

## LETTER OF TRANSMITTAL

Engineers, Geologists, Chemists, Hygienists and Scientists

DATE: September 3, 1992

TO: Mr. Amador Escudero, P.E.  
City Engineer  
City of Laredo  
1110 Houston  
P.O. Box 579  
Laredo, Texas 78042

**Raba-Kistner**  
Consultants, Inc.

P.O. Box 680287, San Antonio, TX 78268-0287  
12621 W. Golden Lane, San Antonio, TX 78248, (512) 696-9090

FROM: Eric Wolff

PROJECT NUMBER: ASB92-034-00

RE: Status and Quarterly Monitoring Report - August 1992  
Airport Fuel Farm, LPST ID No. 95021

ITEMS TRANSMITTED ☐ Attached ☐ Under Separate Cover

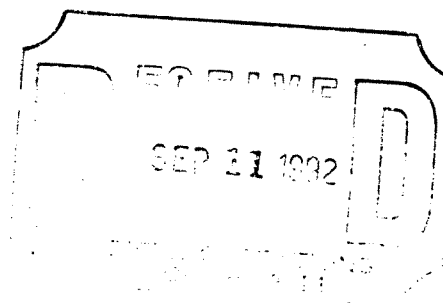
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<input type="checkbox"/> Shop Drawings			
X Report	3	8-27-92	Status and Quarterly Monitoring Report August 1992

## REASON TRANSMITTED

## REMARKS

- ☐ Approval
- ☐ Review and Comment
- ☐ For Information/Use
- ☐ No Exceptions Taken
- ☐ Make Corrections Noted  
Resubmittal Not Req'd
- ☐ Correct and Resubmit
- ☐ Rejected
- ☐ Return Signed Original

Enclosed please find three copies of the  
Status and Quarterly Monitoring Report  
- August 1992, Airport Fuel Farm, 518 Flightline,  
Laredo, Texas, as requested.



COPIES

00938

Project No. ASB92-034-00  
August 27, 1992

Mr. Amador Escudero, P.E.  
City Engineer  
City of Laredo  
1110 Houston  
P.O. Box 579  
Laredo, Texas 78042

Re: Status and Quarterly Monitoring Report - August 1992  
Airport Fuel Farm  
518 Flightline, Laredo (Webb County), Texas  
LPST ID No. 95021

Dear Mr. Escudero:

Raba-Kistner Consultants, Inc. (R-KCI), has completed the August 1992 quarterly ground-water sampling at the Airport Fuel Farm in Laredo, Texas. This report presents the results of the sampling and the installation of four new monitoring wells at the Fuel Farm.

### **PURPOSE**

These activities were performed in response to a Texas Water Commission (TWC) letter dated April 24, 1992. Quarterly monitoring was initiated and additional monitoring wells were installed to further delineate the contaminant plume. The location of the site is shown on Plate 1. All report illustrations are provided in Attachment I. A Site Plan showing the locations of the monitoring wells is presented on Plate 2.

### **CHRONOLOGY OF EVENTS**

<u>DATE</u>	<u>R-KCI ACTIVITY</u>
August 11, 1992	Ground water in six existing monitoring wells was measured, purged, and sampled.
August 17-18, 1992	Additional monitoring wells (MW-7, MW-8, MW-9, and MW-10) were installed.
August 19, 1992	Ground-water levels were measured in all ten wells before development of the four new wells. The new wells were then developed and sampled.

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## **METHODS**

The four new monitoring wells were installed in locations selected to meet requirements set forth in the April 24, 1992, TWC letter. Two wells (MW-7 and MW-8) were installed southwest of the City of Laredo beneficial use (BU) petroleum storage tanks (PSTs) (Plate 2). A third well (MW-10) was installed near the oil-water separator (also referred to as interceptor tank). The fourth well (MW-9) was installed adjacent to the United States Air Force (USAF) non-beneficial use (NBU) PSTs and down gradient of the Barker Aviation BU PSTs (Plate 2).

New monitoring wells were constructed with 4-in. schedule 40 PVC. Well construction, soil collection and analysis, water level measurement, and ground-water sampling and analysis procedures are described in the R-KCI Field and Laboratory Methods in Attachment II.

Soil samples were collected and described during the installation of the four new monitor wells. Logs of the borings are provided in Attachment III. Two soil samples from each well location were selected and analyzed for total petroleum hydrocarbons (TPH); and benzene, toluene, ethylbenzene and total xylenes (BTEX). The samples were selected from intervals where high levels of hydrocarbon vapors were detected by odor or by using a field photo-ionization detector (PID).

Water levels were measured in existing monitoring wells MW-1, MW-2, MW-3, MW-4, and recovery wells RW-5 and RW-6 on August 11, 1992. These wells were monitored with an interface probe to check for presence of phase-separated hydrocarbons. Water levels were again measured in the existing wells as well as the newly installed monitoring wells MW-7 through MW-10 on August 19, 1992. The August 19, 1992, measurements were to determine if short-term variations in water levels occur.

The six existing monitoring wells were sampled on August 11, 1992, to determine current subsurface conditions and to help in the selection of the locations of the four additional monitoring wells. Four of the six existing wells were sampled and analyzed for BTEX and TPH. Since the other two existing wells (RW-5 and RW-6) contained phase-separated hydrocarbons, they were sampled and analyzed for fuel fingerprinting. Monitoring wells MW-7 through MW-10 were sampled August 19, 1992, for BTEX, TPH and methyl-tertiary-butyl-ether (MTBE) after the wells were installed and developed. This sampling was an attempt to define the horizontal extent of dissolved phase hydrocarbon contamination.

## RESULTS

Descriptions of soils collected from the new monitoring wells are provided in the boring logs (Attachment III). A table summarizing the results of analysis of the soils is presented on Plate 3.

Hydrocarbon constituents of BTEX and/or TPH were detected in soil samples taken during installation of the monitoring wells. Reports of Analysis for soil and ground-water samples are provided in Attachment IV. The highest levels of BTEX and TPH detected were 35 mg/kg and 3,000 mg/kg, respectively (MW-10).

Phase-separated hydrocarbons were detected in RW-5 and RW-6 during the August 11, 1992, sampling event. Approximately 0.01 ft and 0.02 ft of product were measured in RW-5 and RW-6, respectively. No phase-separated product was detected during the August 19, 1992 sampling event.

Water-table elevation contour maps were constructed and are provided on Plates 4a and 4b. The ground-water measurements and elevations from this and previous investigations at the site are tabulated on Plate 5. The direction of ground-water flow is to the southwest at a gradient of about 0.003 ft/ft.

A table summarizing the analytical chemistry results of the current sampling event as well as earlier sampling events is presented on Plate 6. Copies of the signed Report of Analyses of the recently collected samples are provided in Attachment IV. Hydrographs of the original six monitoring wells are provided on Plates 7a-7f.

Maximum concentrations of BTEX and TPH were 14.77 and 53 mg/L, respectively, in ground-water samples. No MTBE was detected in samples collected from MW-7 and MW-8. Results of MTBE analyses on samples collected from MW-9 and MW-10 are pending completion of GC/MS scan.

## CONCLUSIONS

Ground-water contamination encountered in MW-9, up gradient of the City of Laredo BU PSTs and adjacent to the NBU PST area, indicates that additional sources of subsurface contamination are contributing to the ground-water contamination in the area. Ground-water contamination identified in MW-3 is down gradient of the Barker Aviation BU PST area and adjacent to the NBU PST area (Plate 2).

The contaminant plume has not yet been completely delineated. More drilling is required to fully delineate the extent of the contaminant plume. Because ground-water

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August 27, 1992

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contamination may be the result of the combination of three or more sources (each controlled by a different owner), some effort should be made to combine efforts to delineate the contamination and determine the level of responsibility for each responsible party. A remedial action plan should address all sources simultaneously to be most efficient and effective.

If you have any questions concerning the information in this report, or if we could be of further service, please do not hesitate to call Eric Wolff or myself at (512) 699-9090.

Very truly yours,

RABA-KISTNER CONSULTANTS, INC.

Kevin L. Wooster  
Hydrogeologist  
Geosciences Section

B. Mark Dobson, R.G., C.E.G.  
Manager  
Geosciences Section

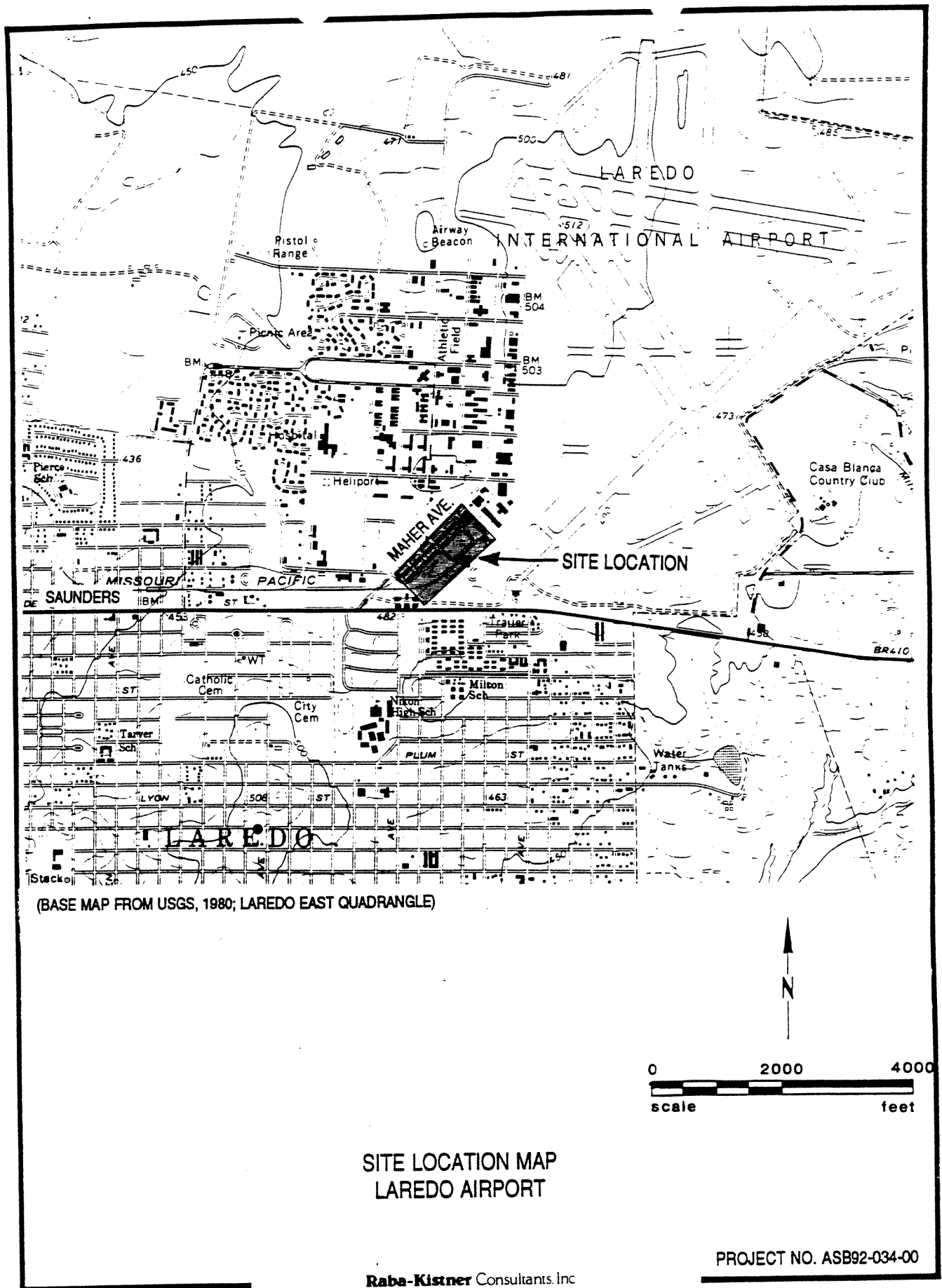
KLW/BMD/mem  
Copies Submitted: Above (3)  
TWC (3)

