Ultramar

Ultramar Inc.
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ENVIRONMENTAL PROJECT QUARTERLY STATUS REPORT

DATE REPORT SUBMITTED: July 15, 1994
QUARTER ENDING: June 30, 1994

FORMER SERVICE STATION NO.: 574
ADDRESS: 22315 Redwood Road, Castro Valley, CA
COUNTY: Alameda
ULTRAMAR CONTACT: Kenneth R. Earnest **TEL. NO:** 209-583-5571

BACKGROUND:

On May 5, 1987, five underground storage tanks (two gasoline, two diesel and one waste oil) were excavated and removed from the site. Soil samples were collected from beneath the tanks and analyzed for hydrocarbon constituents. Based on preliminary analytical data related to the collected soil samples, it was determined that elevated levels of gasoline and diesel were present in the soil beneath the former fuel tanks. Soil was overexcavated from beneath the former fuel tanks. Soil samples were collected after the over-excavation and confirmed that the addition excavation was successful.

During March 1991, three ground-water monitoring wells were installed on-site. Laboratory analysis of soil samples obtained from the borings for the installation of the monitoring wells indicated that the soil near the soil/water interface exhibited gasoline range hydrocarbons.

Quarterly monitoring was initiated during the fourth quarter 1991.

Installed five new groundwater monitoring wells in May of 1993. With the installation of these new wells the site is fully defined.

Conducted a soil gas survey/performance test, aquifer pump test and air sparging test during first quarter 1994.

SUMMARY OF THIS QUARTER'S ACTIVITIES:

Performed second quarter monitoring on June 2, 1994.

RESULT OF QUARTERLY MONITORING:

Results indicate that since the previous sampling event benzene concentrations in MW-1, MW-2 and MW-3 have increased. BTEX and TPH-gasoline concentrations in MW-4, MW-5, MW-6, MW-7 and MW-8 have remained not detected since installation, except TPH-gasoline concentrations in MW-6.

PROPOSED ACTIVITY OR WORK FOR NEXT QUARTER:

ACTIVITY	ESTIMATED COMPLETION DATE
Third quarter monitoring	August 1994
Prepare PAR/RAP	October 1994

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May 26, 1994

Mr. Scott O. Seery, CHMM
Senior Hazardous Materials Specialist
Alameda County Health Care Services
80 Swan Way, Room 200
Oakland, CA 94621

SUBJECT: FORMER BEACON STATION NO. 574, 22315 REDWOOD ROAD, CASTRO VALLEY, CALIFORNIA

Dear Mr. Seery:

Enclosed is a copy of the Hydrogeologic Testing Results for the above-referenced Ultramar facility prepared by Acton, Mickelson Van Dam, Inc. Please do not hesitate to call if you have any questions about this project at (209) 583-5571.

Sincerely,

ULTRAMAR INC.

Kenneth R. Earnest
Environmental Specialist II
Marketing Environmental Department

Enclosure: Hydrogeologic Testing Results

cc w/encl: Mr. Rich Hiett, San Francisco Bay Region, RWQCB

ACTON •
MICKELSON •
van DAM, INC.

Consulting Scientists, Engineers, and Geologists

March 11, 1994

Mr. Kenneth Earnest
Ultramar Inc.
525 West Third Street
Hanford, California 93230

19021.02

Subject: Hydrogeologic Testing Results--Former Beacon Station #574
22315 Redwood Road, Castro Valley, California

Dear Mr. Earnest:

Acton • Mickelson • van Dam, Inc. (AMV), has been authorized to continue an ongoing investigation of aquifer characteristics at former Beacon Station No. 574 located at 22315 Redwood Road, Castro Valley, Alameda County, California (Figure 1). This letter summarizes the results of a 24-hour ground water pumping test, a 4-hour soil vapor extraction pilot test, and an 8-hour air sparging pilot test performed at the referenced site by AMV on January 31 through February 2, 1994.

Scope of Work

The work included a 24-hour ground water pumping test performed using monitoring well MW-1 on January 31 and February 1, 1994 (Figure 2). Ground water samples were collected from monitoring well MW-1 at the end of the test and submitted to a California-certified laboratory for analysis of total petroleum hydrocarbons as gasoline (TPHg), total petroleum hydrocarbons as diesel (TPHd), and the gasoline constituents benzene, toluene, ethylbenzene, and xylenes (BTEX).

An 8-hour air sparge feasibility test was performed at the site on February 2, 1994. The test was performed using a temporary sparge point installed approximately 12 feet upgradient of monitoring MW-1. Also on February 2, 1994, a 4-hour vapor extraction feasibility test was performed at the site using monitoring well MW-1 as the vapor extraction point.

Aquifer Pumping Test

Depth to ground water measurements have historically indicated an inferred ground water gradient of approximately 0.01 ft/ft toward the south-southwest. Ground water measurements

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made by AMV on January 31, 1994, indicated a direction of ground water flow toward the south-southwest at a gradient of 0.012 ft/ft. A static (non-pumping) ground water table contour map from data collected on January 31, 1994, is illustrated on Figure 3.

On January 31 through February 1, 1994, AMV conducted an aquifer pumping test at the site to evaluate aquifer characteristics of the shallow water-bearing strata beneath the site. The test was performed using monitoring well MW-1 as the pumping well for approximately 24 hours. A constant pumping rate of approximately 0.25 gallon per minute (gpm) was maintained for the duration of the test. Ground water monitoring well MW-2 was used as the observation well during the test. Monitoring well MW-2 is located approximately 55 feet from the pumping well. Pressure transducers were installed in both the pumping and observation wells, and an automated data logger was used to continuously record water level data in the pumping well and in monitoring well MW-2. At the end of the test, a drawdown of approximately 4.2 feet was measured in the pumping well, and approximately 0.11 foot of drawdown was measured in monitoring well MW-2. Raw data collected during the pumping test and analytical calculations are contained in Enclosure A.

Approximately 360 gallons of ground water was produced during the 24-hour pumping test. The ground water was routed from the pumping well through a flowmeter to a temporary aboveground storage tank. The water was then removed from the site on February 3, 1994, by Kern Vacuum Service of Coalinga, California, and transported to their facility for remediation.

Aquifer Test Analysis

Analysis of aquifer characteristics was facilitated by use of the computer program AQTESOLV®. The estimated average value of hydraulic conductivity (K) calculated from the test was 0.005 foot/minute (ft/min). This value is at the approximate midpoint of the anticipated range of K values expected for the types of sediment encountered in soil borings in the shallow subsurface beneath the site.

The capture zone of monitoring well MW-1 pumping at a rate of 0.25 gpm was simulated using the value for K of 0.005 ft/min, a gradient of 0.012 ft/ft, an assumed aquifer porosity of 25 percent, and an assumed aquifer thickness of 8.6 feet. At a pumping rate of 0.25 gpm, the simulated capture zone extended approximately 9 feet downgradient of the pumping well and reached a maximum upgradient width of approximately 75 feet wide. However, field measurements made during the pumping test indicate approximately 0.11 foot of drawdown was measured in observation well MW-2. Examination of the water level curve in monitoring well MW-2 recorded during the pumping test indicates that the change in water level of 0.11 foot is

representative of true drawdown in that well. Observation well MW-2 is located approximately 55 feet northwest and crossgradient of monitoring well MW-1. This indicates that the actual capture zone to be expected under pumping conditions would be approximately 110 feet wide (minimum) and would extend 17 feet downgradient of the pumping well.

isotropic ?

Soil Vapor Extraction Test

Using monitoring well MW-1 as the test well (Figure 2), a 1.5-horsepower vacuum blower (EG&G Rotron Model DR454W58) powered by a portable 6.5-kilowatt generator applied a continuous vacuum of about 37 inches of water column at the well head. A 4-inch submersible pump in monitoring well MW-1 maintained a water table drawdown during the pilot test. However, the pump was shut off for the last hour of the vapor extraction test to monitor test parameters as the water level recovered in MW-1. A rotameter in the exhaust line of the blower indicated a flow rate of approximately 43.6 standard cubic feet per minute (scfm), after correcting for temperature. In accordance with the requirements of the Bay Area Air Quality Management District (Bay Area AQMD), vapor emissions from the pilot test were routed through vapor-phase activated carbon prior to discharge to the atmosphere.

Throughout the vapor extraction test, AMV monitored vacuum influence at monitoring well MW-2, about 55 feet from monitoring well MW-1. A vacuum influence of about 0.35 inch of water column was observed at monitoring well MW-2 throughout the test, indicating a zone of vacuum influence around monitoring well MW-1 with a radius of at least 55 feet.

To monitor concentrations of total volatile hydrocarbons (TVH) in the extracted vapors during the pilot test, AMV used Draeger tubes and a flame ionization detector (FID). The FID indicated TVH concentrations were greater than 10,000 parts per million (ppm) as methane throughout the test. Draeger tube readings indicated concentrations greater than 2,500 ppm as octane throughout the test. A table of field readings recorded during the test is contained in Enclosure B.

To confirm field readings and to help estimate mass extraction rates of total petroleum hydrocarbons as gasoline (TPHg), two bag samples were taken of the blower effluent, one at the beginning and one at the end of the test. The samples were analyzed for TPHg and benzene, toluene, ethylbenzene, and xylenes (BTEX). The analytical results (see Enclosure C) for these samples were 7,800 ppm TPHg and 66 ppm benzene at the start, and 4,500 ppm TPHg and 42 ppm benzene at the end of the test.

From the analytical results, the estimated extraction rate for TPHg at the end of the 4-hour test was 67.7 pounds per day (lbs/day). The estimated extraction for benzene at the end of the test was 0.57 lbs/day. Enclosure D contains flow and extraction rate calculations.

Ground water produced during the 4-hour soil vapor extraction test was routed from the pumping well through a 55-gallon drum of liquid-phase granular activated carbon (GAC) enroute to the aboveground storage tank. Ground water samples were collected from the influent and effluent streams of the GAC and submitted to a California-certified laboratory for analysis of TPHg, total petroleum hydrocarbons as diesel (TPHd), and BTEX (influent and effluent). The effluent stream samples were also analyzed for total recoverable petroleum hydrocarbons (TRPH), total oil and grease, general metals analysis, cyanide, pH, total recoverable phenols, and biological oxygen demand (BOD). The results of these analyses are presented in Enclosure E.

Air Sparging Test

Using a temporary machine-driven sparging point (SP on Figure 2) for introducing air into the saturated zone, a 2-horsepower compressor (Speedaire Model 5Z599) powered by a 6.5-kilowatt generator provided a continuous flow of air for 8 hours. Flow was measured by the use of an in-line rotameter placed at the outlet of the compressor. The airflow rate, corrected for temperature and pressure, ranged from 7.0 to 7.7 scfm. A data table is presented in Enclosure F. Sample air sparging flow rate calculations are presented in Enclosure G.

During the test, dissolved oxygen was monitored in monitoring well MW-1. Also, the vapor space inside the casing of MW-1 was monitored for TVH as octane and carbon dioxide (CO_2) using Draeger tubes.

Dissolved oxygen values for water samples from monitoring well MW-1 ranged from 2.1 milligrams per liter (mg/l) before beginning the sparging test to 6.7 mg/l at the conclusion of the test, as determined by field readings using a dissolved oxygen meter. Draeger tube readings of the monitoring well MW-1 vapor space were all greater than 2,500 ppm as octane for the entire test. CO_2 concentrations measured in the monitoring well MW-1 vapor space ranged from greater than 20 percent at the beginning to 3.0 percent at the conclusion of the test.

AMV collected water samples from monitoring well MW-1 at the beginning, the midpoint, and at the conclusion of the sparging test for laboratory analysis (see Enclosure H) of TPHg, BTEX, and dissolved oxygen. TPHg concentrations ranged from 36 to 17 ppm and benzene concentrations ranged from 0.23 to 1.6 ppm. Dissolved oxygen concentrations were consistent with field monitoring and ranged from 2.6 mg/l before the test to 6.5 mg/l at the conclusion of the test.

Dissolved oxygen measurements taken at the conclusion of the sparging test indicate that the approximate 7.4-cubic-foot sparge cap from the sparging point resulted in oxygen enrichment at monitoring well MW-1, which is about 15 feet from the location of the sparging point.

Results

Data collected during the 24-hour aquifer pumping test indicated that a theoretical capture zone with an approximate calculated upgradient width of 75 feet and a downgradient extent of 9 feet was accomplished while pumping at approximately 0.25 gpm from monitoring well MW-1. Field observations (0.11 foot of drawdown observed in monitoring well MW-2) indicated that the capture zone width extended at least 110 feet crossgradient and approximately 17 feet downgradient of the pumping well.

Results of the 4-hour vapor extraction test indicated that a zone of vacuum influence with a radius of at least 70 feet was observed while the vacuum was applied to MW-1. The maximum flow rate accomplished during the test was 46.3 scfm. AMV estimated that, using these parameters, approximately 67.7 lbs/day TPHg and 0.57 lbs/day benzene can be removed from soil using vapor extraction techniques.

Information collected during the 8-hour air sparging pilot test indicated that an approximate radius of influence of 15 feet was achieved around the temporary sparge point at an approximate sparge rate of 7.4 scfm. Dissolved oxygen concentrations in water were observed to increase throughout the test from 2.6 percent prior to the test to 6.5 percent at the end of the test.

If you have any questions regarding the results of these tests, please call either of the undersigned at your convenience.

Sincerely,

ACTON • MICKELSON • van DAM, INC.

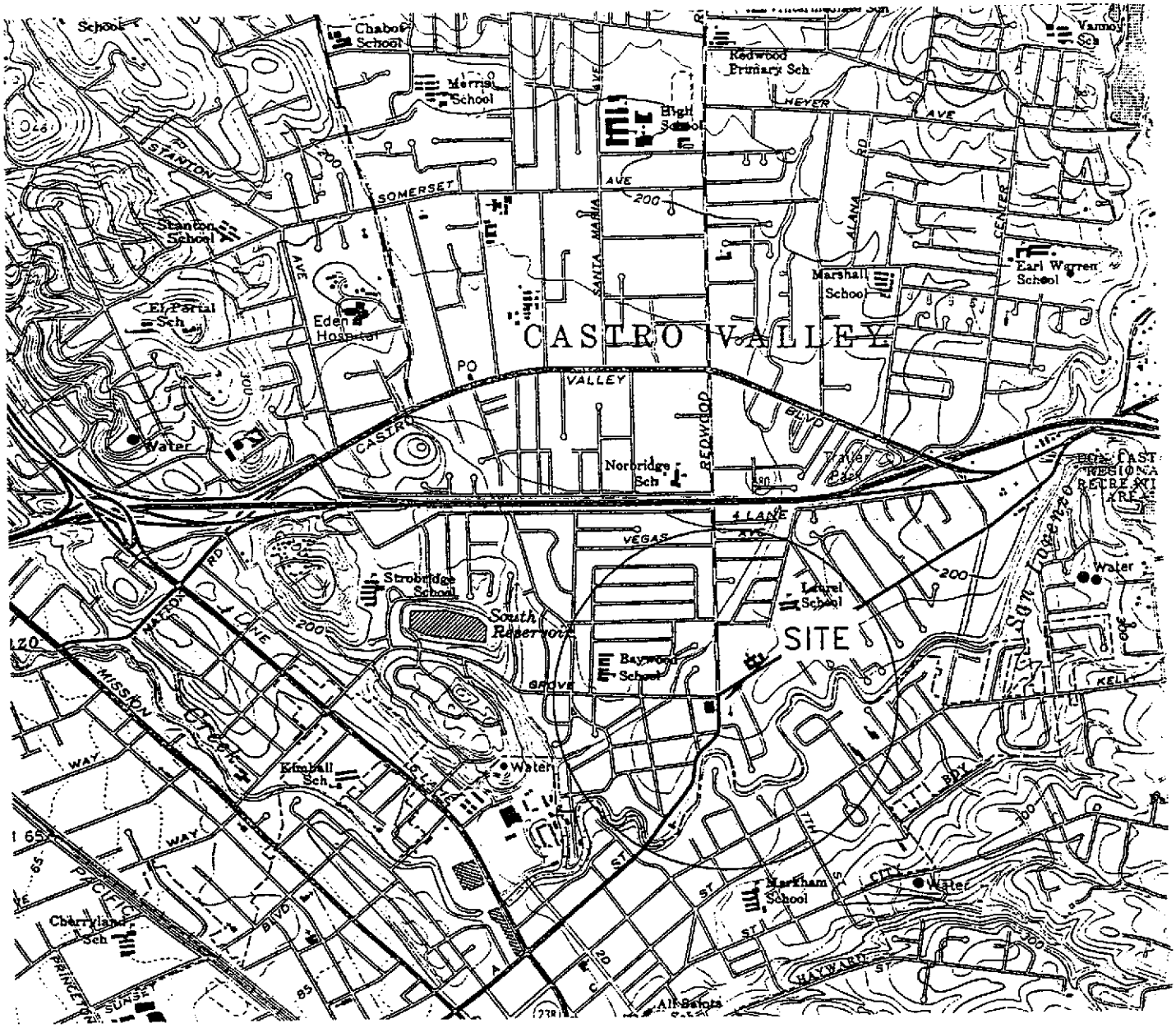
Ellen Frasch
for William G. Rocha, Jr.
Staff Engineer

