Environmental
Science &
Engineering, Inc.
A CILCORP Company

STID 4043

May 6, 1993

Project No. 6-92-5003

Mr. Juan Arreguin
City of Emeryville
Department of Public Works
2200 Powell Street
Emeryville, California 94608

SUBJECT: **Emeryville Marina Fuel Tank Farm, Emeryville, California**

Dear Mr. Arreguin:

Environmental Science & Engineering, Inc. (ESE) presents the following results of a subsurface investigation conducted for the City of Emeryville Department of Public Works (DPW). The investigation included the installation of a ground water monitoring well near the underground storage tank (UST) at the subject site.

Objective
The objective of this work was to assess the presence, if any, and extent of petroleum hydrocarbons in the subsurface ground water near the underground storage tank by drilling one soil boring and by converting the boring to a ground water monitoring well adjacent to the UST. A ground water sample was collected and analyzed for petroleum hydrocarbons.

Procedures
ESE obtained a monitoring well permit from the Alameda County Flood Control District, Zone 7, Well Department to install one ground water monitoring well. ESE prepared a site-specific health and safety plan which all field personnel reviewed prior to the initiation of field work.

Figure 1 - Site Map shows the approximate location of the ground water monitoring well MW-1. On April 8, 1993, one soil boring was drilled within five feet of the UST with 8-inch hollow-stem augers in accordance with ESE's Standard Operating Procedure (SOP) No. 1 (Attachment A). Soil cuttings from the borings were placed in Department of Transportation (DOT) rated 55-gallon drums, labeled, and stored at the subject property. The soil boring was drilled to a depth 18.5 feet below ground surface (bgs). Ground water was found at an approximate depth of 4.5 feet bgs. Boring MW-1 was converted to a ground water monitoring well following ESE's SOP No. 2 (Attachment A).

A two-inch polyvinyl chloride (PVC) well was installed in boring MW-1, located north of the UST. The screened interval was installed at depths from approximately 18.5 to 3.5 feet bgs, so that the top of the screen would be above the water level. The well construction details are included on the attached boring log (Attachment B). Prior to the installation of the annular seal, the well was developed by mechanical surging and bailing as described in ESE's SOP No. 2 (Attachment A). Approximately 10 gallons of water were bailed from the well.

On April 13, 1993, ESE measured the static water level using an electric water level tape prior to purging and sampling. No free phase product was observed in the well. A minimum of three well-casing volumes of ground water were purged from the well prior to collection of the ground water samples. ESE purged approximately 40 gallons of ground water from the well. During the well purging process the pH, conductivity and temperature of the ground water was periodically monitored for stabilization to ensure the collection of samples representative of the aquifer surrounding the well. Ground water was purged from the well using a pneumatic displacement pump. A ground water sampling data form with recorded measurements of pH, conductivity and temperature of the purged water from the well is included as Attachment C - Ground Water Sampling Data Form. All purged ground water and equipment rinse solutions were contained on site in DOT 55-gallon drums pending analytical results and proper recycling.

A ground water sample was collected from the well in accordance with the attached ESE's SOP No. 3 (Attachment A). Ground water samples, including a duplicate sample, were collected and submitted to Curtis & Tompkins, Ltd. for Total Petroleum Hydrocarbons as Gasoline (TPH-G) and for Total Petroleum Hydrocarbons as Diesel (TPH-D) by EPA Method 5030/8015M and the volatile organics Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) by EPA Method 5030/8020.

The ground water sample was obtained from well MW-1 using a new disposable polyethylene bailer lowered into the well using new nylon cord. The ground water from the bailer removed from the well was decanted into laboratory supplied 40-milliliter glass vials containing a trace amount of hydrochloric acid (a preservative) and one-liter amber bottles. Five vials and two liter bottles were collected from the well. The sample containers were then sealed with a Teflon lined cap, labeled, placed on ice in a cooler and under chain of custody for transport to Curtis & Tompkins, Ltd. (C&T), of Berkeley, California. C&T is a state certified analytical laboratory.

Findings

Clay and silty clay fill material containing pieces of bricks, metal, and wood were found in the boring below 6 inches of gravel to the bottom of the boring at a depth of 18.5 feet bgs. No petroleum hydrocarbon odors were observed during drilling activities. However, a strong odor emanated from the soil cuttings from a depth of approximately 15 feet bgs. The boring log is presented as Attachment B. Ground water was encountered in boring MW-1 at an approximate depth of 4.5 feet.

On April 13, 1993, ESE measured the static water level in well MW-1 using an electric water level tape prior to purging and sampling. The static water level measured was at 4.16 feet from the top of the well casing. No free phase product was observed in the well. Analysis of the ground water sample reported nondetectable concentrations of BTEX. However, TPH-G and TPH-D were reported at concentrations of 170 and 4,000 micrograms per liter (ug/L), or parts per billion (ppb), respectively. Laboratory reports and chain of custody documents are attached (Attachment D).

TPH-G = 170 ppb
TPH-D = 4,000 ppb

Conclusions and Recommendations

Analyses of ground water sample collected from well MW-1 showed nondetectable concentrations of BTEX. Concentrations of TPH-G and TPH-D were detected in the ground water sample from MW-1. However, the nature of the fill material found in the boring suggests that petroleum hydrocarbons is inherent in the fill material itself and may contribute to detectable concentrations of TPH-G and TPH-D in the ground water.

In order to further assess the significance of detectable concentrations of petroleum hydrocarbons in well MW-1, ESE recommends conducting quarterly monitoring activities at the site for a minimum of three quarters. These activities will include measuring the ground water level and purging and sampling well MW-1. Estimated costs for conducting additional ground water monitoring for three quarters was presented as Task 4 of ESE's Proposal No. 92-C-261 (REV.1) dated October 28, 1992.

ESE also recommends historical review of the site and vicinity. Historical review of site and vicinity may substantiate reasons for background concentrations of petroleum hydrocarbons in fill and/or ground water.

• • • • •

Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by other hydrogeologists and engineers practicing in this field. No other warranty, express or implied, is made as to the professional advice in this report.

ESE will finalize this letter report upon your review and approval. ESE will then transmit two copies of the final report, one of which you can then transmit to the Alameda County Health Care Services Agency (ACHCSA).

If you have any questions regarding the material presented in this report, please contact Kerry Lefever or Patrick Galvin at (510) 685-4053.

Sincerely,

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.