Attachments: I - Illustrations  
II - Field and Laboratory Methods  
III - Monitoring Well / Boring Logs  
IV - Reports of Analyses

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**ATTACHMENT I**

**ILLUSTRATIONS**



SITE LOCATION MAP  
LAREDO AIRPORT

PROJECT NO. ASB92-034-00

Raba-Kistner Consultants, Inc.

PLATE 0944

# SUMMARY OF ANALYTICAL RESULTS

PROJECT NAME: LAREDO AIRPORT  
 SAMPLE LOCATION: BORINGS  
 SAMPLE TYPE: SOIL

FILE NAME: SOIL.WQ1

Sample Designation	Sample Date	Sample Depth (ft)	Benzene (mg/kg)	Toluene (mg/kg)	Ethylbenzene (mg/kg)	Total Xylenes (mg/kg)	Total Detectable BTEX (mg/kg)	MTBE (mg/kg)	TPH (mg/kg)
MW-7	08/17/92	6.0-8.0	<0.4	<0.4	<0.4	<0.4	—	<0.4	570
		10.0-12.0	<0.4	<0.4	<0.4	<0.4	—	<0.4	210
MW-8	08/18/92	8.0-10.0	<0.4	<0.4	<0.4	2.8	2.8	<0.4	2,200
		10.0-12.0	<0.4	<0.4	<0.4	2.4	2.4	<0.4	1,200
MW-9	08/18/92	8.0-10.0	<0.4	<0.4	<0.4	<0.4	—	<0.4	<20
		10.0-12.0	<0.4	<0.4	<0.4	<0.4	—	<0.4	270
MW-10	08/18/92	6.0-8.0	<0.4	5.0	4.0	25	35	<0.4	3,000
		14.0-16.0	<0.4	<0.4	2.5	2.9	5.4	<0.4	960

PROJECT NO. AS92-06405






LATE 3

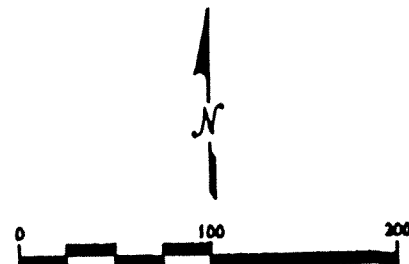


(Related to  
LPST # 95521)

MAHER AVE.

**LEGEND**

- ⊕ MONITORING WELL
- RECOVERY WELL
-  BENEFICIAL USE PST
-  OIL / WATER SEPARATOR
-  BUILDING
- X—X— FENCE
-  NON-BENEFICIAL USE PST TANKHOLD
-  BARKER AVIATION BENEFICIAL USE PST TANKHOLD



—X—X—X—X—

SHOPPING

SIONS  
DATE APPD



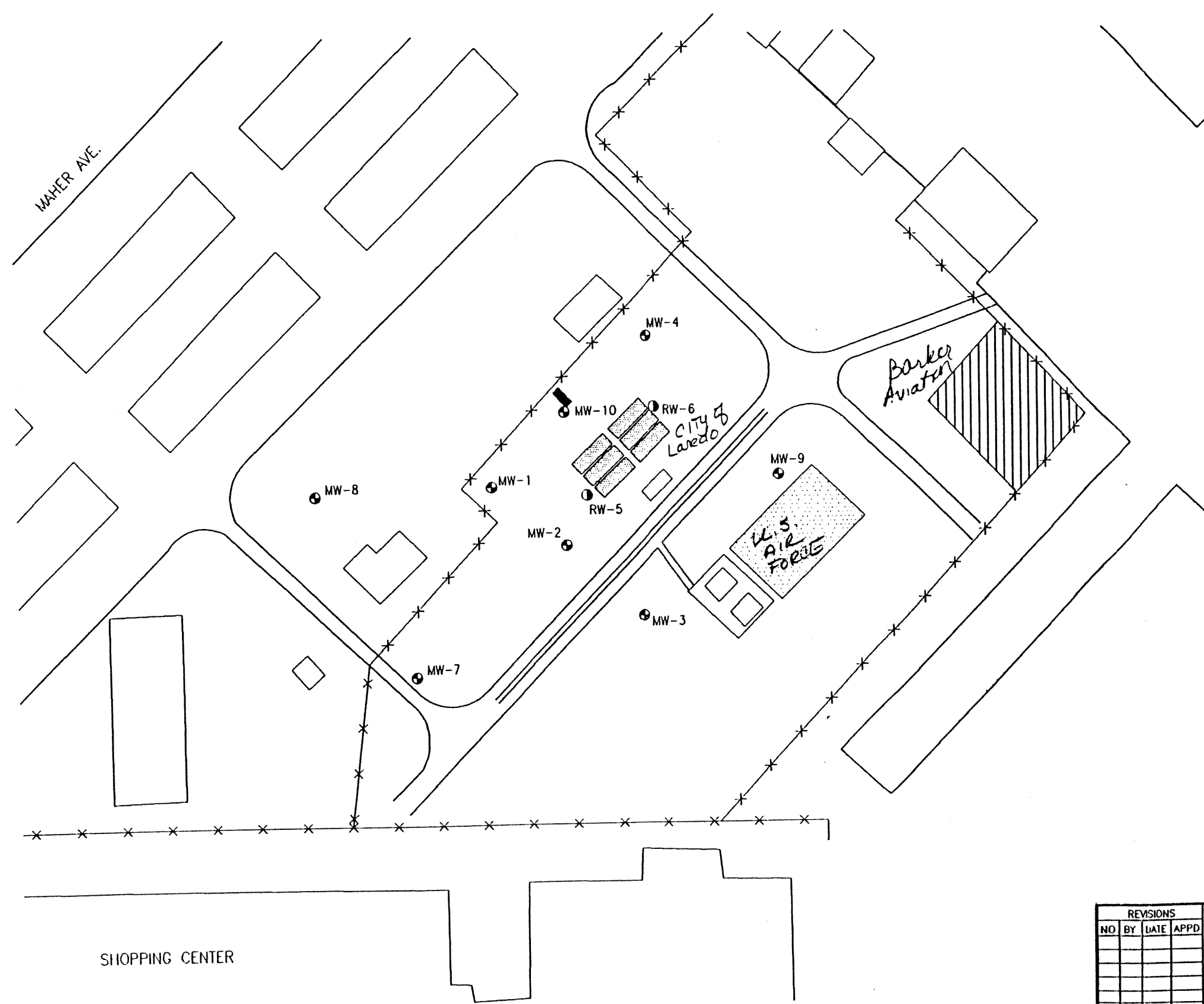
**Raba-Kistner  
Consultants, Inc.**

Engineers Geologists Scientists Chemists

SITE PLAN 00946  
LAREDO AIRPORT

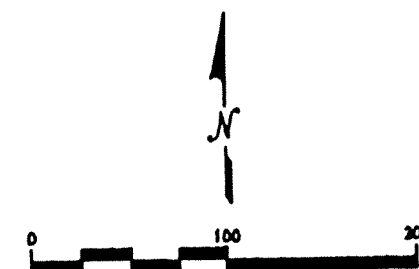
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DRAWN BY: FY CHK. BY: APPD: DATE 08/20/92

(Related to  
LPST # 95521)



**LEGEND**

- MONITORING WELL
- RECOVERY WELL
- BENEFICIAL USE PST
- OIL / WATER SEPARATOR
- BUILDING
- × × FENCE
- NON-BENEFICIAL USE PST TANKHOLD
- BARKER AVIATION BENEFICIAL USE PST TANKHOLD