Steven A. Liaty
Staff Geologist

Dale A. van Dam

Dale A. van Dam, R.G.
California Registered Geologist #4632

WGR:SAL:DAvD:mjd
Enclosures



General Notes

Base Map from U.S.G.S.
Hayward, California
7.5 Minute Topographic
Photorevised 1980

NORTH

0 2,000

Approximate Scale
(in feet)

FIGURE 1

SITE LOCATION MAP
FORMER BEACON STATION #574
22315 REDWOOD ROAD
CASTRO VALLEY, CALIFORNIA

Project No.	Drawn
19021.02	DA
File No.	Prepared
FIG1	SAL
Revision	Reviewed

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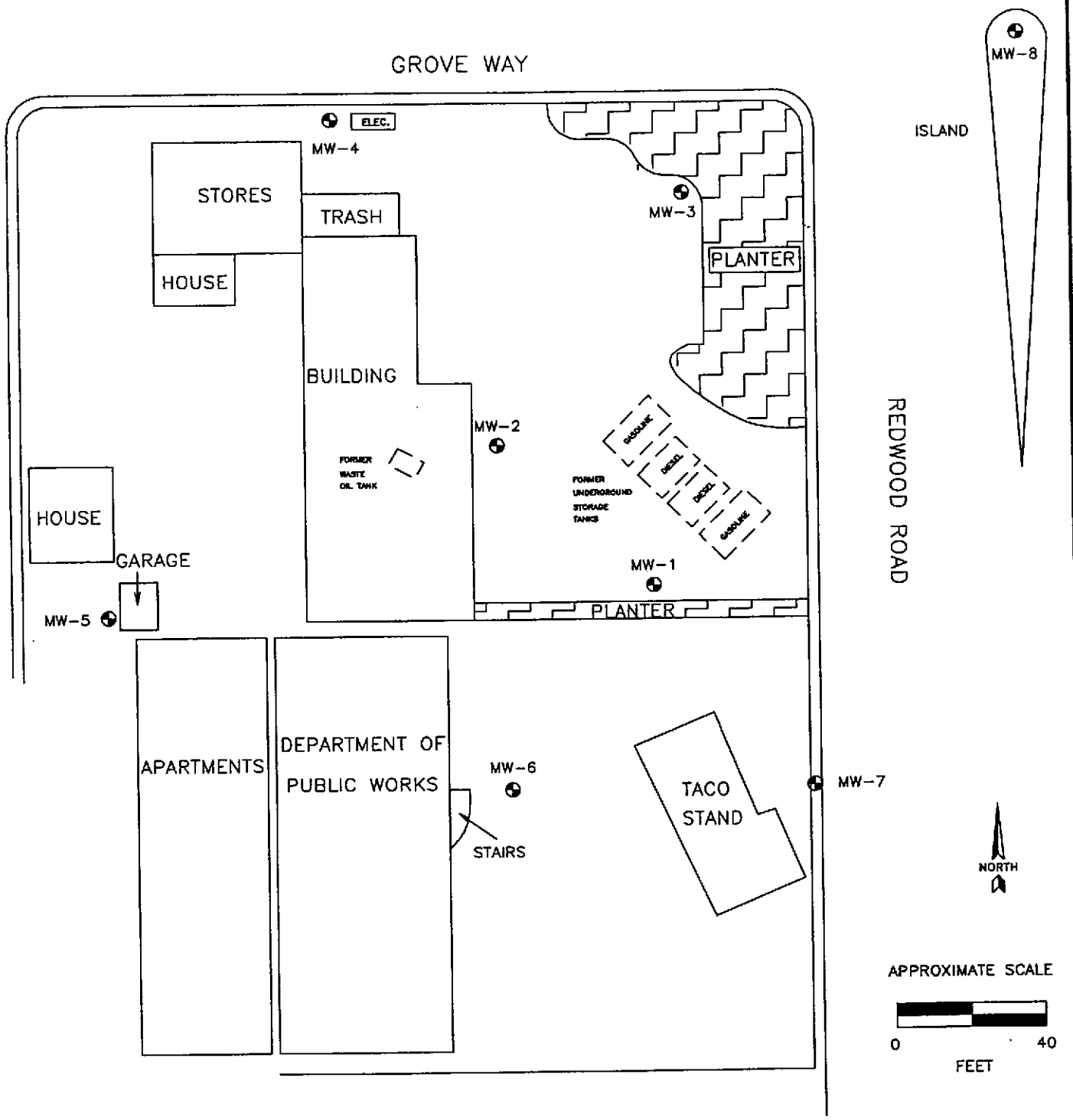

LEGEND

MW-6 — GROUND WATER MONITORING WELL AND NUMBER

GASOLINE — FORMER UNDERGROUND STORAGE TANK LOCATION

FIGURE 2
SITE MAP
FORMER BEACON STATION #574
22315 REDWOOD ROAD
CASTRO VALLEY, CA

Project No. 19021.02	Drawn SAL
File No. UL021SM	Prepared HEH
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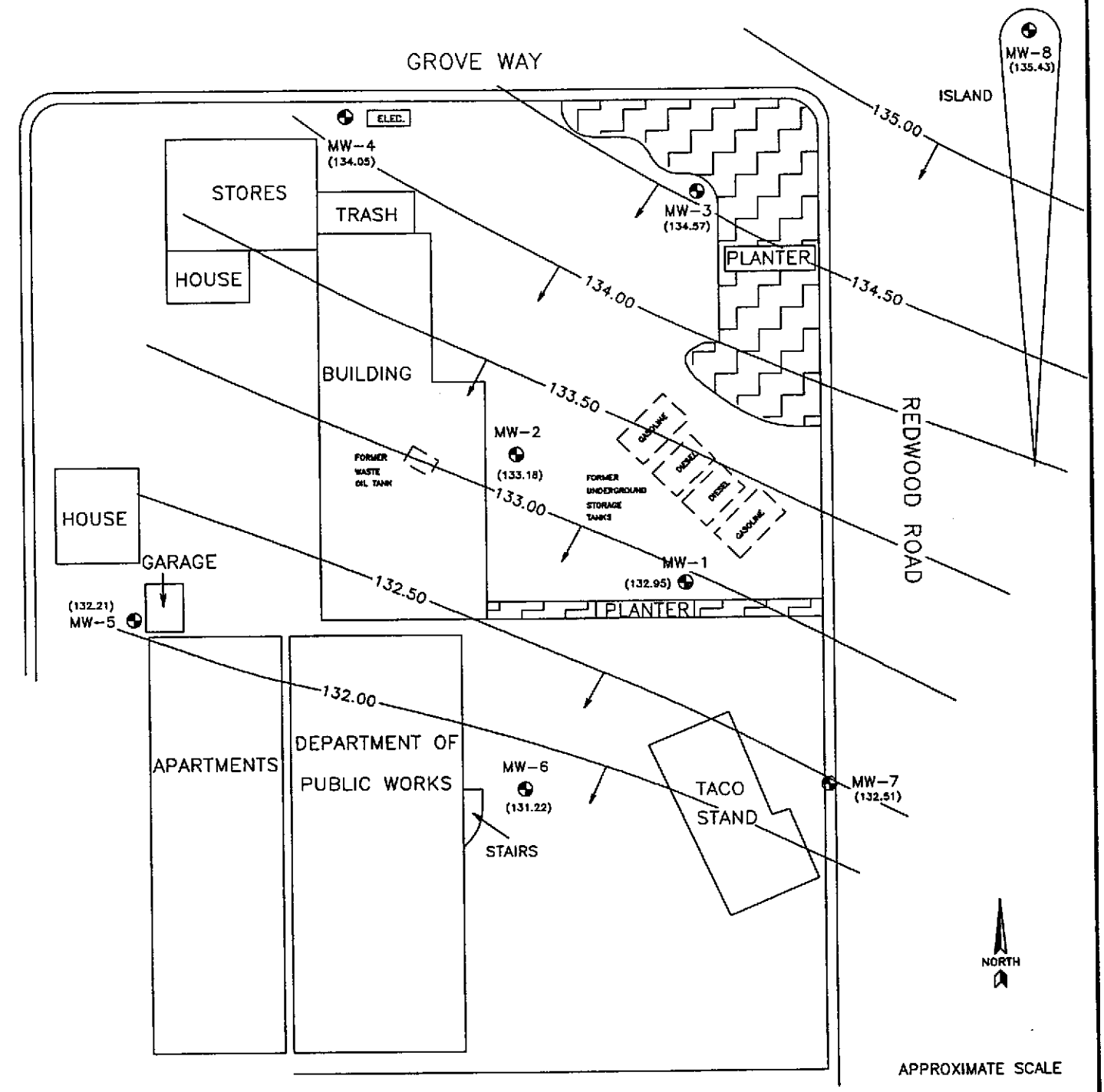

LEGEND

MW-6 — GROUND WATER MONITORING WELL AND NUMBER

GASOLINE — FORMER UNDERGROUND STORAGE TANK LOCATION

135.00 — GROUND WATER CONTOUR SHOWING GROUND WATER ELEVATION IN FT. AND INFERRED FLOW DIRECTION

(135.43) — GROUND WATER ELEVATION IN FEET

FIGURE 3
GROUND WATER CONTOUR MAP 01-31-94
FORMER BEACON STATION #574
22315 REDWOOD ROAD
CASTRO VALLEY, CA

Project No. 19021.02	Drawn DA
File No. UL021GW2	Prepared SAL
Revision	Reviewed

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ENCLOSURE A

RAW DATA AND CALCULATIONS FROM AQUIFER PUMPING TEST

Title: Castro Valley, Beacon #574
Job No: 19021.02
Station: #574
Aquifer Test Performed: Jan 31 - Feb 1, 1994
Analysis By: Steven A. Liaty

AQUIFER TEST PARAMETERS: MW-1 (Pumping Well)

- Pumping Rate = 0.25 gpm (0.03 ft³/min)
  Duration = 24 hours
- Distance to Observation Well (ft) = 0.5 feet
- Saturated Thickness = 5.7 (1.5) = 8.6 feet
  *water level on 1/31 = 23.60 (feet below top of casing)
  *depth to bottom of screen = 29.30 (feet below top of casing)
- Depth to top of pumping well screen = Ø
- Depth to bottom of pumping well screen = 5.7
- Hydraulic Conductivity Ratio = 0.1 (K_z/K_r)

AQUIFER TEST PARAMETERS: MW-2 (Observation Well)

- Distance from Pumping Well (ft) = 55 feet
- Pumping Rate (from above) = 0.03 ft³/min
- Saturated Thickness = 7.7 (1.5) = 11.49 feet
  *water level on 1/31 = 21.99 (feet below top of casing)
  *depth to bottom of screen = 29.65 (feet below top of casing)
- Depth to top of pumping well screen = Ø
- Depth to bottom of pumping well screen = 5.7
- Depth to top of observation well screen = Ø
- Depth to bottom of pumping well screen = 7.7

Ground water gradient on 1/31 was caluculated to be 0.01 ft/ft
toward the south-southwest

CASING STORAGE EFFECT CALCULATION

$$t_c = \frac{0.6\,(d_c^2 - d_p^2)}{Q/s}$$

t_c = time of test affected by casing storage (minutes)

d_c = inside diameter of casing (inches)

d_p = outside diameter of column (discharge) pipe (inches)

Q/s = specific capacity of flow rate divided by drawdown

for MW-1

d_c = 4.0 inches

d_p = 0.75 inches

Q = 0.25 gpm

s = drawdown at t_c (guessed and iterated)

1.) $t_c = \frac{0.6\,[(4.0)^2 - (0.75)^2}{0.25/1} = \frac{9.26}{0.25} = 37.04$ min

@ 37 min, $s \cong 4.25'$

2.) $t_c = 37.04 / (0.25/4.25) = 37.04/0.06 = \underline{617}$ minutes

* Field observations recorded during the initial stages of the aquifer test indicate that casing storage effect, in this case, are negligible.

ESTIMATED TRANSMISSIVITY VALUES

Theis:

for MU-1 :

$T = 0.036 \ ft^2/min$

$S = 1.9 \times 10^{-16}$

for MW-2 :

$T = 0.036 \ ft^2/min$

$S = 9.9 \times 10^{-4}$

Cooper Jacob:

for MW-1 :

$T = 0.054 \ ft^2/min$

$S = 2.7 \times 10^{-21}$

for MW-2 :

$T = 0.050 \ ft^2/min$

$S = 7.6 \times 10^{-4}$

1.) TRANSMISSIVITY:

	MW-1 (pumping)	MW-2 (observation)
Theis:	$T = 0.036\ ft^2/min$	$T = 0.036\ ft^2/min$
Cooper Jacob:	$T = 0.054\ ft^2/min$	$T = 0.050\ ft^2/min$

$T_{ave} = 0.044\ ft^2/min$

2.) CALCULATION OF HYDRAULIC CONDUCTIVITY:

$T = Kb$ or $K = T/b$ where b = aquifer thickness in feet = aquifer thickness (saturated)

for MW-1 :

$T = 0.044\ ft^2/min$
$b = 8.6\ ft$

$K = 0.044/8.6 = 0.005\ ft/min$

for MW-2 :

$T = 0.044$
$b = 11.5$

$K = 0.044/11.5 = 0.004\ ft/min$

$K_{ave} = (0.005 + 0.004)/2 = \underline{0.005\ ft/min}$

Capture Zone Calculations

$$V_{pumping} = Q \div (2\pi r h \phi_e)$$

Q = pumping rate (ft^3/day)

r = radius from recovery well (ft)

h = aquifer thickness (ft)

- assumed to be 1.5 x saturated screened interval for heterogeneous aquifers

ϕ_e = effective porosity

$$V_{natural} = KI/\phi_e$$

K = hydraulic conductivity (feet/day)

I = hydraulic gradient (feet/foot - dimensionless)

ϕ_e = effective porosity (dimensionless

At stagnation point (flow divide) $V_{pumping} = V_{natural}$

$$\frac{Q}{2\pi r h \phi_e} = \frac{KI}{\phi_e} \quad \text{so,} \quad (KI) 2\pi r h \cancel{\phi_e} = Q \cancel{\phi_e}$$

$$Q = (KI) 2\pi r h \quad \text{where } K = Tb \text{ and } b = h$$

rearranging:

$$r = Q / 2\pi T I$$

$Q = 0.25$ gpm $= 0.03$ ft³/min. (1440 min/day) $= 43.2$ ft³/day

$T \simeq 0.044$ ft²/min (1440 min/day) $= 63.4$ ft²/day

$I \simeq 2.36$ ft / 192 ft $= 0.012$ ft/ft (per contour map 01-31-94)

$$r = 43.2 \text{ ft}^3/\text{day} \,/\, 2\pi (63.4 \text{ ft}^2/\text{day})(0.012) = \frac{43.2 \text{ ft}^3/\text{day}}{4.78 \text{ ft}^2/\text{day}}$$

$$r = 9 \text{ ft}$$

- stagnation point occurs approximately 9 feet downgradient of the recovery well.
- Capture zone width = $2\pi r$; where r = distance from recovery well to stagnation point.

$2\pi (9 \text{ ft}) \simeq 60$ feet (30 feet on either side of the well.)

Cautions:

→ T value based on short-term data for recovery well. Actual value may be higher or lower. T is inversely proportional to the area of capture.

→ h incorporates a factor ranging from 1.5 x the saturated screen interval to the actual aquifer thickness. The factor of 1.5 was chosen to represent a stratified, non homogeneous aquifer. Choosing a higher number for the value of h would reduce the area of capture.

→ While using this method, K was assumed to be equal to T/b where b was the saturated screened interval not the true aquifer thickness; true aquifer thickness >> b. If true aquifer thickness were substituted, the capture zone area would be increased.

Note: Approximately 0.11 foot of drawdown was observed in MW-2, about 55 feet crossgradient to the recovery well.