Kerry Lefever

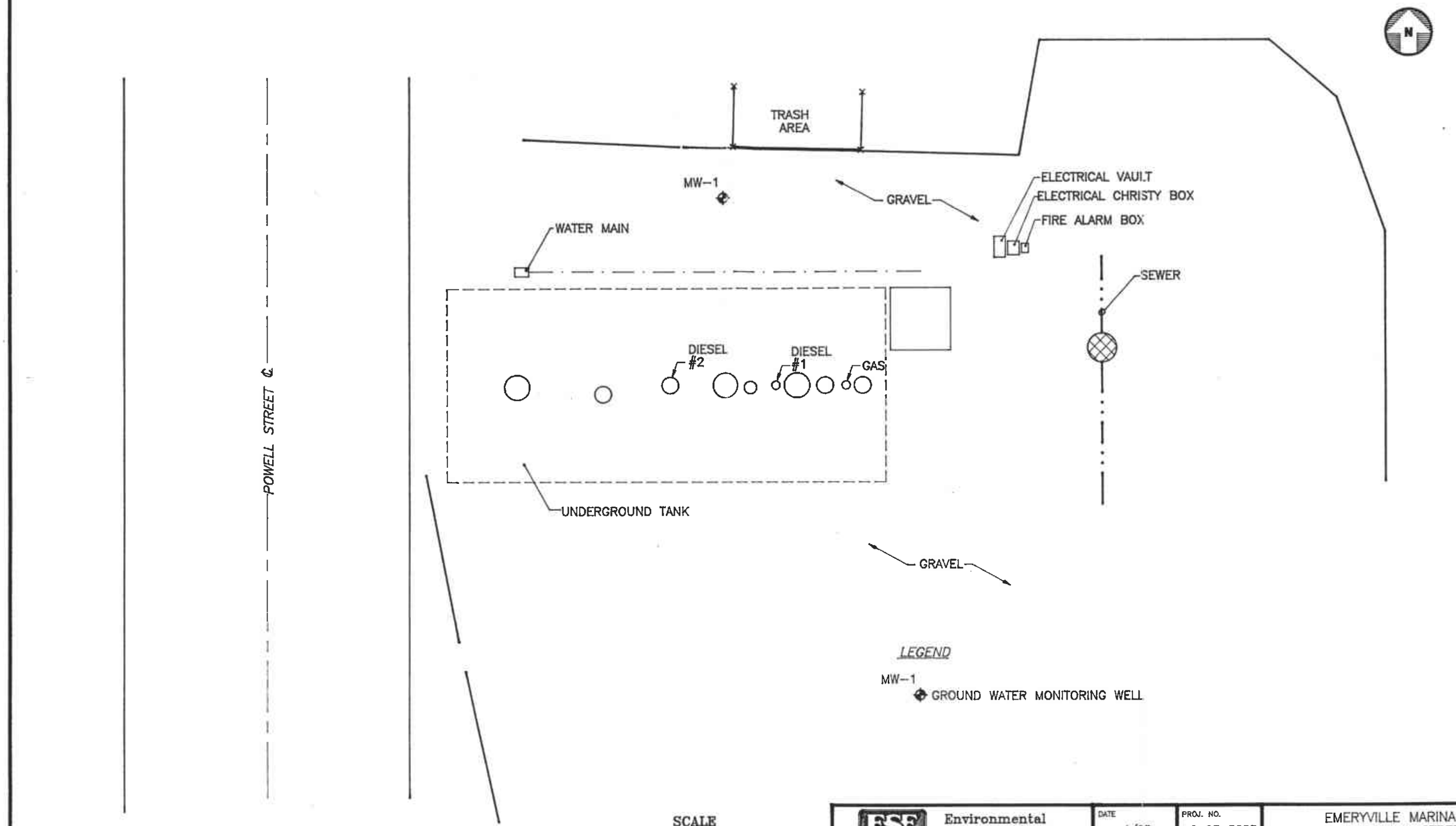
Kerry Lefever
Senior Staff Geologist

Susan S. Wickham

Susan S. Wickham, RG 3851
Senior Geologist

Enclosures (5)

F:\...\6925003\SITEASSE.RPT



ESE A CELORP Company — Environmental Science & Engineering, Inc. 4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	DATE: 4/93	PROJ. NO.: 6-93-5003	EMERYVILLE MARINA 3310 POWELL STREET EMERYVILLE, CALIFORNIA
	DRAWN BY: DWR	CAD FILE: 50031001	FIGURE 1 SITE MAP
	APPROVED BY:	REVISED:	

ATTACHMENT A

ESE'S STANDARD OPERATING PROCEDURES

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 1
FOR SOIL BORINGS AND SOIL SAMPLING WITH HOLLOW-STEM AUGERS IN UNCONSOLIDATED FORMATIONS

Environmental Science & Engineering, Inc. (ESE) typically drills soil borings using a truck-mounted, continuous-flight, hollow-stem auger drill rig. The drill rig is owned and operated by a drilling company possessing a valid State of California C-57 license. The soil borings are conducted under the direct supervision and guidance of an experienced ESE geologist. The ESE geologist logs each borehole during drilling in accordance with the Unified Soil Classification System (USCS). Additionally, the ESE geologist observes and notes the soil color, relative density or stiffness, moisture content, odor (if obvious) and organic content (if present). The ESE geologist will record all observations on geologic boring logs.

Soil samples are collected during drilling at a minimum of five-foot intervals by driving an 18-inch long Modified California Split-spoon sampler (sampler), lined with new, thin-wall brass sleeves, through the center of and ahead of the hollow stem augers, thus collecting a relatively undisturbed soil sample core. The brass sleeves are typically 2-inches in diameter and 6-inches in length. The sampler is driven by dropping a 140-pound hammer 30-inches onto rods attached to the top of the sampler. Soil sample depth intervals and the number of hammer blows required to advance the sampler each six-inch interval are recorded by the ESE geologist on geologic boring logs. The ends of one brass sleeve are covered with Teflon sheeting, then covered with plastic end caps. The end caps are sealed to the brass sleeve using duct tape. Each sample is then labeled and placed on ice in a cooler for transport under chain of custody documentation to the designated analytical laboratory. A portion of the remaining soil in the sampler is placed in either a new Ziploc® bag or a clean Mason Jar® and set in direct sunlight to enhance the volatilization of any Volatile Organic Compounds (VOCs) present in the soil. After approximately 15-minutes that sample is screened for VOCs using a photoionization detector (PID). The PID measurements will be noted on the geologic boring logs. The PID provides qualitative data for use in selecting samples for laboratory analysis. Soil samples from the saturated zone (beneath the ground-water table) are collected as described above, are not screened with the PID, and are not submitted to the analytical laboratory. The samples from the saturated zone are used for descriptive purposes. Soil samples from the saturated zone may be retained as described above for physical analyses (grain size, permeability and porosity testing).