SHOPPING CENTER

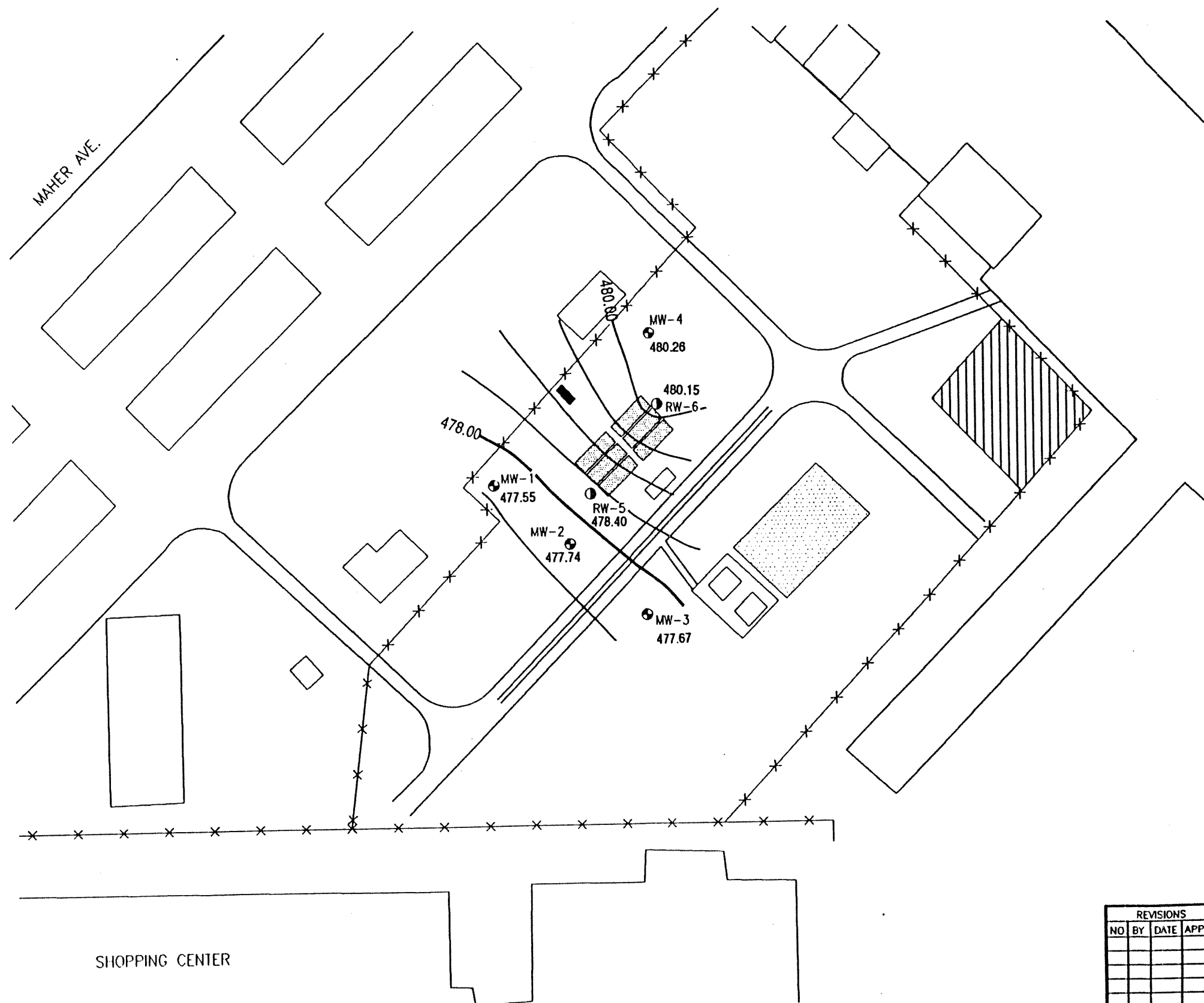
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**Raba-Kistner Consultants, Inc.**

Engineers Geologists Scientists Chemist

SITE PLAN 00946  
LAREDO AIRPORT

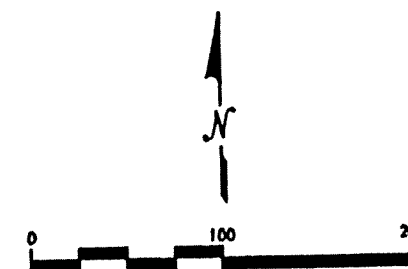
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**LEGEND**

- MONITORING WELL
- RECOVERY WELL
- ▨ BENEFICIAL USE PST
- OIL / WATER SEPARATOR
- BUILDING
- X—X— FENCE
- ▤ NON-BENEFICIAL USE PST TANKHOLD
- ▧ BARKER AVIATION BENEFICIAL USE PST TANKHOLD

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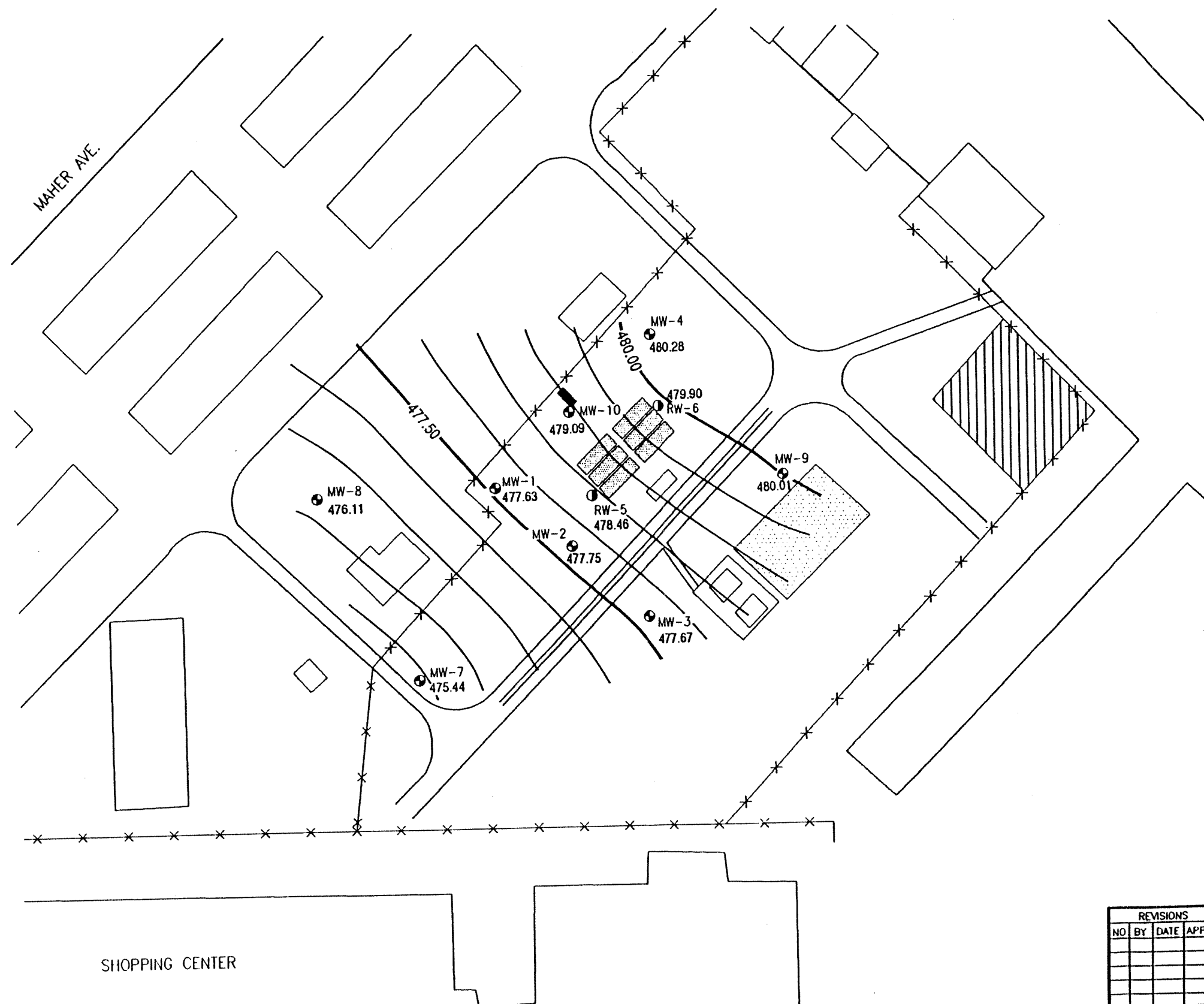


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

**Raba-Kistner Consultants, Inc.**  
 Engineers Geologists Scientists Chemists

WATER TABLE ELEVATION MAP 8/11/92  
 LAREDO AIRPORT 00947  
 SCALE: AS SHOWN PROJECT NO.: ASB92-034-00 PLATE 4a  
 DRAWN BY: CHK. BY: APPD.: DATE: 08/25/92

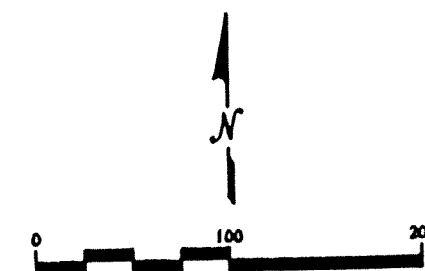


SHOPPING CENTER

### LEGEND

-  MONITORING WELL  
 RECOVERY WELL  
 BENEFICIAL USE PST  
 OIL / WATER SEPARATOR  
 BUILDING  
 FENCE  
 NON-BENEFICIAL USE PST TANKHOLD  
 BARKER AVIATION BENEFICIAL USE PST TANKHOLD

CONTOUR OF WATER TABLE  
ELEVATION, IN FEET ABOVE  
SEA LEVEL. CONTOUR  
INTERVAL = 0.5 FT.  
VALUES ARE POSTED AT  
SAMPLING STATIONS.

