6769	–	–	1.2	
Chloroethane	5.42	10615	–	–	0.7	
Methylene Chloride	7.72	12539	–	–	0.4	
Trichlorofluoromethane	9.77	10315	–	–	1.6	
1,1 Dichloroethylene	10.4	12661	–	–	1	
1,1 Dichloroethane	11.73	12760	–	–	0.4	
trans 1,2 Dichloroethylene	12.38	12543	–	–	0.2	
Chloroform	12.99	16959	–	–	0.3	
1,2 Dichloroethane	13.71	13419	64108	–	0.4	4.8
1,1,1 Trichloroethane	15.06	13095	–	–	0.4	ND.
Carbon Tetrachloride	15.45	14168	–	–	0.8	
Bromodichloromethane	15.93	10805	–	–	0.3	
1,2 Dichloropropane	17.27	11114	–	–	0.3	
trans 1,3 Dichloropropene	17.48	16604	–	–	0.1	
Trichloroethylene	17.97	14578	137127	5	0.4	47 *
1,1,2 Trichloroethane	18.75	9250	–	–	0.2	ND.
Dibromochloromethane	18.75	9250	–	–	0.2	
cis 1,3 Dichloropropene	18.75	9250	–	–	0.2	
Bromoform	19.77	4548	–	–	0.3	
1,1,2,2 Tetrachloroethane	21.47	4240	–	–	0.7	
Tetrachloroethylene	23.6	18555	59550	–	0.7	3.2
Chlorobenzene	26.04	4745	–	–	0.5	N.D.
1,3 Dichlorobenzene	40.03	2166	–	–	0.5	
1,2 Dichlorobenzene	41.75	2060	–	–	0.5	
1,4 Dichlorobenzene	42.1	1970	–	–	0.5	
SURG: BROMOCHLOROMETHANE	10.95	8342	86008	–	–	10.3
AMT. SPIKED (ug/L) =	10					
% RECOVERY =	103					

* RESULT FROM 1:5 DILUTION

Analytical Technologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

RECEIVED
MAR 20 1992
HARGIS - ASSOCIATES, INC.
LA JOLLA, CA

ATI I.D.: 203060

March 18, 1992

HARGIS & ASSOCIATES, INC.
2223 AVENIDA DE LA PLAYA, SUITE 300
LA JOLLA, CA 92037

Project Name: HAC-TORRANCE
Project # : 850.2

Attention: MATT WIEDLIN

Analytical Technologies, Inc. has received the following sample(s):

Date Received	Quantity	Matrix
March 05, 1992	2	WATER

The sample(s) were analyzed with EPA methodology or equivalent methods as specified in the enclosed analytical schedule. The symbol for "less than" indicates a value below the reportable detection limit. Please see the attached sheet for the sample cross reference table.

The results of these analyses and the quality control data are enclosed.

S. Snyder
SUSAN M. SNYDER
SENIOR PROJECT MANAGER

Kenneth Wahl
KENNETH WAHL
LABORATORY MANAGER

AnalyticalTechnologies,Inc.

SAMPLE CROSS REFERENCE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

Report Date: March 18, 1992
ATI I.D. : 203060

ATI #	Client Description	Matrix	Date Collected
1	MW-2	WATER	05-MAR-92
2	TB-2	WATER	05-MAR-92

---TOTALS---

Matrix	# Samples
WATER	2

ATI STANDARD DISPOSAL PRACTICE

The sample(s) from this project will be disposed of in twenty-one (21) days from the date of this report. If an extended storage period is required, please contact our sample control department before the scheduled disposal date.

AnalyticalTechnologies,Inc.

ANALYTICAL SCHEDULE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D.: 203060

Analysis	Technique/Description
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 8010 (HALOGENATED VOLATILE ORGANICS)	GC/ELECTROLYTIC CONDUCTIVITY DETECTOR
EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)	GC/PHOTO IONIZATION DETECTOR
MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)	GC/FLAME IONIZATION DETECTOR

Analytical Technologies, Inc.

METALS RESULTS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D.: 203060

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	MW-2	WATER	05-MAR-92	05-MAR-92

Parameter	Units	1
CHROMIUM	MG/L	0.01

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 203060

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
CHROMIUM	203060-01	MG/L	0.01	0.01	0	1.86	2.00	93

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 203060

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
CHROMIUM	23081	MG/L	<0.01	1.94	2.00	97

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

GAS CHROMATOGRAPHY RESULTS

Test : EPA 8010 (HALOGENATED VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 203060
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW-2	WATER	05-MAR-92	N/A	10-MAR-92	100.00
2	TB-2	WATER	05-MAR-92	N/A	10-MAR-92	1.00

Parameter	Units	1	2
BROMODICHLOROMETHANE	UG/L	<20	<0.20
BROMOFORM	UG/L	<100	<1.0
BROMOMETHANE	UG/L	<100	<1.0
CARBON TETRACHLORIDE	UG/L	<20	<0.20
CHLOROBENZENE	UG/L	<50	<0.50
CHLOROETHANE	UG/L	<100	<1.0
CHLOROFORM	UG/L	<20	<0.20
CHLOROMETHANE	UG/L	<20	<0.20
DIBROMOCHLOROMETHANE	UG/L	<20	<0.20
1,2-DICHLOROBENZENE	UG/L	<50	<0.50
1,3-DICHLOROBENZENE	UG/L	<50	<0.50
1,4-DICHLOROBENZENE	UG/L	<50	<0.50
DICHLORODIFLUOROMETHANE	UG/L	<100	<1.0
1,1-DICHLOROETHANE	UG/L	<20	<0.20
1,2-DICHLOROETHANE	UG/L	<20	<0.20
1,1-DICHLOROETHENE	UG/L	<20	<0.20
CIS-1,2-DICHLOROETHENE	UG/L	<20	<0.20
TRANS-1,2-DICHLOROETHENE	UG/L	<20	<0.20
1,2-DICHLOROPROPANE	UG/L	<20	<0.20
CIS-1,3-DICHLOROPROPENE	UG/L	<20	<0.20
TRANS-1,3-DICHLOROPROPENE	UG/L	<20	<0.20
METHYLENE CHLORIDE	UG/L	<200	<2.0
1,1,2,2-TETRACHLOROETHANE	UG/L	<20	<0.20
TETRACHLOROETHENE	UG/L	56	<0.20
1,1,1-TRICHLOROETHANE	UG/L	<20	<0.20
1,1,2-TRICHLOROETHANE	UG/L	<20	<0.20
TRICHLOROETHENE	UG/L	930	<0.20
TRICHLOROFLUOROMETHANE	UG/L	<200	<2.0
VINYL CHLORIDE	UG/L	<20	<0.20
SURROGATES			
BROMOFLUOROBENZENE (ELCD)	%	108	85
BROMOFLUOROBENZENE (PID)	%	114	97

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8010 (HALOGENATED VOLATILE ORGANICS)
Blank I.D. : 18263
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: N/A
Date Analyzed : 10-MAR-92
Dil. Factor : 1.00

Parameters	Units	Results
BROMODICHLOROMETHANE	UG/L	<0.20
BROMOFORM	UG/L	<1.0
BROMOMETHANE	UG/L	<1.0
CARBON TETRACHLORIDE	UG/L	<0.20
CHLOROBENZENE	UG/L	<0.50
CHLOROETHANE	UG/L	<1.0
CHLOROFORM	UG/L	<0.20
CHLOROMETHANE	UG/L	<0.20
DIBROMOCHLOROMETHANE	UG/L	<0.20
1,2-DICHLOROBENZENE	UG/L	<0.50
1,3-DICHLOROBENZENE	UG/L	<0.50
1,4-DICHLOROBENZENE	UG/L	<0.50
DICHLORODIFLUOROMETHANE	UG/L	<1.0
1,1-DICHLOROETHANE	UG/L	<0.20
1,2-DICHLOROETHANE	UG/L	<0.20
1,1-DICHLOROETHENE	UG/L	<0.20
CIS-1,2-DICHLOROETHENE	UG/L	<0.20
TRANS-1,2-DICHLOROETHENE	UG/L	<0.20
1,2-DICHLOROPROPANE	UG/L	<0.20
CIS-1,3-DICHLOROPROPENE	UG/L	<0.20
TRANS-1,3-DICHLOROPROPENE	UG/L	<0.20
METHYLENE CHLORIDE	UG/L	<2.0
1,1,2,2-TETRACHLOROETHANE	UG/L	<0.20
TETRACHLOROETHENE	UG/L	<0.20
1,1,1-TRICHLOROETHANE	UG/L	<0.20
1,1,2-TRICHLOROETHANE	UG/L	<0.20
TRICHLOROETHENE	UG/L	<0.20
TRICHLOROFLUOROMETHANE	UG/L	<2.0
VINYL CHLORIDE	UG/L	<0.20
SURROGATES		
BROMOFLUOROBENZENE (ELCD)	%	91
BROMOFLUOROBENZENE (PID)	%	97

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : EPA 8010 (HALOGENATED VOLATILE ORGANICS)
MSMSD # : 30903
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: N/A
Date Analyzed : 10-MAR-92
Sample Matrix : WATER
REF I.D. : 203060-02

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
CHLOROBENZENE	UG/L	<0.50	2.0	2.0	100	2.0	100	0
CHLOROFORM	UG/L	<0.20	2.0	1.8	90	1.8	90	0
1,1-DICHLOROETHENE	UG/L	<0.20	1.6	1.3	81	1.3	81	0
TETRACHLOROETHENE	UG/L	<0.20	2.0	1.9	95	1.9	95	0
TRICHLOROETHENE	UG/L	<0.20	2.0	2.0	100	2.1	105	5

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8010 (HALOGENATED VOLATILE ORGANICS)
Blank Spike #: 23210
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: N/A
Date Analyzed : 10-MAR-92
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
CHLOROBENZENE	UG/L	<0.50	3.9	4.0	98
CHLOROFORM	UG/L	<0.20	1.9	2.0	95
1,1-DICHLOROETHENE	UG/L	<0.20	1.9	2.0	95
TETRACHLOROETHENE	UG/L	<0.20	1.9	2.0	95
TRICHLOROETHENE	UG/L	<0.20	1.9	2.0	95

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY RESULTS

Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 203060
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW-2	WATER	05-MAR-92	N/A	06-MAR-92	1.00

Parameter	Units	1
BENZENE	UG/L	<0.50
TOLUENE	UG/L	<0.50
ETHYLBENZENE	UG/L	<0.50
XYLENES (TOTAL)	UG/L	<1.0
SURROGATES		
TRIFLUOROTOLUENE	%	N/A*Y

*Y RESULT NOT ATTAINABLE DUE TO SAMPLE MATRIX INTERFERENCE

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)
Blank I.D. : 18075
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: N/A
Date Analyzed : 06-MAR-92
Dil. Factor : 1.00

Parameters	Units	Results
BENZENE	UG/L	<0.50
TOLUENE	UG/L	<0.50
ETHYLBENZENE	UG/L	<0.50
XYLENES (TOTAL)	UG/L	<1.0
SURROGATES		
TRIFLUOROTOLUENE	%	103

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)
MSMSD # : 30409
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: N/A
Date Analyzed : 05-MAR-92
Sample Matrix : WATER
REF I.D. : 203042-02

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
BENZENE	UG/L	<0.50	5.0	5.4	108	5.2	104	4
TOLUENE	UG/L	2.1	5.0	7.2	102	7.3	104	1

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

KLP — 3-20-92
this needs to be in project file, but I don't know which one.

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE

Test : EPA 8020 (BENZENE, TOLUENE, ETHYLBENZENE, XYLENES)
Blank Spike #: 22885
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: N/A
Date Analyzed : 05-MAR-92
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
BENZENE	UG/L	<0.50	5.2	5.0	104
TOLUENE	UG/L	<0.50	5.3	5.0	106

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 203060
Project # : 850.2
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW-2	WATER	05-MAR-92	06-MAR-92	09-MAR-92	1.00

Parameter	Units	1
FUEL HYDROCARBONS	MG/L	<0.50
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank I.D. : 18098
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: 06-MAR-92
Date Analyzed : 07-MAR-92
Dil. Factor : 1.00

Parameters	Units	Results
FUEL HYDROCARBONS	MG/L	<0.50
HYDROCARBON RANGE		-
HYDROCARBONS QUANTITATED USING		-

Analytical Technologies, Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
MSMSD # : 30527
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.2
Project Name: HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: 06-MAR-92
Date Analyzed : 07-MAR-92
Sample Matrix : WATER
REF I.D. : REAGENT WATER

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
FUEL HYDROCARBONS	MG/L	<0.50	10.0	8.1	81	8.1	81	0

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE

Test : MOD EPA 8015-CDOHS (FUEL HYDROCARBONS)
Blank Spike #: 22963
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.2
Project Name : HAC-TORRANCE

ATI I.D. : 203060
Date Extracted: 06-MAR-92
Date Analyzed : 07-MAR-92
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
FUEL HYDROCARBONS	MG/L	<0.50	8.1	10.0	81

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

HARGIS + ASSOCIATES, INC.

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

F 3 30a

DATE _____ PAGE 1 OF 1

PROJECT NAME: HAC Torrance	PROJECT No./TASK No.: 850.2
PROJECT MANAGER: Matt Wiedlin	FAX No.
QA MANAGER	FAX No.
SAMPLER (SIGNATURE): N. Rayklman	SAMPLER (PRINTED): N. Rayklman

LABORATORY INFORMATION: ATI

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS 40 ml vials	SAMPLE CONTAINERS 40 ml vials	SAMPLE CONTAINERS 40 ml vial	SAMPLE CONTAINERS 500 ml plastic	ANALYSES REQUESTED 8010 VOCs	ANALYSES REQUESTED 8015 TPH	ANALYSES REQUESTED 8020 BTEX	ANALYSES REQUESTED 6010 Total Chrom	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S	SPECIAL HANDLING	REMARKS
~~02~~	MW-2	03/05/92	13:20		V		V				V	2				V						6010 --
~~03~~	"	"	"		V		V				V		2				V					-filter
	"	"	"		V		V				V			2				V				within
~~01~~	"	"	"		V		[illegible]				V				1				V			24 hr and
(02)	TB-2	"	14:31		V		V				V	2				V						preserve
																						2 weeks
																						turn
																						around

Total number of Containers per analysis:

Total No. of Containers: 9

Relinquished by:	Date	Received by:	Date
Natalie Rayklman	03/05/92		
Hargis + Assoc	Time 18.07		Time
Company		Company	

Relinquished by:	Date	Received by:	Date
		[signature]	3/5
	Time	ATI	Time 1807
Company		Laboratory	

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:

- [x] No. of containers correct
- [x] received good condition/cold
- [x] custody seals secure
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EXHIBIT "E"

July 17, 1992

Dr. Michael Yalch
HUGHES AIRCRAFT COMPANY
Electron Dynamics Division
3100 West Lomita Boulevard
Torrance, CA 90509

Re: Transmittal of Interim Field Data and
Initial Groundwater Analytical Results
Hughes Aircraft Company,
Electron Dynamics Division, Torrance, California

Dear Dr. Yalch:

Per your request, this data submittal presents and summarizes the results of the ongoing groundwater assessment performed for Hughes Aircraft Company (HAC), Electron Dynamics Division located at 3100 West Lomita Boulevard, Torrance, California (the site). This submittal is being provided as part of the additional groundwater assessment required by the California Regional Water Quality Control Board in their letter dated January 8, 1992.