If the soil boring is not going to be completed as a well, then the boring is typically terminated upon penetrating the saturated soil horizon or until a predetermined interval of soil containing no evidence of contamination is penetrated. This predetermined interval is typically based upon site specific regulatory or client guidelines. The boring is then backfilled using either neat cement, neat cement and bentonite powder mixture (not exceeding 5% bentonite), bentonite pellets, or a sand and cement mixture (not exceeding a 2:1 ratio of sand to cement). However, if the boring is to be completed as a monitoring well, then the boring is continued until either a competent, low estimated-permeability, lower confining soil layer is found or 10 to 15-feet of the saturated soil horizon is penetrated, whichever occurs first. If a low estimated-permeability soil layer is found, the soil boring will be advanced approximately five-feet into that layer to evaluate its competence as a lower confining layer, prior to the termination of that boring.

All soil sampling equipment is cleaned between each sample collection event using an Alconox® detergent and tap water solution followed by a tap water rinse. Additionally, all drilling equipment and soil sampling equipment is cleaned between borings, using a high pressure steam cleaner, to prevent cross-contamination. All wash and rinse water is collected and contained onsite in Department of Transportation approved containers (typically 55-gallon drums) pending laboratory analysis and proper disposal/recycling.

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 2
FOR MONITORING WELL INSTALLATION AND DEVELOPMENT
PAGE 1

Environmental Science & Engineering, Inc. (ESE) typically installs ground-water monitoring wells in unconsolidated sediments drilled using a truck-mounted hollow-stem auger drill rig. The design and installation of all monitoring wells is performed and supervised by an experienced ESE geologist. Figure A - Typical ESE Monitoring Well Construction Diagram (attached) graphically displays a typical ESE well completion. Prior to the construction of the well, the portion of the borehole that penetrates a lower confining layer (if any) is filled with bentonite pellets. The monitoring well is then constructed by inserting polyvinylchloride (PVC) pipe through the center of the hollow stem augers. The pipe (well-casing) is fastened together by joining the factory threaded pipe ends. ESE typically uses two-inch or four-inch diameter pipe for ground-water monitoring wells. The diameter of the borehole is typically 6-inches greater than that of the diameter of the well-casing, but is at least four-inches greater than that of the well casing. The lowermost portion of the well-casing will be factory perforated (typically having slot widths of 0.010-inch or 0.020-inch). The slotted portion of the well-casing will extend from the bottom of the boring up to approximately five-feet above the occurrence of ground water. A PVC slip or threaded cap will be placed at the bottom end of the well-casing, and a locking expandable well cap will be placed over the top (or surface) end of the well-casing. A sand pack (typically No. 2/12 or No. 3 Monterey sand) will be placed in the borehole annulus, from the bottom of the well-casing up to one to two-feet above the top of the slotted portion, by pouring the clean sand through the hollow stem augers. One to two-feet of bentonite pellets will be placed on top of the sand pack. The bentonite pellets will then be hydrated with three to four-gallons of potable water, to protect the sand pack from intrusion during the placement of the sanitary seal. The sanitary seal (grout) will consist of either neat cement, a neat cement and bentonite powder mixture (containing no more than 5% bentonite), or a neat cement and sand mixture (containing no more than a 2:1 sand to cement ratio). If, the grout seal is to be greater than 30-feet in depth or if standing water is present in the boring on top of the bentonite pellet seal, then the grout mixture will be tremied into the boring from the top of the bentonite seal using either a hose, pipe or the hollow-stem augers, which serve as a tremie. The well will be protected at the surface by a water tight utility box. The utility box will be set into the grout mixture so that it is less than 0.1-foot above grade, to prevent the collection of surface water at the well head. If the well is set within the public right of way, then the utility box will be Department of Transportation (DOT) traffic rated, and the top of the box will be set flush to grade. If the well is constructed in a vacant field a brightly painted metal standpipe may be used to protect the well from traffic. If a standpipe is used, it will be held in place with a grout mixture and will extend one to two-feet above ground surface. All well completion details will be recorded by the ESE geologist on the geologic boring logs.

Subsequent to the solidification of the sanitary seal of the well (a minimum of 72 hours), the new well will be developed by an ESE geologist or field technician. Well development will be performed using surging, bailing and overpumping techniques. Surging is performed by raising and lowering a surge block through the water column within the slotted interval of the well casing. The surge block utilized has a diameter just smaller than that of the well casing, thus, forcing water flow through the sand pack due to displacement and vacuum caused by the movement of the surge block. Bailing is performed by lowering a bailer to the bottom of the well and gently bouncing the bailer off of the well end cap, then removing the full bailer and repeating the procedure. This will bring any material (soil or PVC fragments) that may have accumulated in the well into suspension for removal. Overpumping is performed by lowering a submersible pump to the bottom of each well and pumping at the highest sustainable rate without completely evacuating the well casing. Effective well development will settle the sand pack surrounding the well-casing, which will improve the filtering properties of the sand pack and allow water to flow more easily through the sand pack; improve the communication between the aquifer and the well by aiding the removal of any smearing of fine sediments along the borehole penetrating the aquifer; and, remove fine sediments and any foreign objects (PVC fragments) from the well casing. The ESE geologist or

technician will monitor the ground water purged from the well during development for clarity, temperature, pH and conductivity. Development of the well will proceed until the well produces relatively clear, sand-free water with stable temperature, pH and conductivity measurements. At a minimum, 10 well-casing volumes of ground water will be removed during the development process. Measurements of temperature, conductivity, pH and volume of the purged water and observations of purge water clarity and sediment content will be recorded on the ESE Well Development Data Forms. All equipment used during the well development procedure will be cleaned using an Alconox® detergent and tap water solution followed by a tap water rinse prior to use in each well. All ground water purged during the well development process and all equipment rinse water will be collected and contained onsite in DOT approved containers (typically 55-gallon drums) pending analytical results and proper disposal or recycling.

ATTACHMENT B

BORING LOG

ENVIRONMENTAL SCIENCE & ENGINEERING, INC.
CONCORD, CALIFORNIA OFFICE

STANDARD OPERATING PROCEDURE NO. 3
FOR GROUND-WATER MONITORING AND SAMPLING FROM MONITORING WELLS

Environmental Science & Engineering, Inc. (ESE) typically performs ground-water monitoring at project sites on a quarterly basis. As part of the monitoring program an ESE staff member will first gauge the depth to water and free product (if present) in each well, then collect ground-water samples from each well. Depth to water measurements are taken by lowering an electric fiberglass tape measure into the well and recording the occurrence of water in feet below a fixed datum set on the top of the well-casing. If free-phase liquid hydrocarbons (free product) are known or suspected to be present in the well, then an electric oil/water interface probe is used to determine the depth to the occurrence of ground-water and the free product in feet below the fixed datum on the top of the well-casing. Depth to water and depth to product measurements are measured and recorded within an accuracy of 0.005-foot. The electric tape and the electric oil/water interface probe are washed with an Alconox® detergent and tap water solution then rinsed with tap water between uses in different wells.