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**Raba-Kistner  
Consultants, Inc.**

Engineers Geologists Scientists Chemis

WATER TABLE ELEVATION MAP 8/18/92  
LAREDO AIRPORT 00948

SCALE: AS SHOWN	PROJECT NO.: AS892-034-00	PLATE 4b
DRAWN BY:	CHK BY:	APPD: DATE 08/29/97

# SUMMARY OF ANALYTICAL RESULTS

PROJECT NAME: LAREDO AIRPORT  
 SAMPLE LOCATION: MONITORING WELLS  
 SAMPLE TYPE: GROUND WATER

FILE NAME: WATER.WQ1

Sample Designation	Sample Date	Sample * Analyzed by	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Total Xylenes (mg/L)	Total Detectable BTEX (mg/L)	MTBE (mg/L)	TPH (mg/L)	TDS (mg/L)
MW-1	07/25/90	PAL	4.0	0.730	0.200	0.530	5.46	<0.01	13	
	12/11/91	PAL	3.056	0.531	0.143	0.446	4.176	<0.01	13.8	
	05/27/92	PAL	4.853	0.687	0.277	0.703	6.52	1.494	1.98	
	08/11/92	R-KCI	12	1.5	0.38	0.89	14.77		44	
MW-2	12/11/91	PAL	0.329	0.271	0.205	0.516	1.321	<0.01	214	
	05/27/92	PAL	0.698	0.361	0.281	0.662	2.002	0.890	29.6	
	08/11/92	R-KCI	0.33	0.26	0.16	0.39	1.14		53	
MW-3	07/25/90	PAL	0.860	0.082	0.190	0.280	1.412	<0.01	<10	
	12/11/91	PAL	0.010	0.018	<0.01	0.013	0.041	0.049	3.3	
	05/27/92	PAL	0.480	<0.01	0.028	<0.01	1.38	0.026	1.38	
	08/11/92	R-KCI	0.38	0.31	0.20	0.51	1.4		6	
MW-4	07/25/90	PAL	<0.01	<0.01	<0.01	<0.01	—	<0.01	<10	
	12/11/91	PAL								3.510
	05/27/92	PAL	<0.01	<0.01	<0.01	<0.01	—	0.803	<10	
	08/11/92	R-KCI	<0.005	<0.005	<0.005	<0.005	—		<1	
MW-7	08/19/92	R-KCI	<0.005	<0.005	<0.005	<0.005	—	<0.005	<1	
MW-8	08/19/92	R-KCI	<0.005	<0.005	<0.005	<0.005	—	<0.005	<1	
MW-9	08/19/92	R-KCI	5.4	2.5	0.73	1.8	10.43	—	12	
MW-10	08/19/92	R-KCI	3.4	0.78	0.24	0.26	4.68	—	4	

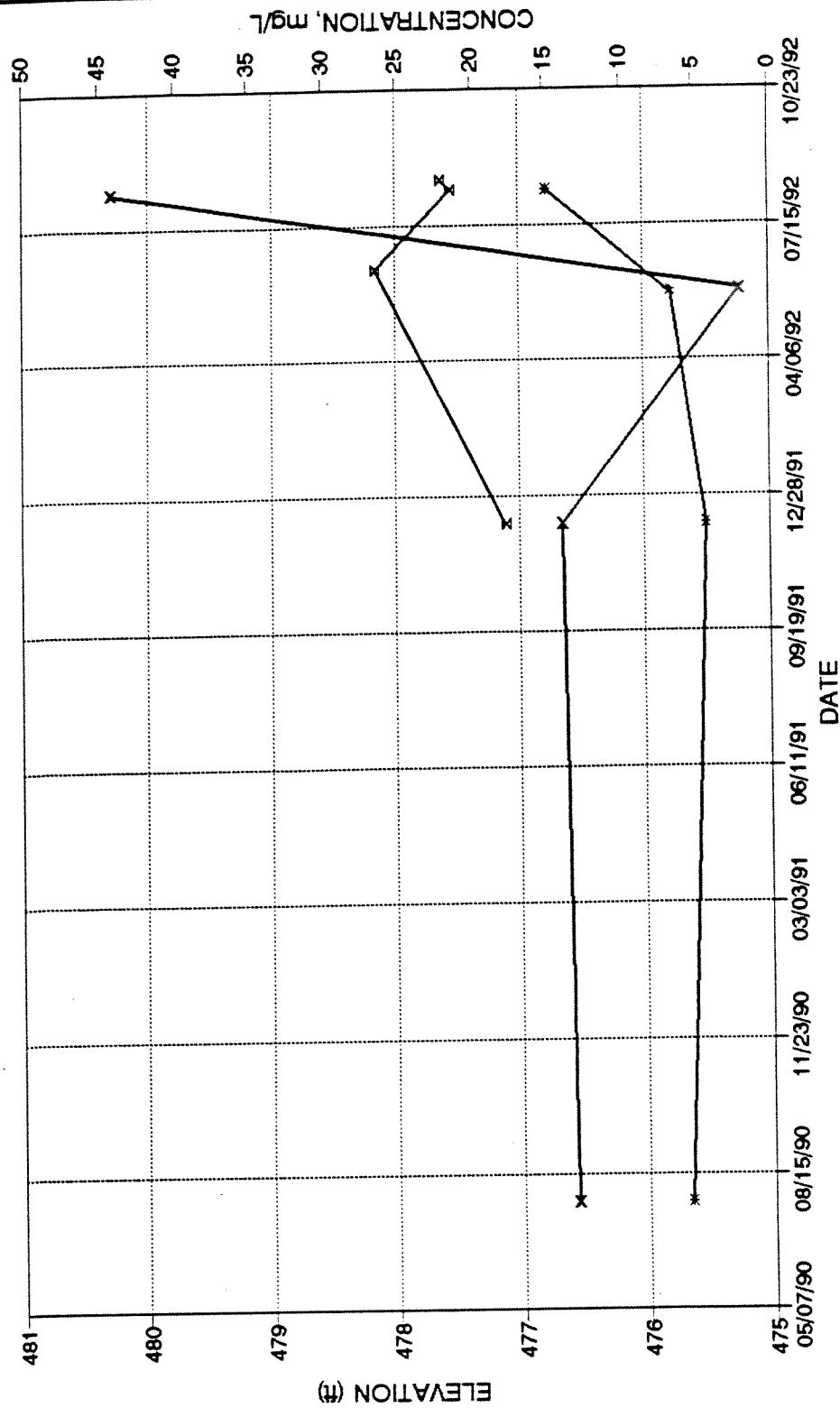
\* R-KCI = RABA-KISTNER CONSULTANTS, INC.  
 PAL = PAN AMERICAN LABORATORIES, INC.  
 — RESULTS PENDING GC/MS.