SE1000C
Environmental Logger
02/15 14:57

Unit# 01919 Test 1

Setups:	INPUT 1	INPUT 2
Type	Level (F)	Level (F)
Mode	TOC	TOC
I.D.	00000	00000
Reference	0.000	-0.022
Linearity	0.120	0.040
Scale factor	19.950	10.040
Offset	0.030	0.050
Delay mSEC	50.000	50.000

Step 0 01/31 15:58:12

Elapsed Time	INPUT 1	INPUT 2
0.0000	0.119	-0.022
0.0033	0.113	-0.022
0.0066	0.113	-0.022
0.0100	0.113	-0.022
0.0133	0.113	-0.022
0.0166	0.113	-0.022
0.0200	0.113	-0.022
0.0233	0.113	-0.022
0.0266	0.113	-0.022
0.0300	0.113	-0.022
0.0333	0.113	-0.022
0.0366	0.113	-0.022
0.0400	0.113	-0.022
0.0433	0.113	-0.022
0.0466	0.113	-0.022
0.0500	0.113	-0.022
0.0533	0.113	-0.022
0.0566	0.113	-0.022
0.0600	0.113	-0.022
0.0633	0.113	-0.022
0.0666	0.113	-0.022
0.0700	0.113	-0.022
0.0733	0.113	-0.022
0.0766	0.113	-0.022
0.0800	0.113	-0.022
0.0833	0.113	-0.022
0.0866	0.201	-0.022
0.0900	0.340	-0.022
0.0933	0.088	-0.022
0.0966	0.314	-0.022
0.1000	0.232	-0.022
0.1033	0.352	-0.022
0.1066	0.346	-0.022
0.1100	0.409	-0.022
0.1133	0.428	-0.022

0.1200	0.497	-0.022
0.1233	0.528	-0.022
0.1266	0.560	-0.022
0.1300	0.585	-0.022
0.1333	0.617	-0.022
0.1366	0.635	-0.022
0.1400	0.661	-0.022
0.1433	0.686	-0.022
0.1466	0.705	-0.022
0.1500	0.730	-0.022
0.1533	0.749	-0.022
0.1566	0.774	-0.022
0.1600	0.799	-0.022
0.1633	0.805	-0.022
0.1666	0.843	-0.022
0.1700	0.850	-0.022
0.1733	0.875	-0.022
0.1766	0.894	-0.022
0.1800	0.919	-0.022
0.1833	0.931	-0.022
0.1866	0.944	-0.022
0.1900	0.969	-0.022
0.1933	0.988	-0.022
0.1966	1.001	-0.022
0.2000	1.026	-0.022
0.2033	1.038	-0.022
0.2066	1.051	-0.022
0.2100	1.076	-0.022
0.2133	1.089	-0.022
0.2166	1.108	-0.022
0.2200	1.126	-0.022
0.2233	1.139	-0.022
0.2266	1.158	-0.022
0.2300	1.171	-0.022
0.2333	1.189	-0.022
0.2366	1.215	-0.022
0.2400	1.215	-0.022
0.2433	1.240	-0.022
0.2466	1.259	-0.022
0.2500	1.271	-0.022
0.2533	1.284	-0.022
0.2566	1.303	-0.022
0.2600	1.309	-0.022
0.2633	1.334	-0.022
0.2666	1.353	-0.022
0.2700	1.353	-0.022
0.2733	1.397	-0.022
0.2766	1.397	-0.022
0.2800	1.422	-0.022
0.2833	1.441	-0.022
0.2866	1.460	-0.022
0.2900	1.473	-0.022
0.2933	1.492	-0.022
0.2966	1.510	-0.022
0.3000	1.523	-0.022
0.3033	1.542	-0.022
0.3066	1.561	-0.022
0.3100	1.573	-0.022
0.3133	1.599	-0.022
0.3166	1.617	-0.022
0.3200	1.630	-0.022
0.3233	1.649	-0.022
0.3266	1.668	-0.022
0.3300	1.674	-0.022
0.3333	1.699	-0.022
0.3500	1.743	-0.022

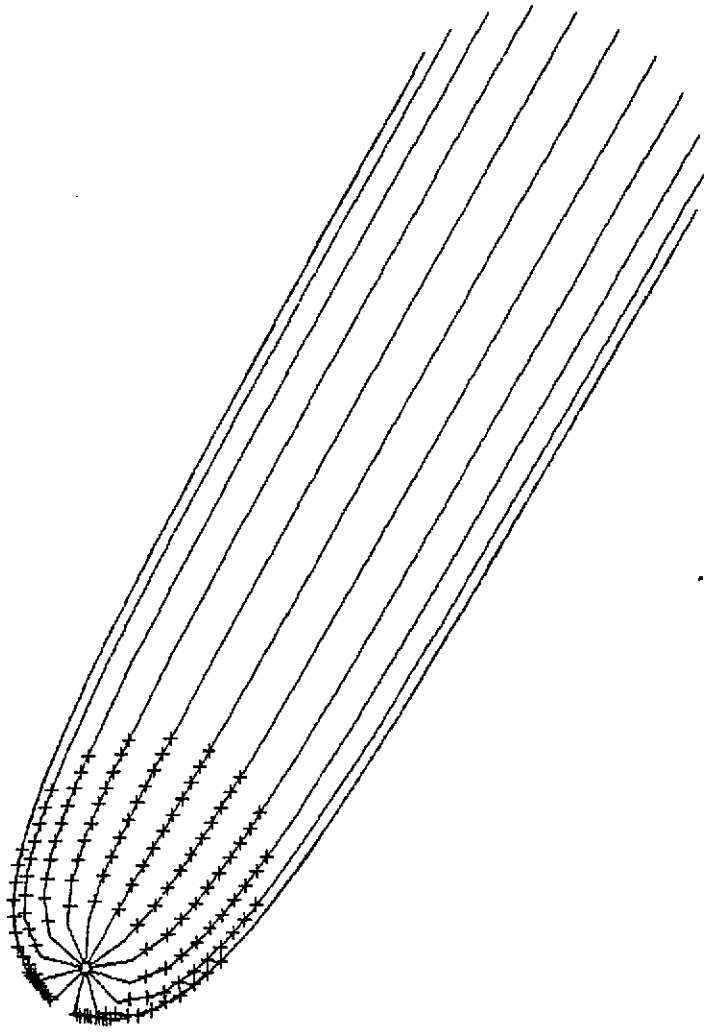
0.3833	1.819	-0.022
0.4000	1.850	-0.022
0.4166	1.863	-0.022
0.4333	1.894	-0.022
0.4500	1.907	-0.022
0.4666	1.945	-0.022
0.4833	2.008	-0.019
0.5000	2.064	-0.019
0.5166	2.115	-0.022
0.5333	2.159	-0.022
0.5500	2.197	-0.022
0.5666	2.234	-0.022
0.5833	2.272	-0.022
0.6000	2.291	-0.022
0.6166	2.322	-0.022
0.6333	2.360	-0.019
0.6500	2.404	-0.019
0.6666	2.461	-0.019
0.6833	2.511	-0.019
0.7000	2.562	-0.019
0.7166	2.606	-0.019
0.7333	2.650	-0.019
0.7500	2.700	-0.019
0.7666	2.744	-0.019
0.7833	2.794	-0.019
0.8000	2.851	-0.019
0.8166	2.889	-0.019
0.8333	2.914	-0.019
0.8500	2.945	-0.019
0.8666	2.952	-0.019
0.8833	2.958	-0.019
0.9000	2.945	-0.019
0.9166	2.952	-0.019
0.9333	2.933	-0.019
0.9500	2.933	-0.019
0.9666	2.939	-0.019
0.9833	2.933	-0.019
1.0000	2.945	-0.019
1.2000	2.989	-0.015
1.4000	3.040	-0.019
1.6000	3.077	-0.015
1.8000	3.096	-0.019
2.0000	3.122	-0.015
2.2000	3.134	-0.015
2.4000	3.153	-0.015
2.6000	3.178	-0.015
2.8000	3.285	-0.019
3.0000	3.367	-0.019
3.2000	3.430	-0.015
3.4000	3.474	-0.015
3.6000	3.524	-0.019
3.8000	3.568	-0.019
4.0000	3.612	-0.019
4.2000	3.656	-0.019
4.4000	3.707	-0.015
4.6000	3.732	-0.019
4.8000	3.763	-0.019
5.0000	3.807	-0.015
5.2000	3.845	-0.015
5.4000	3.870	-0.015
5.6000	3.895	-0.019
5.8000	3.921	-0.015
6.0000	3.958	-0.019
6.2000	3.990	-0.019

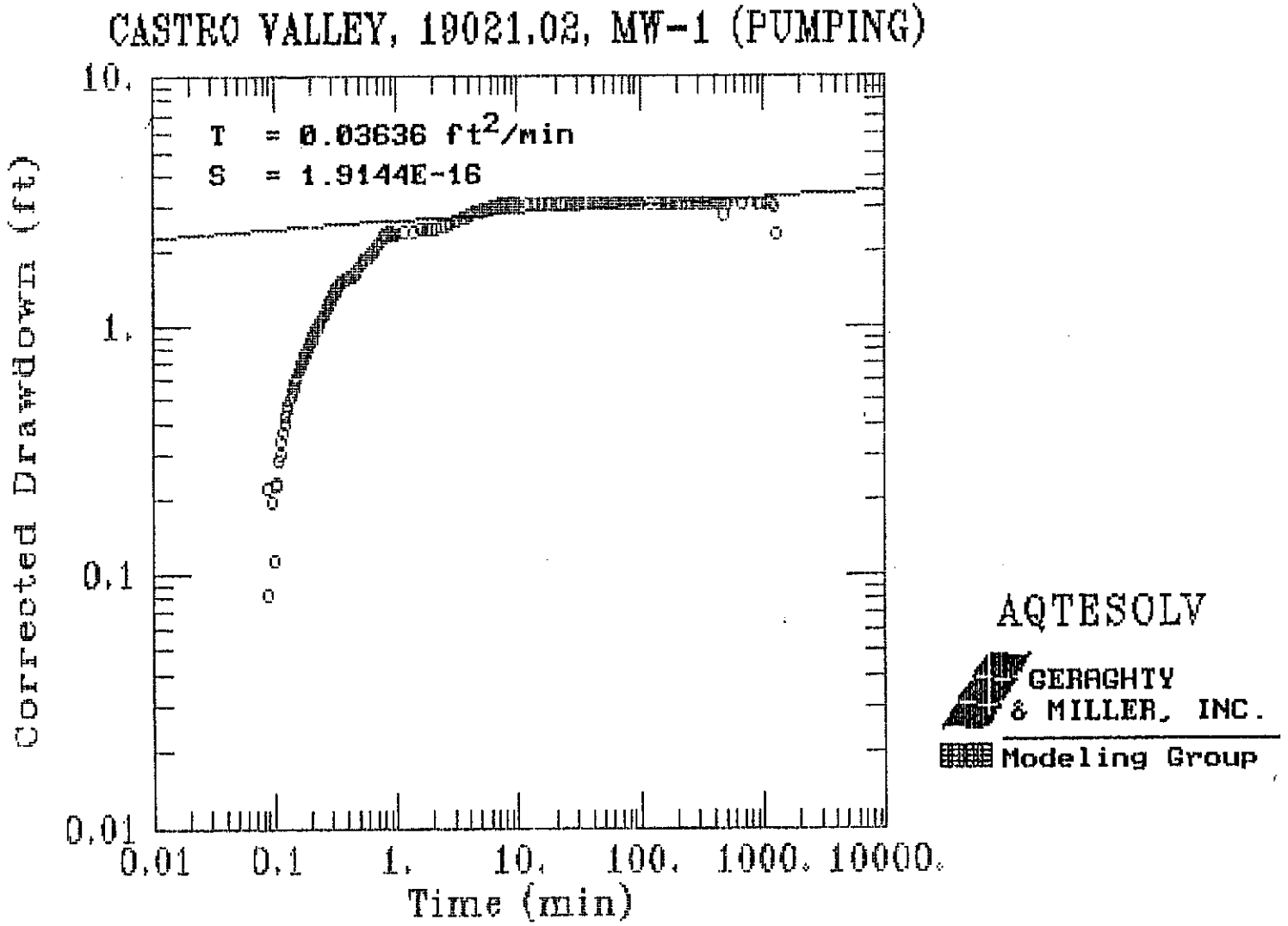
6.8000	4.078	-0.019
7.0000	4.103	-0.019
7.2000	4.141	-0.015
7.4000	4.166	-0.019
7.6000	4.185	-0.019
7.8000	4.191	-0.019
8.0000	4.204	-0.019
8.2000	4.204	-0.015
8.4000	4.204	-0.019
8.6000	4.191	-0.019
8.8000	4.191	-0.019
9.0000	4.191	-0.019
9.2000	4.191	-0.019
9.4000	4.191	-0.019
9.6000	4.191	-0.019
9.8000	4.191	-0.019
10.0000	4.191	-0.019
12.0000	4.197	-0.019
14.0000	4.185	-0.019
16.0000	4.185	-0.015
18.0000	4.191	-0.015
20.0000	4.185	-0.019
22.0000	4.185	-0.015
24.0000	4.185	-0.015
26.0000	4.197	-0.012
28.0000	4.191	-0.015
30.0000	4.160	-0.012
32.0000	4.185	-0.012
34.0000	4.191	-0.009
36.0000	4.185	-0.012
38.0000	4.191	-0.009
40.0000	4.178	-0.009
42.0000	4.191	-0.009
44.0000	4.178	-0.009
46.0000	4.185	-0.006
48.0000	4.191	-0.003
50.0000	4.191	-0.003
52.0000	4.185	-0.003
54.0000	4.191	0.000
56.0000	4.185	-0.003
58.0000	4.185	0.000
60.0000	4.191	0.003
62.0000	4.185	0.003
64.0000	4.185	0.003
66.0000	4.185	0.006
68.0000	4.185	0.006
70.0000	4.191	0.006
72.0000	4.191	0.009
74.0000	4.191	0.009
76.0000	4.191	0.009
78.0000	4.191	0.012
80.0000	4.197	0.015
82.0000	4.197	0.015
84.0000	4.197	0.015
86.0000	4.185	0.015
88.0000	4.191	0.019
90.0000	4.191	0.019
92.0000	4.185	0.022
94.0000	4.185	0.022
96.0000	4.185	0.022
98.0000	4.197	0.022
100.000	4.197	0.022
120.000	4.197	0.031
140.000	4.197	0.044
160.000	[illegible]	[illegible]

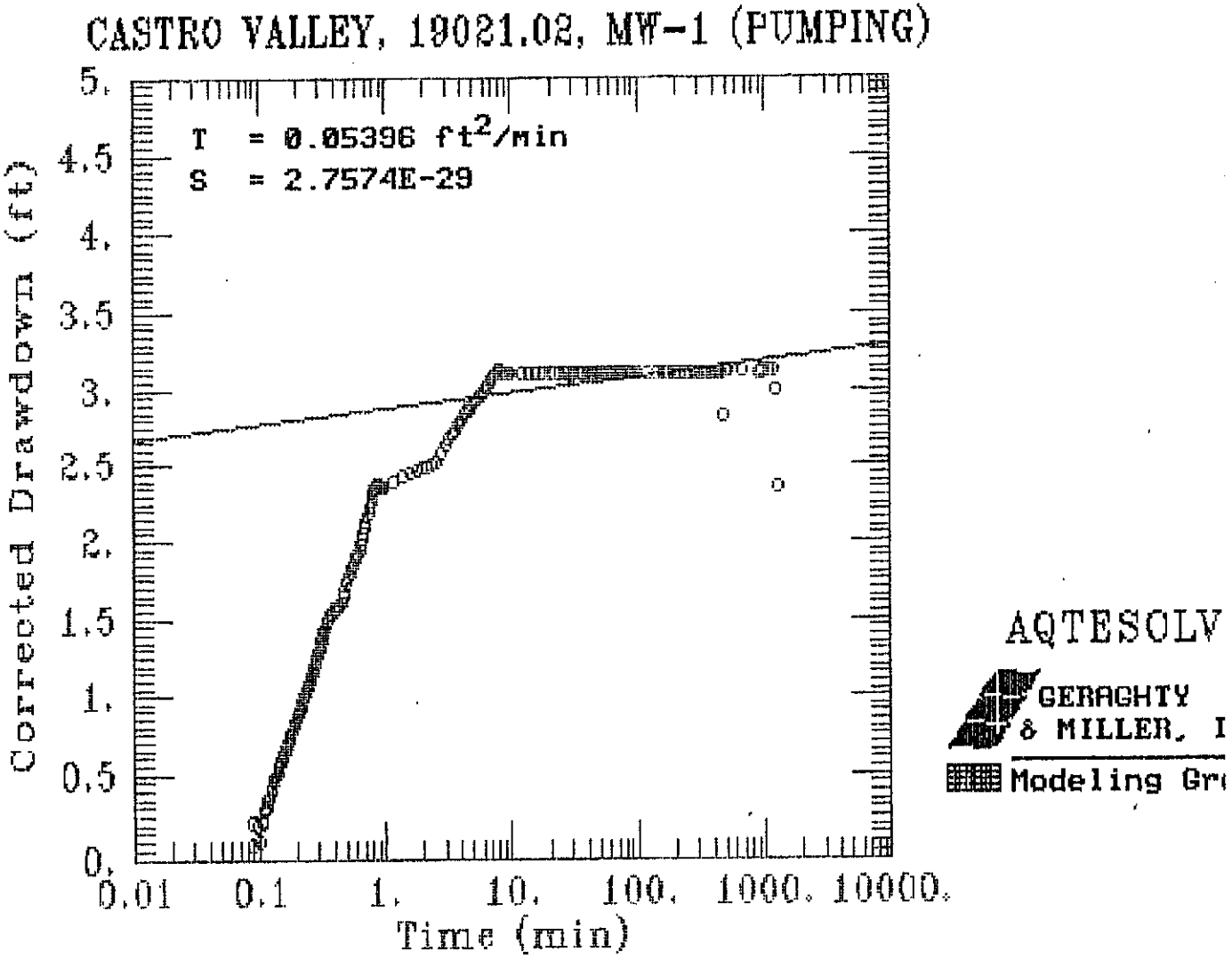
200.000	4.197	0.063
220.000	4.197	0.069
240.000	4.197	0.076
260.000	4.197	0.085
280.000	4.191	0.088
300.000	4.191	0.095
320.000	4.191	0.095
340.000	4.191	0.098
360.000	4.191	0.098
380.000	4.191	0.101
400.000	4.191	0.104
420.000	4.191	0.098
440.000	4.191	0.095
460.000	4.191	0.095
480.000	3.675	0.101
500.000	4.204	0.107
520.000	4.216	0.107
540.000	2.845	0.107
560.000	1.233	0.107
580.000	3.914	0.107
600.000	3.757	0.104
620.000	1.832	0.107
640.000	0.755	0.107
660.000	0.478	0.104
680.000	4.210	0.095
700.000	3.933	0.085
720.000	3.109	0.076
740.000	2.197	0.076
760.000	3.832	0.079
780.000	1.945	0.082
800.000	3.776	0.079
820.000	3.140	0.069
840.000	1.435	0.066
860.000	0.673	0.060
880.000	0.371	0.060
900.000	3.870	0.057
920.000	4.172	0.053
940.000	4.191	0.053
960.000	4.204	0.053
980.000	2.820	0.057
1000.00	1.114	0.063
1030.00	3.606	0.066
1060.00	4.210	0.066
1090.00	1.844	0.069
1120.00	0.617	0.063
1150.00	3.298	0.066
1180.00	4.210	0.076
1210.00	1.926	0.072
1240.00	3.983	0.072
1270.00	1.152	0.063
1300.00	2.945	0.053