Ground-water samples are collected from a well subsequent to purging a minimum of three to four well-casing volumes of ground water from the well, if the well bails dry prior to the removal of the required minimum volume, then the samples are collected upon the recovery of the ground water in that well to 80% of its initial static level. Ground water is typically purged from monitoring wells using either a hand-operated positive displacement pump, constructed of polyvinylchloride (PVC); a new (precleaned), disposable polyethylene bailer; or, a variable-flow submersible pump, constructed of stainless steel and Teflon®. The hand pumps and the submersible pumps are cleaned between each use with an Alconox® detergent and tap water solution followed by a tap water rinse. During the well purging process the conductivity, pH and temperature of the ground water are monitored by the ESE staff member. Ground-water samples are collected from the well subsequent to the stabilization of the of the conductivity, pH and temperature of the purge water, and the removal of four well-casing volumes of ground-water (unless the well bails dry). The parameters are deemed to have stabilized when two consecutive measurements are within 10% of each other, for each respective parameter. The temperature, pH, conductivity and purge volume measurements, and observations of water clarity and sediment content will be documented by the ESE staff member on ESE Ground-Water Sampling Data Forms.

Ground-water samples are collected by lowering a new (precleaned), disposable polyethylene bailer into the well using new, disposable nylon cord. The filled bailer is retrieved, emptied, then filled again. The ground water from this bailer is decanted into appropriate laboratory supplied glassware and/or plastic containers (if sample preservatives are required, they are added to the empty containers at the laboratory prior to the sampling event). The containers are filled carefully so that no headspace is present to avoid volatilization of the sample. The filled sample containers are then labeled and placed in a cooler with ice for transport under chain of custody documentation to the designated analytical laboratory. The ESE staff member will document the time and method of sample collection, and the type of sample containers and preservatives (if any) used. These facts will appear on the ESE Ground-Water Sampling Data Forms. ESE will collect a duplicate ground-water sample from one well for every ten wells sampled at each site. The duplicate will be a blind sample (its well designation will be unknown to the laboratory). The duplicate sample is for Quality Assurance and Quality Control (QA/QC) purposes, and provides a check on ESE sampling procedures and laboratory sample handling procedures. When VOCs are included in the laboratory analyses, ESE will include a trip blank, if required, in the cooler with the ground-water samples for analysis for the identical VOCs. The trip blank is supplied by the laboratory and consists of deionized water. The trip blank is for QA/QC purposes and provides a check on both ESE and laboratory sample handling and storage procedures. Since disposable bailers are used for sample collection, and are not reused, no equipment blank (rinsate) samples are collected.

UNIFIED SOIL CLASSIFICATION SYSTEM (USC)

MAJOR DIVISIONS			GROUP SYMBOLS	DESCRIPTION	GRAPHIC LOG
COARSE GRAINED SOILS: 50% or more retained on the No. 200 sieve.	GRAVELS: More than half of coarse fraction retained on the No. 4 sieve.	Clean sands	GW	Well-graded gravels, gravel-sand mixtures, little or no fines.	
			GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines.	
		Gravels with fines	GM	Silty gravels, gravel-sand mixtures.	
			GC	Clayey gravels, gravel-sand-clay mixtures.	
	SANDS: More than half of coarse fraction passing the No. 4 sieve.	Clean sands	SW	Well-graded sands, gravelly sands, little or no fines.	
			SP	Poorly-graded sands, gravelly sands, little or no fines.	
		Sands with fines	SM	Silty sands, sand-silt mixtures.	
			SC	Clayey sands, sand clay mixtures.	
FINE GRAINED SANDS: More than 50% passing the No. 200 sieve.	SILTS AND CLAYS	Liquid Limit below 50%	ML	Inorganic silts and very fine sands.	
			CL	Inorganic clays, gravelly clays, sandy clays, lean clays.	
			OL	Organic silts and organic clays.	
			MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.	
		Liquid Limit 50% and above	CH	Inorganic fat clays.	
			OH	Organic clays or organic silts.	
Highly organic soils			Pt	Peat, organic content greater than 60%.	

BEDROCK

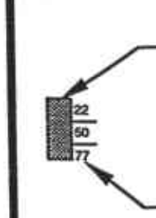
Sandstone		Metamorphics	
Shale		Volcanics	
Siltstone			

WELL INSTALLATION

SYMBOL	DESCRIPTION
	Bentonite/cement grout
	Bentonite Pellets
	Sand
	Screen section of well or piezometer
	Blank section of well or piezometer with centralizer
	Traffic rated well box with locking water-tight cap

See log for details of installation.

LEGEND



Vapor

Field Photolonization detector reading in parts per million (ppm). See remarks on log for background readings and comments.

ESE A CH2M HILL COMPANY
Environmental Science & Engineering, Inc.
4090 Nelson Avenue, Suite J
Concord, CA 94520
(415) 685-4053

LEGEND TO LOGS

DRAWN BY	DATE	FILE NAME
CVS	3/91	LEGEND

Environmental Science & Engineering, Inc.

A CILCORP Company

BORING LOG AND WELL COMPLETION SUMMARY

MW-1

Page 1 of 1

WELL COMPLETION

Completion Depth: 25 Feet

Size/Type	From	To
Casing: 2" PVC SCH. 40	0	3.5
Screen: Slot 0.02" PVC	3.5	18.5
Filter: Monterey #3 Sand	18.5	3
Seal: Bentonite Pellets	3	2.5
Grout	2.5	0

Well Cap or Box: Cap, Well box

Project Name: Emeryville Marina Project No: 6-92-5003

Location: 3310 Powell Street
Emeryville, California

Driller: Soils Exploration Services, Inc.
Method: Hollow Stem Auger
Hole Diameter: 8 In. O.D. Total Depth: 18.5 Feet
Ref. Elevations:
Logged By: Kerry Lefever

Dates:
Start: 4-8-93
Finish: 4-8-93

Depth (ft)	Lithologic Description	USC	Graphic Log: Sample/Blows	Graphic Log: Lithology	Graphic Log: Well Installation	Vapor	Remarks: Water, drilling/completion, summary, sample type
0	Gravel at Surface FILL CLAY TO SILTY CLAY; light brown to dark brown, pieces of brick, pebbles to 1".	GP					Hand auger to 3 Feet Hnu Breathing Zone = 0 No Soil Samples collected.
	CLAY; black, moderate plasticity, soft, moist.						
5							▼ Ground Water @ 4.5 Feet
	CLAY; black, pieces of bricks, pieces of metal , appears like asphalt, but no odor.						
10		CL					Hnu downhole = 0
	CLAY; dark gray to black, with fibrous debris (wood) creosote(?) odor.						
15							Hard Drilling at 17 Feet
							Total Depth = 18.5 Feet
20							Developed well prior to placing seal.