Enclosed are the following documents for your review:

1) Data Summary Tables

- Monitor Well Construction Data (Table 1)
- Water Level Elevations (Table 2)
- Volatile Organic Compounds and Fuel Hydrocarbons in Groundwater (Table 3)
- Maximum Contaminant Levels (Table 4)
- Total Dissolved Chromium in Groundwater (Table 5)

2) Lithologic Logs of Monitor Wells MW-5 through MW-9 (Tables 6 through 10)

3) Illustrations

- Site Plan (Figure 1)
- Water Level Elevations (Figure 2)
- Volatile Organic Compounds in Groundwater (Figure 3)

4) Raw Analytical Data Sheets (Attachment 1)

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Tucson, AZ
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Manhattan Beach, CA
Bakersfield, CA

The following summarizes the additional groundwater assessment work conducted at the site during the period from April through July 1992.

SCOPE OF WORK

Five additional groundwater monitor wells were constructed in the Gage aquifer to further evaluate groundwater quality in the vicinity of the site. These water table monitor wells were designated MW-5 through MW-9. Monitor wells MW-5 through MW-7 were drilled in April 1992, and monitor wells MW-8 and MW-9 were drilled in June 1992. Water levels were measured in monitor wells MW-1 through MW-9 in July 1992. Two rounds of groundwater samples were collected from monitor wells MW-5 through MW-7 in April and May 1992. One round of groundwater samples was collected from monitor wells MW-8 and MW-9 in July 1992.

MONITOR WELL CONSTRUCTION

Monitor wells MW-5 through MW-9 were drilled and constructed using a CME-75 hollow stem auger drill rig (Figure 1; Table 1). Lithologic samples were collected from the boreholes using continuous coring methods. The lithologic samples were used to prepare lithologic logs (Tables 6 through 10).

Monitor well MW-5 was installed to evaluate groundwater quality to the south and cross-gradient of the three former tank locations. Monitor wells MW-6 and MW-7 were installed to evaluate groundwater quality downgradient of the three former tank locations. Monitor well MW-8 was installed to evaluate groundwater quality to the north and cross-gradient of the three former tank locations. Monitor well MW-9 was installed to evaluate groundwater quality upgradient of the three former tank locations.

WATER LEVELS

Depth to water at the site is approximately 88 feet below land surface. Based on water levels measured on July 1, 1992, water level elevations ranged from -11.52 feet mean sea level (msl) in monitor well MW-7 to -9.70 feet msl in monitor well MW-9 (Table 2). Based on these data, the direction of groundwater flow is to the east, and the hydraulic gradient is 0.002 (Figure 2).

CHEMICAL QUALITY OF GROUNDWATER

Analytical results for groundwater samples collected from monitor wells MW-6, MW-7, and MW-8 indicated that volatile organic compounds (VOCs) and total dissolved chromium are present in the groundwater underlying the site (Table 4; Figure 3). Total fuel hydrocarbons (TFH) were not detected in the groundwater samples collected from MW-5 through MW-7 during the first two sampling events. Groundwater samples collected from monitor wells MW-8 and MW-9 were not analyzed for TFH because TFH had not been detected in perimeter monitor wells MW-4, MW-5, MW-6, and MW-7.

The VOCs, trichloroethylene (TCE) and tetrachloroethylene (PCE), were detected in groundwater samples collected from monitor wells MW-6 and MW-7 on April 21, 1992 and May 13, 1992, and from MW-8 on July 1, 1992. VOCs were not detected in groundwater samples collected from monitor wells MW-5 and MW-9 during any of the sampling rounds (Table 3; Figure 3).

TCE was detected in groundwater samples collected from monitor wells MW-6, MW-7, and MW-8 (Table 3; Figure 3). The highest concentration of TCE was 353 micrograms per liter (µg/l) in a groundwater sample collected from monitor well MW-6. The California Maximum Contaminant Level (MCL) for TCE is 5 µg/l (Table 4). Concentrations of TCE detected in groundwater samples collected from monitor wells MW-6, MW-7, and MW-8 exceeded the MCL for TCE.

PCE was detected in groundwater samples from monitor well MW-6 (Table 3; Figure 3). The highest concentration of PCE detected was 9 µg/l. The California MCL for PCE is 5 µg/l (Table 4). Concentrations of PCE detected in groundwater samples collected from monitor well MW-6 exceeded the MCL for PCE.

Total chromium was detected in groundwater samples collected from monitor wells MW-6, MW-7, and MW-9 (Table 5). The highest concentration of total chromium was 0.03 milligrams per liter (mg/l), which was detected in a groundwater sample collected from monitor well MW-7. The California MCL for chromium is 0.05 mg/l (Table 4). Concentrations of chromium detected in groundwater samples collected from monitor wells MW-6, MW-7 and MW-9 did not exceed the MCL for chromium.

Further assessment is necessary to delineate the extent of VOCs in groundwater. Hargis + Associates, Inc. is currently compiling regional hydrogeologic data to aid in the selection of off-site monitor well locations. As these results become available, proposed off-site monitor well locations will be provided to Hughes Aircraft Company.

Hargis + Associates, Inc. appreciates this opportunity to be of service to Hughes Aircraft Company. If you have any questions or wish further discussion regarding this data submittal, please contact Matt Wiedlin at (619) 454-0165 or me at (310) 372-7992.

Sincerely,

HARGIS + ASSOCIATES, INC.

Roger G. Meinzer for

Rush N. Boynton
Project Manager

RNB:ljh

cc: Gary L. Rafferty, Esq.

Enclosure

yalch11.850

TABLE 1

MONITOR WELL CONSTRUCTION DATA

WELL IDENTIFIER	DATE CONSTRUCTED	LAND SURFACE ELEVATION (feet msl)	REFERENCE POINT ELEVATION (feet msl)	TOTAL DEPTH (feet bls)	SCREENED INTERVAL (feet bls)	FILTER PACK (feet bls)	BENTONITE PELLETS (feet bls)	VOLCLAY GROUT (feet bls)	CONCRETE (feet bls)
MW-1	07-12-91	78.75	79.30	105	75-105	68-105	64-68	2-64	0-2
MW-2	07-10-91	75.53	77.22	113	83-113	77.5-113	73-77.5	2-73	0-2
MW-3	07-11-91	76.06	77.90	105	75-105	69-105	66-69	2-66	0-2
MW-4	07-09-91	74.72	75.62	113	83-113	77-113	73-77	2-73	0-2
MW-5	04-13-92	78.61	78.21	103	73-103	70.6-103	68-70.6	2-68	0-2
MW-6	04-14-92	75.24	74.87	108	78-108	75-108	73.5-75	2-73.5	0-2
MW-7	04-15-92	75.31	76.58	108	78-108	74-108	70-74	2-70	0-2
MW-8	06-26-92	75.63	75.09	110	78.5-108.5	75.7-108.5	73.4-75.7	2-73.4	0-2
MW-9	06-30-92	75.75	75.34	110	78-108	72.4-108	69.7-72.4	2-69.7	0-2

msl = Mean sea level
bls = Below land surface

TABLE 2

WATER LEVEL ELEVATIONS

WELL IDENTIFIER	DATE MEASURED	REFERENCE POINT ELEVATION (feet msl)	DEPTH TO WATER (feet brp)	WATER LEVEL ELEVATION (feet msl)
MW-1	07/23/91	79.30	88.53	-9.23
	03/05/92		89.47	-10.17
	04/21/92		89.16	-9.86
	05/13/92		89.10	-9.80
	07/01/92		89.45	-10.15
MW-2	07/23/91	77.22	87.13	-9.91
	03/05/92		88.17	-10.95
	04/21/92		87.85	-10.63
	05/13/92		87.92	-10.70
	07/01/92		88.17	-10.95
MW-3	07/23/91	77.90	87.82	-9.92
	03/05/92		88.87	-10.97
	04/21/92		88.57	-10.67
	05/13/92		88.63	-10.73
	07/01/92		88.84	-10.94
MW-4	07/23/91	75.62	84.51	-8.89
	03/05/92		85.30	-9.68
	04/21/92		85.08	-9.46
	05/13/92		85.14	-9.52
	07/01/92		85.40	-9.78
MW-5	04/21/92	78.21	88.37	-10.16
	05/13/92		88.45	-10.24
	07/01/92		88.74	-10.53

brp = Below reference point
msl = Mean sea level

TABLE 2 (continued)
WATER LEVEL ELEVATIONS

WELL IDENTIFIER	DATE MEASURED	REFERENCE POINT ELEVATION (feet msl)	DEPTH TO WATER (feet brp)	WATER LEVEL ELEVATION (feet msl)
MW-6	04/21/92	74.87	85.88	-11.01
	05/13/92		85.96	-11.09
	07/01/92		86.14	-11.27
MW-7	04/21/92	76.58	87.91	-11.33
	05/13/92		87.92	-11.34
	07/01/92		88.10	-11.52
MW-8	07/01/92	75.09	85.94	-10.85
MW-9	07/01/92	75.34	85.04	-9.70

brp = Below reference point
msl = Mean sea level

TABLE 3

VOLATILE ORGANIC COMPOUNDS
AND FUEL HYDROCARBONS IN GROUNDWATER

WELL IDENTIFIER	SAMPLE DATE	.....CONCENTRATIONS IN MICROGRAMS PER LITER..... .....EPA METHOD 8240/8010..... TCE	1,1,1-TCA	PCE	1,1-DCE	MODIFIED EPA ...METHOD 8015... TOTAL FUEL HYDROCARBONS (mg/l)
MW-1	07/15/91	180	3	22	<2	<0.50
	07/23/91	200	3	23	3	<0.50
	03/05/92	47	<0.4	3.2	<1	NA
MW-2	07/12/91	650	<5	30	<5	0.56
	07/23/91	1,000	<5	53	<5	0.55
	03/05/92	910	2.6	39	13	NA
MW-3	07/15/91	2	<1	<1	<1	<0.50
	07/23/91	1	<1	<1	<1	<0.50
	03/05/92	<0.4	<0.4	<0.7	<1	NA
MW-4	07/11/91	<1	<1	<1	<1	<0.50
	07/23/91	<1	<1	<1	<1	<0.50
	03/05/92	<0.4	<0.4	<0.7	<1	NA
MW-5	04/21/92	<1	<1	<1	<1	<0.20
	05/13/92	<1	<1	<1	<1	<0.20
MW-6	04/21/92	343	<1	9	<1	<0.20
	05/13/92	353	<1	7	<1	<0.20
MW-7	04/21/92	87	<1	<1	<1	<0.20
	05/13/92	111	<1	<1	<1	<0.20
MW-8	07/01/92	237	<1	<1	<1	NA
MW-9	07/01/92	<1	<1	<1	<1	NA

NOTE: Refer to page 2 of this table for footnotes

TABLE 3 (continued)
VOLATILE ORGANIC COMPOUNDS AND
FUEL HYDROCARBONS IN GROUNDWATER

FOOTNOTES:

NOTE: Samples analyzed on March 5, 1992 were analyzed using EPA Method 8010

EPA = U.S. Environmental Protection Agency
TCE = Trichloroethylene
1,1,1-TCA = Trichloroethane
PCE = Tetrachloroethylene
1,1-DCE = Dichloroethylene
mg/l = Milligrams per liter
(<) = Less than; numerical value is the Limit of Detection for that compound
NA = Not Analyzed

TABLE 4

MAXIMUM CONTAMINANT LEVELS

ORGANIC COMPOUNDS (micrograms per liter)	CALIFORNIA MCL	GROUNDWATER SAMPLES FROM NEW MONITOR WELLS THAT EXCEEDED MCLs
Trichloroethylene (TCE)	5	MW-6, MW-7, and MW-8
1,1,1-Trichloroethane (1,1,1-TCA)	200	None
Tetrachloroethylene (PCE)	5	MW-6
1,1-Dichloroethylene (1,1-DCE)	6	None
Fuel hydrocarbons	None Established	----
INORGANIC COMPOUNDS (milligrams per liter)		
Chromium (Total)	0.05	None

Source: Marshack, J.B., 1991. A Compilation of Water Quality Goals. Prepared for the California Regional Quality Control Board, Central Valley Region; February, 1991.

MCL = Maximum Contaminant Level
(---) = Not Applicable

TABLE 5

TOTAL DISSOLVED CHROMIUM IN GROUNDWATER

WELL IDENTIFIER	SAMPLE DATE	CONCENTRATION OF TOTAL DISSOLVED CHROMIUM (milligrams per liter)
MW-1	03/05/92	0.04
	07/23/92	0.14
	07/15/92	0.02
MW-2	03/05/92	0.06
	07/23/92	0.02
	07/12/92	0.04
MW-3	03/05/92	0.05
	07/23/91	0.05
	07/15/91	0.02
MW-4	03/05/92	0.03
	07/23/92	0.02
	07/11/92	0.03
MW-5	04/21/92	<0.01
	05/13/92	<0.01
MW-6	04/21/92	<0.01
	05/13/92	0.02
MW-7	04/21/92	<0.01
	05/13/92	0.03
MW-8	07/01/92	<0.01
MW-9	07/01/92	0.02

(<) = Less than, numerical value is the Limit of Detection for that compound

TABLE 6

LITHOLOGIC LOG OF MONITOR WELL MW-5

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0.0 - 0.5	ASPHALT		
0.5 - 0.9	BASE		
0.9 - 1.5	FILL: SILTY CLAY WITH SAND	CL	Very dark grayish brown (2.5Y 3/2), medium plasticity, moist, trace fine gravel, sand is fine to medium grained, no odor.
1.5 - 4.0	FILL: SAND AND SOME CLAY	SP	Olive yellow (2.5Y 6/6); sand is fine to very fine grained, poorly graded, noncohesive, dry; trace fine gravel and silt; clay is medium plastic, moist; no odor.
4.0 - 8.5	SILTY CLAY	CL	Very dark grayish brown (10YR 3/2), medium plasticity, stiff, moist; trace sand; no odor.
8.5 -10.5	SILTY CLAY/ CLAYEY SILT WITH SAND	CL/ML	Olive brown (2.5Y 4/4), low to medium plasticity, slightly moist; sand is very fine to fine grained; no odor.
10.5 - 11.3	SANDY SILT	ML	Light brownish gray (2.5Y 6/2); slightly moist; sand is fine grained; trace fine grained gravel; no odor.
11.3 - 18.5	SAND	SP	Light yellowish brown (2.5Y 6/4), very fine to fine grained, poorly graded, dry; no odor.
18.5 - 28.5	CLAYEY SAND	SC	Light yellowish brown (10YR 6/4), very fine to medium grained, moderately cohesive, moist; trace coarse sand; no odor. With some slightly cemented sand lenses from 24.5 to 26.5 feet. Becomes silty and noncohesive below 26.5 feet.