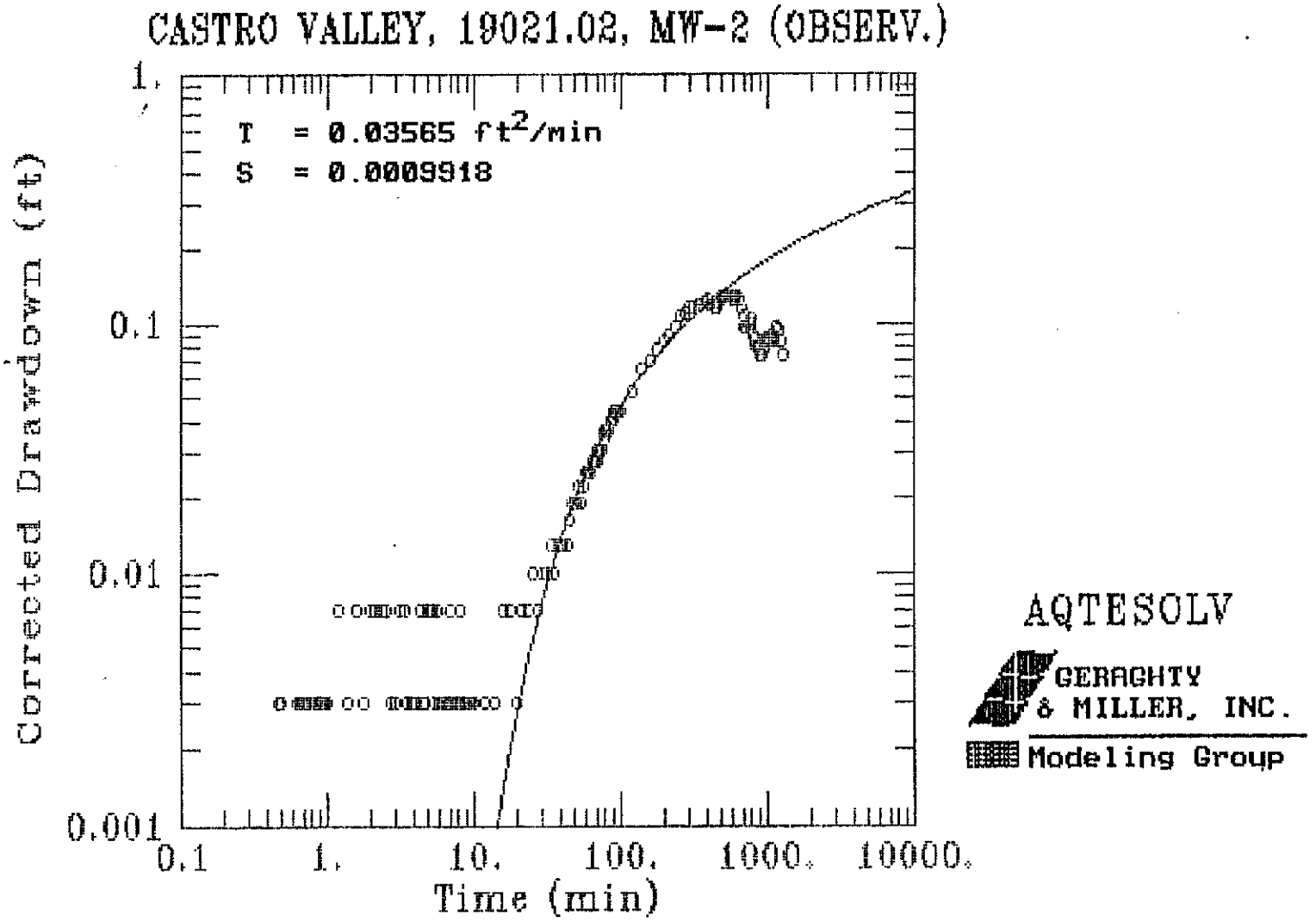
```
C:\CAPTURE>type ,19021.mwi
MW-1 pumping at 0.25 gpm    K is 0.005 ft/min
 45              0              0              .012           240
.005             8.6            .25
 10              250
 13              0              10             100            10
 .25             150            100            Y
 999             0              0              N
 999             0              0              0
 999             0              0              0              0              N

C:\CAPTURE>
```

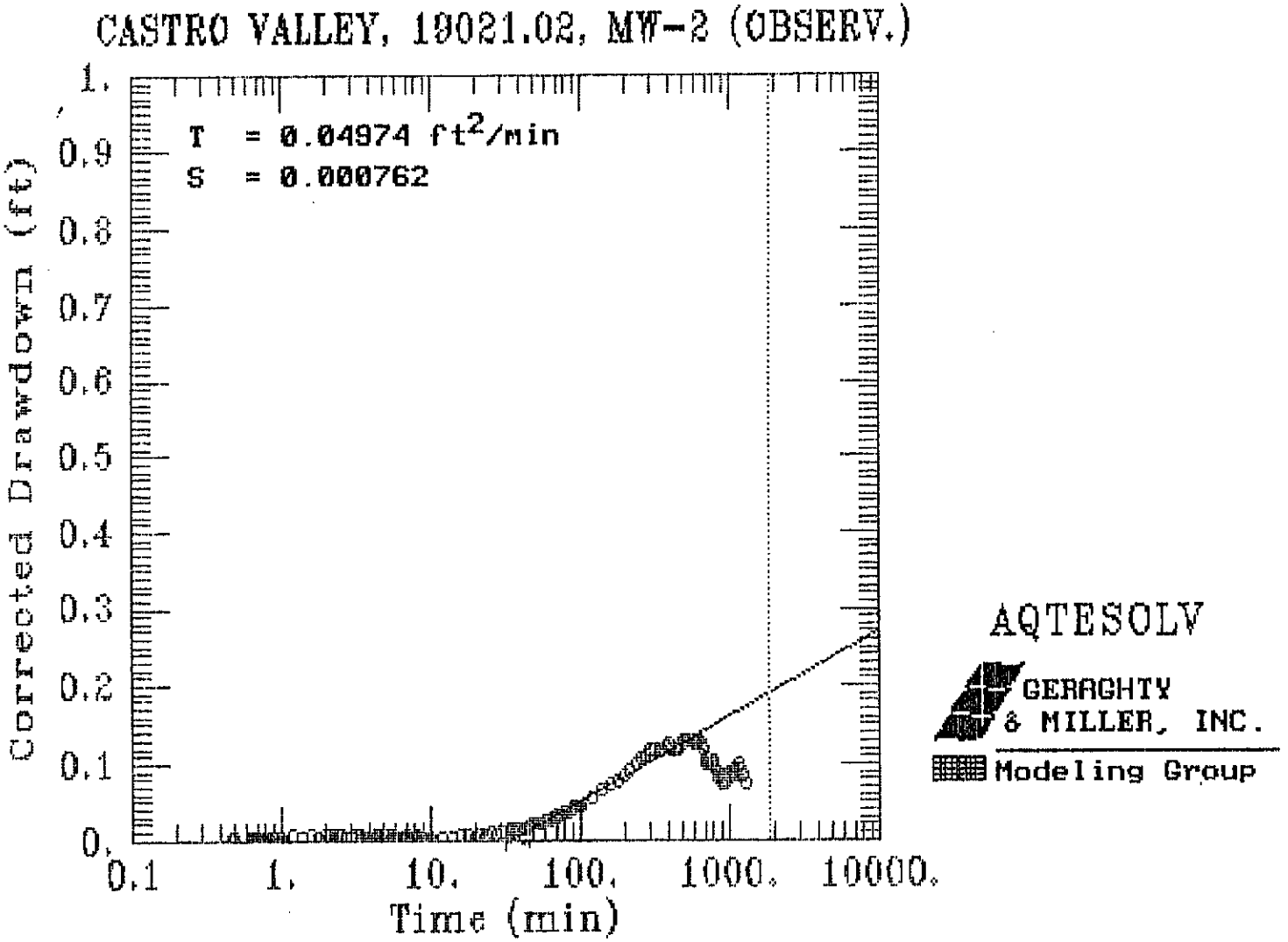
MW-1 pumping at 0.25 gpm K is 0.005 ft/min




CASTRO VALLEY, 19021.02, MW-1 (PUMPING)
T = 0.03636 ft²/min
S = 1.9144E-16
Corrected Drawdown (ft)
10.
1.
0.1
0.01
0.01
0.1
1.
10.
100.
1000.
10000.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

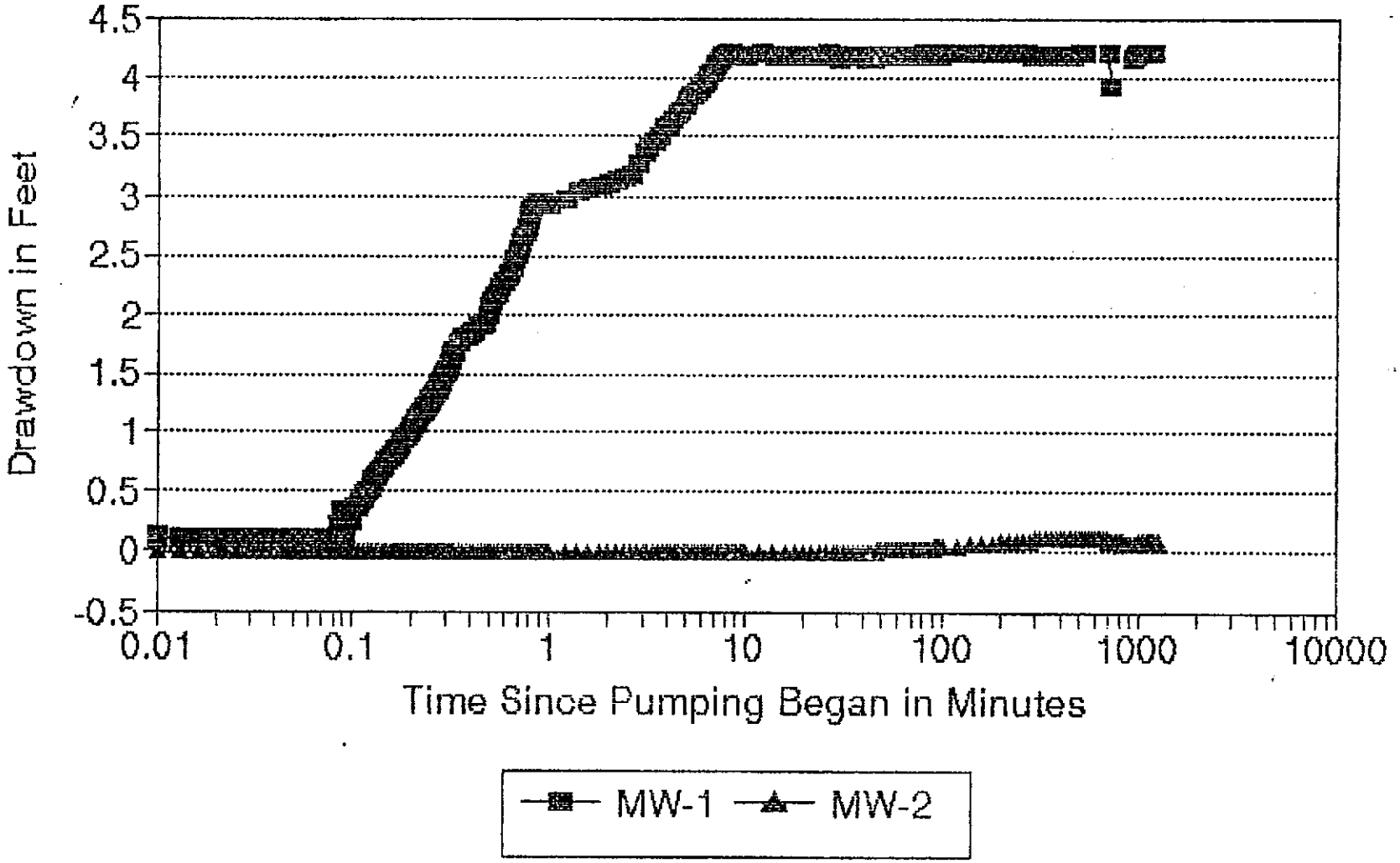

CASTRO VALLEY, 19021.02, MW-1 (PUMPING)
T = 0.05396 ft²/min
S = 2.7574E-29
Corrected Drawdown (ft)
5.
4.5
4.
3.5
3.
2.5
2.
1.5
1.
0.5
0.
0.01
0.1
1.
10.
100.
1000.
10000.
Time (min)
AQTESOLV
GERAGHTY
& MILLER, I
Modeling Gr


CASTRO VALLEY, 19021.02, MW-2 (OBSERV.)
T = 0.03565 ft²/min
S = 0.0009918
Corrected Drawdown (ft)
1.
0.1
0.01
0.001
0.1
1.
10.
100.
1000.
10000.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group


CASTRO VALLEY, 19021.02, MW-2 (OBSERV.)
T = 0.04974 ft²/min
S = 0.000762
Corrected Drawdown (ft)
1.
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.
0.1
1.
10.
100.
1000.
10000.
Time (min)
AQTESOLV
GERAGHTY & MILLER, INC.
Modeling Group