REGISTERED GEOLOGIST
SUSAN S. WIGHTMAN
6053

ATTACHMENT C

GROUND WATER SAMPLING DATA FORM

WELL SAMPLING FIELD LOG

PROJECT NAME: Emeryville - Marina
PROJECT MANAGER: PGJ
SAMPLER: KL
GROUNDWATER: _____ OTHER: _____

DATE: 4/13/93
CLIENT: Emeryville - DPW
SAMPLE LOCATION I.D. MW-1
START TIME: _____

CASING ELEVATION (FT): _____ DATUM: _____ CASING DIAMETER: 2" X 4" __ OTHER __

dtw 14.90 from surface

DEPTH TO WATER (FT): 4.16 (TOC) DEPTH OF WELL (FT): 18.5 DIFFERENCE (FT): 14.34

WATER ELEVATION (FT): _____ CALCULATED WELL VOLUME (GAL): 2.34

ACTUAL PURGE VOLUME (GAL): 40 gal MINIMUM PURGE VOLUME (3 x WV): 9.36

FIELD MEASUREMENTS

TIME	Volume (GAL)	pH (Units)	E.C. (x 1000)	Temp.	Clarity & Color	Other
1130	2	10.12	10.12	71.5	dk gry, ~~cloudy~~ silty	
1135	5	9.65	3.52 ~~9.65~~	70.1	"	
1138	10	9.13	3.24	69.1	gry, cloudy	st odor
1142	20	8.92	3.43	67.1		
1150	30	8.82	3.45	65.1	gry, cloudy	
1152	35	8.78	3.51	64.1	"	
1155	40	8.76	3.42	64.0		

PURGE METHOD

X Pneumatic Displacement Pump __Other
__Bailer (Teflon/PVC/SS) __Submersible Pump

SAMPLE METHOD

__Bailer (Teflon/PVC/SS) __Dedicated
X Bailer (Disposable) __Other

WELL INTEGRITY: _____

REMARKS: dtw 4.15 @ 1215
Sampled @ 1230 4/13/93

SIGNATURE: Kerry Lefever CHECKED BY: _____

SELECTED WELL CASING DIAMETERS VOLUMES PER UNIT LENGTH

WELL CASING I.D. (inches)	GAL/FT	CUBIC FT/FT
2.0	0.1632	0.0218
4.0	0.6528	0.0873
6.0	1.4690	0.1963

CONVERSION FACTORS

TO CONVERT	INTO	MULTIPLY
Feet of Water	Lbs/Sq. Inch	0.4335
Lbs/Sq. Inch	Feet of Water	2.3070
Cubic Feet	Gallons	7.4800
Gallons	Liters	3.7850
Feet	Meters	0.3048
Inches	Centimeters	2.5400

ATTACHMENT D

CHAIN OF CUSTODY DOCUMENTS AND LABORATORY REPORTS

DUPLICATE

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

DATE RECEIVED: 04/13/93
DATE REPORTED: 04/22/93

LABORATORY NUMBER: 110624

4 1993

CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING

PROJECT ID: 6-92-5003

LOCATION: EMERYVILLE MARINA

RESULTS: SEE ATTACHED

Teresa K. Morrison
Reviewed by

Reviewed by

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 110624
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
PROJECT ID: 6-92-5003
LOCATION: EMERYVILLE MARINA

DATE SAMPLED: 04/13/93
DATE RECEIVED: 04/13/93
DATE EXTRACTED: 04/14/93
DATE ANALYZED: 04/21/93
DATE REPORTED: 04/22/93

Extractable Petroleum Hydrocarbons in Aqueous Solutions
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT SAMPLE ID	KEROSENE RANGE (ug/L)	DIESEL RANGE (ug/L)	REPORTING LIMIT (ug/L)	SURROGATE RECOVERY (Hexacosane)
110624-001	MW-1	**	4,000	50	111 %
METHOD BLANK	N/A	ND	ND	50	96 %

ND = Not detected at or above the reporting limit.
** = Quantitated as diesel due to overlap of hydrocarbon ranges.

Surrogate recovery limits: 75% - 125%

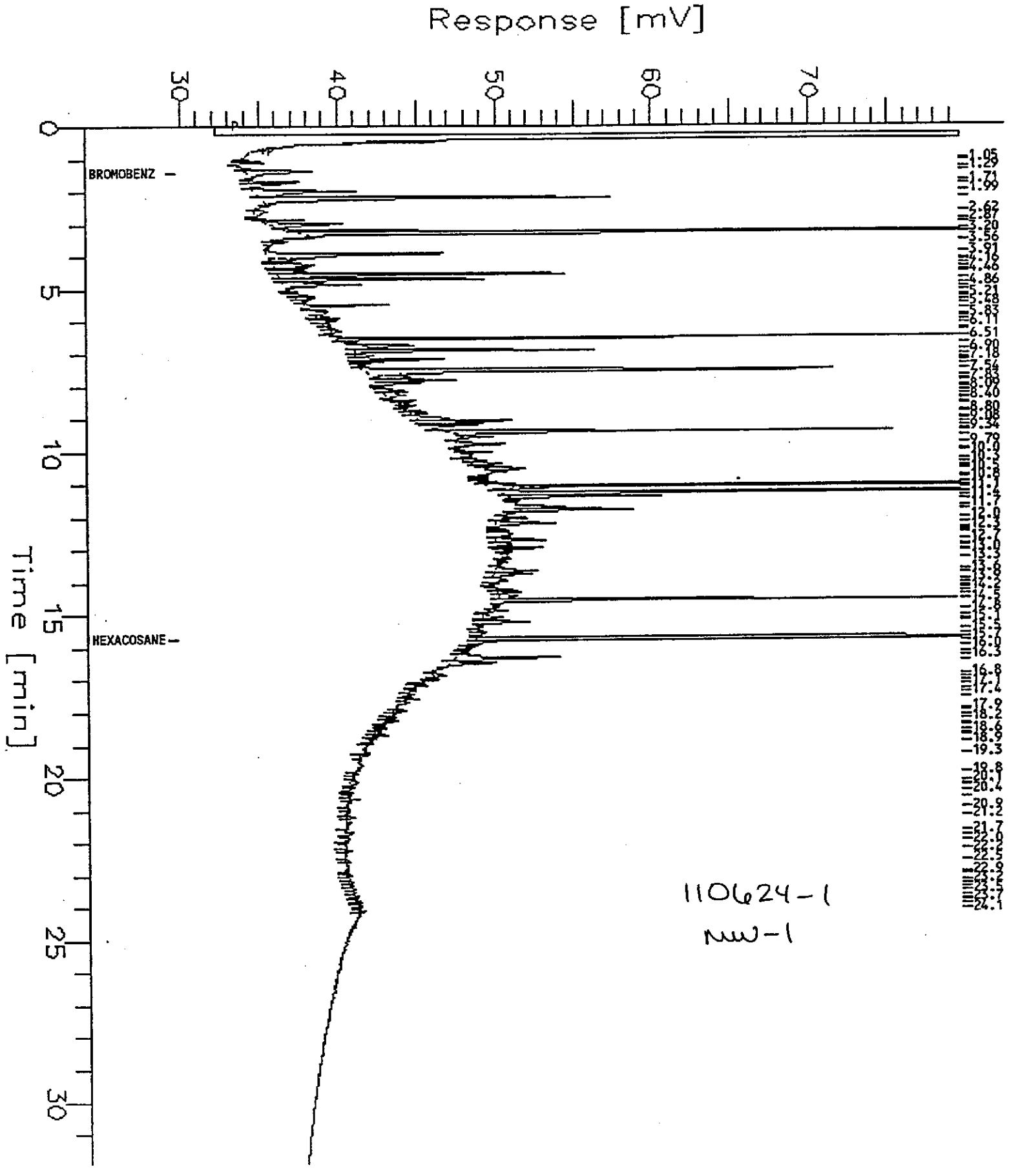
QA/QC SUMMARY: MS/MSD (Spiked Sample: 110586-007)