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PROJECT NO. ASB92-034-00

PLATE 6

# HYDROGRAPH OF MW-1 LAREDO AIRPORT



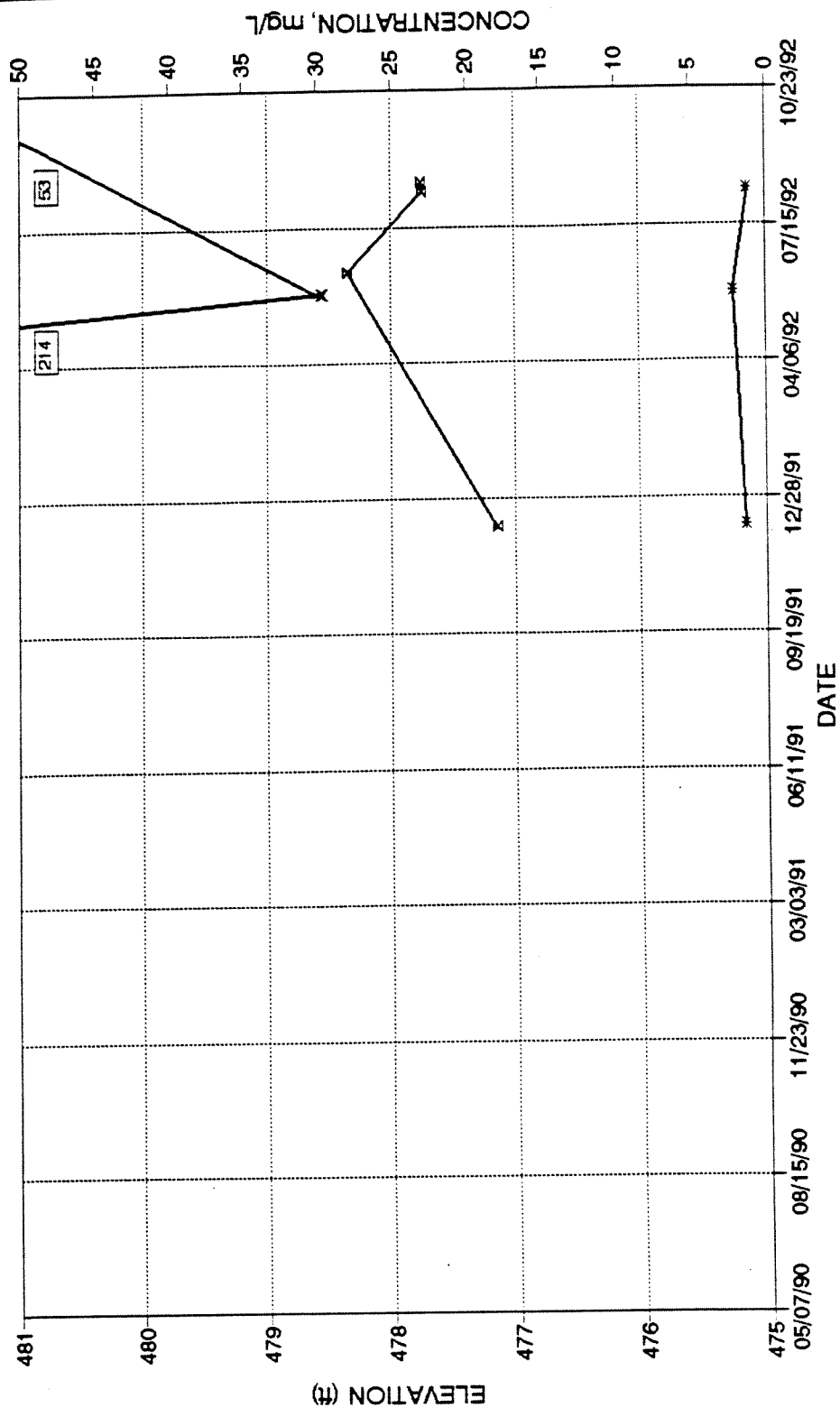
—x— WATER TABLE \*— TOTAL BTEX —x— TPH

00951

PROJECT NO. ASB92-034-00

PLATE 7a

# HYDROGRAPH OF MW-2 LAREDO AIRPORT



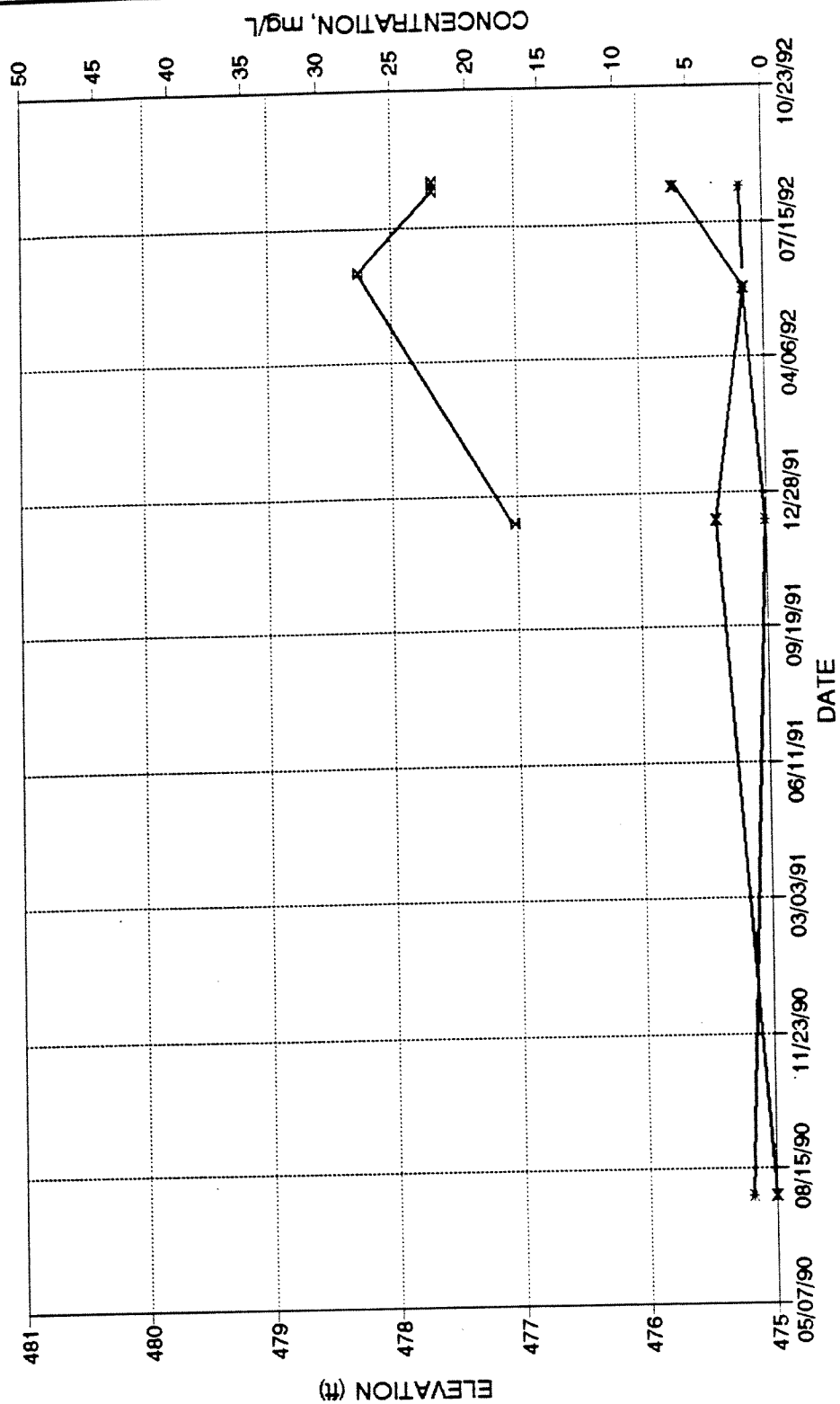
WATER TABLE 
 TOTAL BTEX 
 TPH

00952

PROJECT NO. ASB92-034-0X

PLATE 7

# HYDROGRAPH OF MW-3 LAREDO AIRPORT



— WATER TABLE \* TOTAL BTEX — TPH

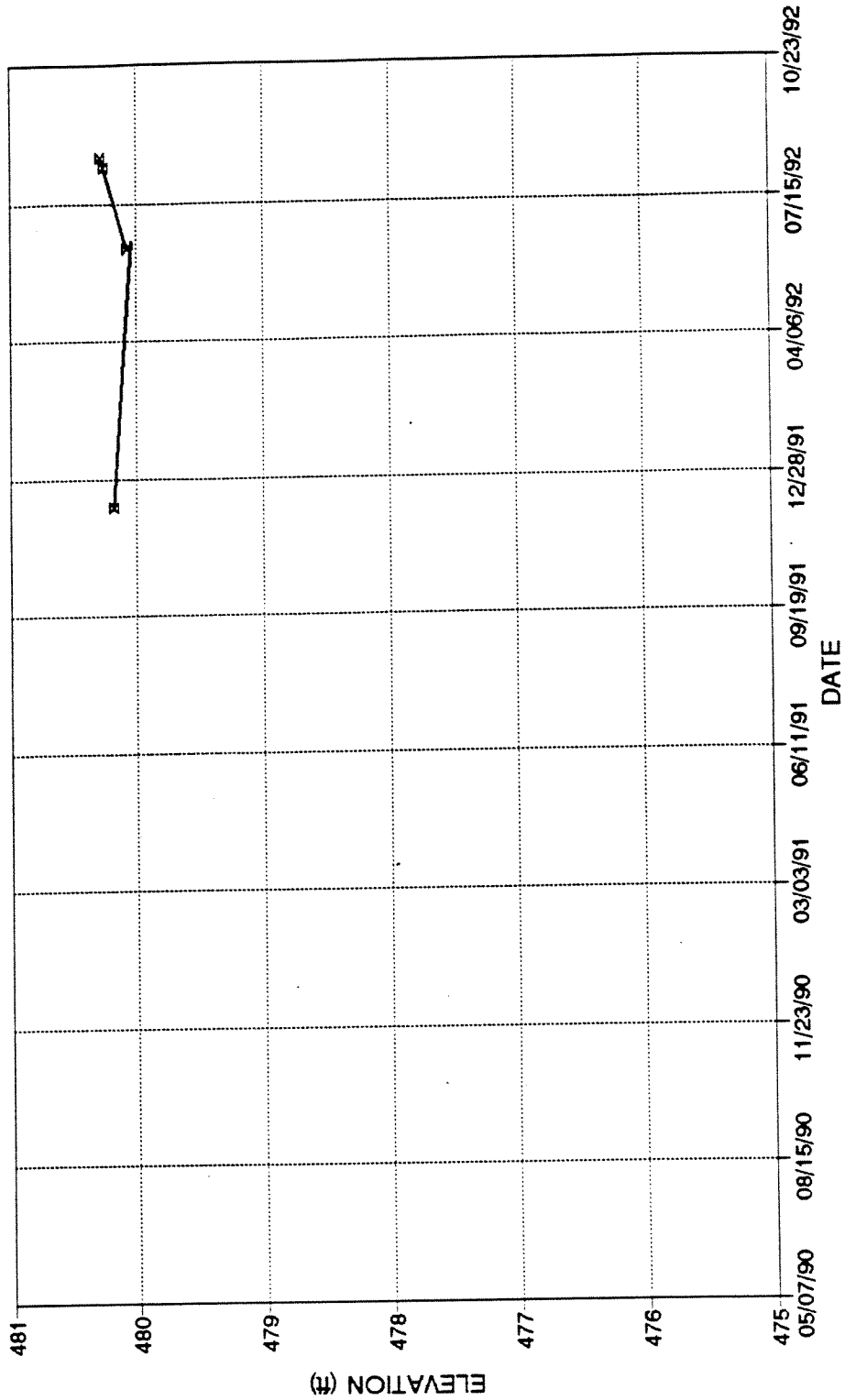
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PROJECT NO. ASB92-034-00