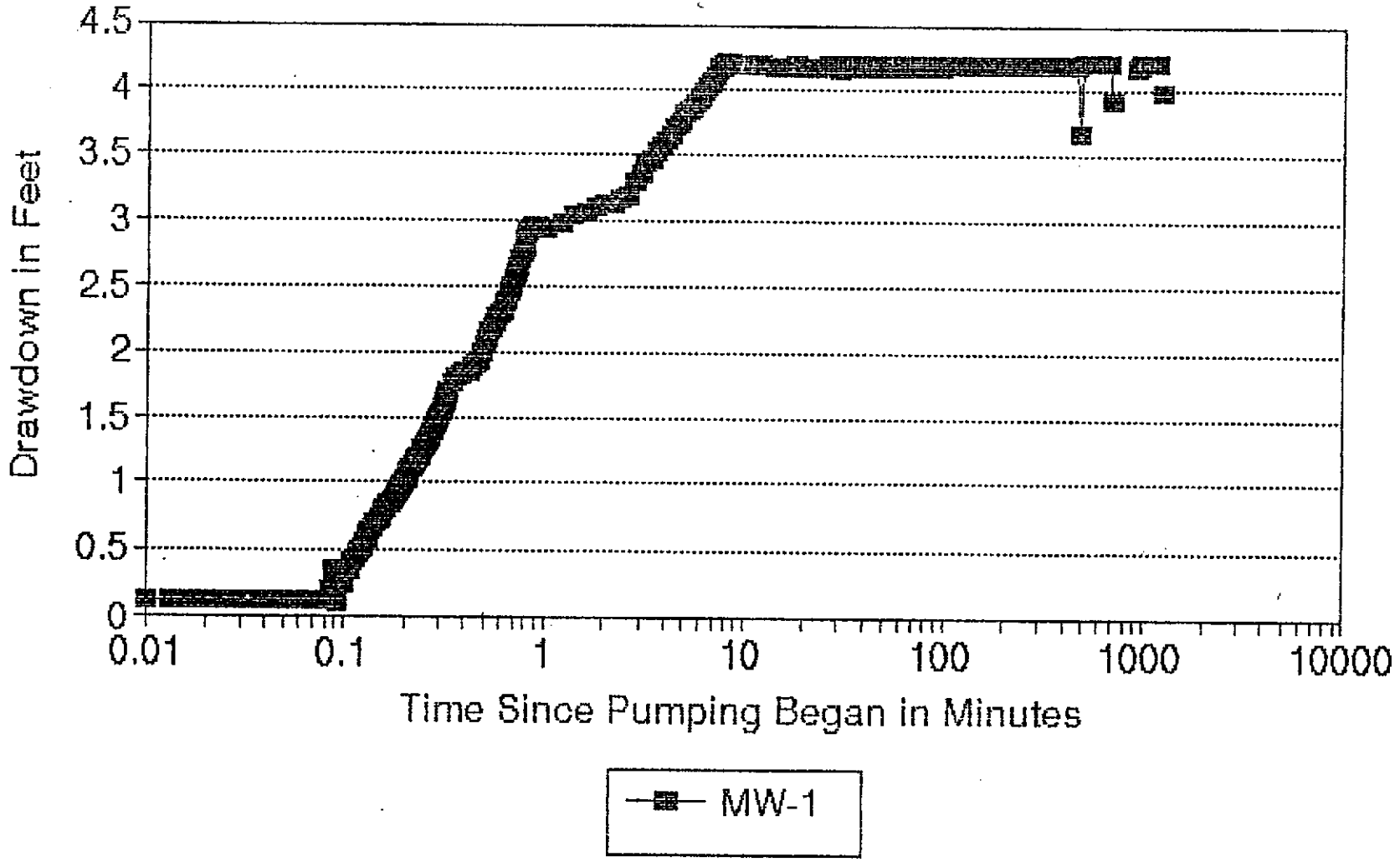
HYDROGRAPHS FROM PUMPING TEST

Beacon Station #574 – January 31, 1994



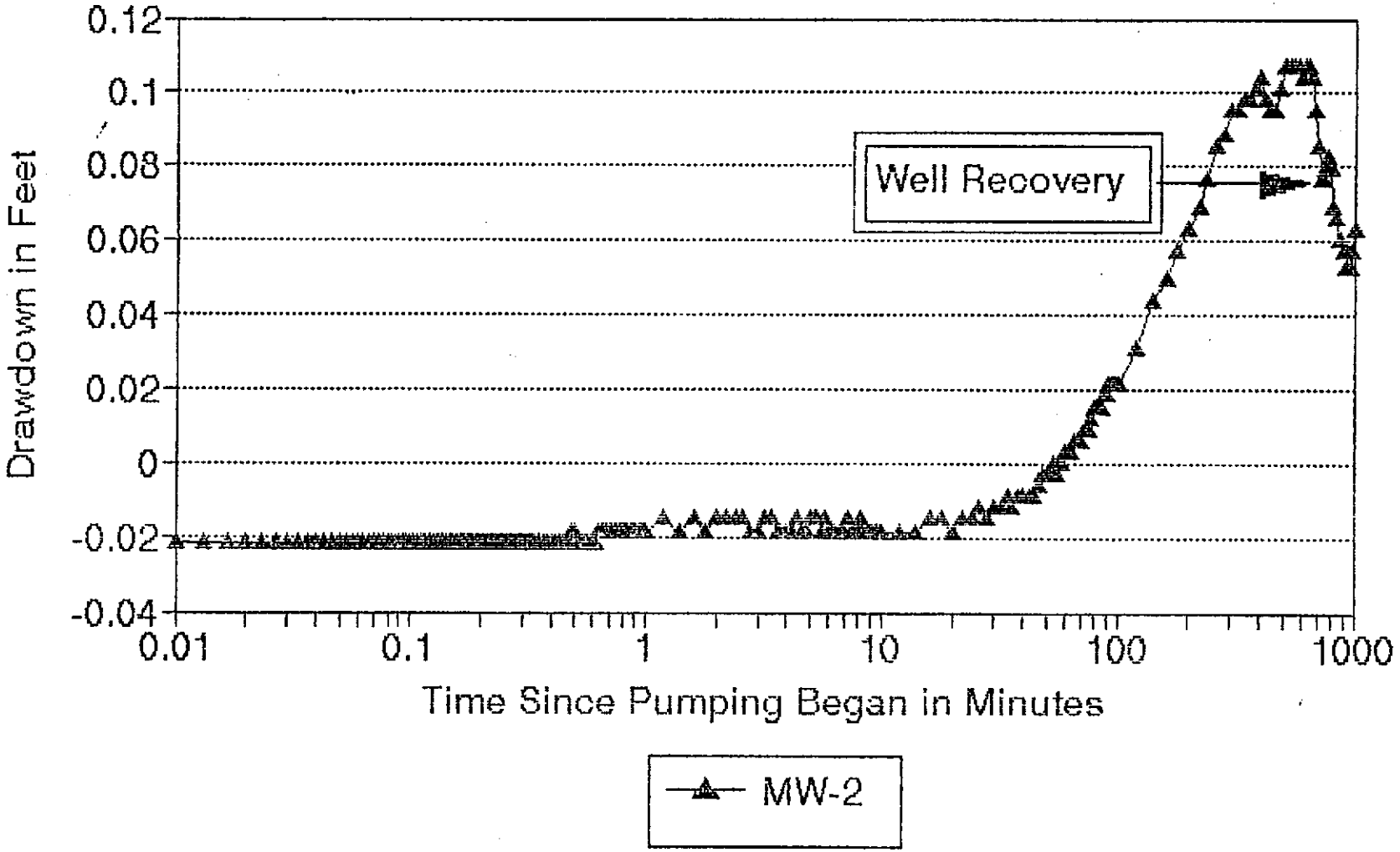
HYDROGRAPHS FROM PUMPING TEST

Beacon Station #574 -- January 31, 1994



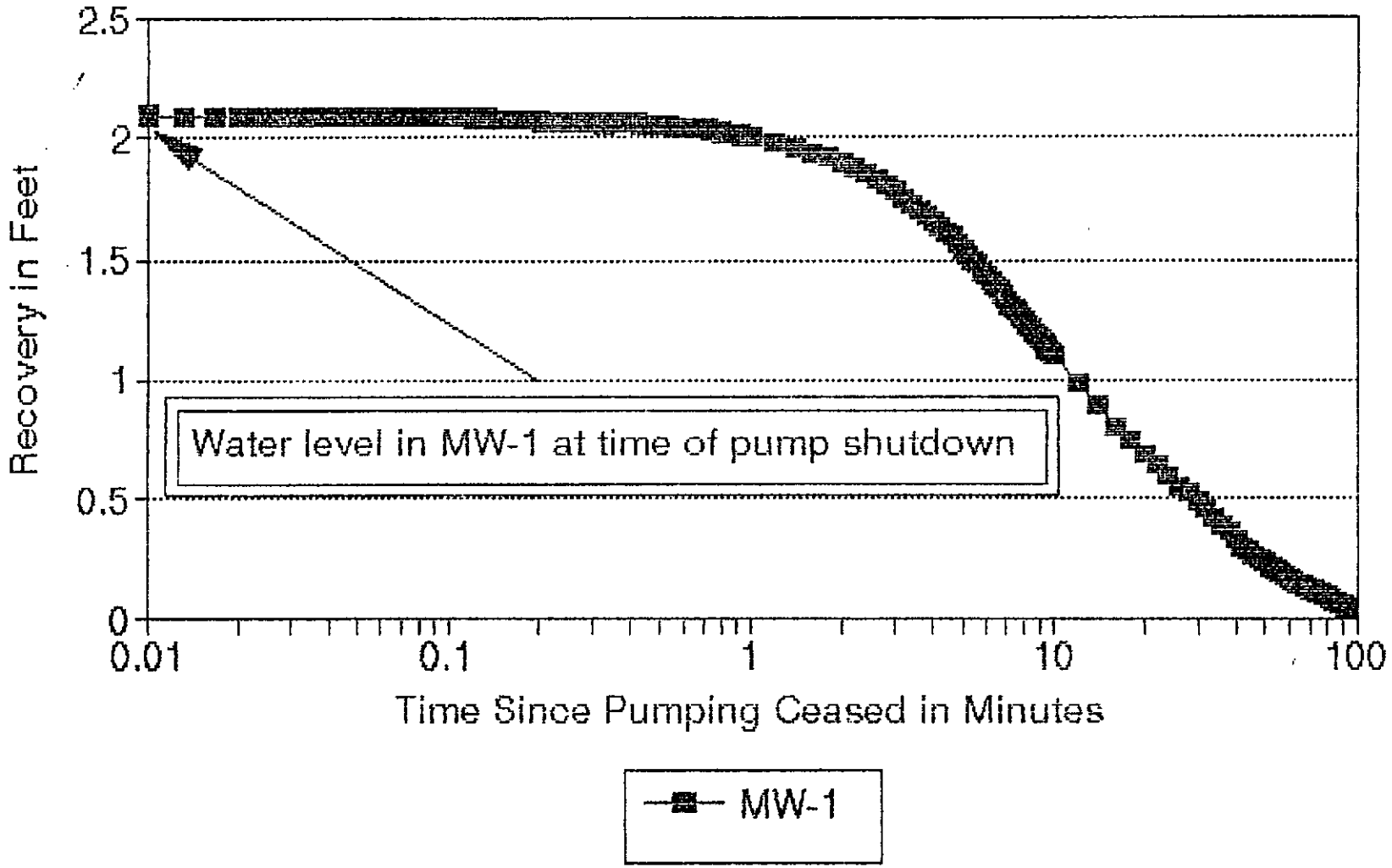
HYDROGRAPHS FROM PUMPING TEST

Beacon Station #574 – January 31, 1994



RECOVERY IN PUMPING WELL (MW-1)

Beacon Station #574 – February 1, 1994



ENCLOSURE B

FIELD READINGS
SOIL VAPOR EXTRACTION TEST

Site: Former Beacon Station #574
Date: 2-2-94
Test Well: MW-1
Observation Well: MW-2
Field Conditions: Partly Cloudy, 50° F.

VAPOR EXTRACTION PILOT TEST DATA

Hour	Flow (cfm)	Vacuum (inches of H_2O)	Temperature at Flowmeter (degrees F.)	Airflow Corrected for Temperature (scfm)	Vacuum at Observation Point MW-2 (inches of H_2O)	Test Well Influent Concentrations (ppm)			Extraction Rates (lbs/day)	
						FID	Draeger	Analytical	TPH	Benzene
0	40	40	68	40.0	0	>10,000	>2,500	7,800	107.5	0.86
1	45	37	108	43.5	0.30	>10,000	>2,500	NM*	NM	NM
2	43	37	106	41.6	0.35	>10,000	>2,500	NM	NM	NM
3	45	36	105	43.6	0.35	>10,000	>2,500	NM	NM	NM
4	45	36	105	43.6	0.35	>10,000	>2,500	4,500	67.7	0.57

*NM = Not measured.

ENCLOSURE C

AIR ANALYTICAL RESULTS
SOIL VAPOR EXTRACTION TEST

February 7, 1994
Sample Log 8557

William Rocha
Acton, Mickelson & van Dam
5090 Robert J. Matthews Pkwy
El Dorado Hills, CA 95762

Subject: Analytical Results for 2 Air Samples
Identified as: Project # 19021.02 (Beacon 574)
Received: 02/04/94

Dear Mr. Rocha:

Analysis of the sample(s) referenced above has been completed. This report is written to confirm results communicated on February 7, 1994 and describes procedures used to analyze the samples.

The sample(s) were received in:

Tedlar air sampling bags

Each sample was transported and received under documented chain of custody, assigned a consecutive log number and stored at 4 degrees Celsius until analysis commenced.

Sample(s) were analyzed using the following method(s):

"BTEX" (EPA Method 8020/Purge-and-Trap)
"TPH as Gasoline" (Modified EPA Method 8015/Purge-and-Trap)

Please refer to the following table(s) for summarized analytical results and contact us at 916-753-9500 if you have questions regarding procedures or results. The chain-of-custody document is enclosed.

Approved by:

Joel Kiff
Senior Chemist

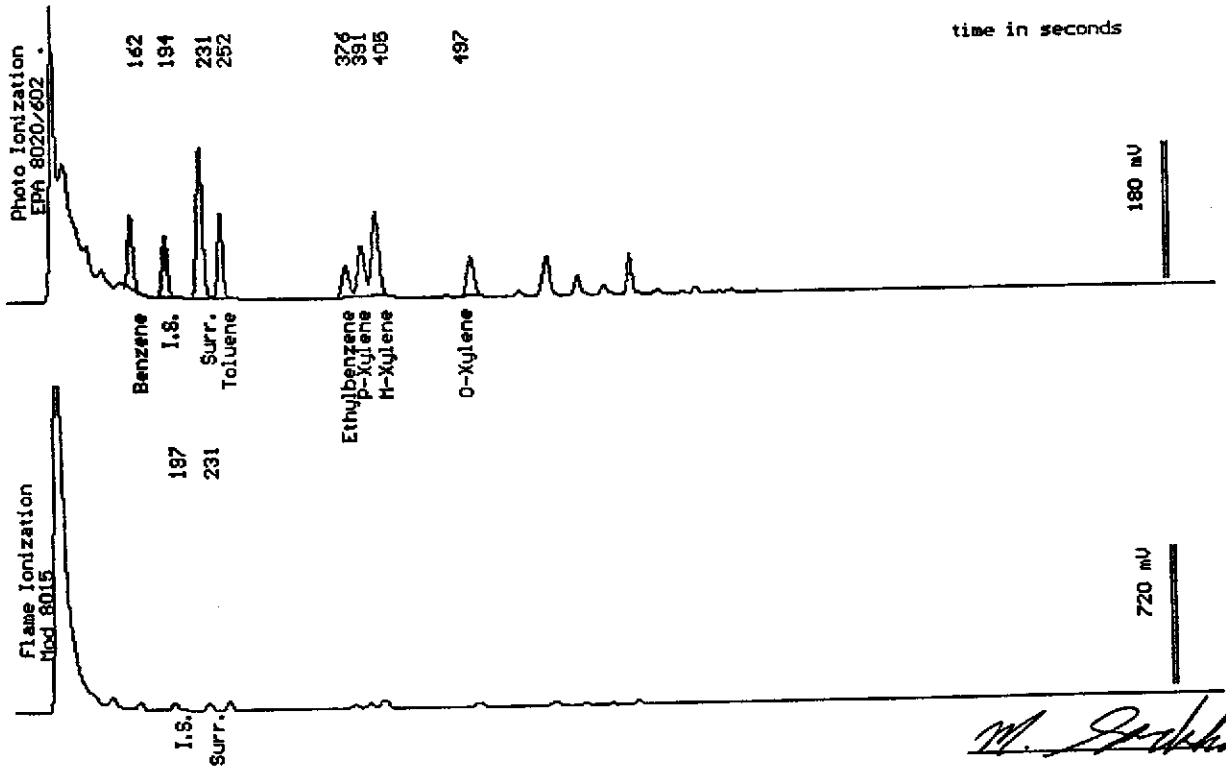
Sample Log 8557

8557-1

Sample: **MW-1 (1505)**

From : Project # 19021.02 (Beacon 574)
Sampled : 02/02/94
Dilution : 1:50 QC Batch : 4064b
Matrix : Air

Parameter	(MRL) Molar ppm	Measured Value Molar ppm
Benzene	(2.5)	66
Toluene	(2.5)	83
Ethylbenzene	(2.5)	39
Total Xylenes	(2.5)	220
TPH as Gasoline	(250)	7800
Surrogate Recovery		94 %



Date Analyzed: 02-04-94
Column : 0.53mm ID X 30m DBWAX (J&W Scientific)

Mitra Sarkhosh
Senior Chemist

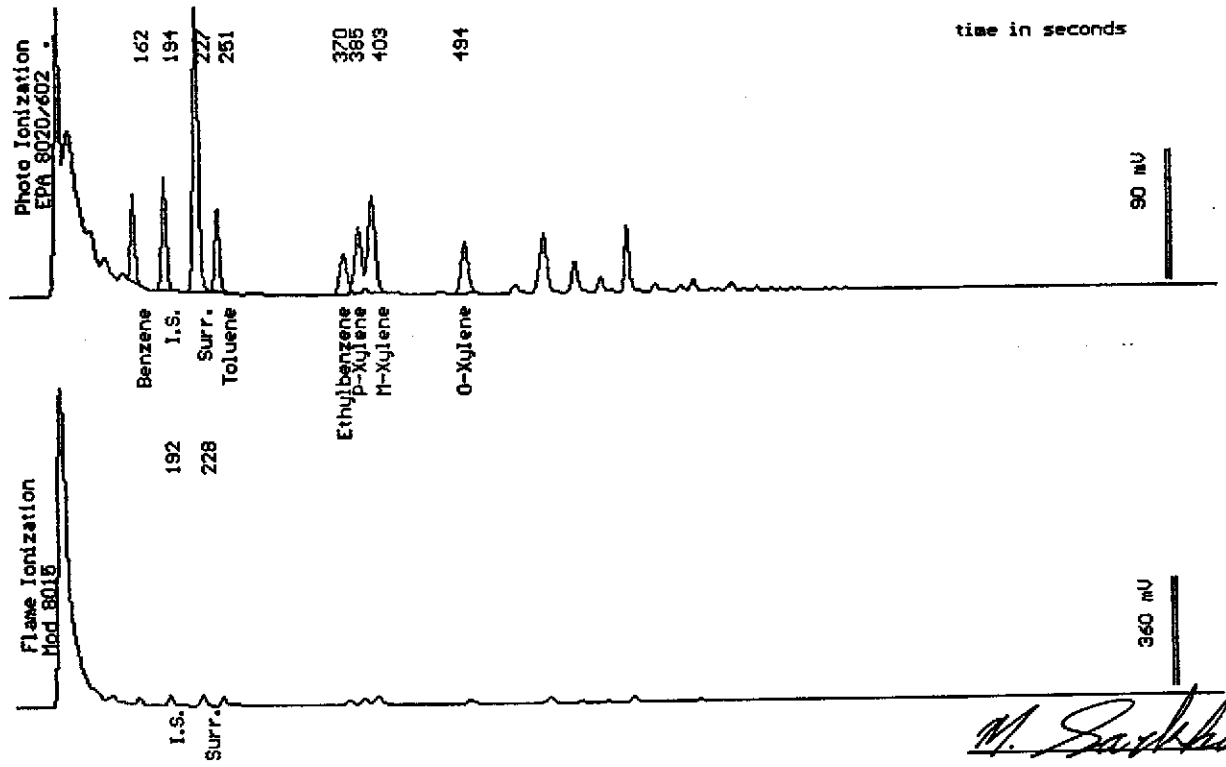
Sample Log 8557

8557-2

Sample: **MW-1 (1905)**

From : Project # 19021.02 (Beacon 574)
Sampled : 02/02/94
Dilution : 1:50 QC Batch : 4064b
Matrix : Air

Parameter	(MRL) Molar ppm	Measured Value Molar ppm	
Benzene	(2.5)	42	
Toluene	(2.5)	42	
Ethylbenzene	(2.5)	28	
Total Xylenes	(2.5)	150	
TPH as Gasoline	(250)	4500	
Surrogate Recovery		93	%



Date Analyzed: 02-04-94
Column : 0.53mm ID X 30m DBWAX (J&W Scientific)

M. Sarkhosh

Mitra Sarkhosh
Senior Chemist

U ...