RPD,%	4
RECOVERY,%	100

TEH Chromatogram GC11 CH B

ple Name : 110624-001 980:5
FileName : g:\gc11\chb\110b021.raw
Method : GC11DB5.ins
Start Time : 0.00 min End Time : 31.92 min
Scale Factor: -1 Plot Offset: 30 mV

Sample #: 8901
Date : 4/21/93 8:14 AM
Time of Injection: 4/21/93 7:37 AM
Low Point : 29.70 mV High Point : 79.70 mV
Plot Scale: 50 mV



110624-1
MW-1

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 110624
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
PROJECT ID: 6-92-5003
LOCATION: EMERYVILLE MARINA

DATE SAMPLED: 04/13/93
DATE RECEIVED: 04/13/93
DATE ANALYZED: 04/16/93
DATE REPORTED: 04/22/93

Total Volatile Hydrocarbons as Gasoline in Aqueous Solutions
California DOHS Method
LUFT Manual October 1989

LAB ID	CLIENT ID	TVH AS GASOLINE (ug/L)	REPORTING LIMIT (ug/L)	SURROGATE RECOVERIES TFT	BFB
110642-001	MW-1	170	50	103 %	90 %
METHOD BLANK	N/A	ND	50	102 %	87 %

TFT = Trifluorotoluene (Limits: 69-120)
BFB = Bromofluorobenzene (Limits: 70-122)

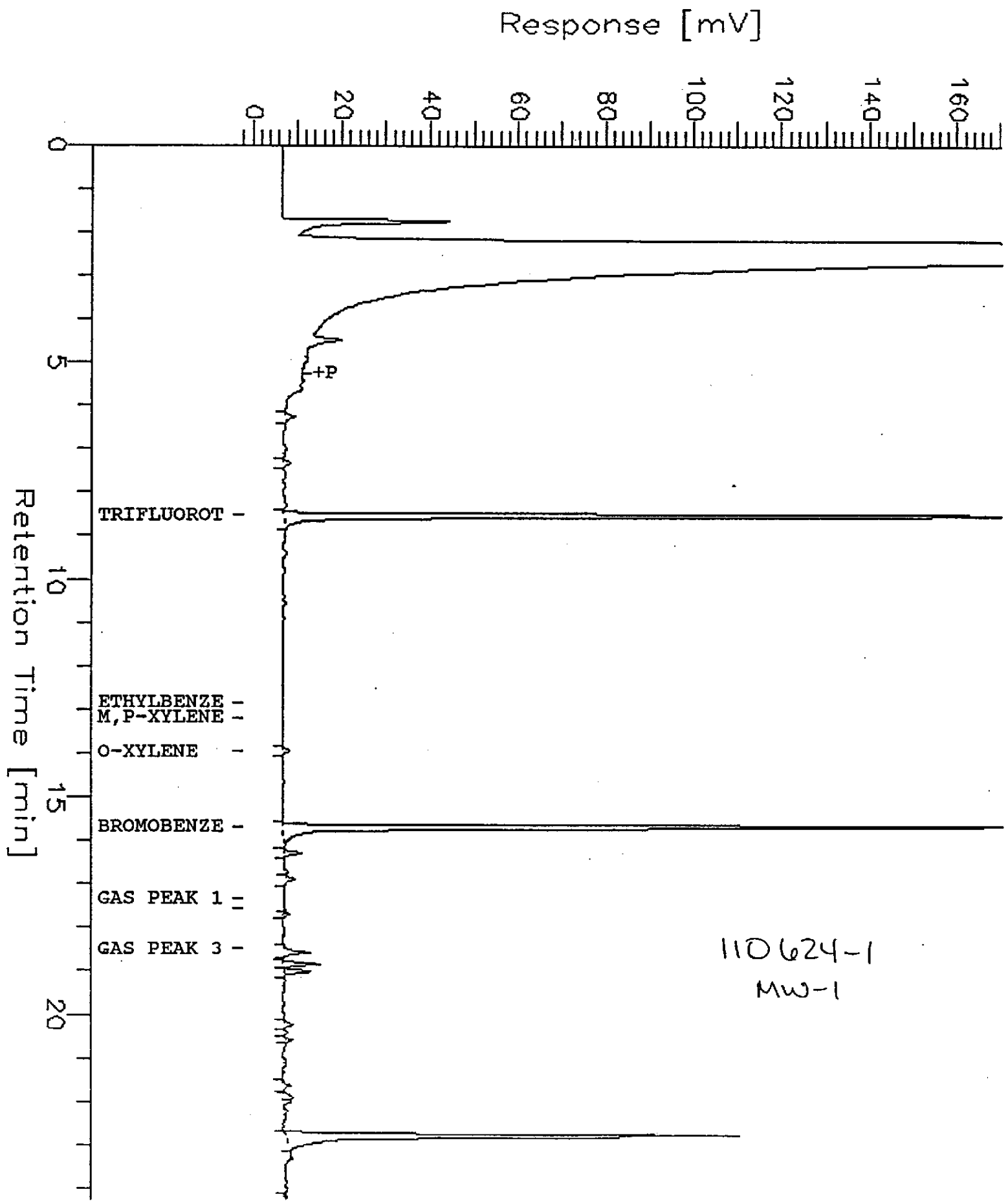
ND = Not detected at or above reporting limit.