(a) Unified Soil Classification System ASTM D-2487

TABLE 6 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-5

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
28.5 - 31.5	CLAYEY SAND	SC	Mottled, light yellowish brown (2.5Y 6/2) and yellowish brown (10YR 5/8), fine to coarse grained, slightly cohesive, slightly moist, no odor.
31.5 - 41.0	SAND	SP	Light yellowish brown (2.5Y 6/4), very fine grained, poorly graded, slightly moist, no odor. Becomes very pale brown (10YR 7/3), trace mica and interbedded oxidized laminations from 33.5 to 38.5 feet.
41.0 - 43.5	CLAY	CL	Olive (5Y 5/4), stiff, moist; trace sand and sand lenses; no odor. Iron oxidized below 43 feet.
43.5 - 58.5	SAND	SP	Pale yellow (5Y 7/4), very fine grained, poorly graded, slightly moist; trace mafics; micaceous; no odor. From 48.5 to 53.5 feet, iron oxidized with mafics; coarser below 51 feet. From 54.5 to 55.5 feet, silty sand, slightly cohesive.
58.5 - 60.0	SILTY SAND	SM	Yellowish brown (10YR 5/6), very fine to fine grained, poorly graded, slightly cohesive, slightly moist, no odor.
60.0 - 61.0	SANDY CLAY	CL	Olive (5Y 5/4), low plasticity, slightly moist; sand is very fine grained; trace iron oxide; no odor.

(a) Unified Soil Classification System ASTM D-2487

TABLE 6 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-5

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
61.0 - 63.5	SILTY SAND	SM	Mottled, yellowish brown (10YR 5/6) and olive (5Y 5/4), very fine to fine grained, poorly graded, slightly cohesive, slightly moist, micaceous; no odor.
63.5 - 103.0	SAND	SP	Yellow (2.5Y 7/6) to pale yellow (2.5Y 7/4), very fine grained, poorly graded, slightly moist, micaceous; no odor. From 69 to 71.5 feet color changes to pale yellow (5Y 7/3). From 73.5 to 76 feet color changes to pale olive (5Y 6/3). From 76 to 98.5 color changes to olive yellow (5Y 6/8). Saturated below 87.5 feet.

TOTAL DEPTH OF BORING: 103 FEET

NOTE: The soil description from 0.0 to 98.5 feet is based on lithologic samples collected from a continuous core barrel. Continuous core samples were not collected below 98.5 feet due to heaving sand conditions in the borehole. The soil description below 98.5 feet is based on auger cuttings.

(a) Unified Soil Classification System ASTM D-2487

TABLE 7

LITHOLOGIC LOG OF MONITOR WELL MW-6

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0.0 - 0.4	ASPHALT		
0.4 - 0.7	BASE		
0.7 - 2.5	SILTY CLAY/SANDY CLAY (FILL)	CL	Very dark gray (10YR 3/1) and dark greenish gray (5GY 4/1), with organic material and cobbles; moist.
2.5 - 7.5	CLAY	CL	Very dark gray (10YR 3/1); moderately plastic, moist, stiff, no odor.
7.5 - 8.5	SANDY CLAY	CL	Pale brown (10YR 6/3); moderately cohesive, low plasticity, moderately stiff, moist; sand is fine to medium grained, poorly graded; no odor.
8.5 - 13.5	SAND	SP	Yellowish brown (10YR 5/6), fine to medium, poorly graded, slightly cohesive, moist, trace silt, no odor.
13.5 - 22.5	CLAYEY SAND	SC	Yellowish brown (10YR 5/4), medium to coarse grained, angular to subangular, slightly cohesive, moist, no odor.
			From 18.5 to 22.5 feet, trace clay.
22.5 - 23.5	SAND	SP	Very pale brown (10YR 7/3), very fine grained, poorly graded, moist; no odor.
23.5 - 25.0	SILTY SAND	SP	Yellowish brown (10YR 5/6), fine to medium grained, poorly graded, moist, slightly cohesive, no odor.
25.0 - 28.5	SAND	SP	Very pale brown (10YR 7/4), fine to medium grained, poorly graded, slightly moist, no odor.
28.5 - 36	SAND	SW	Brownish yellow (10YR 6/8), very fine to coarse grained, well graded, moist, trace mafics, no odor.

(a) Unified Soil Classification System ASTM D-2487

TABLE 7 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-6

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
36.0 - 47.0	SAND	SP	Very pale brown (10YR 7/3), very fine grained, poorly graded, slightly moist; trace mica; no odor. From 38.5 to 47 feet, color change to pale olive (5Y 6/4); trace mafics and iron oxide.
47.0 - 48.5	SAND	SP	Pale yellow (5Y 7/4), very fine to medium grained, poorly graded, moist; trace mica and mafics; no odor.
48.5 - 50.5	SILTY SAND	SM	Light olive brown (2.5Y 5/6), very fine to fine grained, poorly graded, moderately cohesive, moist, micaceous, no odor.
50.5 - 53.0	SANDY SILTY CLAY	CL	Pale olive (5Y 6/4), moderately plastic, very stiff, moist; sand is fine to medium grained; no odor.
53.0 - 53.5	SILTY SAND	SM	Pale olive (5Y 6/4), moderately cohesive, fine to medium grained, moist, no odor.
53.5 - 63.5	SAND	SP	Light olive brown (2.5Y 5/6), very fine grained, poorly graded, slightly moist; trace mica flakes and mafics; no odor. From 58.5 to 63.5 feet, color change to light yellowish brown (2.5Y).
63.5 - 66.5	CLAYEY SILTY SAND	SM	Mottled pale olive (5Y 6/3) and yellowish brown (10YR 5/6), fine to medium grained, moderately cohesive, moist, iron oxide laminations, no odor. From 64.5 to 66.5 feet, color change to light olive brown (2.5Y 5/6); trace shells.

(a) Unified Soil Classification System ASTM D-2487

TABLE 7 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-6

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
66.5 - 98.5	SAND	SP	Pale yellow (2.5Y 7/4), very fine grained, poorly graded, slightly moist, micaceous, no odor. From 68.5 to 69 feet, color change to light gray (10YR 7/2). From 69 to 73.5 feet, color change to pale yellow (2.5Y 7/4), trace black organic stains. From 73.5 to 78.5 feet, color change to light olive brown (2.5Y 5/6), moist below 76.5 feet. From 78.5 83.5 feet, occasional iron oxide laminations. From 83.5 to 85.5 feet, sand is wet. From 85.5 to 93.5 feet, color change to light brownish gray (2.5Y 6/2), sand is saturated. From 93.5 to 98.5 feet, color change to yellowish brown (10YR 5/4).

TOTAL DEPTH OF BORING: 110 FEET

NOTE: The soil description from 0.0 to 98.5 feet is based on lithologic samples collected from a continuous core barrel. Continuous core samples were not collected below 98.5 feet due to heaving sand conditions in the borehole. The soil description below 98.5 feet is based on auger cuttings.

(a) Unified Soil Classification System ASTM D-2487

TABLE 8

LITHOLOGIC LOG OF MONITOR WELL MW-7

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0.0 - 2.0	TOP SOIL		
2.0 - 6.0	CLAY	CH	Black (10 YR 2/1), high plasticity, moist; trace organic material, no odor.
6.0 - 7.0	SANDY SILTY CLAY	CL	Olive Brown (2.5 YR 4/4), low to medium plasticity, slightly moist; sand is fine grained; trace organic material and fine gravel; no odor.
7.0 - 8.0	CLAYEY SANDY SILT	ML	Very dark grayish brown (10YR 3/2), moderately plastic, moist; sand is fine grained; no odor.
8.0 - 9.0	SILTY SAND	SM	Light olive brown (2.5YR 5/4), very fine grained; non-cohesive, slightly moist, poorly graded; trace reddish mottling; no odor.
9.0 - 12.5	SAND	SP	Light olive brown (2.5YR 5/4), fine grained, slightly moist; poorly graded; no odor. From 11 to 12.5 feet, color change to dark yellowish brown (10YR 4/4).
12.5 - 13.0	SANDY SILT	ML	Yellowish brown (10YR 5/6); low plasticity; dry; sand is fine grained; no odor.
13.0 - 18.0	SILTY SAND	SM	Yellowish brown (10YR 5/6), fine grained, dry, slightly cohesive, no odor. From 14.0 to 18.0 feet, color change to yellowish brown (10YR 5/4); trace silt.

(a) Unified Soil Classification System ASTM D-2487

TABLE 8 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-7

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
18.0 - 24.0	SAND	SP	Yellowish brown (10YR 5/4), very fine to fine grained, dry; trace silt; no odor. From 23.0 to 24.0 feet, color change to light yellowish brown (10YR 6/4).
24.0 - 27.0	SAND	SP	Light yellowish brown (10YR 6/4), fine to medium grained, slightly moist, no odor.
27.0 - 34.0	SAND	SP	Olive yellow (2.5YR 6/8), fine grained, poorly graded, dry, no odor. From 29.0 to 34.0 feet, very fine to fine grained.
34.0 - 36.5	SANDY CLAY	CL	Mottled light brownish gray (2.5Y 6/2) to yellowish brown (10YR 5/6), moderate plasticity, slightly moist; sand is fine grained; trace iron oxide nodules; no odor.
36.5 - 39.0	SILTY SAND	SM	Light brownish gray (2.5Y 6/2), very fine grained, non-cohesive, dry, trace mica, no odor.
39.0 - 49.0	SAND	SP	Light brownish gray (2.5Y 6/2), fine grained, poorly graded, dry; trace mica; no odor. From 46.5 to 49.0 feet, color change to pale olive (5Y 6/3); slightly moist.
49.0 - 53.0	SILTY SAND	SM	Olive yellow (2.5Y 6/6), very fine grained, slightly cohesive, slightly moist, micaceous; no odor.

(a) Unified Soil Classification System ASTM D-2487

TABLE 8 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-7

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
53.0 - 56.5	CLAYEY SAND/SANDY CLAY	SC/CL	Pale olive (5Y 6/4), slightly plastic, cohesive, moist; sand is fine grained; micaceous; trace laminations of white sand and iron oxide nodules; no odor.
56.5 - 64.0	SAND	SP	Pale yellow (5Y 7/4), very fine grained, poorly graded, slightly cohesive, slightly moist, micaceous; trace mafics; no odor. From 59.0 to 64.0 feet, color change to olive yellow (2.5Y 6/6).
64.0 - 66.5	SILTY SAND	SM	Olive yellow (2.5Y 6/8), very fine to fine grained, slightly cohesive, slightly moist; no odor.
66.5 - 110.0	SAND	SP	Pale yellow (2.5Y 7/4), very fine grained, poorly graded, slightly cohesive, slightly moist, micaceous; trace small black organic staining; no odor. From 84.0 to 89.0 feet, sand is damp. From 89.0 to 94.0 feet, color change light olive brown (2.5Y 5/4). From 94.0 to 99.0 feet, sand is wet.

TOTAL DEPTH OF BORING: 110 FEET

NOTE: The soil description from 0.0 to 99.0 feet is based on lithologic samples collected from a continuous core barrel. Continuous core samples were not collected below 99.0 feet due to heaving sand conditions in the borehole. The soil description below 99.0 feet is based on auger cuttings.

(a) Unified Soil Classification System ASTM D-2487

TABLE 9

LITHOLOGIC LOG OF MONITOR WELL MW-8

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0.0 - 0.5	ASPHALT		
0.5 - 1.0	BASE		
1.0 - 2.0	SAND WITH SILT	SP	Brownish yellow (10YR 5/8), fine grained, poorly graded, dry to moist, no odor.
2.0 - 2.4	SILTY CLAY	CL	Black (10YR 2/1), medium plasticity, slightly moist, no odor.
2.4 - 5.0	CLAYEY SAND	SC	Olive (5Y 5/4), fine grained, poorly graded, dry to moist, no odor.
5.0 - 14.0	SANDY CLAY	CL	Olive yellow (2.5Y 6/6), medium plasticity, stiff, moist, no odor; sand is fine to medium grained, trace iron oxides.
14.0 - 16.0	SILTY SAND	SM	Yellowish brown (10YR 5/6), medium to coarse grained, well graded, slightly cohesive, moist, no odor.
16.0 - 26.5	CLAYEY SAND	SC	Dark yellowish brown (10YR 4/4), medium grained, occasionally coarse grained, poorly graded, moist, slightly cohesive, no odor. Becomes yellow (2.5Y 6/8), with lenses of clay below 21.0 feet.
26.5 - 34.0	SAND	SP	Pale yellow (2.5Y 8/4), very fine grained, poorly graded, non cohesive, dry, iron oxide, no odor.
34.0 - 35.0	CLAY WITH TRACE SAND	CL	Yellowish brown (10YR 5/6), medium plasticity, medium stiff to stiff, moist, no odor; sand is fine grained.
35.0 - 36.0	CLAYEY SAND	SC	Yellowish brown (10YR 5/6), fine to medium grained, well graded, slightly cohesive, dry to moist, with mica.

(a) Unified Soil Classification System ASTM D-2487

TABLE 9 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-8

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
36.0 - 49.0	SILTY SAND	SM	Light gray (10 YR 7/1), very fine grained, poorly graded, dry, no odor, micaceous. Becomes moist to wet below 44.0 feet. Becomes fine to medium grained below 48.0 feet.
49.0 - 50.0	CLAYEY SAND	SC	Mottled, pale yellow (5Y 7/3) and olive yellow (2.5Y 6/8), fine to medium grained, well graded, slightly cohesive, moist, with lenses of clay and trace mica.
50.0 - 52.0	SAND	SW	Olive yellow (2.5Y 6/8), fine to medium grained, well graded, slightly cohesive, lenses of clay, with mica.
52.0 - 64.0	SAND	SP	Pale yellow (2.5Y 7/4), very fine grained, poorly graded, non-cohesive, dry to moist, no odor, with iron oxides. With trace black organic nodules below 56 feet.
64.0 - 66.5	CLAYEY SAND	SC	Mottled, pale yellow (5Y 7/3) and olive yellow (2.5Y 6/8), fine to medium grained, well graded, slightly cohesive, moist, lenses of clay and trace mica.

(a) Unified Soil Classification System ASTM D-2487

TABLE 9 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-8

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
66.5 - 103.5	SAND	SP	Pale yellow (2.5Y 7/4), very fine grained, poorly graded, non-cohesive, dry to moist, no odor, trace iron oxide. Becomes micaceous and with black nodules below 69 feet. Becomes fine to very fine grained and wet below 84 feet. Becomes saturated below 87.0 feet. Becomes fine to medium grained below 94.0 feet.
103.5 - 110.0	SILTY SAND	SM	Olive brown (2.5Y 4/3), fine grained, cohesive, saturated. Becomes finer with depth.

TOTAL DEPTH OF BORING: 110 FEET

NOTE: The soil description from 0.0 to 104.0 feet is based on lithologic samples collected from a continuous core barrel. Continuous core samples were not collected below 104.0 feet due to heaving sand conditions in the borehole. The soil description below 104.0 feet is based on auger cuttings.