Ultramar Inc.

CHAIN OF CUSTODY REPORT

BEACON

Beacon Station No.	Sampler (Print Name)	Date	Form No.
574	William Rocha Jr	2-4-94	1 of 1

Project No.: 19021.02

Sampler (Signature): William Rocha Jr.

Project Location: 22315 Redwood Rd Castro Valley, CA

Affiliation: AMV, Inc.

Remarks (general): Standard TAT

Sample No./Identification	Date	Time	Lab No.	BTEX	TPH (gasoline)	TPH (diesel)						No. of Containers	REMARKS
MW-1	2-2-94 ~~1505~~	1505		X	X							1	Tedlar Bag, 1-L
MW-1	2-2-94 ~~1905~~	1905										1	"

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
William Rocha Jr., AMV, Inc.	2-4-94	10:42	[signature]	2/4/94	10:42
[signature]	2/4/94	1156	[signature] WEST	2/4/94	1159

Report To: Bill Rocha, AMV, Inc.

Bill to: ULTRAMAR INC.
525 West Third Street
Hanford, CA 93230
Attention: K. Earnest

32-8003 1/90

WHITE: Return to Client with Report YELLOW: Laboratory Copy PINK: Originator Copy

ENCLOSURE D

ESTIMATED EXTRACTION RATE CALCULATIONS

VAPOR EXTRACTION PILOT TEST CALCULATIONS
AMV PROJECT NO. 19021.02

Extraction Rate

The pilot test flow rate from monitoring well MW-1 at 1505 hours was determined to be approximately 40.0 standard cubic feet per minute (scfm) or 57,600 standard cubic feet per day (scfd). Laboratory analysis of an air sample collected at this time during the pilot test (laboratory report(s) enclosed) indicates the concentration of total petroleum hydrocarbons as gasoline (TPHg) in the vapor stream to be 7,800 parts per million by volume (ppmv), with a benzene fraction 0.85 percent. These values represent the maximum expected concentration at start-up. Continued system operation should result in decreased concentration.

The maximum volumetric rate of TPHg extraction is calculated as follows:

$$40.0\,scfm\sqrt{\frac{530R}{1.0\,bar}\cdot\frac{1.0\,bar}{528R}} = 40.0\,scfm\ ;\ \frac{40.0\,FT^3}{min}\times\frac{1440\,min}{day}\times\frac{7800\,FT^3}{1E6\,FT^3}\,TPHg = 449.3\,\frac{scfd}{TPHg}$$

Using the ideal gas law to determine the equivalent pound-moles (lb-moles) for 57,600 scfd gives:

$$449.3\,\frac{FT^3}{day}\,TPHg\times\frac{lb\cdot mol}{359\,ft^3}\,TPHg = 1.25\,\frac{lb\,mol}{day}\,TPHg$$

Using the molecular weight of hexane, the rate of TPHg extracted on a pounds basis is calculated as:

$$1.25\,\frac{lb\cdot mol}{day}\,TPHg\times\frac{86\,lb}{lb\cdot mol} = 107.5\,\frac{lbs}{day}\,TPHg$$

With a benzene fraction of 0.85 percent, the lb-moles rate of benzene extraction is calculated as:

$$1.25\,\frac{lb\,mol}{day}\,TPHg\times(0.0085) = 0.0047\,\frac{lb\cdot mol}{day}\,Benzene$$

On a pounds basis, the extraction rate for benzene is calculated as:

$$0.0047\,\frac{lb\cdot mol}{day}\,benzene\times\frac{78\,lb}{lb\,mol}\,benzene = 0.86\,\frac{lb}{day}\,Benzene$$

Vapor Extraction Zone of Influence

Approximation of the vapor extraction zone of influence is calculated using the empirical equation:

$$r = Q/2\pi hv$$

where r = distance from extraction of minimum effective air velocity, ft
Q = extracted air flow rate, scfm
h = thickness of the unsaturated zone of the screened interval
v = assumed minimum effective air velocity, 0.01 feet/minute

The calculated zone of influence is:

$$r = \frac{40.0\,scfm}{2\pi\,(15FT)\,(0.01\,\frac{ft}{min})} = 42.4\,FT.$$

VAPOR EXTRACTION PILOT TEST CALCULATIONS
AMV PROJECT NO. 19021.02

Extraction Rate

The pilot test flow rate from monitoring well MW-1 at 1905 hours was determined to be approximately 43.6 standard cubic feet per minute (scfm) or 62,784 standard cubic feet per day (scfd). Laboratory analysis of an air sample collected at this time during the pilot test (laboratory report(s) enclosed) indicates the concentration of total petroleum hydrocarbons as gasoline (TPHg) in the vapor stream to be 4,500 parts per million by volume (ppmv), with a benzene fraction 0.93 percent. These values represent the maximum expected concentration at start-up. Continued system operation should result in decreased concentration.

The maximum volumetric rate of TPHg extraction is calculated as follows:

$$45\sqrt{\frac{530R}{1.0bar}\cdot\frac{1.0bar}{565R}} = 43.6\ scfm\ ;\quad 43.6\frac{FT^3}{min}\times 1440\frac{min}{day}\times\frac{4500\ FT^3\ TPHg}{1E6\ FT3} = 282.5\ scfd\ TPHg$$

Using the ideal gas law to determine the equivalent pound-moles (lb-moles) for 62,784 scfd gives:

$$282.5\frac{FT^3}{day}\ TPHg\times\frac{lb\cdot mol}{359\ FT3}\ TPHg = 0.787\ \frac{lb\ mol}{day}\ TPHg$$

Using the molecular weight of hexane, the rate of TPHg extracted on a pounds basis is calculated as:

$$0.787\ \frac{lb\ mol}{day}\ TPHg\times\frac{86\ lb}{lb\cdot mol} = 67.7\ \frac{lbs}{day}\ TPHg$$

With a benzene fraction of 0.93 percent, the lb-moles rate of benzene extraction is calculated as:

$$0.787\ \frac{lb\cdot mol}{day}\ TPHg\times(0.0093) = 0.0073\ \frac{lb\cdot mol}{day}\ Benzene$$

On a pounds basis, the extraction rate for benzene is calculated as:

$$0.0073\ \frac{lb\cdot mol}{day}\ benzene\times\frac{78\ lb}{lb\cdot mol}\ benzene = 0.57\ \frac{lb}{day}\ Benzene$$

Vapor Extraction Zone of Influence

Approximation of the vapor extraction zone of influence is calculated using the empirical equation:

$$r = Q/2\pi hv$$

where r = distance from extraction of minimum effective air velocity, ft
Q = extracted air flow rate, scfm
h = thickness of the unsaturated zone of the screened interval
v = assumed minimum effective air velocity, 0.01 feet/minute

The calculated zone of influence is:

$$r = \frac{43.6\ scfm}{2\pi(15FT)(0.01\frac{FT}{min})} = 46.3\ FT.$$

ENCLOSURE E

GROUND WATER SAMPLE ANALYTICAL REPORTS

February 9, 1994
Sample Log 8528

Steve Liaty
Acton, Mickelson & van Dam
5090 Robert J. Matthews Pkwy
El Dorado Hills, CA 95762

Subject: Analytical Results for 2 Water Samples
Identified as: Project # 19021.02 (Beacon 574)
Received: 02/02/94

Dear Mr. Liaty:

Analysis of the sample(s) referenced above has been completed. This report is written to confirm results communicated on February 9, 1994 and describes procedures used to analyze the samples.

The sample(s) were received in:

40-ml glass vial sealed with TFE-lined septae
1-L glass bottle sealed with TFE-lined cap
1-L polyethylene bottle with polyethylene cap

Each sample was transported and received under documented chain of custody, assigned a consecutive log number and stored at 4 degrees Celsius until analysis commenced.

Sample(s) were analyzed using the following method(s):

"BTEX" (EPA Method 602/Purge-and-Trap)
"TPH as Gasoline" (Modified EPA Method 8015/Purge-and-Trap)
"TPH as Diesel,Motor Oil,Jet/Kerosene" (Mod. 8015/Extraction)
"Total Recoverable Petroleum Hydrocarbons" (EPA 418.1)
"Oil and Grease" (Standard Methods 5520 B,F)
"Metals" (EPA 6010,7000)

Please refer to the following table(s) for summarized analytical results and contact us at 916-753-9500 if you have questions regarding procedures or results. The chain-of-custody document is enclosed.

Approved by:

Joel Kiff
Senior Chemist

Western Environmental Science & Technology • 45133 County Road 32B • Davis, CA 95616 • 916 753-9500 • FAX: 916 757-4652

February 9, 1994
Sample Log 8528

Total Recoverable Petroleum Hydrocarbons (EPA 418.1)
From: Project # 19021.02 (Beacon 574)
Received: 02/02/94
Matrix: Water

--all concentrations are units of ug/l--

Sample	Date Sample	Date Extract	Date Analyzed	RDL	(EPA 418.1) TRPH
MW-1E	02/01/94	02/03/94	02/09/94	(1000)	<1000

QC Batch: JW940201

Total Oil and Grease (Standard Methods 5520 B,F)
From: Project # 19021.02 (Beacon 574)
Received: 03/02/94
Matrix: Water

--all concentrations are units of ug/l--

Sample	Date Sampled	Date Analyzed	RDL	(5520 B,F) Oil and Grease
MW-1E	02/01/94	02/07/94	(1000)	<1000

QC Batch: KW940201

Joel Kiff
Senior Chemist

Western Environmental Science & Technology • 45193 County Road 32B • Davis, CA 95616 • 916 753-9500 • FAX: 916 757-4652

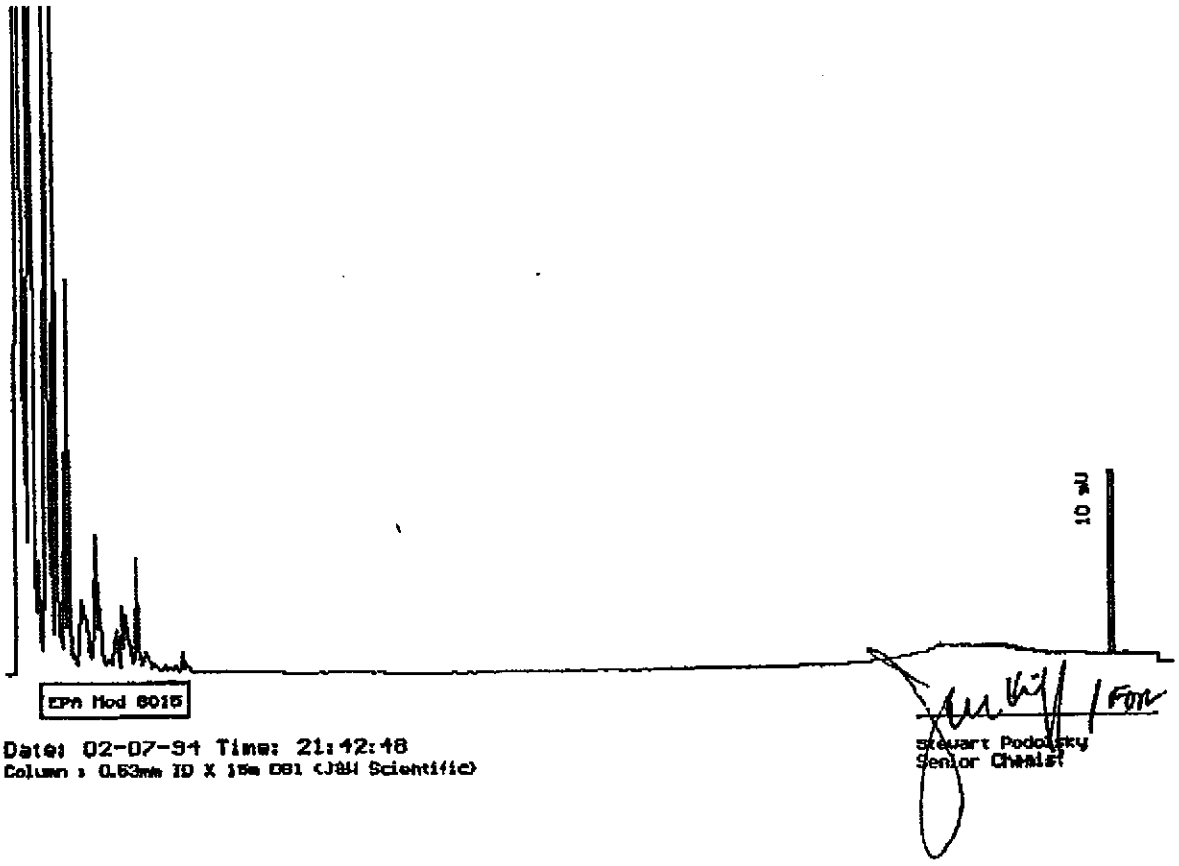
Sample Log 8528
8528-1

Sample: MW-1

From : Project # 19021.02 (Beacon 574)
Sampled : 02/01/94
Extracted: 02/07/94
Dilution : 1:1
Matrix : Water