PLATE 7c



# HYDROGRAPH OF MW-4 LAREDO AIRPORT



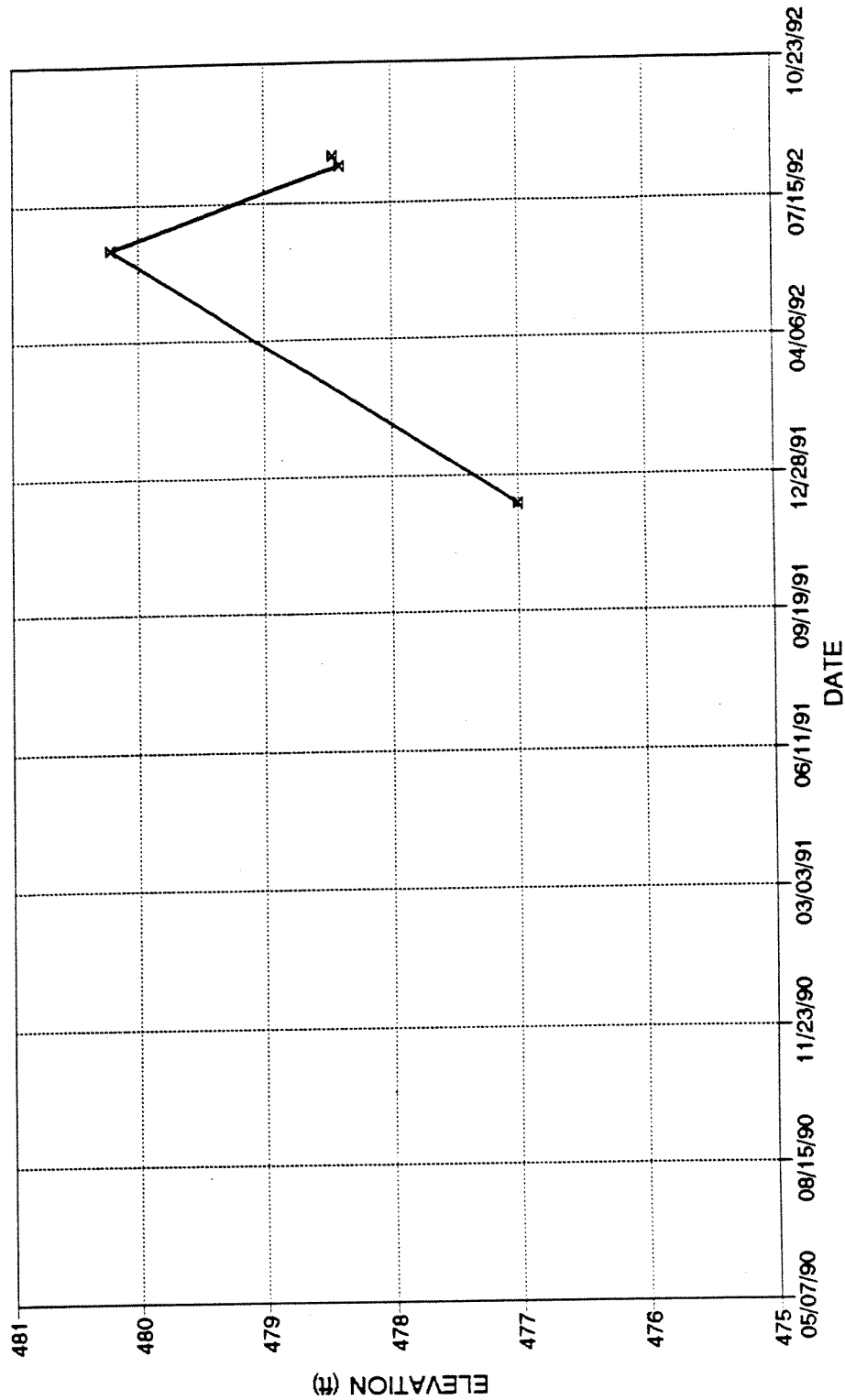
—X— WATER TABLE

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PROJECT NO. ASB92-034-00

PLATE 7d

# HYDROGRAPH OF RW-5 LAREDO AIRPORT



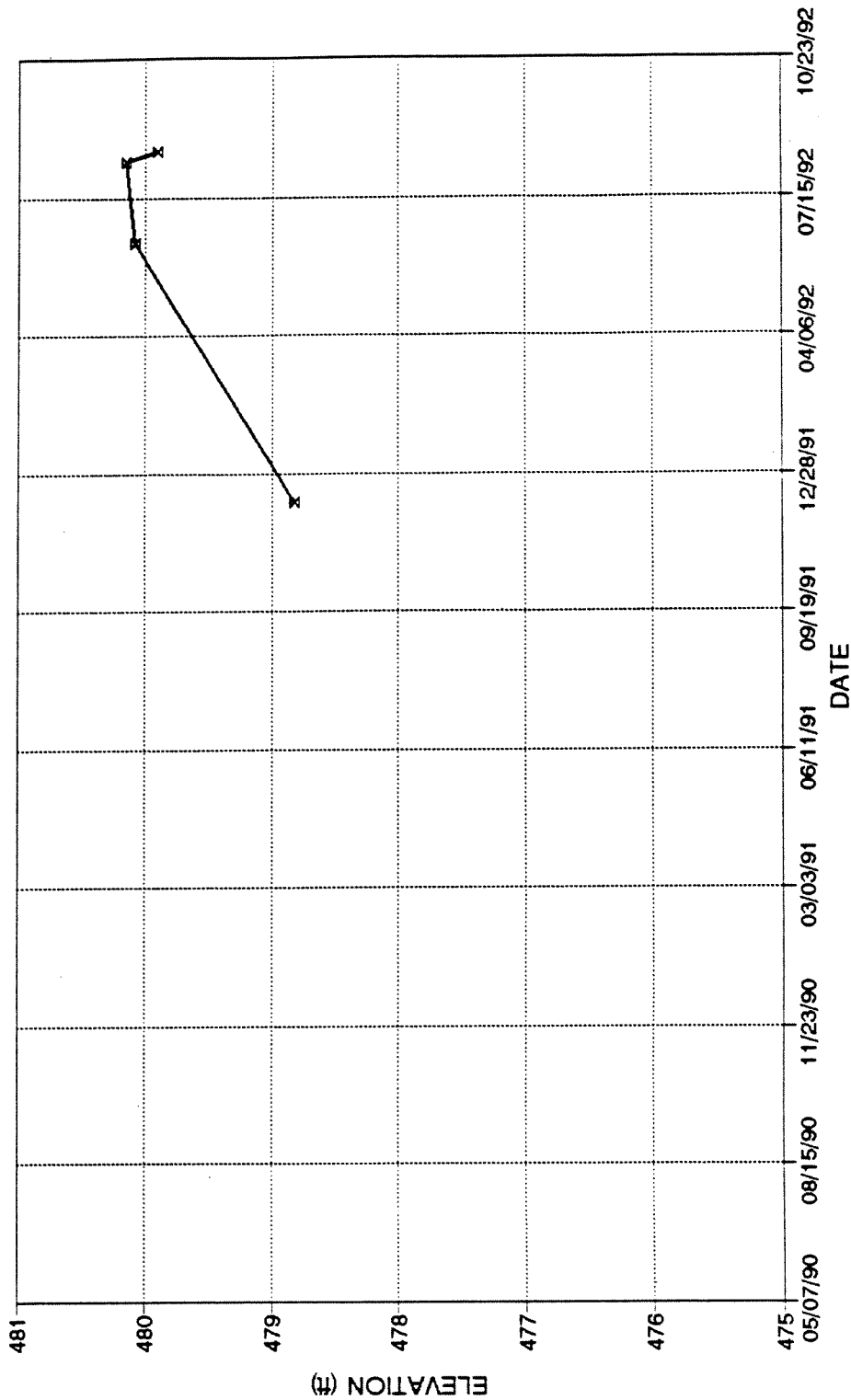
WATER TABLE

00955

PROJECT NO. ASB92-034-00

PLATE 7e

# HYDROGRAPH OF RW-6 LAREDO AIRPORT



WATER TABLE

00956

PROJECT NO. ASB92-034-00

PLATE 71

**ATTACHMENT II**

**FIELD AND LABORATORY METHODS**

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## FIELD AND LABORATORY METHODS

The field and laboratory procedures employed during this study are those considered to be good standard practice in the Geoscience and Environmental Engineering professions. This appendix describes standard field and laboratory methods used by Raba-Kistner Consultants, Inc. (R-KCI).

### FIELD METHODS

#### EXCAVATION SAMPLING

##### Purpose

The purpose of excavation sampling is to collect samples for laboratory analysis. Samples are analyzed to determine the levels of contamination in soils and rock. This information is used to assess the extent of contamination within or at the perimeters of the excavation.

##### Sample Selection

Samples are selected to determine worst-case levels of contamination. Sample selection is based on a combination of the following:

1. Visual observations including staining, soil discoloration, and presence of free product
2. Olfactory observations
3. Organic vapors detected with an organic vapor analyzer (Porta-FID)

R-KCI uses a Porta-FID II flame ionization detector (FID) manufactured by Heath Consultants, Inc., or a HNU Model P1 101 manufactured by HNU Systems, Inc.

The Porta-FID II is designed to detect combustible hydrocarbons in parts per million (ppm) as methane. The instrument is calibrated using a 100 ppm standard of methane. The meter on the Porta-FID is set to zero on site, prior to use, in order to adjust readings for background levels.

The HNU is designed to detect a variety of gases in ppm. The analyzer employs the principle of photoionization. The HNU can be calibrated for each species to be measured or for a combination of species such as found in association with fuel contamination. R-KCI uses a 55 ppm standard mix supplied by HNU Systems, Inc.

### Sampling Procedures

Excavation sampling consists of obtaining samples of representative natural material from select portions of the excavation. The sampling is normally conducted following excavation of obviously contaminated soils. The upper 6 to 12 inches of soils are removed to expose fresh soil. A bulk sample of the soil is obtained normally using a backhoe or other heavy equipment on site. A subsample that has not been in contact with the sampling device is selected from the bulk sample.

### Sample Handling and Preservation

Samples selected for chemical analysis are immediately placed in appropriate containers, stored in a cooler with ice, and transported to R-KCI's analytical laboratory. Chain-of-custody forms are completed at the time of sample collection and transported with the samples.

### SOIL BORINGS

#### Purpose

The purposes of soil borings are to:

- Determine the soil stratigraphy
- Obtain subsurface soil samples for laboratory testing
- Determine the vertical and horizontal extent of fuel contamination in soils
- Enable installation of monitor wells

#### Auger Drilling Methods

Borings are drilled using dry, hollow-stem auger methods. R-KCI uses a Mobile B-53 drilling rig. The augers are 8-in. OD and 3-in. ID.

#### Sampling Procedures and Intervals

Samples are obtained with split-barrel, split-spoon, or Shelby-tube samplers. The sampler is fixed near the bottom of the lead auger and advanced with the auger over an interval of 2 ft. The sampler is then retrieved and the sample removed.

Initial borings are generally sampled continuously from the ground surface. If it is determined that the site's stratigraphy is continuous across the site, subsequent borings may be sampled semi-continuously or at intervals selected to evaluate specific horizons or zones of contamination. Sampler type and sampled intervals are indicated on the boring logs.

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### Logging Procedures

Samples and auger cuttings are logged by a geologist. Soils are logged for soil composition, structure, consistency, color, moisture content, occurrence of groundwater, and hydrocarbons. Samples are also screened for evidence of contamination using the FID or HNU. Soil descriptions and FID/HNU measurements are recorded on a field log form. This information is input into a computer boring log program for generation of a final boring log.

### Decontamination

To prevent cross contamination, the drilling rig and augers are steam cleaned prior to drilling each boring. Sampling devices are steam cleaned between each use.

### MONITOR WELL INSTALLATION

#### Purpose

If shallow groundwater occurs within the depth of the soil borings, the borings are generally converted to monitor wells. The purposes of monitor wells are to:

- Determine groundwater elevation
- Determine presence of free product on the groundwater
- Collect groundwater samples for laboratory analysis
- Perform tests to evaluate aquifer properties

#### Well Construction

Monitor wells are constructed of ID PVC casing and screen. Screen slot openings are pre-manufactured at a size of 0.01 in. at an interval of 0.25 in. Casing and screen are threaded and have flush joints.

Sections of casing are assembled at the site to allow for pre-installation inspection. The screened interval extends above the water table by a few feet to ensure product migration into the well during water table fluctuations. Monitor well construction information is presented on the corresponding boring log.

A sand pack of Espey silica sand or equivalent is installed in the annulus between the borehole and the well screen. The sand pack extends from the bottom of the borehole to about 1 ft above the top of the screen. Commercial granular or powdered bentonite is used to form a 1-ft thick seal above the sand pack. A cement-bentonite grout backfill is then placed from the top of the bentonite seal to about 1

ft below grade. The remaining space allows for placement of protective surface casing.

#### Surveying

Upon completion of the monitor wells, the relative elevation of the top of casing is determined for each well. The point surveyed on each well is marked by a "V" notch for further measurement reference.