(a) Unified Soil Classification System ASTM D-2487

TABLE 10

LITHOLOGIC LOG OF MONITOR WELL MW-9

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
0.0 - 0.7	ASPHALT		
0.7 - 1.0	BASE		
1.0 - 3.0	SAND	SP	Yellowish brown (10YR 5/4), fine to medium grained, slightly cohesive, moist, no odor, trace clay.
3.0 - 7.0	CLAY	CH	Black (2.5Y N2), high plasticity, moist, with organic odor.
7.0 - 8.5	SILTY CLAY	CL	Grayish brown (2.5Y 5/2), low plasticity, dry to moist, no odor, trace fine grained sand and cemented sand.
8.5 - 12.5	SANDY, SILTY CLAY	CL	Light olive brown (2.5Y 5/3), slightly plastic, dry; sand is fine grained, no odor.
12.5 - 15.5	SAND	SW	Pale yellow (2.5Y 7/4), fine to medium grained, non cohesive, slightly moist, no odor.
15.5 - 23.5	SAND	SP	Yellowish brown (10YR 5/4) and yellow (2.5Y 7/4), fine grained, moist, no odor, with iron oxides.
			With trace of clay below 23.0 feet.
23.5 - 31.5	SAND	SW	Brownish yellow (10YR 6/8), medium to coarse grained, well graded, cohesive, moist, no odor, trace clay.
31.5 - 38.0	SAND	SP	Olive yellow (2.5Y 6/6), fine grained, poorly graded, slightly cohesive, slightly moist, no odor, with iron oxide lamination.
			From 33.5 to 38.0 color changes to pale yellow (2.5Y 8/3).

(a) Unified Soil Classification System ASTM D-2487

TABLE 10 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-9

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
38.0 - 38.5	SAND	SW	Brownish yellow (10YR 6/8), medium to coarse grained, well graded, moist, slightly cohesive, no odor, with trace of clay.
38.5 - 42.5	SANDY CLAY	CL	Mottled, light gray (10YR 7/1) and olive yellow (2.5Y 6/6), medium plasticity, moist, no odor; sand is fine grained, with iron oxides.
42.5 - 43.5	SILTY SAND	SM	Olive yellow (2.5Y 6/8), fine grained, poorly graded, slightly cohesive, moist, no odor.
43.5 - 54.5	SAND	SP	Pale yellow (2.5Y 8/4), fine grained, poorly graded, slightly moist, with iron oxide lamination, and mica, no odor. Becomes moist with clay lenses below 48.5 feet.
54.5 - 87.5	SAND	SP	Olive yellow (2.5Y 6/6), fine to medium grained, poorly graded, slightly moist, trace mica and mafics, no odor. From 66.0 to 68.5 feet sand becomes fine grained with trace clay nodules and iron oxides. Becomes micaceous below 73.5 feet. From 83.0 to 87.5 feet becomes fine to medium grained and moist to wet.
87.5 - 93.5	SILTY SAND	SM	Light yellowish brown, (2.5Y 6/6), very fine to fine grained, well graded, moist, cohesive, no odor, with mica. Becomes saturated below 88.5 feet.

(a) Unified Soil Classification System ASTM D-2487

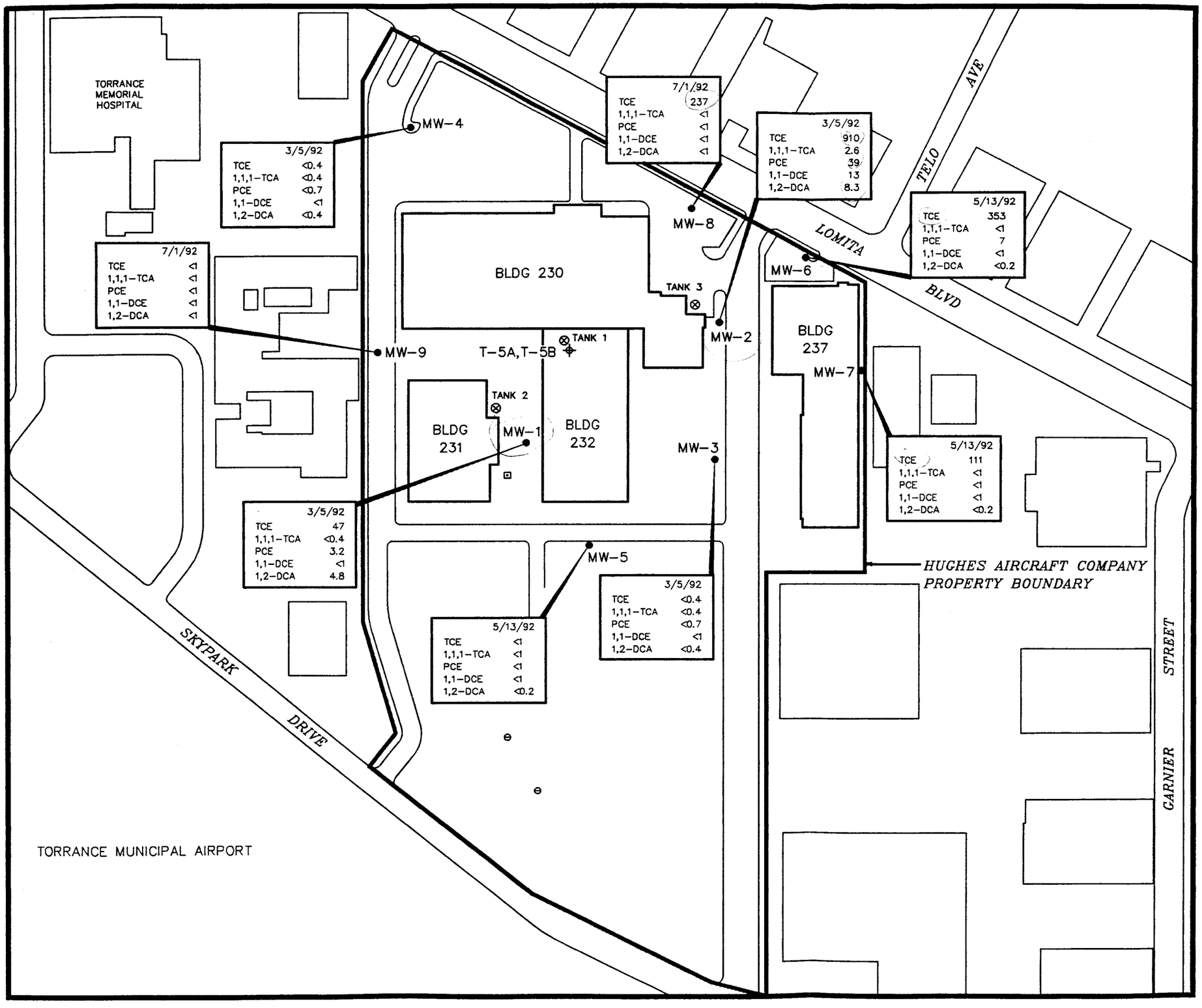
TABLE 10 (continued)
LITHOLOGIC LOG OF MONITOR WELL MW-9

DEPTH INTERVAL (feet below land surface)	SOIL TYPE	GROUP SYMBOL(a)	DESCRIPTION OF MATERIAL
93.5 - 96.5	SAND	SW	Yellowish brown, (10YR 5/6), very fine to fine grained, well graded, cohesive, saturated, no odor, with trace silt, micaceous.
96.5 - 110.0	SILTY SAND	SM	Light gray (10YR 7/1), very fine to fine grained, cohesive, saturated, no odor.

TOTAL DEPTH OF BORING: 110 FEET

NOTE: The soil description from 0.0 to 103.5 feet is based on lithologic samples collected from a continuous core barrel. Continuous core samples were not collected below 103.5 feet due to heaving sand conditions in the borehole. The soil description below 103.5 feet is based on auger cuttings.

(a) Unified Soil Classification System ASTM D-2487



EXPLANATION

MW-2 — MONITOR WELL

INACTIVE INDUSTRIAL WATER SUPPLY WELL

INACTIVE INJECTION WELL

T-5A,T-5B — FORMER SOIL BORING

TANK 1 — FORMER UNDERGROUND STORAGE TANK LOCATION

HUGHES AIRCRAFT COMPANY BUILDING

MW-1
3/5/92 — DATE OF MOST RECENT GROUNDWATER SAMPLE
TCE 47
1,1,1-TCA <0.4 — CONCENTRATION IN MICROGRAMS PER LITER
VOLATILE ORGANIC COMPOUND

TCE = TRICHLOROETHYLENE
1,1,1-TCA = 1,1,1-TRICHLOROETHANE
PCE = TETRACHLOROETHYLENE
1,1-DCE = 1,1-DICHLOROETHYLENE
1,2-DCA = 1,2-DICHLOROETHANE

0 200 400
FEET

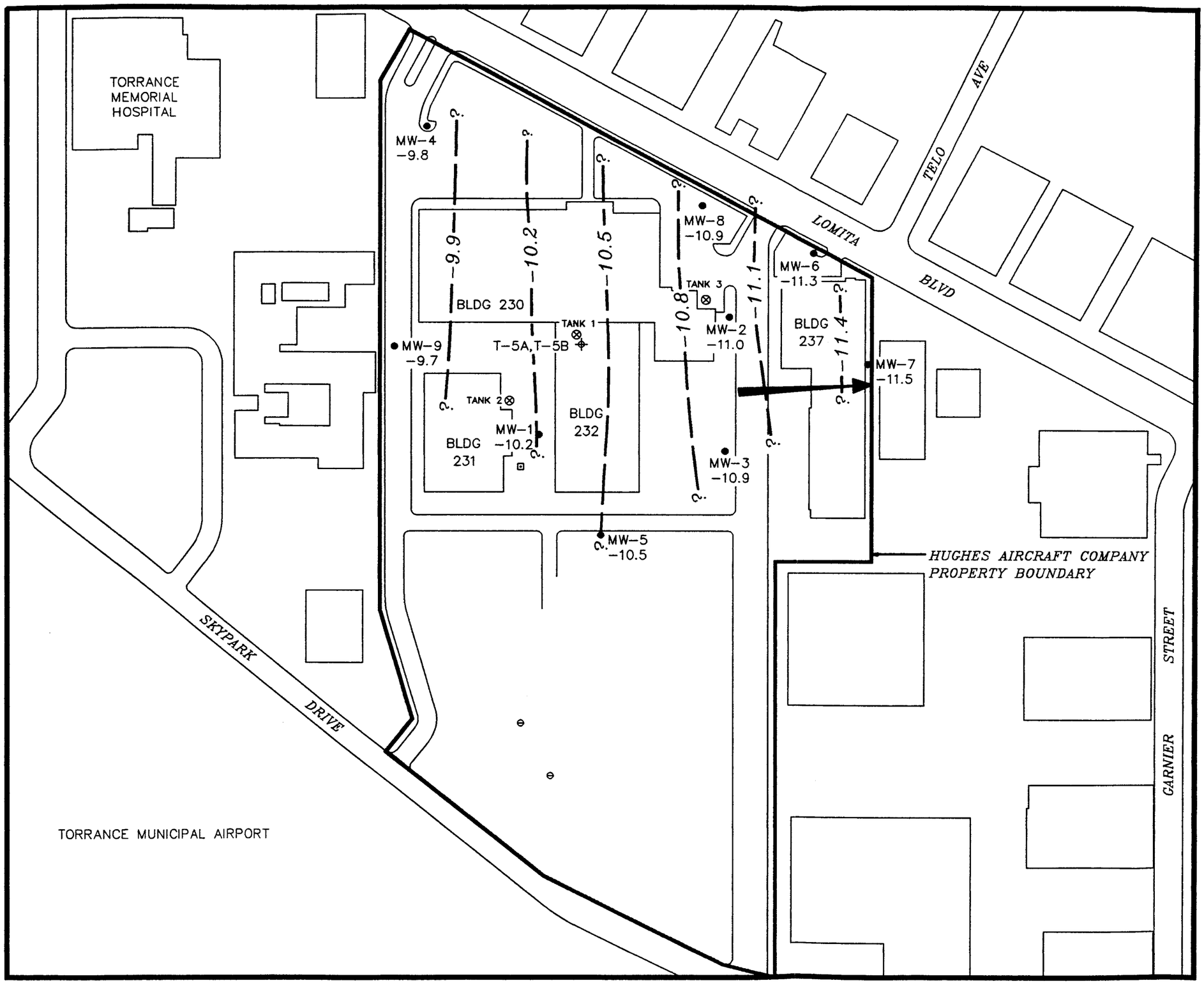
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

HARGIS + ASSOCIATES, INC. 7/92

FIGURE 3

PREP BY YY REV BY R.G.M. RPT NO. 210-0146 A



EXPLANATION

MW-2 ●	MONITOR WELL
⊡	INACTIVE INDUSTRIAL WATER SUPPLY WELL
⊖	INACTIVE INJECTION WELL
T-5A, T-5B ⌖	FORMER SOIL BORING
TANK 1 ⊗	FORMER UNDERGROUND STORAGE TANK LOCATION
▭	HUGHES AIRCRAFT COMPANY BUILDING
MW-2 ● -11.0	WATER LEVEL ELEVATION, IN FEET MEAN SEA LEVEL
—— -10.2 —— ?	CONTOUR LINE OF EQUAL WATER LEVEL ELEVATIONS IN FEET MEAN SEA LEVEL DASHED WHERE APPROXIMATE, QUERIED WHERE INFERRED
→	APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: WATER LEVELS WERE MEASURED JULY 1, 1992

0 200 400
FEET

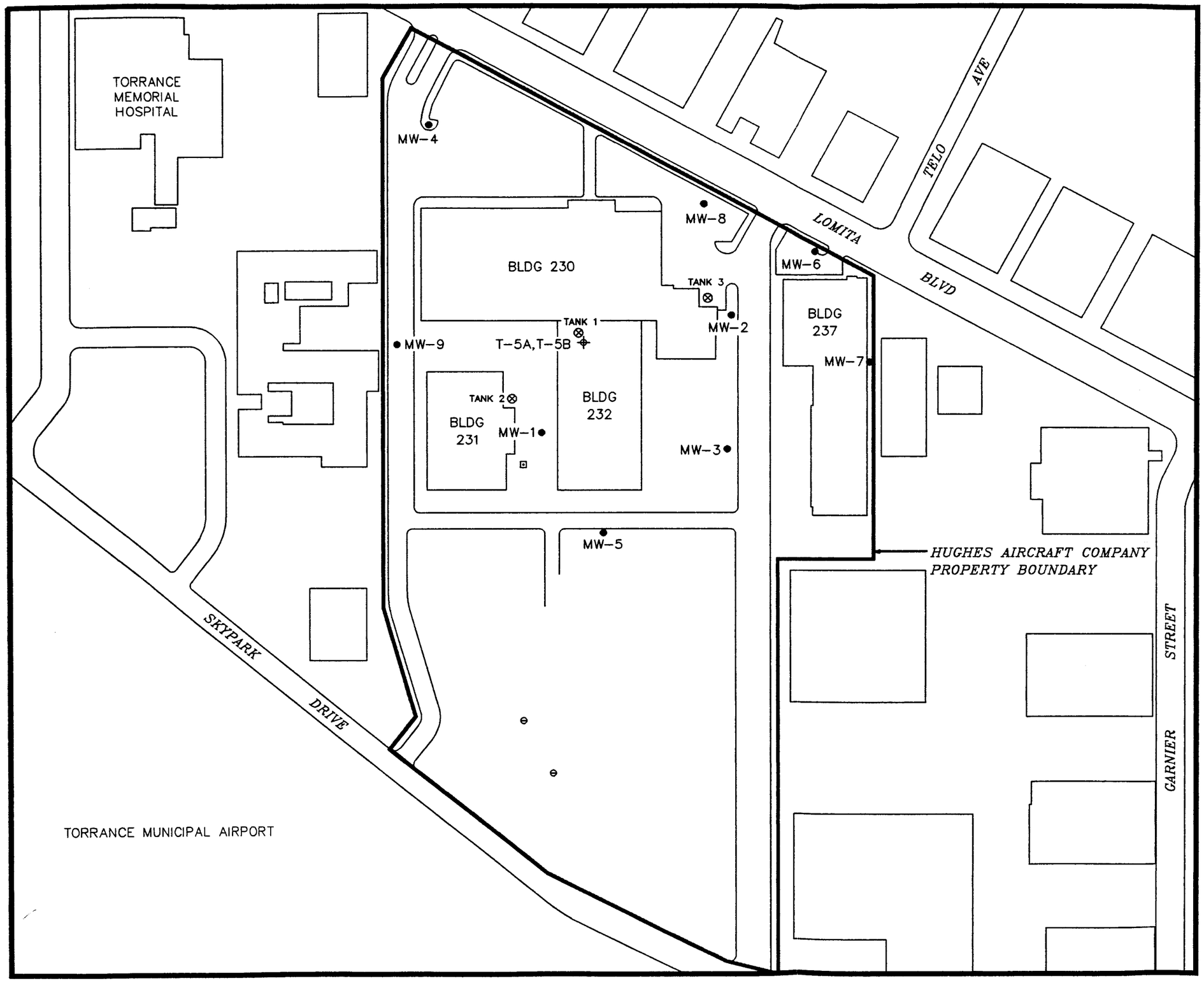
HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