QA/QC SUMMARY: BLANK SPIKE/BLANK SPIKE DUPLICATE

RPD,%	1
RECOVERY,%	91

TVH - GC-07 RTX-1

FileName : G:\GC07\104F029.raw
Start Time : 0.00 min
End Time : 24.33 min
Scale Factor: -1
Plot Offset: -2 mV
Date : 4/16/93 12:53 AM
Low Point : -2.04 mV
Plot Scale: 175 mV
High Point : 172.96 mV



110624-1
MW-1

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 110624
CLIENT: ENVIRONMENTAL SCIENCE & ENGINEERING
PROJECT ID: 6-92-5003
LOCATION: EMERYVILLE MARINA

DATE SAMPLED: 04/13/93
DATE RECEIVED: 04/13/93
DATE ANALYZED: 04/16/93
DATE REPORTED: 04/22/93

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	BENZENE (ug/L)	TOLUENE (ug/L)	ETHYL BENZENE (ug/L)	TOTAL XYLENES (ug/L)	REPORTING LIMIT (ug/L)	SURROGATE RECOVERIES TFT	BFB
110642-001	MW-1	ND	ND	ND	ND	0.5	98 %	97 %
METHOD BLANK	N/A	ND	ND	ND	ND	0.5	96 %	97 %

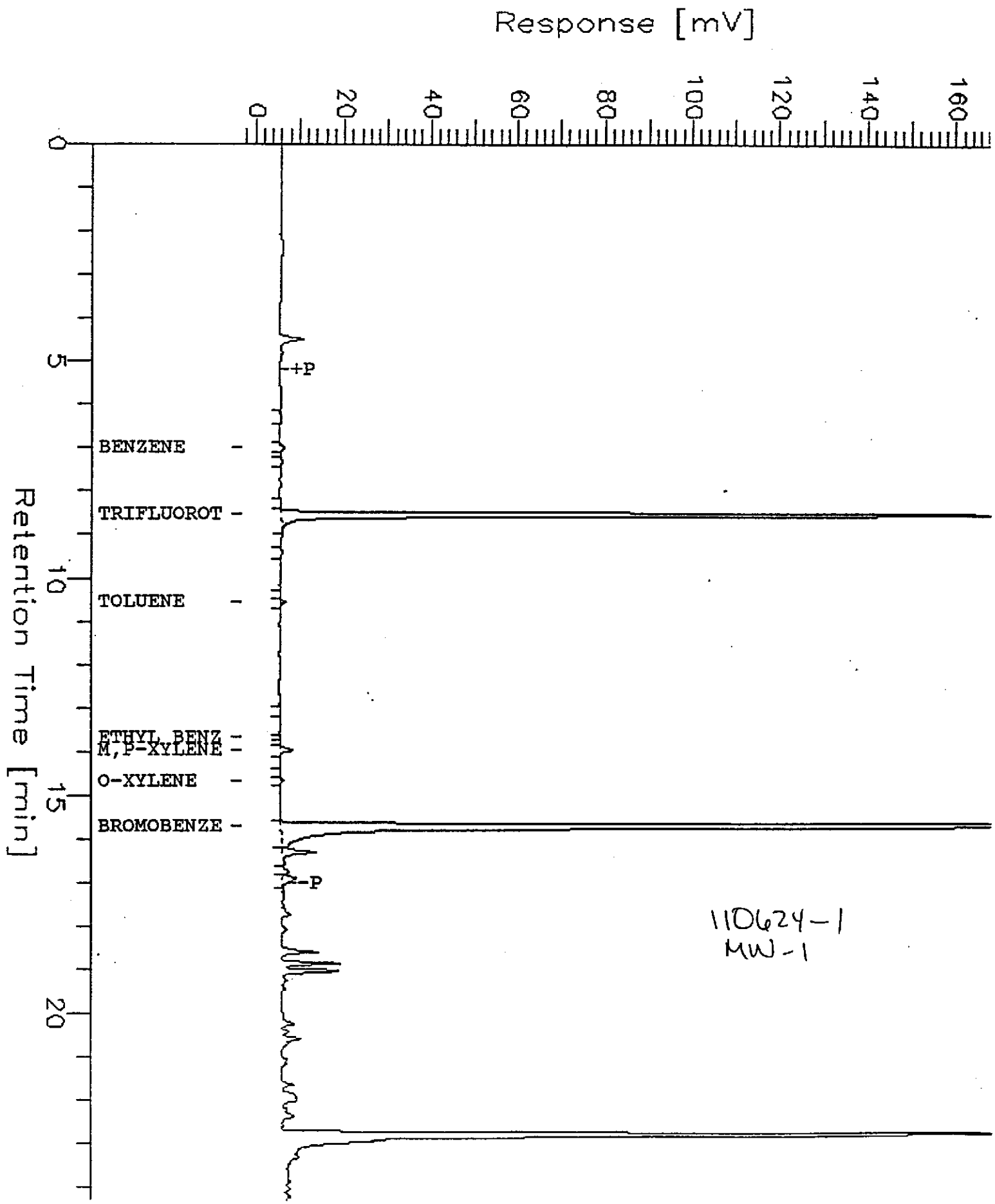
TFT = Trifluorotoluene (Limits: 58-130)
BFB = Bromofluorobenzene (Limits: 62-131)

ND = Not detected at or above reporting limit.
Reporting Limit applies to all analytes.

QA/QC SUMMARY: LABORATORY CHECK SAMPLE		LIMITS
AVG RECOVERY,%	104	75-125

BTXE - GC-07 RTX-1

FileName : G:\GC07\104P029.raw
Start Time : 0.00 min
End Time : 24.33 min
Scale Factor: -1
Plot Offset: -3 mV
Date : 4/16/93 12:54 AM
Low Point : -3.17 mV
Plot Scale: 175 mV
High Point : 171.83 mV



110624-1
MW-1

WA# 654-1373

110624

DATE 4/13/93 PAGE 1 OF 1

CHAIN OF CUSTODY RECORD

PROJECT NAME Emeryville-Marina

ADDRESS 3310 Powell St. Emeryville

PROJECT NO. 6-92-5003

SAMPLED BY KERRY LEFEVER

LAB NAME C&T

ESE Environmental Science & Engineering, Inc.
A CILCORP Company
4090 Nelson Avenue
Suite J
Concord, CA 94520
Phone (510) 685-4053
Fax (510) 685-5323

SAMPLE #	DATE	TIME	LOCATION	ANALYSES TO BE PERFORMED: TPH-5 BTEX	ANALYSES TO BE PERFORMED: TPH-D	MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
MW-1	4/13/93	1230	Marina	X	X	WATER	7	2 liters, 5 VOAs
TRIP						WATER	2	2 VOAs HOLD

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1. Kerry Lefever	Joanne Heath	4/13/93	1:25
2.			
3.			
4.			
5.			

7 TOTAL NUMBER OF CONTAINERS

REPORT RESULTS TO: KERRY LEFEVER

SPECIAL SHIPMENT REQUIREMENTS

SAMPLE RECEIPT

CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDTN/COLD	✓
CONFORMS TO RECORD	✓

INSTRUCTIONS TO LABORATORY (handling, analyses, storage, etc.):

NORMAL TA (5 DAYS)

*Please put Work Authorization Release # + ESE project # on report

TANK PROTECT ENGINEERING
Of Northern California, Inc.