QC Batch : DW940202
Run Log : 8148C

Parameter	(MDL) ug/L	Measured Value ug/L
TPH as Diesel	(50)	<50



Stewart Podolsky
Senior Chemist

Sample Log 8528

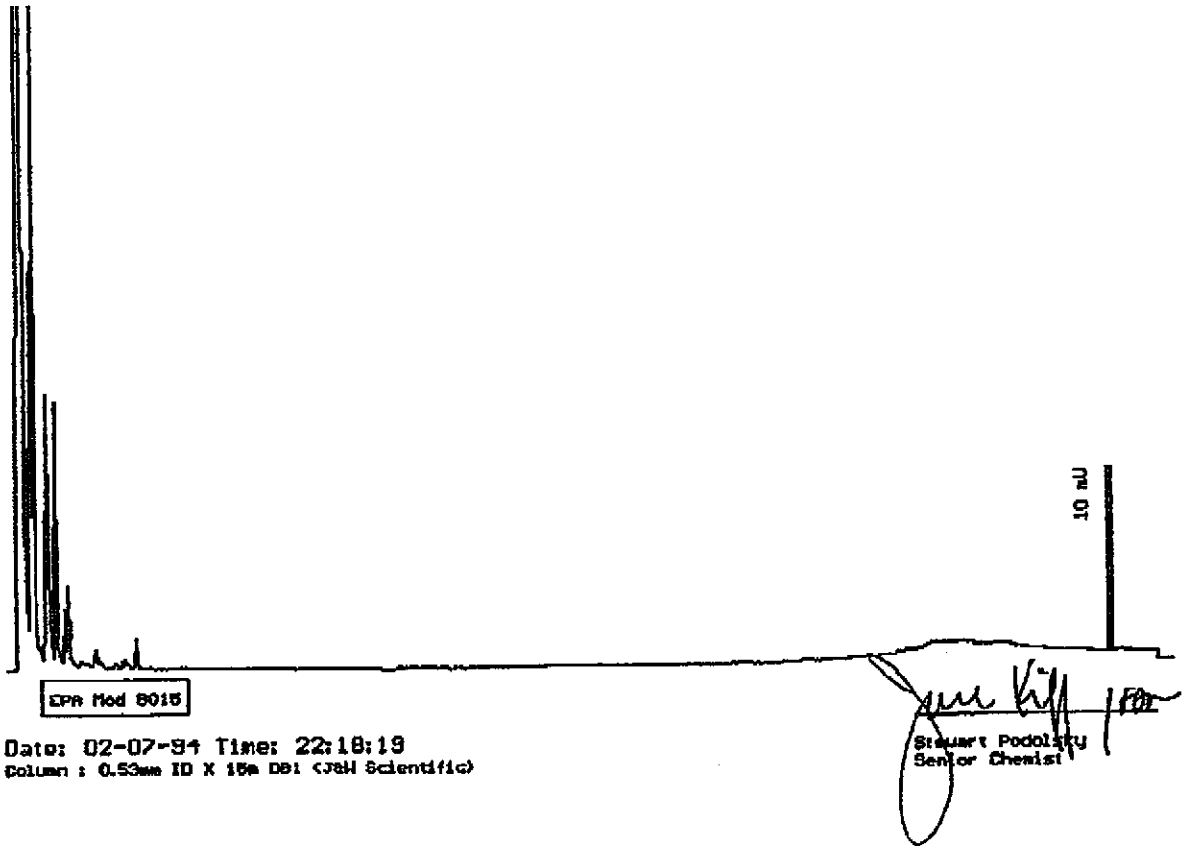
8528-2

Sample: MW-1E

From : Project # 19021.02 (Beacon 574)
Sampled : 02/01/94
Extracted: 02/07/94
Dilution : 1:1
Matrix : Water

QC Batch : DW940202
Run Log : 8148C

Parameter	(MDL) ug/L	Measured Value ug/L
TPH as Diesel	(50)	<50



Date: 02-07-94 Time: 22:18:19
Column : 0.53mm ID X 15m DB1 (J&W Scientific)

Stewart Podolsky
Senior Chemist

February 8, 1994
Sample Log 8528

Sample : MW-1E
From : Project # 19021.02 (Beacon 574)
Sampled : 02/01/94 Received : 02/02/94
Matrix : Water Analysis Completed : 02/08/94
Units : mg/L Report As : Wet Weight

General Metals

Parameter	EPA Method	Date Digested	Date Analyzed	MRL*	Conc.
Arsenic	7060	02/03/94	02/04/94	(0.020)	0.18
Cadmium	6010	02/03/94	02/07/94	(0.004)	0.0041
Chromium	6010	02/03/94	02/07/94	(0.007)	0.022
Copper	6010	02/03/94	02/07/94	(0.006)	0.035
Lead	7421	02/03/94	02/03/94	(0.003)	0.014
Mercury	7470	02/08/94	02/08/94	(0.001)	<0.001
Nickel	6010	02/03/94	02/07/94	(0.015)	<0.015
Selenium	7740	02/03/94	02/04/94	(0.005)	<0.005
Silver	6010	02/03/94	02/07/94	(0.007)	<0.007
Zinc	6010	02/03/94	02/07/94	(0.010)	0.094

* MRL = Method Reporting Limit

Michelle L. Anderson
Metals Supervisor

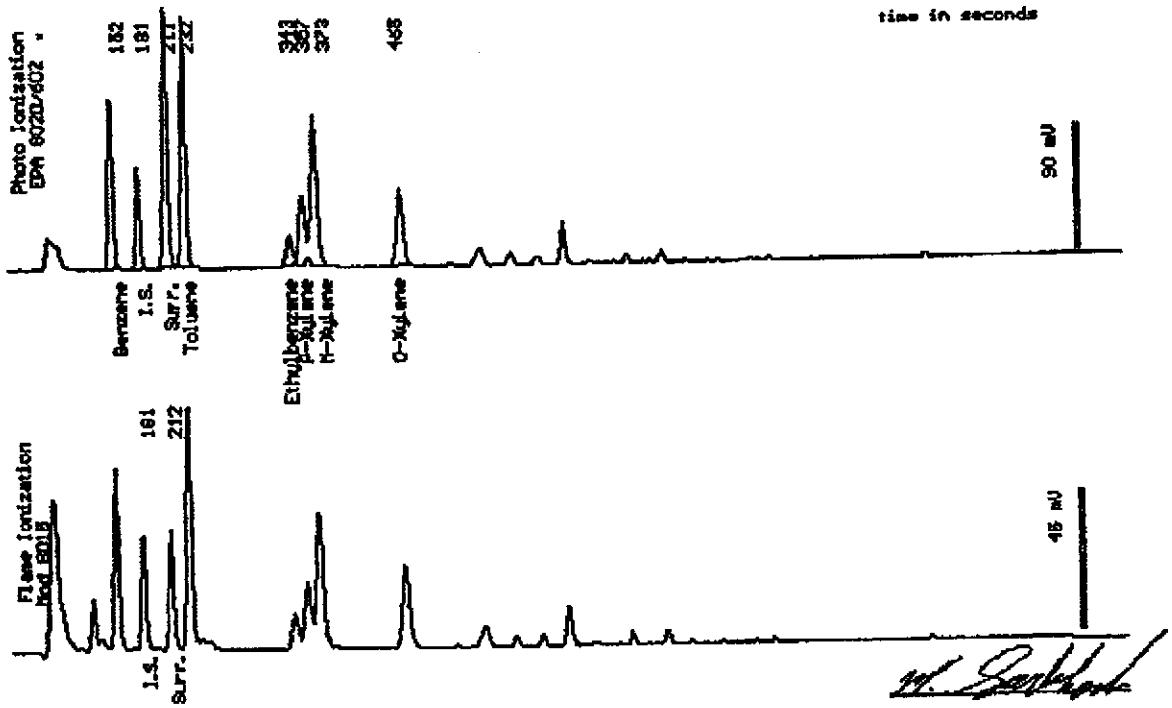
Western Environmental Science & Technology • 45133 County Road 32B • Davis, CA 95616 • 916 753-9500 • FAX: 916 757-4652

Sample Log 8528
8528-1

Sample: MW-1

From : Project # 19021.02 (Beacon 574)
Sampled : 02/01/94
Dilution : 1:10 QC Batch : 4064e
Matrix : Water

Parameter	(MRL) ug/L	Measured Value ug/L
Benzene	(5.0)	340
Toluene	(5.0)	550
Ethylbenzene	(5.0)	90
Total Xylenes	(5.0)	1000
TPH as Gasoline	(500)	3300
Surrogate Recovery		96 %



Mitra Sarkhosh
Senior Chemist

Date Analyzed: 02-07-94
Column : 0.53mm ID X 30m DBWAX (J&W Scientific)

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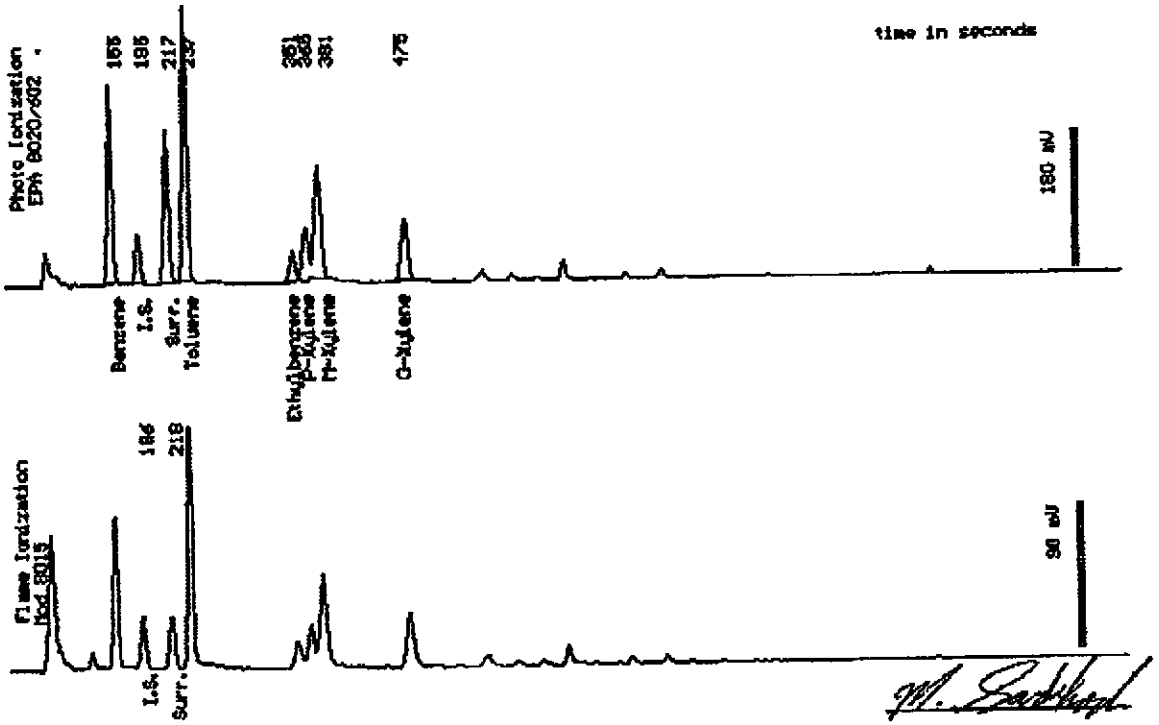
Sample Log 8528

8528-2

Sample: MW-1E

From : Project # 19021.02 (Beacon 574)
Sampled : 02/01/94
Dilution : 1:1 QC Batch : 4063G
Matrix : Water

Parameter	(MRL) ug/L	Measured Value ug/L
Benzene	(.50)	33
Toluene	(.50)	56
Ethylbenzene	(.50)	8.8
Total Xylenes	(.50)	73
TPH as Gasoline	(50)	260
Surrogate Recovery		98 %



Date Analyzed 02-09-94
Column : 0.53mm ID X 30m DBWAX (J&W Scientific)

Mitra Sarkhosh
Senior Chemist

Ultramar Inc.

BEACON

Ultramar Inc.
CHAIN OF CUSTODY REPORT

Beacon Station No.	Sampler (Print Name)	Date	Form No.
#574	Steve Licty	2-2-94	1 of 2
Project No.	**Sampler (Signature)**		
19C2002	[signature]		
Project Location	**Affiliation**		
22315 Redwood Road, Castro Valley, CA	AMC Geo		

Sample No./Identification	Date	Time	Lab No.	BTEX	TPH (gasoline)	TPH (diesel)	Phenols	Cyanide	Metals	Oil & Grease		No. of Containers	REMARKS
MW-1	2-1-94	1400		X	X							3	40 ml VOA's
MW-1	"	1405				X						1	Liter Amber
MW-1E	"	1510		X	X							3	40/VOA
MW-1E	"	1512				X						1	Liter Amber
MW-1E	"	1515					X					1	Liter Amber
MW-1E	"	1517						X				1	Cyanide
MW-1E	"	1520							X			1	Liter Poly
MW-1E	"	1525								X		2	Liter Ambers

REMARKS: 1 week TAT

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
[signature]	2-2-94	09:45	[signature] (WEST)	2-2-94	09:45
[signature] /WEST	2-2-94	11:21			
			[signature]	2/2/94	11:29

Report To: Steve Licty, AMC, fax (916) 939-7570

Bill to: ULTRAMAR INC.
525 West Third Street
Hanford, CA 93230
Attention: Kenneth Earnest

WHITE: Return to Client with Report YELLOW: Laboratory Copy PINK: Originator Copy

32-4003 L/90

Ultramar Inc.

CHAIN OF CUSTODY REPORT

BEACON

Beacon Station No.	Sampler (Print Name)	Date	Form No.
#574	STEVE LUNTY	2-2-94	2 of 2
Project No.	**Sampler (Signature)**		
18021.02	Steve Lunty		
Project Location	**Affiliation**		
2235 Redwood Road Castro Valley, CA	AMC Geo		

Sample No./Identification	Date	Time	Lab No.	BTEX	TPH (gasoline)	TPH (diesel)	TPH/Ext	No. of Containers	REMARKS
MW1C	2-1-94						X	1	Liter Amber

1 week TAT

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Steve Lunty	2-2-94	09:45	Jay A. Jayne / WEST	2-2-94	09:45
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Jay A. Jayne / WEST	2-2-94	11:21			
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
			D. Cantrell	2/2/94	11:29

Report To: Steve Lunty
AMC
(916) 939-7570

Bill to: ULTRAMAR INC.
525 West Third Street
Hanford, CA 93230
Attention: Kenneth Ernest

WHITE: Return to Client with Report YELLOW: Laboratory Copy PINK: Originator Copy

32-6003 1/90

Anlab
ANALYTICAL LABORATORY
1910 S STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2948 • FAX 916-447-8321

February 9, 1994

Western Environmental Science
& Technology
1046 Olive Drive, Suite 3
Davis, CA 95616
Attn: Les Biddle

Post-it™ brand fax transmittal memo 7671	# of pages ▸ 2
To	From
Co.	Co. Anlab
Dept.	Phone #
Fax #	Fax #

Project #: 19021.02
P.O. #: 8528
Project Name: Beacon #: 574
Location: Castro Valley

Anlab I.D. AD02675 Client Code: 315
SAMPLE DESCRIPTION: MW1-E Matrix: W
Sample collection date: 02/01-02/94 Time: 15:17, 15:15
Lab submittal date: 02/02/94 Time: 13:32
Turn-Around-Time: RUSH 5 Sample Disposal: LAB

TEST PARAMETER	UNITS	TEST RESULT	DETECTION LIMIT
Cyanide by EPA 335.2	mg/l	ND	0.0030
BOD (5) by EPA 405.1	mg/l	ND	3
pH by EPA 150.1 (Electrometric)	Std. units	7.4	--
Tot. Rec. Phenols by EPA 420.1	mg/l	0.016	0.010

ND = Not Detected

Report Approved By: Marilyn Fuca
ELAP ID #: 1468

:lmr

Ultramar Inc.
CHAIN OF CUSTODY REPORT

BEACON

Beacon Station No.	Sampler (Print Name)	ANALYSES	Date	Form No.
#574	Steve Lusty		2-2-94	2 of 2
Project No.	**Sampler (Signature)**		1 week TAT	
19621.02	Steve Lusty			
Project Location	**Affiliation**			
2235 Redwood Road Castro Valley, CA	AMW Geo			

Sample No./Identification	Date	Time	Lab No.	BTEX	TPH (gasoline)	TPH (diesel)	O&G/FH	No. of Containers	REMARKS
MW1E	2-1-94						X	1	Liter Amber

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Steve Lusty	2-2-94	09:45	Troy D. Lyon / WEST	2-2-94	09:45
Troy D. Lyon / WEST	2-2-94	11:21			
			D. Crawford	2/2/94	11:29

Report To: Steve Lusty
AMW
(916) 939-7570

Bill to: ULTRAMAR INC.
525 West Third Street
Hanford, CA 93230
Attention: Kenneth Ernest

WHITE: Return to Client with Report YELLOW: Laboratory Copy PINK: Originator Copy

Ultramar Inc.
CHAIN OF CUSTODY REPORT

BEACON

Beacon Station No.	Sampler (Print Name)	Date	Form No.
#574	Steve Liaty	2-2-94	1 of 2

Project No.: 1962002

Sampler (Signature): [signature]

Project Location: 22315 Redwood Road, Castro Valley, CA

Affiliation: AMU Geo

Sample No./Identification	Date	Time	Lab No.	BTEX	TPH (gasoline)	TPH (diesel)	Phenols	Cyanide	Metals	Oil & Grease		No. of Containers	REMARKS
MW-1	2-1-94	1400		X	X							3	40 ml voa's 8oz/cc
MW-1	"	1405				X						1	liter Amber
MW-1E	"	1510		X	X							3	8oz/cc
MW-1E	"	1512				X						1	Liter Amber
MW-1E	"	1515					X					1	liter Amber
MW-1E	"	1517						X				1	Cyanide
MW-1E	"	1520							X			1	liter Poly
MW-1E	"	1525								X		2	liter Ambers

1 week TAT

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
[signature]	2-2-94	09:45	[signature] (WEST)	2-2-94	09:45
[signature] /WEST	2-2-94	11:21			
			S. Cantrell	2/2/94	11:29

Report To: Steve Liaty, AMU, fax (916) 939-7570

Bill to: ULTRAMAR INC.
525 West Third Street
Hanford, CA 93230
Attention: Kenneth Earnest

WHITE: Return to Client with Report YELLOW: Laboratory Copy PINK: Originator Copy

32-8003 1/90

ENCLOSURE F

AIR SPARGING PILOT TEST DATA

Site: Former Beacon Station #574
Date: 2-2-94
Test Point: SP
Observation Well: MW-1
Field Conditions: Partly Cloudy, 50° F.