WATER LEVEL ELEVATIONS
JULY 1992

HARGIS + ASSOCIATES, INC. 7/9

FIGURE

PREP BY M REV BY K.C.M RPT NO. 850.7 | 220-0109



EXPLANATION

MW-2 ●	MONITOR WELL
⊡	INACTIVE INDUSTRIAL WATER SUPPLY WELL
⊖	INACTIVE INJECTION WELL
T-5A,T-5B ⌖	FORMER SOIL BORING
TANK 1 ⊗	FORMER UNDERGROUND STORAGE TANK LOCATION
▭	HUGHES AIRCRAFT COMPANY BUILDING

N

0 200 400
FEET

HUGHES AIRCRAFT COMPANY
TORRANCE, CALIFORNIA

SITE PLAN

HARGIS + ASSOCIATES, INC. 7/9

FIGURE

PREP BY YY REV BY RGM RPT NO. 850.7 | 410-0132

ATTACHMENT 1

RAW ANALYTICAL DATA SHEETS

LABORATORY DATA SHEETS FOR GROUNDWATER SAMPLES COLLECTED APRIL 21, 1992

CHAIN OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 4/16/92 PAGE 1 OF 1

PROJECT NAME: HAC - TORRANCE
PROJECT No./TASK No.: 850.8
PROJECT MANAGER: RUSH N. BOYNTON
FAX No.: 310-372-9624
QA MANAGER: Kathryn Parker
FAX No.:
SAMPLER (SIGNATURE): Jonathan Yoseph
SAMPLER (PRINTED): YONATHAN YOSEPH

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS GLASS JAR	ANALYSES REQUESTED ~~8010/8020~~ 8240	ANALYSES REQUESTED 8015 TPH	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S	SPECIAL HANDLING 48-hour turnaround	SPECIAL HANDLING FAX Results	LABORATORY INFORMATION / REMARKS
61601	Comp MW6	4/16/92	8:20	✓							✓	1	✓	✓		✓	✓	TPH Using
61602	Comp MW7	"	9:30	✓							✓	1	✓	✓		✓	✓	Disel Standard
61603	Comp MW5	"	10:10	✓							✓	1	✓	✓		✓	✓	
Total number of Containers per analysis:												3						Total No. of Containers: 3

Relinquished by:	Date	Received by:	Date
Yonathan Yoseph	1135	[signature]	4/16/92
H+A	Time 4/16/92	[signature]	Time 11:35 A
Company		Company	

Relinquished by:	Date	Received by:	Date
	Time		Time
Company		Laboratory	

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
☒ No. of containers correct ☒ received good condition/cold
☐ custody seals secure ☒ conforms to COC document

Shipment Method: HAND DELIVERED
Send Results to: see below

☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
☒ 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165 RUSH N. BOYNTON
☒ 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992 PETER QUINLAN
☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4[illegible]

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: QA MANAGER PINK: FIELD/TASK MANAGER

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 4/21/92 PAGE 1 OF

PROJECT NAME: HAC TORRANCE
PROJECT No./TASK No.: 850.8
PROJECT MANAGER: Rush Boynton
FAX No.: 310-372-9624
QA MANAGER: K. PARKER
FAX No.:
SAMPLER (SIGNATURE): Rush N. Boynton / Timothy K. Burke
SAMPLER (PRINTED): RUSH N. BOYNTON / Timothy K. Burke

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS 40 ml VOA VIALS	SAMPLE CONTAINERS 250 ml NALGENE	ANALYSES REQUESTED EPA 8240	ANALYSES REQUESTED EPA MOD 8015	ANALYSES REQUESTED EPA 5010- CHROMIUM	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S LOW TO MEDIUM	SPECIAL HANDLING FILTER AND ACIDIFY WITHIN 24 HOURS	REMARKS
61666	MW-5	4/21/92	1527		X		X				X	4		x	x		x		USE DIESEL STANDARD
61666	MW-5		1524								X		1			X	P	X	
61667	MW-6		16:24				X					4		x	x				
61667	MW-6		16:24										1			X		X	
61668	MW-7		1732				X					4		x	x				
61668	MW-7		1732										1			X		X	
61669	MW-700		1637				X					4		x	x				
61669	MW-700		1637										1			X		X	
61670	MW-78		1720				X					4		x	x				
61671	TB-1	4/21/92	1500				X				X	4		x	x		x		
Total number of Containers per analysis:														12	12	4			Total No. of Containers: 28

LABORATORY INFORMATION: HAC EDSG

Relinquished by:	Date	Received by:	Date
Rush N. Boynton	4/21/92	W. C. Sellers	4/21/92
HARDIS + ASSOC.	Time 18:55	EPTL	Time 18:55
Company		Hughes EDSG	
Company		Company	
Relinquished by:	Date	Received by:	Date
	Time		Time
Company		Laboratory	

INSTRUCTIONS
1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
☒ No. of containers correct ☒ received good condition/cold
☒ custody seals secure ☒ conforms to COC document

Shipment Method: HAND DELIVERY
Send Results to: SEE BELOW

☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
☒ PETER QUINLAN 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165
☒ RUSH BOYNTON 111 N. SEPULVEDA BLVD. No. 350 MANHATTAN BEACH, CA 90266 (213) 372-7992
☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL: LABORATORY YELLOW: CLIENT PINK: FIELD TASK PAGE

Sample Cross Reference Sheet for Project 850.8

SAMPLE ID	LAB FILE ID
COMP MW-5	61603
COMP MW-6	61601
COMP MW-7	61602
MW-5	61666
MW-6	61667
MW-7	61668
MW-700	61669
MW-7B	61670
TB-1	61671

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

4

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: VOA Method Blank
Lab File ID (Log No): Blk041692
Matrix: Soil

Date Sampled: —
Date Received: —
Date Analyzed: 4/16/92
Sample wt/vol: (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/Kg	ug/Kg
Chloromethane	ND	10
Vinyl Chloride		10
Bromomethane		10
Chloroethane		10
Trichlorofluoromethane		10
Acrolein		10
Acetone		15
1,1-Dichloroethene		10
Acrylonitrile		10
Carbon Disulfide		10
Methylene Chloride		25
trans-1,2-Dichloroethene		10
1,1-Dichloroethane		10
Vinyl Acetate		10
2-Butanone (MEK)		15
cis-1,2-Dichloroethene		10
Chloroform		10
1,1,1-Trichloroethane		10
1,2-Dichloroethane		10
Benzene		10
Carbon Tetrachloride		10
1,2-Dichloropropane		10
Trichloroethene		10
Bromodichloromethane		10
2-Chloroethyl Vinyl Ether		10
cis-1,3-Dichloropropene		10
4-Methyl-2-Pentanone		10
Toluene		10
trans-1,3-Dichloropropene		10
1,1,2-Trichloroethane		10
Dibromochloromethane		10
2-Hexanone		10
Tetrachloroethene		10
Chlorobenzene		10
Ethylbenzene		10
Bromoform		10
Styrene		10
Xylenes (total)		10
1,1,2,2-Tetrachloroethane		10
1,3-Dichlorobenzene		10
1,4-Dichlorobenzene	✓	10
1,2-Dichlorobenzene	ND	10

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	111	70 - 121

SS#1 (DCE)=1,2-Dichloroethane-d4

VOLATILE ORGANICS BLANK SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: VOA Method Blank
Lab File ID (Log No): BlkC41692
Matrix: Soil

Date Sampled: —
Date Received: —
Date Analyzed: 4/16/92
Sample wt/vol: _____ (g/ml) 5ml

THIS BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	CLIENT SAMPLE ID	LAB FILE ID
1	COMP MW5	61603
2	COMP MW6	61601
3	COMP MW7	61602
4	Matrix Spike	MSC41692
5	Matrix Spike duplicate	MSDC41692
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		
26		
27		
28		
29		
30		

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG) Blank
Client Sample ID: VOA Holding/Method
Lab File ID (Log No): B1K042292
Matrix: Water

Date Sampled: 04/21/92
Date Received: –
Date Analyzed: 04/22/92
Sample wt/vol: (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)	ND	1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	104	76 - 114
SS#2 (TOL)	95	88 - 110
SS#3 (BFB)	106	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

VOLATILE ORGANICS BLANK SUMMARY

Lab Name: EPTL (HAC/EDSG) Blank Date Sampled: 4/21/92
Client Sample ID: VOA Method/Holding Date Received: —
Lab File ID (Log No): BLK042292 Date Analyzed: 4/22/92
Matrix: Water Sample wt/vol: (g/ml) 5ml

THIS BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	CLIENT SAMPLE ID	LAB FILE ID
1	MW-5	61666
2	MW-6	61667; 61667di
3		
4		
5		
6		
7		
8		
9		
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METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: VOA Method Blank
Lab File ID (Log No): Blk042392
Matrix: Water

Date Sampled: 04/21/92
Date Received: —
Date Analyzed: 4/23/92
Sample wt/vol: _____(g/ml) 5 ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1.1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)	↓	1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	109	76 - 114
SS#2 (TOL)	96	88 - 110
SS#3 (BFB)	103	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

VOLATILE ORGANICS BLANK SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: VOA Method Blank
Lab File ID (Log No): Blk042392
Matrix: Water

Date Sampled: –
Date Received: –
Date Analyzed: 04/23/92
Sample wt/vol: _____ (g/ml) 5 ml

THIS BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	CLIENT SAMPLE ID	LAB FILE ID
1	MW-7	61668
2	MW-700	61669
3	MW-7B	61670
4	TB-1	61671
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METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

1c

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: VOA Method Blank
Lab File ID (Log No): Blk042492
Matrix: Water

Date Sampled: -
Date Received: -
Date Analyzed: 4/24/92
Sample wt/vol: _____ (g/ml) 5 ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)	✓	1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	104	76 - 114
SS#2 (TOL)	98	88 - 110
SS#3 (BFB)	109	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

VOLATILE ORGANICS BLANK SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: VOA Method Blank
Lab File ID (Log No): Blk042492
Matrix: Water

Date Sampled: —
Date Received: —
Date Analyzed: 4/24/92
Sample wt/vol: _____ (g/ml) 5ml

THIS BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	CLIENT SAMPLE ID	LAB FILE ID
1	Matrix Spike (MW-5)	MS042492
2	Matrix spike duplicate (MW-5)	MSD042492
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METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

12

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: COMP MW5
Lab File ID (Log No): 61603
Matrix: Soil

Date Sampled: 4/16/92
Date Received: 4/16/92
Date Analyzed: 4/16/92
Sample wt/vol: 5.4 (g/ml) (dry weight)

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/Kg	ug/Kg
Chloromethane	ND	10
Vinyl Chloride		10
Bromomethane		10
Chloroethane		10
Trichlorofluoromethane		10
Acrolein		10
Acetone		15
1,1-Dichloroethene		10
Acrylonitrile		10
Carbon Disulfide		10
Methylene Chloride		15
trans-1,2-Dichloroethene		10
1,1-Dichloroethane		10
Vinyl Acetate		10
2-Butanone (MEK)		15
cis-1,2-Dichloroethene		10
Chloroform		10
1,1,1-Trichloroethane		10
1,2-Dichloroethane		10
Benzene		10
Carbon Tetrachloride		10
1,2-Dichloropropane		10
Trichloroethene		10
Bromodichloromethane		10
2-Chloroethyl Vinyl Ether		10
cis-1,3-Dichloropropene		10
4-Methyl-2-Pentanone		10
Toluene		10
trans-1,3-Dichloropropene		10
1,1,2-Trichloroethane		10
Dibromochloromethane		10
2-Hexanone		10
Tetrachloroethene		10
Chlorobenzene		10
Ethylbenzene		10
Bromoform		10
Styrene		10
Xylenes (total)		10
1,1,2,2-Tetrachloroethane		10
1,3-Dichlorobenzene		10
1,4-Dichlorobenzene		10
1,2-Dichlorobenzene	ND	10

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	111	70 - 121

SS#1 (DCE)=1,2-Dichloroethane-d_4

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

13

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: COMPMW 6
Lab File ID (Log No): 61601
Matrix: Soil

Date Sampled: 4/16/92
Date Received: 4/16/92
Date Analyzed: 4/16/92
Sample wt/vol: 5.1 (g/ml)
dry weight

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/Kg	ug/Kg
Chloromethane	ND	10
Vinyl Chloride		10
Bromomethane		10
Chloroethane		10
Trichlorofluoromethane		10
Acrolein		10
Acetone		15
1,1-Dichloroethene		10
Acrylonitrile		10
Carbon Disulfide		10
Methylene Chloride		15
trans-1,2-Dichloroethene		10
1,1-Dichloroethane		10
Vinyl Acetate		10
2-Butanone (MEK)		15
cis-1,2-Dichloroethene		10
Chloroform		10
1,1,1-Trichloroethane		10
1,2-Dichloroethane		10
Benzene		10
Carbon Tetrachloride		10
1,2-Dichloropropane		10
Trichloroethene		10
Bromodichloromethane		10
2-Chloroethyl Vinyl Ether		10
cis-1,3-Dichloropropene		10
4-Methyl-2-Pentanone		10
Toluene		10
trans-1,3-Dichloropropene		10
1,1,2-Trichloroethane		10
Dibromochloromethane		10
2-Hexanone		10
Tetrachloroethene		10
Chlorobenzene		10
Ethylbenzene		10
Bromoform		10
Styrene		10
Xylenes (total)		10
1,1,2,2-Tetrachloroethane		10
1,3-Dichlorobenzene		10
1,4-Dichlorobenzene	↓	10
1,2-Dichlorobenzene	ND	10

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	111	70 - 121

SS#1 (DCE)=1,2-Dichloroethane-d_4

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: COMP MW7
Lab File ID (Log No): 61602
Matrix: Soil