### GROUNDWATER MONITORING AND SAMPLING

#### Water Level Measurements

Water levels are measured in three or more monitor wells to determine the direction of groundwater flow. Water levels are measured to within 0.01 ft. Measurements are made with an Olympus Well Probe (E-line), a Marine Moisture Control interface probe, or a tape and plopper. Water levels are measured as the depth from the top of the PVC casing. These depths are converted to elevations above sea level. The groundwater elevations are contoured to determine the direction of groundwater flow.

#### Well Purging

Just prior to sampling, monitor wells are purged of approximately three casing volumes. Groundwater is bailed from the well using a disposable bailer suspended from a new nylon rope or string. In wells where the rate of recovery is very slow, a minimum of one casing volume is removed.

#### Groundwater Sampling

Groundwater samples are generally taken from the monitor wells no sooner than 24 hours after well installation. Sampling of wells is performed with disposable bailers using new nylon rope or string. Water samples are immediately placed in amber bottles with Teflon lids. The bottles are completely filled so as not to leave a head space. Filled sample bottles are placed in a cooler with ice and transported to R-KCI's analytical laboratory within 24 hours of sample collection. Chain-of-custody forms are completed at the time of sample collection and transported with the samples.



### ANALYTICAL CHEMISTRY METHODS

The purposes of the laboratory analyses are to determine the levels of contamination in the various media being sampled.

#### CONTAMINANT CHARACTERIZATION

Benzene, Toluene, Ethylbenzene, and Xylenes;  
Methyl-Tertiary-Butyl Ether

Gasoline contamination is evaluated by analyzing for four indicator constituents: benzene, toluene, ethylbenzene, and xylenes (collectively referred to as BTEX and when appropriate, methyl-tertiary-butyl ether (MTBE)). Samples for BTEX and MTBE analysis are prepared following EPA Method 5030 (purge-and-trap method). BTEX and MTBE in both soil and water are analyzed following three methods. The methods are described in detail in US EPA Publication SW-846, Test Methods for Environmental Solid Waste, Physical/Chemical Methods, Volumes IA, IB, IC, and II. Samples are analyzed for BTEX and MTBE following one of these three methods:

- Gas Chromatography / Flame Ionization Detection (GC/FID), Method 8015;
- Gas Chromatography / Mass Spectroscopy (GC/MS), Method 8240.

The specific methods of analysis used for each study are described on the Report of Analysis. For all three methods, the normal detection limit for each constituent of BTEX and MTBE is 0.005 ppm for water and 0.625 ppm for soil. The results of analyses on soils are presented on the appropriate boring logs and in table form presented in appropriate reports.

#### Total Petroleum Hydrocarbons

Levels of petroleum hydrocarbon contamination are determined by measuring for total petroleum hydrocarbons (TPH). Soil samples for TPH analysis are prepared following EPA Method 3550 (sonication/Freon-extraction method). TPH in soil and water samples are analyzed following EPA 600/4-79-20, Method 418.1 (Freon-extraction method). The method is described in detail in US EPA Publication 600, Methods for Chemical Analysis of Water and Wastes. The normal detection limit for soil is 10 ppm and the detection limit for water is 1 ppm in method 418.1. The results of analyses on soils are presented on the appropriate boring logs and in table form presented in appropriate reports.

**ATTACHMENT III**  
**MONITORING WELL / BORING LOGS**

LOG OF BORING NO. MW-7  
LAREDO AIRPORT

**R**  
Raba-Kistner  
Consultants, Inc.

**DRILLING METHOD:** Hollow Stem Auger

**LOCATION:** See Plate 2

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FORMATION	Monitor Well	OVA (ppm)	LABORATORY ANALYSES (ppm)					% -200
							B	T	E	X	TPH	
			SURFACE ELEVATION: TOC ELEVATION: 485.24'									
5			SAND, Silty, Medium Dense, Tan, Slightly Moist, with roots - with ferrous stains and gypsum crystals along laminae - gravel from 0.5' to 1' - increasing clay, moist below 3' - wet from 6' to 8' - gray, hydrocarbon odor below 7.6' - increasing gypsum crystals with depth			ND						
						ND						
						ND						
						110	<0.4	<0.4	<0.4	<0.4	570	
						105						
10						120	<0.4	<0.4	<0.4	<0.4	210	
15			SAND, Fine, Medium Dense, Laminated, Tan, Wet, No Hydrocarbon Odor - saturated at 14' - with widely scattered gypsum partings at 16' and 16.5'									
20												
25			Boring terminated in this stratum									
30												
35												
40			GROUND-WATER ANALYTICAL RESULTS (8/19/92)				<0.005	<0.005	<0.005	<0.005	<1	
45												
50												

DEPTH DRILLED: 25.0'      DEPTH TO WATER: 9.80'      PROJ. No. ASB92-034-00  
DATE DRILLED: 8/17/92      DATE MEASURED: 8/19/92

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT.

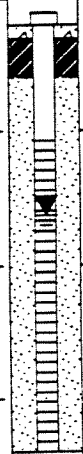
00064

**LOG OF BORING NO. MW-8  
LAREDO AIRPORT**

**R**  
**Raba-Kistner**  
Consultants, Inc.

**DRILLING METHOD:** Hollow Stem Auger

**LOCATION:** See Plate 2

METHOD: Hollow Stem Auger												
DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FORMATION	Monitor Well	LABORATORY ANALYSES (ppm)					% -200	
						OVA (ppm)	B	T	E	X		TPH
			SURFACE ELEVATION: TOC ELEVATION: 484.27'									
			SAND, Silty, Medium Dense, Slightly Moist, with roots			ND						
			- fine to coarse gravel to 1'			ND						
5			- with widely scattered clay from 2.5' to 4'			105						
			- moist, with scattered calcareous pockets from 5' to 8'			50						
10			- gray, hydrocarbon staining at 5.8'			135	<0.4	<0.4	<0.4	2.8	2,200	
			- with gypsum crystals below 8'			125	<0.4	<0.4	<0.4	2.4	1,200	
			- saturated at 11.8'									
15			SAND, Fine, Dense, Laminated, Tan, Wet, with gypsum crystals									
			- with gypsum partings from 15.8' to 15.9'									
			- hard at 16'									
20			SANDSTONE, Hard, Tan									
			Boring terminated in this stratum									
25												
30												
35												
40							<0.005	<0.005	<0.005	<0.005	<1	
			GROUND-WATER ANALYTICAL RESULTS (8/19/92)									
45												
50												

<b>DEPTH DRILLED:</b> 17.0'	<b>DEPTH TO WATER:</b> 8.16'	<b>PROJ. No.</b> ASB92-034-00
<b>DATE DRILLED:</b> 8/18/92	<b>DATE MEASURED:</b> 8/19/92	

00965

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT.

**LOG OF BORING NO. MW-9  
LAREDO AIRPORT**

**Raba-Kistner**  
Consultants, Inc.

**DRILLING METHOD:** Hollow Stem Auger

**LOCATION:** See Plate 2

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FORMATION	Monitor Well	OVA (ppm)	LABORATORY ANALYSES (ppm)					% -200
							B	T	E	X	TPH	
			SURFACE ELEVATION: TOC ELEVATION: 487.17'									
5			SAND, Silty, Medium Dense, Slightly Moist, Tan, with roots and fine gravel - clayey from 0.5' to 1.5' - with scattered calcareous pockets from 2' to 4'			ND						
						ND						
10			- with gypsum crystals below 8' - grayish-black, wet, hydrocarbon stains and odor at 8.2' - with gypsum seams at 11', 12.8', and 13.8'			30	<0.4	<0.4	<0.4	<0.4	<20	
						75	<0.4	<0.4	<0.4	<0.4	270	
						50						
15			SILT, Clayey, Stiff, Tan and Gray, Moist to Wet, Hydrocarbon Staining and Odor									
20			SAND, Silty, Fine, Medium Dense, Mottled Gray and Tan, Hydrocarbon Odor and Staining									
25			- with gypsum seams at 23.5' - with greenish stain at 24.8'									
30			Boring terminated in this stratum									
35			NOTE: Vapors observed emanating from inside augers									
40			GROUND-WATER ANALYTICAL RESULTS (8/19/92)				5.4	2.5	0.73	1.8	12	
45												
50												

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT.

DEPTH DRILLED: 27.5'	DEPTH TO WATER: 7.16'	PROJ. No. ASB92-034-00
DATE DRILLED: 8/18/92	DATE MEASURED: 8/19/92	00966

**LOG OF BORING NO. MW-10  
LAREDO AIRPORT**

**Raba-Kistner**  
Consultants, Inc.

**DRILLING METHOD:** Hollow Stem Auger

**LOCATION:** See Plate 2

DEPTH, FT	SYMBOL	SAMPLES	DESCRIPTION OF MATERIAL	FORMATION	Monitor Well	OVA (ppm)	LABORATORY ANALYSES (ppm)					% 200
							B	T	E	X	TPH	
			SURFACE ELEVATION: TOC ELEVATION: 487.34'									
5			SAND, Silty, Fine, Medium Dense, Slightly Moist, Tan, with roots and gravel - dark gray, hydrocarbon staining and odor below 1.5'			100						
						110						
						150						
			- no silt from 8' to 9.2'			160	<0.4	5.0	4.0	25	3,000	
			- with gypsum crystals below 8.5'			160						
10			- clayey below 9.2'			145						
			SAND, Fine, Dense, Tan and Gray, Moist, Hydrocarbon Stain and Odor - saturated at 14.2'			120						
15						160	<0.4	<0.4	2.5	2.9	960	
			- mottled tan and gray from 18' to 22'									
20												
25			Boring terminated in this stratum									
30												
35												
40			GROUND-WATER ANALYTICAL RESULTS (8/19/92)				3.4	0.78	0.24	0.26	4	
45												
50												

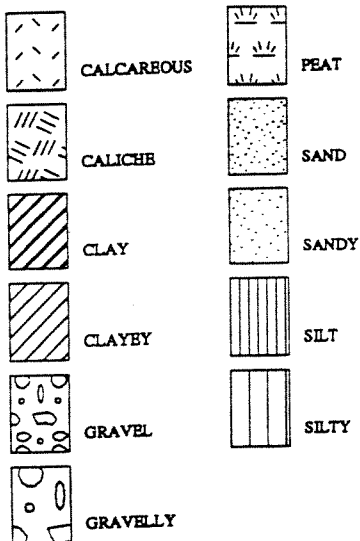
<b>DEPTH DRILLED:</b> 25.0'	<b>DEPTH TO WATER:</b> 8.25'	<b>PROJ. No.</b> ASB92-034-00
<b>DATE DRILLED:</b> 8/18/92	<b>DATE MEASURED:</b> 8/19/92	00967

NOTE: THESE LOGS SHOULD NOT BE USED SEPARATELY FROM THE PROJECT REPORT.