AIR SPARGING PILOT TEST DATA

Hour	Flow (cfm)	Temperature (degrees F.)	Pressure (psi)	Flow Corrected for Temperature and Pressure (scfm)	Observation Well MW-1			
					Pressure (inches of H_2O)	Water-Dissolved Oxygen (% of saturation)	Vapor Space CO_2 (percent)	Vapor Space TVH*
0	3.5	46	53	7.7	0	21	>20	>2,500
1	3.5	66	48	7.3	0.19	58	13.0	>2,500
2	3.7	64	47	7.6	0.16	52	4.0	>2,500
3	3.5	74	46	7.1	0.17	61	4.5	>2,500
4	3.7	77	46	7.5	0.17	57	4.0	>2,500
5	3.7	77	44	7.3	0.19	57	3.0	>2,500
6	3.5	77	45	7.0	0.18	60	4.0	>2,500
7	3.8	78	45	7.6	0.21	56	2.5	>2,500
8	3.7	74	45	7.4	0.21	67	2.0	>2,500

*Total volatile hydrocarbons: _____ as methane by flame ionization detector; __X__ as octane by Draeger tube.

trpt058.mj

ENCLOSURE G

SAMPLE AIR SPARGING FLOW RATE CALCULATIONS

AIR SPARGING PILOT TEST CALCULATIONS
AMV PROJECT NO. 19021.02

Corrected Flow Rate

The air sparging flow rate into the sparging point (SP) was corrected for temperasture and pressure. The flow rate ranged from 7.0 to 7.7 standard cubic feet per minute (scfm).

Sample Calculation: Flow = Unadjusted flow into SP in cfm
Pressure = Compressor outlet gauge pressure in psi
Temperature = Compressor air temperature in Fahrenheit

$$\text{FLOW (cfm)} \sqrt{\frac{530R}{19.7psi} \times \frac{\text{Pressure}}{\text{Test Pressure (psi)} + 14.7\ psi}} = \text{scfm}$$

$$\text{Hour 4,} \quad 3.7\ \text{cfm} \sqrt{\frac{530R}{19.7psi} \times \frac{(40_{psi} + 14.7\ psi)}{(460 + 77)}} = 7.5\ \text{scfm}$$

ENCLOSURE H

GROUND WATER SAMPLE ANALYSIS
AIR SPARGING TEST

February 10, 1994
Sample Log 8536

Steve Liaty
Acton, Mickelson & van Dam
5090 Robert J. Matthews Pkwy
El Dorado Hills, CA 95762

Subject: Analytical Results for 3 Water Samples
Identified as: Project # 19021.02 (Beacon 574)
Received: 02/02/94

Dear Mr. Liaty:

Analysis of the sample(s) referenced above has been completed. This report is written to confirm results communicated on February 10, 1994 and describes procedures used to analyze the samples.

Sample(s) were received in 40-milliliter glass vials sealed with TFE lined septae and plastic screw-caps. Each sample was transported and received under documented chain of custody and stored at 4 degrees C until analysis was performed.

Sample(s) were analyzed using the following method(s):

"BTEX" (EPA Method 602/Purge-and-Trap)
"TPH as Gasoline" (Modified EPA Method 8015/Purge-and-Trap)

Please refer to the following table(s) for summarized analytical results and contact us at 916-753-9500 if you have questions regarding procedures or results. The chain-of-custody document is enclosed.

Approved by:

Joel Kiff
Senior Chemist

Anlab
ANALYTICAL LABORATORY
1910 S STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2946 • FAX 916-447-8321

February 8, 1994

Western Environmental Science
& Technology
1046 Olive Drive, Suite 3
Davis, CA 95616
Attn: Les Biddle

Project Name: Beacon 574
Project #: 19021.02
P.O. #: 8536
Project Location: 22315 Redwood Road

Anlab I.D. AD02730 Client Code: 315
SAMPLE DESCRIPTION: MW-1 05:55 Matrix: W
Sample collection date: 02/02/94 Time: 05:55
Lab submittal date: 02/02/94 Time: 16:48
Turn-Around-Time: RUSH 5 Sample Disposal: LAB

TEST PARAMETER	UNITS	TEST RESULT	DETECTION LIMIT
Dissolved Oxygen by EPA 360.1	mg/l	2.5	0.1

Anlab I.D. AD02731 Client Code: 315
SAMPLE DESCRIPTION: MW-1 10:10 Matrix: W
Sample collection date: 02/02/94 Time: 10:10
Lab submittal date: 02/02/94 Time: 16:48
Turn-Around-Time: RUSH 5 Sample Disposal: LAB

TEST PARAMETER	UNITS	TEST RESULT	DETECTION LIMIT
Dissolved Oxygen by EPA 360.1	mg/l	6.7	0.1

Anlab I.D. AD02732 Client Code: 315
SAMPLE DESCRIPTION: MW-1 14:10 Matrix: W
Sample collection date: 02/02/94 Time: 14:10
Lab submittal date: 02/02/94 Time: 16:48
Turn-Around-Time: RUSH 5 Sample Disposal: LAB

TEST PARAMETER	UNITS	TEST RESULT	DETECTION LIMIT
Dissolved Oxygen by EPA 360.1	mg/l	6.5	0.1

Report Approved By: Marilyn Fuqua
ELAP ID #: 1468

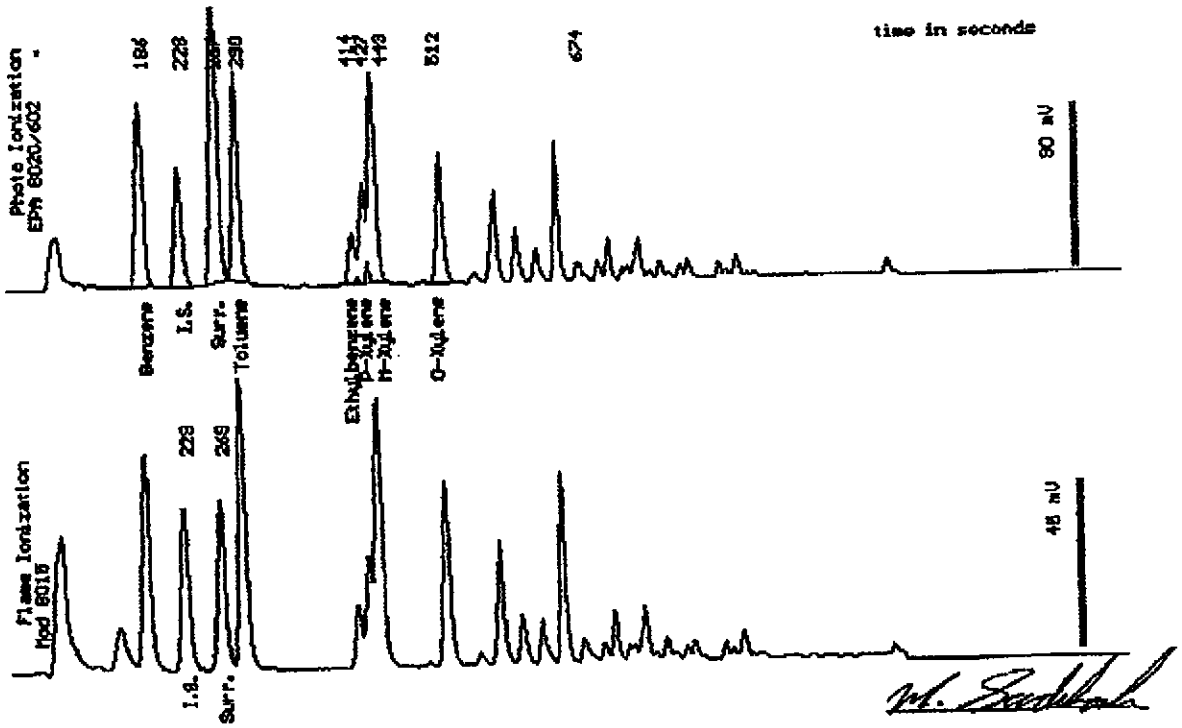
:lmr

Sample Log 8536
8536-1

Sample: MW-1 (0555)

From : Project # 19021.02 (Beacon 574)
Sampled : 02/02/94
Dilution : 1:50 QC Batch : 2051b
Matrix : Water

Parameter	(MRL) ug/L	Measured Value ug/L
Benzene	(25)	1600
Toluene	(25)	2000
Ethylbenzene	(25)	480
Total Xylenes	(25)	3700
TPH as Gasoline	(2500)	17000
Surrogate Recovery		102 %



Mitra Sarkhosh
Senior Chemist

Date Analyzed 02-09-94
Column : 0.53mm ID X 30m DBWAX (J&W Scientific)

Western Environmental Science & Technology • 45133 County Road 32B • Davis, CA 95616 • 916 753-9500 • FAX: 916 757-4652

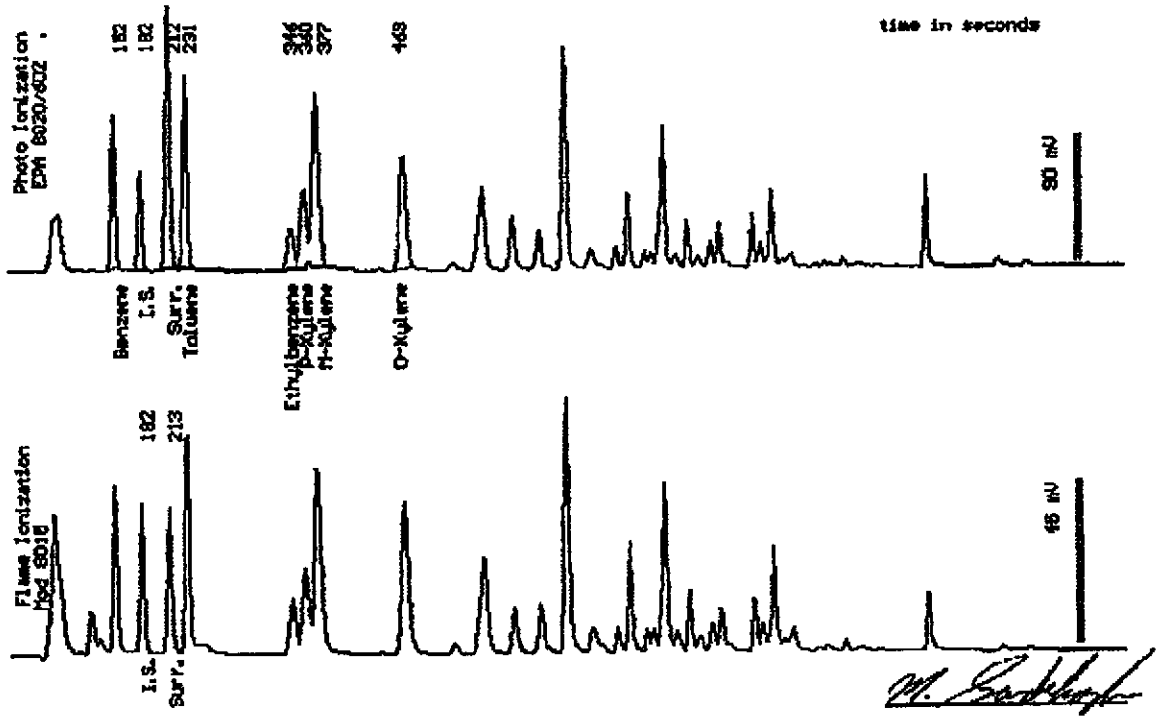
Sample Log 8536

8536-2

Sample: MW-1 (1010)

From : Project # 19021.02 (Beacon 574)
Sampled : 02/02/94
Dilution : 1:10 QC Batch : 4064g
Matrix : Water

Parameter	(MRL) ug/L	Measured Value ug/L
Benzene	(5.0)	260
Toluene	(5.0)	430
Ethylbenzene	(5.0)	140
Total Xylenes	(5.0)	1300
TPH as Gasoline	(500)	5500
Surrogate Recovery		95 %



Date Analyzed: 02-06-94
Column : 0.53mm ID X 30m DB-WAX (J&W Scientific)

Mitra Sarkhosh
Senior Chemist

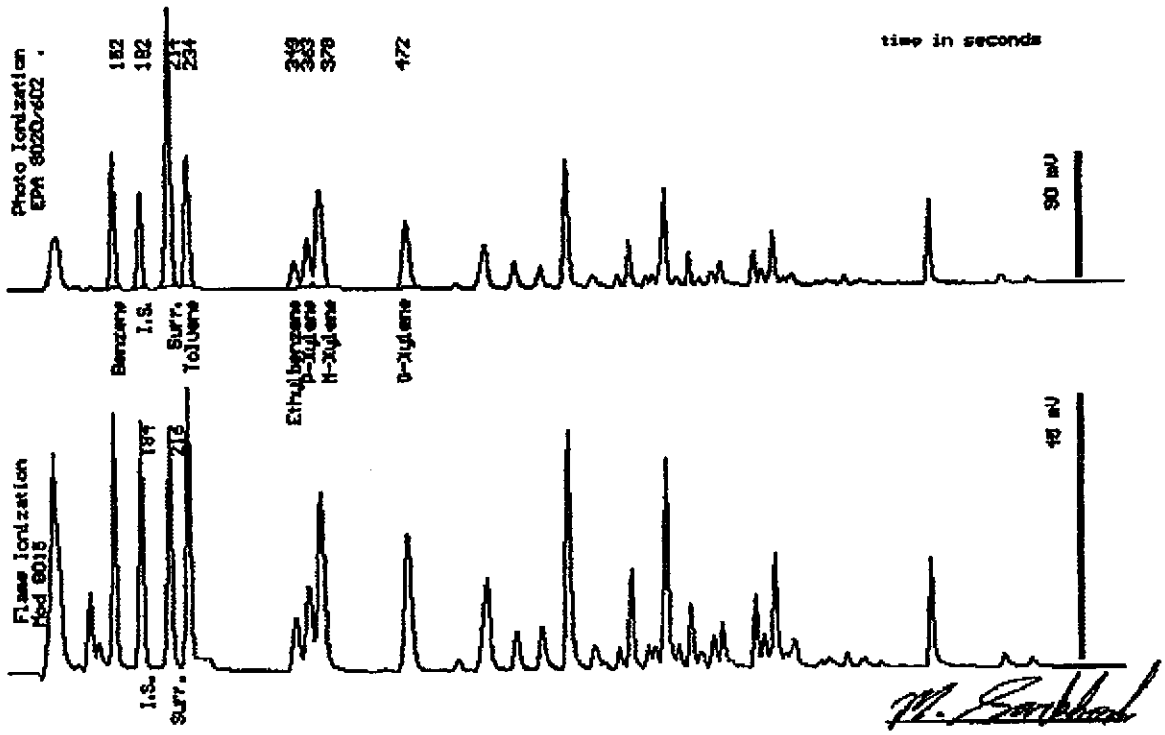
Sample Log 8536

8536-3

Sample: MW-1 (1410)

From : Project # 19021.02 (Beacon 574)
Sampled : 02/02/94
Dilution : 1:10 QC Batch : 4064g
Matrix : Water

Parameter	(MRL) ug/L	Measured Value ug/L
Benzene	(5.0)	230
Toluene	(5.0)	310
Ethylbenzene	(5.0)	77
Total Xylenes	(5.0)	710
TPH as Gasoline	(500)	3600
Surrogate Recovery		95 %



Date Analyzed: 02-08-94
Column : 0.53mm ID X 30m DBWAX (J&W Scientific)

Nitra Sarkhosh
Senior Chemist

Ultramar Inc.

CHAIN OF CUSTODY REPORT

BEACON

Beacon Station No.	Sampler (Print Name)	Date	Form No.
#574	STEVE LAITY	2-2-94	1 of 1
Project No.	**Sampler (Signature)**		
19021.02	Steve Laity		
Project Location	**Affiliation**		
22315 Redwood Road Castro Valley, CA	AMV Geo		

D.G samples have 12 hour hold time

BTEX/TPHG on 1 week TAT

Sample No./Identification	Date	Time	Lab No.	BTEX	TPH (gasoline)	TPH (diesel)	Dissolved O2	No. of Containers	REMARKS
MW-1 (0555)	2-2-94	0555		X	X		X	4	3 40ml VOA's / 1 500ml poly
MW-1 (1000)	2-2-94	1000		X	X		X	4	
MW-1 (1410)	2-2-94	1410		X	X		X	4	

Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Steve Laity	2-2-94	1622			
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
Relinquished by: (Signature/Affiliation)	Date	Time	Received by: (Signature/Affiliation)	Date	Time
			WCC	2/2/94	1622

Report To:	Bill to:
Steve Laity (916) 939-7570 fax	ULTRAMAR INC. 525 West Third Street Hanford, CA 93230 Attention: Kenneth Earnest

WHITE: Return to Client with Report YELLOW: Laboratory Copy PINK: Originator Copy

32-8003 1/99