Date Sampled: 4/16/92
Date Received: 4/16/92
Date Analyzed: 4/16/92
Sample wt/vol: 5.2 (g/ml) (dry weight)

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/Kg	ug/Kg
Chloromethane	ND	10
Vinyl Chloride		10
Bromomethane		10
Chloroethane		10
Trichlorofluoromethane		10
Acrolein		10
Acetone		15
1,1-Dichloroethene		10
Acrylonitrile		10
Carbon Disulfide		10
Methylene Chloride		15
trans-1,2-Dichloroethene		10
1,1-Dichloroethane		10
Vinyl Acetate		10
2-Butanone (MEK)		15
cis-1,2-Dichloroethene		10
Chloroform		10
1,1,1-Trichloroethane		10
1,2-Dichloroethane		10
Benzene		10
Carbon Tetrachloride		10
1,2-Dichloropropane		10
Trichloroethene		10
Bromodichloromethane		10
2-Chloroethyl Vinyl Ether		10
cis-1,3-Dichloropropene		10
4-Methyl-2-Pentanone		10
Toluene		10
trans-1,3-Dichloropropene		10
1,1,2-Trichloroethane		10
Dibromochloromethane		10
2-Hexanone		10
Tetrachloroethene		10
Chlorobenzene		10
Ethylbenzene		10
Bromoform		10
Styrene		10
Xylenes (total)		10
1,1,2,2-Tetrachloroethane		10
1,3-Dichlorobenzene		10
1,4-Dichlorobenzene	✓	10
1,2-Dichlorobenzene	ND	10

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	106	70 - 121

SS#1 (DCE)=1,2-Dichloroethane-d4

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-5
Lab File ID (Log No): 61666
Matrix: Water

Date Sampled: 4/21/92
Date Received: 4/21/92
Date Analyzed: 4/22/92
Sample wt/vol: (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	102	76 - 114
SS#2 (TOL)	98	88 - 110
SS#3 (BFB)	105	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-6
Lab File ID (Log No): 61667
Matrix: Water

Date Sampled: 4/21/92
Date Received: 4/21/92
Date Analyzed: 4/22/92
Sample wt/vol: _____ (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane	ND	1
* Trichloroethene	343	5
Bromodichloromethane	ND	1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone	ND	1
Tetrachloroethene	9	1
Chlorobenzene	ND	1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	107	76 - 114
SS#2 (TOL)	95	88 - 110
SS#3 (BFB)	105	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-7
Lab File ID (Log No): 61668
Matrix: Water

Date Sampled: 4/21/92
Date Received: 4/21/92
Date Analyzed: 4/23/92
Sample wt/vol: _____(g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride	✓	1
1,2-Dichloropropane	ND	1
Trichloroethene	87	1
Bromodichloromethane	ND	1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)	✓	1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	110	76 - 114
SS#2 (TOL)	101	88 - 110
SS#3 (BFB)	106	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-700
Lab File ID (Log No): 61669
Matrix: Water

Date Sampled: 4/21/92
Date Received: 4/21/92
Date Analyzed: 4/23/92
Sample wt/vol: _____(g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane	ND	1
Trichloroethene	91	1
Bromodichloromethane	ND	1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	104	76 - 114
SS#2 (TOL)	102	88 - 110
SS#3 (BFB)	97	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-7B
Lab File ID (Log No): 61670
Matrix: Water

Date Sampled: 4/21/92
Date Received: 4/21/92
Date Analyzed: 4/23/92
Sample wt/vol: _____ (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)	↓	1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	100	76 - 114
SS#2 (TOL)	102	88 - 110
SS#3 (BFB)	98	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: TB-1
Lab File ID (Log No): 61671
Matrix: Water

Date Sampled: 4/21/92
Date Received: 4/21/92
Date Analyzed: 4/23/92
Sample wt/vol: _____ (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	105	76 - 114
SS#2 (TOL)	99	88 - 110
SS#3 (BFB)	102	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

SOIL VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: EPTL (HAC/EDSG) Date Analyzed: 4/16/92

Matrix Spike/Matrix Spike Duplicate Sample No.: MS041692 ; MSD041692
61601 ;

COMPOUND	SPIKE ADDED (ug/Kg)	SAMPLE CONC (ug/Kg)	MS CONC. (ug/Kg)	MS % REC.	QC LIMITS REC.	
1,1-Dichloroethene	50	0	28.5	57	55 - 172	
Benzene	50	0	54.1	108	66 - 142	
Trichloroethene	50	0	51.3	103	62 - 137	
Toluene	50	0	59.7	119	59 - 139	
Chlorobenzene	50	0	56.3	113	60 - 133	

COMPOUND	SPIKE ADDED (ug/Kg)	MSD CONC. (ug/Kg)	MSD % REC.	% RPD	QC LIMITS RPD	REC.
1,1-Dichloroethene	50	27.9	56	1.8	22	55 - 172
Benzene	50	53.8	108	0	21	66 - 142
Trichloroethene	50	50.0	100	3.0	24	62 - 137
Toluene	50	59.5	119	0	21	59 - 139
Chlorobenzene	50	57.4	115	1.8	21	60 - 133

* Value outside of QC limits

RPD: - out of 5 outside limits
Spike Recovery: - out of 10 outside limits

COMMENTS:

VOLATILE ORGANICS MS/MSD SUMMARY

Lab Name: EPTL (HAC/EDSG) Date Sampled: 4/16/92
Client Sample ID: MW-6 COMP 61601 Date Received: 4/16/92
Lab File ID (Log No): MS 61601; MSD 61601 Date Analyzed: 4/17/92
Matrix: Soil Sample wt/vol: - (g/ml) -

THIS MS/MSD APPLIES TO THE FOLLOWING SAMPLES:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID
1	COMP MW-5	61603
2	COMP MW-6	61601
3	COMP MW-7	61602
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WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: EPTL (HAC/EDSG)

Matrix Spike/Matrix Spike Duplicate Sample No.: MS042492 ; MSD042492
61666 ; MW-5

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONC (ug/L)	MS CONC. (ug/L)	MS % REC.	QC LIMITS REC.	
1,1-Dichloroethene	50	0	50.3	101	61 - 145	
Benzene	50	0	52.3	105	76 - 127	
Trichloroethene	50	0	51.0	102	71 - 120	
Toluene	50	0	61.2	122	76 - 125	
Chlorobenzene	50	0	58.3	117	75 - 130	

COMPOUND	SPIKE ADDED (ug/L)	MSD CONC. (ug/L)	MSD % REC.	% RPD	QC LIMITS RPD	QC LIMITS REC.
1,1-Dichloroethene	50	51.7	103	2.0	14	61 - 145
Benzene	50	50.0	100	4.9	11	76 - 127
Trichloroethene	50	48.7	97	5.0	14	71 - 120
Toluene	50	61.2	122	0	13	76 - 125
Chlorobenzene	50	58.4	117	0	13	75 - 130

* Value outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS:

VOLATILE ORGANICS MS/MSD SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-5 61666
Lab File ID (Log No): MS042492
Matrix: Water MSD042492

Date Sampled: 4/21/92
Date Received: 4/21/92
Date Analyzed: 4/24/92
Sample wt/vol: _____ (g/ml) 5ml

THIS MS/MSD APPLIES TO THE FOLLOWING SAMPLES:

SAMPLE NO.	CLIENT SAMPLE ID	LAB FILE ID
1	MW-5	61666
2	MW-6	61667; 61667dil
3	MW-7	61668
4	MW-700	61669
5	MW-7B	61670
6	TB-1	61671
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MODIFIED EPA METHOD 8015 ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: COMP MW5, MW6, MW7
Lab File ID (Log No): 60601, 60602, 60603
Matrix: Soil

Date Sampled: 4/16/92
Date Received: 4/16/92
Date Analyzed: 4/17/92
Sample wt/vol: — (g/ml) —

EPTL SAMPLE ID	HARGIS SAMPLE ID	TEST METHOD	MATRIX	RESULT mg/Kg	DETECTION LIMIT(mg/Kg)	SURROGATE RECOVERY(%)
60601	Comp MW6	Mod.8015	Soil	ND	5	101
60602	Comp MW7	Mod.8015	Soil	ND	5	109
60603	Comp MW5	Mod.8015	Soil	ND	5	73
Surrogate:	Naphthalene-d8			Recovery Limit: 65 - 135%		
Sample used	for MS/MSD:	61601				
AMOUNT SPIKED (ul/L)	AMOUNT RECOVERED (ul/L)	MS REC %	MSD REC %	RPD %	QC LIMITS(%) RPD	RECOVERY
333	297 (MS)	89	100	12	25	80 - 120
	334 (MSD)					

MODIFIED EPA METHOD 8015 ANALYSIS DATA SHEET

Lab Name: EPTL (HAC/EDSG)
Lab Sample ID: MW5, 6, 7, 7B, 700; TB-1
Lab File ID: 61666 — 61671
Matrix: Water

Date Sampled: 4/21/92
Date Received: 4/21/92
Date Analyzed: 4/23 - 4/24/92
Sample wt/vol: — (g/ml) —

EPTL SAMPLE ID	HARGIS SAMPLE ID	TEST METHOD	MATRIX	RESULT mg/L	DETECTION LIMIT(mg/L)	SURROGATE RECOVERY(%)
61666	MW-5	Mod.8015	Water	ND	2	103
61667	MW-6	Mod.8015	Water	ND	2	85
61668	MW-7	Mod.8015	Water	ND	2	102
61669	MW-700	Mod.8015	Water	ND	2	93
61670	MW-7B	Mod.8015	Water	ND	2	90
61671	TB-1	Mod.8015	Water	ND	2	84
Surrogate:	Naphthalene-d8			Recovery Limit: 75 - 125%		
Sample used	for MS/MSD:	61668	(MW-7)			
AMOUNT SPIKED (ul/L)	AMOUNT RECOVERED (ul/L)	MS REC %	MSD REC %	RPD %	QC LIMITS(%) RPD	RECOVERY
16.6	15.8 (MS)	95	111	16	20	80 - 120
	18.4 (MSD)					

MODIFIED EPA METHOD 8015

QA SUMMARY (LOG NOS. 60601-60603)

Calibrations:

3-points calibration (Linearity check)

	Sum of 7 peaks	Area/Conc.	Av.	R
10 ul /L Diesel Std	5.29	0.53		
50 ul/L Diesel Std	23.85	0.48	0.49	0.9995
100 ul/L Diesel Std	44.71	0.45		

	Sum of 7 peaks	Area/Conc.	%D
50ul/L Diesel Daily Std.	23.85	0.48	2.0

QA SUMMARY (LOG. NOS. 61666-61671)

Calibrations:

3-points calibration (linearity check)

	Sum of 7 Peaks	Area/Conc.	Av.	R
10 ul/L Diesel Std	3.76	0.38		
50 ul/L Diesel Std	19.35	0.39	0.40	0.9995
100 ul/L Diesel Std	44.46	0.44		

	Sum of 7 Peaks	Area/Conc.	%D
50 ul/L Diesel Daily Std	19.97	0.40	0

METHOD 6010 INORGANIC ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG) Date Sampled: 4/16/92
Client Sample ID: MW5, MW-6, MW 7 Date Received: 4/16/92
Lab File ID (Log No): 61603, 61601, 61602 Date Analyzed: 4/17/92
Matrix: Soil

EPTL SAMPLE ID	HARGIS SAMPLE ID	TEST METHOD	METAL	RESULT mg/Kg	DETECTION LIMIT mg/Kg
60601	Comp MW6	6010	Total Chromium	6.4	0.1
60602	Comp MW7	6010	Total Chromium	14.7	0.1
60603	Comp MW5	6010	Total Chromium	11.8	0.1
Method Blank	Method Blank	6010	Total Chromium	ND	0.1
Sample used for MS/MSD : 60603					
SPIKE ADDED UG	SAMPLE CONC. UG	MS % REC	MSD % REC	% RPD	QC LIMITS (%) RPD / REC
30	44.2	85	91	6.8	15 / 80 - 120

METHOD 6010 INORGANIC ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG) MW-700 Date Sampled: 4/21/92
Client Sample ID: MW-5; MW-6; MW-7; Date Received: 4/21/92
Lab File ID (Log No): 61666 – 61669 Date Analyzed: 4/22/92
Matrix: Water

EPTL SAMPLE ID	HARGIS SAMPLE ID	TEST METHOD	METAL	RESULT mg/L	DETECTION LIMIT mg/L
61666	MW-5	6010	Total Chromium	ND	0.01
61667	MW-6	6010	Total Chromium	ND	0.01
61668	MW-7	6010	Total Chromium	ND	0.01
61669	MW-700	6010	Total Chromium	ND	0.01
Method Blank	Method Blank	6010	Total Chromium	ND	0.01
Sample used for MS/MSD : 61665					
SPIKE ADDED mg /L	SAMPLE CONC. mg/L	MS % REC	MSD % REC	% RPD	QC LIMITS (%) RPD / REC
1	0	94	100	6.2	10 / 80 - 120

LABORATORY DATA SHEETS FOR GROUNDWATER SAMPLES COLLECTED MAY 13, 1992

ENVIRONMENTAL PROCESS TECHNOLOGY LABORATORIES

HUGHES

TO: Mr. Rush Boynton
Hargis + Associates, Inc.
111 N, Sepulveda Blvd. No. 250
Manhattan Beach, CA 90266
(310) 372-7992

Date: 05/19/92

Project No.: 850.10

A total of six water samples from Project No. 850.10 (HAC-Torrance) were received at EPTL (HAC-EDSG) on 05/14/92 for volatile organic analysis (EPA Method 8240), total petroleum hydrocarbon (modified EPA Method 8015), and total chromium (EPA Method 6010). All samples plus holding blanks were stored in a refrigerator designated for VOA samples. Samples and holding blanks were analyzed on 05/14/92 to 05/15/92.