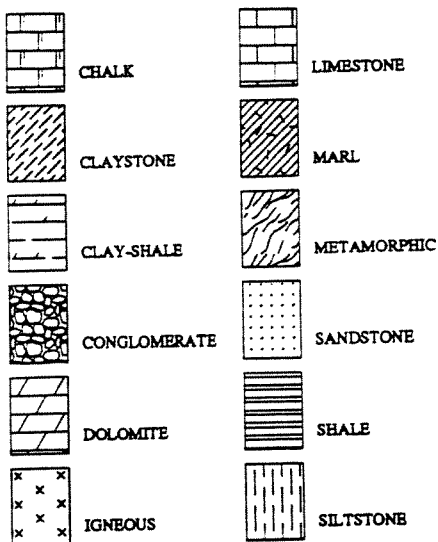
# KEY TO TERMS AND SYMBOLS

## MATERIAL TYPES

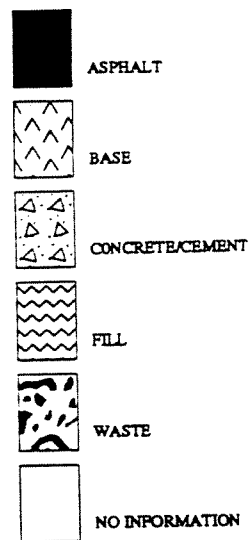
### SOIL TERMS



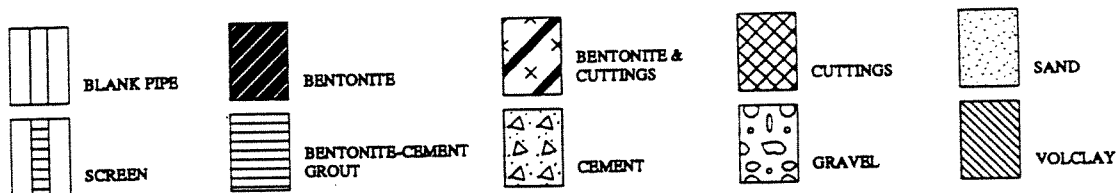
### ROCK TERMS



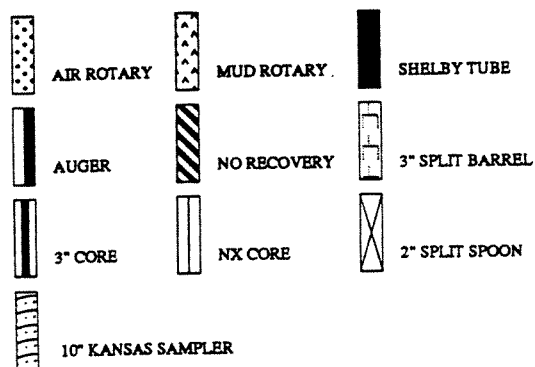
### OTHER



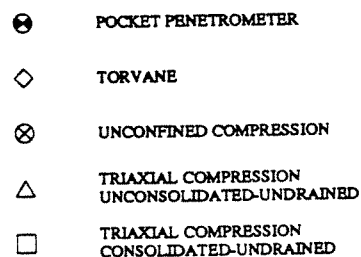
## WELL CONSTRUCTION AND PLUGGING MATERIALS



## SAMPLE TYPES



## STRENGTH TEST RESULTS



NOTE: VALUES SYMBOLIZED ON BORING LOGS REPRESENT SHEAR STRENGTHS UNLESS OTHERWISE NOTED

**ATTACHMENT IV**  
**REPORTS OF ANALYSES**

00969



Raba-Kistner Consultants, Inc.  
Interim Report

To: Laredo Airport  
c/o R-KCI

Attn: Eric Wolff

Project No.: ASB92-034-00

Assignment No.: 3263

Date Received: 8-12-92

Page 1 of 1 Date: 8-14-92

Sample Type/Sample Loc: Water/Airport  
Date Collected: 8-11-92

TEST	TEST METHODS: PREPARATION/DATE	ANALYSIS/DATE
BTEX	5030/8-12-92	8020/8-12-92
TPH		418.1/8-12-92
Fuel Fingerprint		Pending

TEST RESULTS:

Analyte	Detection Limit (mg/L)	3263-4 (MW-4) (mg/L)	3263-5 (MW-3) (mg/L)	3263-6 (MW-2) (mg/L)	3263-7 (MW-1) (mg/L)
Benzene	0.005	<0.005	0.38	0.33	12
Toluene	0.005	<0.005	0.31	0.26	1.5
Ethylbenzene	0.005	<0.005	0.20	0.16	0.38
Total Xylenes	0.005	<0.005	0.51	0.39	0.89
TPH	1	<1	6	53	44

Note: Final report upon analysis of fuel fingerprint.

By Earl S. Moore

00970



# Report of Analysis

Eng'rs, Geologists, Chemists, Water Planners,  
Hygienists and Environmental Scientists

**R**  
**Raba-Kistner**  
Consultants, Inc.

P.O. Box 690287, San Antonio, TX 78269-0287  
12821 W. Golden Lane, San Antonio, TX 78249  
(512) 699-9090

To: City of Laredo  
c/o R-KCI

Attn: Kevin Wooster

Project No.: ASB92-034-00

Assignment No.: 3290

Contract/P.O. No.:

Date Received: 8-19-92

Page 1 of 2 Date: 8-25-92

Sample Type/Sample Loc: Soil/Airport  
Date Collected: 8-17,18-92  
Date Completed: 8-21-92  
Collected By: R-KCI

## TEST METHODS:

TEST	PREPARATION/DATE	ANALYSIS/DATE
BTEX/MTBE	5030/8-20-92	8020/8-20-92
TPH	3550/8-20-92	418.1/8-20-92

All soil and sludge results are reported on the dry-weight basis.  
Methods are from EPA SW 846 and EPA 600/4-79-20 or as listed.

By Earl S. Moore  
Earl S. Moore  
Organic Section Manager

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By Thomas P. Fox  
Thomas P. Fox  
Vice-President, Chemistry

00972

Test Results:

Analyte	Detection Limit (mg/kg)	3290-1 (MW-7, 6-8') (mg/kg)	3290-2 (MW-7, 10-12') (mg/kg)	3290-3 (MW-8, 8-10') (mg/kg)	3290-4 (MW-8, 10-12') (mg/kg)
Benzene	0.4	<0.4	<0.4	<0.4	<0.4
Toluene	0.4	<0.4	<0.4	<0.4	<0.4
Ethylbenzene	0.4	<0.4	<0.4	<0.4	<0.4
Total Xylenes	0.4	<0.4	<0.4	2.8	2.4
MTBE	0.4	<0.4	<0.4	<0.4	<0.4
TPH	20	570	210	2,200	1,200
% Moisture		22.53	16.40	29.63	21.56

Analyte	Detection Limit (mg/kg)	3290-5 (MW-9, 8-10') (mg/kg)	3290-6 (MW-9, 10-12') (mg/kg)	3290-7 (MW-10, 6-8') (mg/kg)	3290-8 (MW-10, 14-16') (mg/kg)
Benzene	0.4	<0.4	<0.4	<0.4	<0.4
Toluene	0.4	<0.4	<0.4	5.0	<0.4
Ethylbenzene	0.4	<0.4	<0.4	4.0	2.5
Total Xylenes	0.4	<0.4	<0.4	25	2.9
MTBE	0.4	<0.4	<0.4	<0.4	<0.4
TPH	20	<20	270	3,000	960
% Moisture		20.15	19.33	17.58	15.93

RA

**JUSTNER CONSULTANTS, INC. - CHEMISTRY LAB**

12821 W. Golden Lane • San Antonio, Texas 78249  
Fax (512) 699-6426  
Phone (512) 699-9090  
Sample Custodian - Ext. 168 Report Results - Ext. 170

Sample Custodian - Ext. 168

### Chain of Custody Record and Analysis Request

3290

**NOTE:** Project Approval and Project Setup must be complete prior to Initiation of analysis

[illegible]

# Report of Analysis

Engineers, Geologists, Chemists, Water Planners,  
Hygienists and Environmental Scientists

**R**  
**Raba-Kistner**  
Consultants, Inc.

P.O. Box 690287, San Antonio, TX 78269-0287  
12821 W. Golden Lane, San Antonio, TX 78249  
(512) 699-9090

To: Laredo Airport  
c/o R-KCI

Attn: Eric Wolff

Project No.: ASB92-034-00  
Assignment No.: 3295  
Contract/P.O. No.:  
Date Received: 8-20-92  
Page 1 of 2 Date: 8-27-92  
Interim Report

Sample Type/Sample Loc: Water  
Date Collected: 8-19-92  
Date Completed: 8-24-92  
Collected By: R-KCI

## TEST METHODS:

TEST	PREPARATION/DATE	ANALYSIS/DATE
BTEX/MTBE	5030/8-20-92	8020/8-20-92
BTEX/MTBE		Pending
TPH		418.1/8-20-92
Fuel Fingerprint		Pending

By

*Earl S. Moore*

Earl S. Moore  
Organic Section Manager

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By

*Thomas P. Fox*

Thomas P. Fox  
Vice-President, Chemistry

00975

Test Results:

nalyte	Detection Limit (mg/L)	3295-1 (MW-7) (mg/L)	3295-2 (MW-8) (mg/L)	3295-3 (MW-9) (mg/L)	3295-4 (MW-10) (mg/L)
Benzene	0.005	<0.005	<0.005	5.4	3.4
Toluene	0.005	<0.005	<0.005	2.5	0.78
Ethylbenzene	0.005	<0.005	<0.005	0.73	0.24
Total Xylenes	0.005	<0.005	<0.005	1.8	0.26
MTBE	0.005	<0.005	<0.005	**	**
TPH	1	<1	<1	12	4

\*\* Pending GC/MS confirmation.

[illegible]