All QA/QC criteria were met. A chain-of-custody form, a sample cross reference sheet, sample analysis summaries, method blanks and matrix spike/matrix spike duplicate summaries are attached.

cc: K. Parker
M. Wiedlin

If there are any questions regarding this report, contact: **CONTROL CENTER**
Refer to samples by log number. E4/P180 616-8023

Maral M. Kazazian, Technical Head
EPT Laboratories

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HARGIS + ASSOCIATES, INC. CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 5-13-92 PAGE 1 OF

PROJECT NAME: HAC-Torrance

PROJECT No./TASK No.: 850.10

PROJECT MANAGER: FAX No.:

QA MANAGER: FAX No.:

SAMPLER (SIGNATURE): Rush N. Boynton, Timothy R. Burke

SAMPLER (PRINTED): RUSH N. BOYNTON, Timothy R. Burke

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice	SAMPLE CONTAINERS 40 ml Vial	SAMPLE CONTAINERS 500 ml plastic	ANALYSES REQUESTED EPA 8240	ANALYSES REQUESTED EPA 8015(m)	ANALYSES REQUESTED EPA 6010 Chromium	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOAS	SPECIAL HANDLING	LABORATORY INFORMATION	REMARKS
																			ETFL	
61912	MW-5	05/13/92	1559		X		X				X	2		X						
"	MW-5				X		X				X	2			X					
"	MW-5				X						X		1			X				
61913	MW-6		1433		X		X				X	2			X					
"	MW-6		1433		X		X				X	2		X						
"	MW-6		1433		X						X		1			X				
61914	MW-600		1433		X		X				X	2		X						
"	MW-600				X		X				X	2			X					
"	MW-600				X						X		1			X				
61915	MW-6FB		1424				X				X	2		X						
61916	MW-7		1552		X		X				X	2			X					
"	MW-7				X		X				X	2		X						
"	MW-7				X						X		1			X				
61917	TB-1		1433				X				X	2		X						

Total number of Containers per analysis:

Total No. of Containers: 24

Relinquished by:	Date	Received by:	Date
Timothy R. Burke	05/14/92	[signature]	5/14/92
Hargis + Ass. (Company)	Time	EPTL (Company)	Time 9:00 AM
Relinquished by:	Date	Received by:	Date
	Time		Time
Company		Laboratory	

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:

- ☒ No. of containers correct
- ☒ received good condition/cold
- ☐ custody seals secure
- ☒ conforms to COC document

Shipment Method: In person

Send Results to:

- ☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
- ☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
- ☒ 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165 Matt Weidlin
- ☒ 111 N. SEPULVEDA BLVD. No. 250 MANHATTAN BEACH, CA 90266 (213) 372-7992 Rush Boynton
- ☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

ORIGINAL - LABORATORY YELLOW - QA MANAGER

Sample Cross Reference Sheet for Project 850.10

CLIENT SAMPLE ID	LAB FILE ID
MW-5	61912
MW-6	61913
MW-600	61914
MW6FB	61915
MW-7	61916
TB-1	61917

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: —
Lab File ID (Log No): Method Blank
Matrix: Water

Date Sampled: —
Date Received: —
Date Analyzed: 05/15/92
Sample wt/vol: _____(g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	110	76 - 114
SS#2 (TOL)	97	88 - 110
SS#3 (BFB)	106	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

VOLATILE ORGANICS BLANK SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: –
Lab File ID (Log No): Method Blank
Matrix: Water

Date Sampled: –
Date Received: –
Date Analyzed: 05/15/92
Sample wt/vol: (g/ml) 5ml

THIS BLANK APPLIES TO THE FOLLOWING SAMPLES, MS AND MSD:

SAMPLE NO.	CLIENT SAMPLE ID	LAB FILE ID
1	MW-5	61912
2	MW-6	61913; 61913a
3	MW-600	61914; 61914a
4	MW-6FB	61915
5	MW-7	61916; 61916a
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METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-5
Lab File ID (Log No): 61912
Matrix: Water

Date Sampled: 05/13/92
Date Received: 05/14/92
Date Analyzed: 05/15/92
Sample wt/vol: (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	101	76 - 114
SS#2 (TOL)	103	88 - 110
SS#3 (BFB)	125	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-6
Lab File ID (Log No): 61913
Matrix: Water

Date Sampled: 05/13/92
Date Received: 05/14/92
Date Analyzed: 05/15/92
Sample wt/vol: _____(g/ml)_____

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane	ND	1
* Trichloroethene	353	5
Bromodichloromethane	ND	1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone	ND	1
Tetrachloroethene	7	1
Chlorobenzene	ND	1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	104	76 - 114
SS#2 (TOL)	97	88 - 110
SS#3 (BFB)	120	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

* Based on 1:5 dilution

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-600
Lab File ID (Log No): 61914
Matrix: Water

Date Sampled: 05/13/92
Date Received: 05/14/92
Date Analyzed: 05/15/92
Sample wt/vol: _____ (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane	ND	1
* Trichloroethene	343	5
Bromodichloromethane	ND	1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone	ND	1
Tetrachloroethene	7	1
Chlorobenzene	ND	1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	104	76 - 114
SS#2 (TOL)	100	88 - 110
SS#3 (BFB)	107	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

* Based on 1:5 dilution

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-6FB
Lab File ID (Log No): 61915
Matrix: Water

Date Sampled: 05/13/92
Date Received: 05/14/92
Date Analyzed: 05/15/92
Sample wt/vol: _____ (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	105	76 - 114
SS#2 (TOL)	99	88 - 110
SS#3 (BFB)	107	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-7
Lab File ID (Log No): 6191bw
Matrix: Water

Date Sampled: 05/13/92
Date Received: 05/14/92
Date Analyzed: 05/15/92
Sample wt/vol: (g/ml) 2.5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane	ND	1
Trichloroethene	111	2
Bromodichloromethane	ND	1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	110	76 - 114
SS#2 (TOL)	100	88 - 110
SS#3 (BFB)	114	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

METHOD 624/8240 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: TB - 1
Lab File ID (Log No): 61917
Matrix: Water

Date Sampled: 05/13/92
Date Received: 05/14/92
Date Analyzed: 05/15/92
Sample wt/vol: (g/ml) 5ml

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	ND	1
Vinyl Chloride		1
Bromomethane		1
Chloroethane		1
Trichlorofluoromethane		1
Acrolein		1
Acetone		1
1,1-Dichloroethene		1
Acrylonitrile		1
Carbon Disulfide		1
Methylene Chloride		1
trans-1,2-Dichloroethene		1
1,1-Dichloroethane		1
Vinyl Acetate		1
2-Butanone (MEK)		1
cis-1,2-Dichloroethene		1
Chloroform		1
1,1,1-Trichloroethane		1
1,2-Dichloroethane		1
Benzene		1
Carbon Tetrachloride		1
1,2-Dichloropropane		1
Trichloroethene		1
Bromodichloromethane		1
2-Chloroethyl Vinyl Ether		1
cis-1,3-Dichloropropene		1
4-Methyl-2-Pentanone		1
Toluene		1
trans-1,3-Dichloropropene		1
1,1,2-Trichloroethane		1
Dibromochloromethane		1
2-Hexanone		1
Tetrachloroethene		1
Chlorobenzene		1
Ethylbenzene		1
Bromoform		1
Styrene		1
Xylenes (total)		1
1,1,2,2-Tetrachloroethane	ND	1

Surrogate Percent Recovery

		QC Limit
SS#1 (DCE)	103	76 - 114
SS#2 (TOL)	102	88 - 110
SS#3 (BFB)	113	75 - 125

SS#1 (DCE)=1,2-Dichloroethane-d4
SS#2 (TOL)=Toluene-d8
SS#3 (BFB)=4-Bromofluorobenzene

WATER VOLATILE MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Lab Name: EPTL (HAC/EDSG) Date Analyzed: 05/11/92

Matrix Spike/Matrix Spike Duplicate Sample No.: 61857MS; 61857MSD

COMPOUND	SPIKE ADDED (ug/L)	SAMPLE CONC (ug/L)	MS CONC. (ug/L)	MS % REC.	QC LIMITS REC.	
1,1-Dichloroethene	50	0	62	124	61 - 145	
Benzene	50	0	50	100	76 - 127	
Trichloroethene	50	27	82	110	71 - 120	
Toluene	50	0	58	116	76 - 125	
Chlorobenzene	50	0	58	116	75 - 130	
COMPOUND	SPIKE ADDED (ug/L)	MSD CONC. (ug/L)	MSD % REC.	% RPD	QC LIMITS RPD	REC.
1,1-Dichloroethene	50	59	118	5.0	14	61 - 145
Benzene	50	48	96	4.1	11	76 - 127
Trichloroethene	50	78	102	7.5	14	71 - 120
Toluene	50	57	114	1.7	13	76 - 125
Chlorobenzene	50	56	112	3.6	13	75 - 130

* Value outside of QC limits

RPD: 0 out of 5 outside limits
Spike Recovery: 0 out of 10 outside limits

COMMENTS:

VOLATILE ORGANICS MS/MSD SUMMARY

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: Matrix Spike; MSD
Lab File ID (Log No): 61857MS; 61857MSD
Matrix: Water

Date Sampled: 05/04/92
Date Received: 05/11/92
Date Analyzed: 05/11/92
Sample wt/vol: _____ (g/ml) 5ml

THIS MS/MSD APPLIES TO THE FOLLOWING SAMPLES:

SAMPLE NO.	LAB SAMPLE ID	LAB FILE ID
1	MW-5	61912
2	MW-6	61913
3	MW-600	61914
4	MW-6FB	61915
5	MW-7	61916
6	TB-1	61917
7		
8		
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MODIFIED EPA METHOD 8015 ANALYSIS DATA SHEET

Lab Name: EPTL (HAC/EDSG)
Client Sample ID: MW-5, -6, -7; MW-600
Lab File ID (Log No): 61912 – 61916
Matrix: Water

Date Sampled: 05/13/92
Date Received: 05/14/92
Date Analyzed: 05/14/92
Sample wt/vol: – (g/ml) –

EPTL SAMPLE ID	HARGIS SAMPLE ID	TEST METHOD	MATRIX	RESULT mg/L	DETECTION LIMIT(mg/L)	SURROGATE RECOVERY(%)
61912	MW-5	Mod.8015	Water	ND	0.2	115
61913	MW-6	Mod.8015	Water	ND	0.2	99
61914	MW-600	Mod.8015	Water	ND	0.2	108
61916	MW-7	Mod.8015	Water	ND	0.2	120
Surrogate:	Naphthalene-d8			Recovery	Limit: 75 - 125%	
Sample used	for MS/MSD:	MW-7				
AMOUNT SPIKED (ul/L)	AMOUNT RECOVERED (ul/L)	MS REC %	MSD REC %	RPD %	QC LIMITS(%) RPD	RECOVERY
16.6	15.8 (MS)	95	111	16	20	80 - 120
	18.4 (MSD)					

MODIFIED EPA METHOD 8015

QA SUMMARY (LOG. NOS. 61912 - 61915)

Calibrations:

3-points calibration (linearity check)

	Sum of 7 Peaks	Area/Conc.	Av.	R
10 ul/L Diesel Std	3.76	0.38		
50 ul/L Diesel Std	19.35	0.39	0.40	0.9995
100 ul/L Diesel Std	44.46	0.44		

	Sum of 7 Peaks	Area/Conc.	%D
50 ul/L Diesel Daily Std	19.24	0.3848	3.8

METHOD 6010 INORGANIC ANALYSIS DATA SUMMARY

Lab Name: EPTL (HAC/EDSG) MW-7 Date Sampled: 05/13/92
Client Sample ID: MW-5; MW-6; MW-600; Date Received: 05/14/92
Lab File ID (Log No): 61912-61916 Date Analyzed: 05/14/92
Matrix: Water

EPTL SAMPLE ID	HARGIS SAMPLE ID	TEST METHOD	METAL	RESULT mg/L	DETECTION LIMIT mg/L
61912	MW-5	6010	Total Chromium	ND	0.01
61913	MW-6	6010	Total Chromium	0.02	0.01
61914	MW-600	6010	Total Chromium	0.02	0.01
61916	MW-7	6010	Total Chromium	0.03	0.01
Method Blank	Method Blank	6010	Total Chromium	0.02	0.01
Sample used for MS/MSD : 61916		(MW-7)			
SPIKE ADDED mg /L	SAMPLE CONC. mg/L	MS % REC	MSD % REC	% RPD	QC LIMITS (%) RPD REC
1	0.03	92	94	2.1	10 80 - 120

AnalyticalTechnologies, Inc. Corporate Offices: 5550 Morehouse Drive San Diego, CA 92121 (619) 458-9141

RECEIVED
MAY 29 1992
HARGIS & ASSOCIATES, INC.
MANHATTAN BEACH, CA

ATI I.D.: 205167

May 26, 1992

HARGIS & ASSOCIATES, INC.
111 N. SEPULVEDA BLVD. #350
MANHATTAN BEACH, CA 90266

Project Name: HAC-TORRANCE
Project # : 850.10

Attention: RUSH BOYNTON

Analytical Technologies, Inc. has received the following sample(s):

Date Received	Quantity	Matrix
May 14, 1992	1	WATER

The sample(s) were analyzed with EPA methodology or equivalent methods as specified in the enclosed analytical schedule. The symbol for "less than" indicates a value below the reportable detection limit. Please see the attached sheet for the sample cross reference table.

The results of these analyses and the quality control data are enclosed.

Chromium sample was filtered and acidified on Saturday, May 16, 1992.

Leslie Getman
LESLIE GETMAN
PROJECT MANAGER

Kenneth Wahl
KENNETH WAHL
LABORATORY MANAGER

cc: MATT WIEDLIN
HARGIS & ASSOCIATES, INC.
2223 AVENIDA DE LA PLAYA, NO. 300
LA JOLLA, CA 92037

KATHRYN PARKER
HARGIS & ASSOCIATES, INC.
2223 AVENIDA DE LA PLAYA, NO. 300
LA JOLLA, CA 92037

Analytical Technologies, Inc.

SAMPLE CROSS REFERENCE

Client : HARGIS & ASSOCIATES, INC.
Project # : 850.10
Project Name: HAC-TORRANCE

Report Date: May 26, 1992
ATI I.D. : 205167

ATI #	Client Description	Matrix	Date Collected
1	MW-6	WATER	13-MAY-92

---TOTALS---

Matrix	# Samples
WATER	1

ATI STANDARD DISPOSAL PRACTICE

The sample(s) from this project will be disposed of in twenty-one (21) days from the date o this report. If an extended storage period is required, please contact our sample contro department before the scheduled disposal date.

Analytical Technologies, Inc.

ANALYTICAL SCHEDULE

Client : HARGIS & ASSOCIATES, INC.
Project # : 850.10
Project Name: HAC-TORRANCE

ATI I.D.: 205167

Analysis	Technique/Description
EPA 6010 (CHROMIUM)	INDUCTIVELY COUPLED ARGON PLASMA
EPA 8010 (HALOGENATED VOLATILE ORGANICS)	GC/ELECTROLYTIC CONDUCTIVITY DETECTOR

AnalyticalTechnologies,Inc.

METALS RESULTS

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.10
Project Name: HAC-TORRANCE

ATI I.D.: 20516

Sample #	Client ID	Matrix	Date Sampled	Date Received
1	MW-6	WATER	13-MAY-92	14-MAY-92

Parameter	Units	1
CHROMIUM	MG/L	<0.01

Analytical Technologies, Inc.

METALS - QUALITY CONTROL

DUP/MS

Client : HARGIS & ASSOCIATES, INC.
Project # : 850.10
Project Name: HAC-TORRANCE

ATI I.D. : 205167

Parameters	REF I.D.	Units	Sample Result	Dup Result	RPD	Spiked Sample	Spike Conc	% Rec
CHROMIUM	205178-04	MG/L	<0.01	<0.01	0	1.84	2.00	92

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

METALS - QUALITY CONTROL

BLANK SPIKE

Client : HARGIS & ASSOCIATES,INC.
Project # : 850.10
Project Name: HAC-TORRANCE

ATI I.D. : 205167

Parameters	Blank Spike ID#	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
CHROMIUM	25237	MG/L	<0.01	2.00	2.00	100

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Sample Result - Duplicate Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY RESULTS

Test : EPA 8010 (HALOGENATED VOLATILE ORGANICS)
Client : HARGIS & ASSOCIATES,INC. ATI I.D. : 205167
Project # : 850.10
Project Name: HAC-TORRANCE

Sample #	Client ID	Matrix	Date Sampled	Date Extracted	Date Analyzed	Dil. Factor
1	MW-6	WATER	13-MAY-92	N/A	20-MAY-92	40.00

Parameter	Units	1
BROMODICHLOROMETHANE	UG/L	<8.0
BROMOFORM	UG/L	<40
BROMOMETHANE	UG/L	<40
CARBON TETRACHLORIDE	UG/L	<8.0
CHLOROBENZENE	UG/L	<20
CHLOROETHANE	UG/L	<40
CHLOROFORM	UG/L	<8.0
CHLOROMETHANE	UG/L	<40
DIBROMOCHLOROMETHANE	UG/L	<8.0
1,2-DICHLOROBENZENE	UG/L	<20
1,3-DICHLOROBENZENE	UG/L	<20
1,4-DICHLOROBENZENE	UG/L	<20
DICHLORODIFLUOROMETHANE	UG/L	<40
1,1-DICHLOROETHANE	UG/L	<8.0
1,2-DICHLOROETHANE	UG/L	<8.0
1,1-DICHLOROETHENE	UG/L	<8.0
CIS-1,2-DICHLOROETHENE	UG/L	<8.0
TRANS-1,2-DICHLOROETHENE	UG/L	<8.0
1,2-DICHLOROPROPANE	UG/L	<8.0
CIS-1,3-DICHLOROPROPENE	UG/L	<8.0
TRANS-1,3-DICHLOROPROPENE	UG/L	<8.0
METHYLENE CHLORIDE	UG/L	<80
1,1,2,2-TETRACHLOROETHANE	UG/L	<8.0
TETRACHLOROETHENE	UG/L	<8.0
1,1,1-TRICHLOROETHANE	UG/L	<8.0
1,1,2-TRICHLOROETHANE	UG/L	<8.0
TRICHLOROETHENE	UG/L	340
TRICHLOROFLUOROMETHANE	UG/L	<80
VINYL CHLORIDE	UG/L	<8.0
SURROGATES		
BROMOFLUOROBENZENE (ELCD)	%	82
BROMOFLUOROBENZENE (PID)	%	109

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

REAGENT BLANK

Page

Test : EPA 8010 (HALOGENATED VOLATILE ORGANICS)
Blank I.D. : 19346
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.10
Project Name: HAC-TORRANCE

ATI I.D. : 205167
Date Extracted: N/A
Date Analyzed : 20-MAY-92
Dil. Factor : 1.00

Parameters	Units	Results
BROMODICHLOROMETHANE	UG/L	<0.20
BROMOFORM	UG/L	<1.0
BROMOMETHANE	UG/L	<1.0
CARBON TETRACHLORIDE	UG/L	<0.20
CHLOROBENZENE	UG/L	<0.50
CHLOROETHANE	UG/L	<1.0
CHLOROFORM	UG/L	<0.20
CHLOROMETHANE	UG/L	<1.0
DIBROMOCHLOROMETHANE	UG/L	<0.20
1,2-DICHLOROBENZENE	UG/L	<0.50
1,3-DICHLOROBENZENE	UG/L	<0.50
1,4-DICHLOROBENZENE	UG/L	<0.50
DICHLORODIFLUOROMETHANE	UG/L	<1.0
1,1-DICHLOROETHANE	UG/L	<0.20
1,2-DICHLOROETHANE	UG/L	<0.20
1,1-DICHLOROETHENE	UG/L	<0.20
CIS-1,2-DICHLOROETHENE	UG/L	<0.20
TRANS-1,2-DICHLOROETHENE	UG/L	<0.20
1,2-DICHLOROPROPANE	UG/L	<0.20
CIS-1,3-DICHLOROPROPENE	UG/L	<0.20
TRANS-1,3-DICHLOROPROPENE	UG/L	<0.20
METHYLENE CHLORIDE	UG/L	<2.0
1,1,2,2-TETRACHLOROETHANE	UG/L	<0.20
TETRACHLOROETHENE	UG/L	<0.20
1,1,1-TRICHLOROETHANE	UG/L	<0.20
1,1,2-TRICHLOROETHANE	UG/L	<0.20
TRICHLOROETHENE	UG/L	<0.20
TRICHLOROFLUOROMETHANE	UG/L	<2.0
VINYL CHLORIDE	UG/L	<0.20
SURROGATES		
BROMOFLUOROBENZENE (ELCD)	%	84
BROMOFLUOROBENZENE (PID)	%	119

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

MSMSD

Test : EPA 8010 (HALOGENATED VOLATILE ORGANICS)
MSMSD # : 33676
Client : HARGIS & ASSOCIATES,INC.

Project # : 850.10
Project Name: HAC-TORRANCE

ATI I.D. : 205167
Date Extracted: N/A
Date Analyzed : 20-MAY-92
Sample Matrix : WATER
REF I.D. : 205161-11

Parameters	Units	Sample Result	Conc Spike	Spiked Sample	% Rec	Dup Spike	Dup % Rec	RPD
CHLOROBENZENE	UG/L	<0.50	2.0	1.9	95	2.1	105	10
CHLOROFORM	UG/L	<0.20	2.0	2.0	100	2.2	110	10
1,1-DICHLOROETHENE	UG/L	<0.20	2.0	2.2	110	1.9	95	15
TETRACHLOROETHENE	UG/L	<0.20	2.0	2.2	110	2.2	110	0
TRICHLOROETHENE	UG/L	<0.20	2.0	2.4	120	2.4	120	0

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample Result - Duplicate Spike Result)*100/Average Result

AnalyticalTechnologies,Inc.

GAS CHROMATOGRAPHY - QUALITY CONTROL

BLANK SPIKE

Page

Test : EPA 8010 (HALOGENATED VOLATILE ORGANICS)
Blank Spike #: 25105
Client : HARGIS & ASSOCIATES,INC.
Project # : 850.10
Project Name : HAC-TORRANCE

ATI I.D. : 205167
Date Extracted: N/A
Date Analyzed : 20-MAY-92
Sample Matrix : WATER

Parameters	Units	Blank Result	Spiked Sample	Spike Conc.	% Rec
CHLOROBENZENE	UG/L	<0.50	3.9	4.0	98
CHLOROFORM	UG/L	<0.20	1.9	2.0	95
1,1-DICHLOROETHENE	UG/L	<0.20	2.0	2.0	100
TETRACHLOROETHENE	UG/L	<0.20	1.9	2.0	95
TRICHLOROETHENE	UG/L	<0.20	1.9	2.0	95

% Recovery = (Spike Sample Result - Sample Result)*100/Spike Concentration
RPD (Relative % Difference) = (Spiked Sample - Blank Result)*100/Average Result

2 (3161

HARGIS + ASSOCIATES, INC.

CHAIN-OF-CUSTODY RECORD AND ANALYSIS REQUEST FORM

DATE 5-13-92 PAGE 1 OF 1

PROJECT NAME: HAC-Torrance
PROJECT No./TASK No.: 850.10
PROJECT MANAGER: Rush Boynton
FAX No.: (310) 372-9624
QA MANAGER:
FAX No.:
SAMPLER (SIGNATURE): Timothy R. Burke, Rush N. Boynton
SAMPLER (PRINTED): Timothy R. Burke, Rush N. Boynton

LABORATORY INFORMATION: ATI

LAB ID	SAMPLE ID	SAMPLE COLLECTION Date	SAMPLE COLLECTION Time	MATRIX Soil	MATRIX Ground-water	MATRIX Surface water	PRESERVATION HCl	PRESERVATION HNO3	PRESERVATION NaOH	PRESERVATION H2SO4	PRESERVATION Ice (BLUE)	SAMPLE CONTAINERS 40 ml Vial	SAMPLE CONTAINERS 500 ml Plastic	ANALYSES REQUESTED EPA 8010	ANALYSES REQUESTED EPA 6010 - TOTAL DISOLVED CHROME	ESTIMATED CONCENTRATION RANGE (ppb) FOR VOA'S	SPECIAL HANDLING	REMARKS
01	MW-6	5-13-92	1433		X		X				X	2		X				
01	MW-6	5-13-92	1433		X						X		1		X		X	Please filter and acidify chrome sample with 24 hrs of sample
Total number of Containers per analysis:												2	1					Total No. of Containers: 3

Relinquished by:	Date	Received by:	Date
Timothy R. Burke	5 13 92		
Hargis + Ass.	Time 1805		Time
Company		Company	

Relinquished by:	Date	Received by:	Date
		Kim Sturek	5/14
	Time	ATI-SD	Time 1610
Company		Laboratory	

INSTRUCTIONS

1. Fill out form completely except for shaded areas (lab use only); sign only after verified for completeness.
2. Complete in ballpoint pen. Draw one line through errors, initial and date correction.
3. Indicate number of sample containers in analysis request space; indicate choice with ✓ or x.
4. Note applicable preservatives, special instructions, and deviations from typical environmental samples.
5. Consult project QA documents for specific instructions.

Sample Receipt:
- ☑ No. of containers correct
- ☑ received good condition/cold
- ☑ custody seals secure
- ☑ conforms to COC document

Shipment Method: FED-X
Send Results to: see below

- ☐ 3385 N. CAMPBELL No. 121 TUCSON, AZ 85719 (602) 881-7300
- ☐ 2222 S. DOBSON RD. No. 401 MESA, AZ 85202 (602) 345-0888
- cc: Matt Wiedlin
- ☒ 2223 AVENIDA DE LA PLAYA No. 300 LA JOLLA, CA 92037 (619) 454-0165
- Rush Boynton
- ☒ 111 N. SEPULVEDA BLVD. No. 350 MANHATTAN BEACH, CA 90266 (213) 372-7992
- ☐ 1616 W. BURBANK BLVD. No. E BURBANK, CA. 91506 (818) 563-4569

Send invoice to La Jolla, CA Business Office Attn: Kim Sturek

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LABORATORY DATA SHEETS FOR GROUNDWATER SAMPLES COLLECTED JULY 1, 1992

Environmental and Process Technology Laboratories (HAC/EDSG)

METHOD 8240/624 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Client Sample ID	: MW-8	Date Sampled	: 7/1/92
Project No.	: 850.8	Date Received	: 7/1/92
Lab File ID	: 62590	Date Extracted	: NA
Matrix	: Water	Date Analyzed	: 7/2/92
		Dilution Factor	: 1

COMPOUND	CONCENTRATION	DETECTION LIMIT
	ug/L	ug/L
Chloromethane	<1	1
Vinyl Chloride	<1	1
Bromomethane	<1	1
Chloroethane	<1	1
Trichlorofluoromethane	<1	1
Acrolein	<1	1
Acetone	<1	1
1,1-Dichloroethene	<1	1
Acrylonitrile	<1	1
Carbon Disulfide	<1	1
Methylene Chloride	<1	1
trans-1,2-Dichloroethene	<1	1
1,1-Dichloroethane	<1	1
Vinyl Acetate	<1	1
2-Butanone (MEK)	<1	1
cis-1,2-Dichloroethene	<1	1
Chloroform	<1	1
1,1,1-Trichloroethane	<1	1
1,2-Dichloroethane	<1	1
Benzene	<1	1
Carbon Tetrachloride	<1	1
1,2-Dichloropropane	<1	1
Trichloroethene	237	D(1:5)
Bromodichloromethane	<1	1
2-Chloroethyl Vinyl Ether	<1	1
cis-1,3-Dichloropropene	<1	1
4-Methyl-2-pentanone	<1	1
Toluene	<1	1
trans-1,3-Dichloropropene	<1	1
1,1,2-Trichloroethane	<1	1
Dibromochloromethane	<1	1
2-Hexanone	<1	1
Tetrachloroethene	<1	1
Chlorobenzene	<1	1
Ethylbenzene	<1	1
Bromoform	<1	1
Styrene	<1	1
Xylenes (total)	<1	1
1,1,2,2-Tetrachloroethane	<1	1
1,2-Dichlorobenzene	<1	1

Surrogate Percent Recovery		QC Limits
SS#1 (DCE)	94	76 - 114
SS#2 (TOL)	102	88 - 110
SS#3 (BFB)	116	75 - 125

Environmental and Process Technology Laboratories (HAC/EDSG)

METHOD 6010 INORGANIC ANALYSIS DATA SHEET

Client Sample ID: MW-8; MW-9
Project No.: 850.8
Lab File ID: 62592; 62593

Date Sampled: 7/1/92

Date Received: 7/1/92

Matrix: Water

EPTL SAMPLE ID	HARGIS SAMPLE ID	DATE ANALYZED	TEST METHOD	METAL	RESULT (mg/L)	DETECTION LIMIT (mg/L)
62593	MW-8	7/2/92	6010	Total Cr	<0.01	0.01
62592	MW-9	7/2/92	6010	Total Cr	0.02	0.01
Method Blank	Method Blank	7/2/92	6010	Total Cr	0.02	0.01

Sample used for MS/MSD : 62593

SPIKE ADDED (mg/L)	SAMPLE CONC (mg/L)	MS % REC	MSD % REC	% RPD	QC LIMITS (%) RPD	REC
1.0	0	100	99	1.0	10	80 - 120

Environmental and Process Technology Laboratories (HAC/EDSG)

METHOD 8240/624 VOLATILE ORGANICS ANALYSIS DATA SUMMARY

Client Sample ID : MW-9
Project No. : 850.8
Lab File ID : 62591
Matrix : Water

Date Sampled : 7/1/92
Date Received : 7/1/92
Date Extracted : NA
Date Analyzed : 7/2/92
Dilution Factor : 1

COMPOUND	CONCENTRATION ug/L	DETECTION LIMIT ug/L
Chloromethane	<1	1
Vinyl Chloride	<1	1
Bromomethane	<1	1
Chloroethane	<1	1
Trichlorofluoromethane	<1	1
Acrolein	<1	1
Acetone	<1	1
1,1-Dichloroethene	<1	1
Acrylonitrile	<1	1
Carbon Disulfide	<1	1
Methylene Chloride	<1	1
trans-1,2-Dichloroethene	<1	1
1,1-Dichloroethane	<1	1
Vinyl Acetate	<1	1
2-Butanone (MEK)	<1	1
cis-1,2-Dichloroethene	<1	1
Chloroform	<1	1
1,1,1-Trichloroethane	<1	1
1,2-Dichloroethane	<1	1
Benzene	<1	1
Carbon Tetrachloride	<1	1
1,2-Dichloropropane	<1	1
Trichloroethene	<1	1
Bromodichloromethane	<1	1
2-Chloroethyl Vinyl Ether	<1	1
cis-1,3-Dichloropropene	<1	1
4-Methyl-2-pentanone	<1	1
Toluene	<1	1
trans-1,3-Dichloropropene	<1	1
1,1,2-Trichloroethane	<1	1
Dibromochloromethane	<1	1
2-Hexanone	<1	1
Tetrachloroethene	<1	1
Chlorobenzene	<1	1
Ethylbenzene	<1	1
Bromoform	<1	1
Styrene	<1	1
Xylenes (total)	<1	1
1,1,2,2-Tetrachloroethane	<1	1
1,2-Dichlorobenzene	<1	1

Surrogate Percent Recovery		QC Limits
SS#1 (DCE)	94	76 - 114
SS#2 (TOL)	103	88 - 110
SS#3 (BFB)	124	75 - 125