LETTER OF TRANSMITTAL

DATE	4/24/92	JOB NO.	203A
ATTENTION	Susan L. Hugo		
RE:			

TO: Alameda County Health Care Services Agency
Department of Environmental Health
Hazardous Material Program
80 Swan Way, Room 200
Oakland, CA 94621

WE ARE SENDING YOU ☒ Attached ☐ Under separate cover via _____ the following items:

☐ Shop drawings ☐ Prints ☐ Plans ☐ Samples ☐ Specifications
☐ Copy of letter ☐ Change Order ☐ _____

COPIES	DATE	NO.	DESCRIPTION
1	4/23/92		Underground Storage Tank Unauthorized Release(Leak)/Contamination
			Site Report
1	4/21/92		Analytical Results and Chain-of-Custody
1			Tank Removal Site Map

THESE ARE TRANSMITTED as checked below:

☒ For approval ☐ Approved as submitted ☐ Resubmit _____ copies for approval
☐ For your use ☐ Approved as noted ☐ Submit _____ copies for distribution
☐ As requested ☐ Returned for corrections ☐ Return _____ corrected prints
☐ For review and comments ☐ _____
☐ FOR BIDS DUE _____ 19____ ☐ PRINTS RETURNED AFTER LOAN TO US

REMARKS _____

COPY TO _____

SIGNED: Mara E. Conf

If enclosures are not as noted, kindly notify us at once.

S&W
Soil and Water Environmental Laboratory

Drinking Water
Waste Water o Asbestos
Hazardous Waste – Soil
Calderon Testing – Air

14072 W. Park Avenue
Boulder Creek, CA 95006
(408) 338-3053

Laboratory Report

Client
Tank Protect Engineering
2821 Whipple Rd.
Union City CA 94587

Report Date
04/21/92

Sample Site
City of Emeryville
3310 Powell Street

203A- 041592

Date Received
04/16/92

Analysis Requested
Total Hydrocarbons - Gas
Total Hydrocarbons - Diesel
BTEX

Procedure
EPA 5020
EPA 3550
EPA 8020

Date Analyzed
04/17/92

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
1072-TP1-G	S-7	Soil/TPH-G	*	1 ppm
1072-TP1-G	S-7	Soil/TPH-D	*	10 ppm
1072-TP1-G	S-7	Soil/BTEX		
		Benzene	*	5 ppb
		Toluene	*	5 ppb
		Ethylbenzene	*	5 ppb
		Xylenes	*	5 ppb
1072-TP1-H	S-8	Soil/TPH-G	*	1 ppm
1072-TP1-H	S-8	Soil/TPH-D	*	10 ppm
1072-TP1-H	S-8	Soil/BTEX		
		Benzene	*	5 ppb
		Toluene	*	5 ppb
		Ethylbenzene	*	5 ppb
		Xylenes	*	5 ppb

* No detectable amount @ detection limit

Analyst Signature R. N. Lemon

1/87

S&W
Soil and Water Environmental Laboratory

Drinking Water
Waste Water ○ Asbestos
Hazardous Waste – Soil
Calderon Testing – Air

14072 W. Park Avenue
Boulder Creek, CA 95006
(408) 338-3053

Laboratory Report

Client
Tank Protect Engineering
2821 Whipple Rd.
Union City CA 94587

Report Date
04/21/92

Sample Site
City of Emeryville
3310 Powell Street

203A-041592

Date Received
04/16/92

Analysis Requested
Total Hydrocarbons - Gas
Total Hydrocarbons - Diesel
BTEX

Procedure
EPA 5020
EPA 3550
EPA 8020

Date Analyzed
04/17/92

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
1072-TP1-D	S-4	Soil/TPH-G	45.0	1 ppm
1072-TP1-D	S-4	Soil/TPH-D	*	10 ppm
1072-TP1-D	S-4	Soil/BTEX		
		Benzene	25.0	5 ppb
		Toluene	*	5 ppb
		Ethylbenzene	6.4	5 ppb
		Xylenes	45.4	5 ppb
1072-TP1-E	S-5	Soil/TPH-G	*	1 ppm
1072-TP1-E	S-5	Soil/TPH-D	*	10 ppm
1072-TP1-E	S-5	Soil/BTEX		
		Benzene	*	5 ppb
		Toluene	*	5 ppb
		Ethylbenzene	*	5 ppb
		Xylenes	*	5 ppb
1072-TP1-F	S-6	Soil/TPH-G	*	1 ppm
1072-TP1-F	S-6	Soil/TPH-D	*	10 ppm
1072-TP1-F	S-6	Soil/BTEX		
		Benzene	*	5 ppb
		Toluene	*	5 ppb
		Ethylbenzene	*	5 ppb
		Xylenes	*	5 ppb

* No detectable amount @ detection limit

Analyst Signature R. A. Lawson

1/87

S&W
Soil and Water Environmental Laboratory

Drinking Water
Waste Water ○ Asbestos
Hazardous Waste – Soil
Calderon Testing – Air

14072 W. Park Avenue
Boulder Creek, CA 95006
(408) 338-3053

Laboratory Report

Client
Tank Protect Engineering
2821 Whipple Rd.
Union City CA 94587

Report Date
04/21/92

Sample Site
City of Emeryville
3310 Powell Street

203A-041592

Date Received
04/16/92

Analysis Requested	Procedure	Date Analyzed
Total Hydrocarbons – Gas	EPA 5020	04/17/92
Total Hydrocarbons – Diesel	EPA 3550	
BTEX	EPA 8020	

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
1072-TP1-A	S-1	Soil/TPH-G	4.7	1 ppm
1072-TP1-A	S-1	Soil/TPH-D	*	10 ppm
1072-TP1-A	S-1	Soil/BTEX		
		Benzene	*	5 ppb
		Toluene	*	5 ppb
		Ethylbenzene	*	5 ppb
		Xylenes	*	5 ppb
1072-TP1-B	S-2	Soil/TPH-G	5.7	1 ppm
1072-TP1-B	S-2	Soil/TPH-D	*	10 ppm
1072-TP1-B	S-2	Soil/BTEX		
		Benzene	*	5 ppb
		Toluene	*	5 ppb
		Ethylbenzene	*	5 ppb
		Xylenes	*	5 ppb
1072-TP1-C	S-3	Soil/TPH-G	[illegible]	1 ppm
1072-TP1-C	S-3	Soil/TPH-D	*	10 ppm
1072-TP1-C	S-3	Soil/BTEX		
		Benzene	13.0	5 ppb
		Toluene	*	5 ppb
		Ethylbenzene	5.5	5 ppb
		Xylenes	*	5 ppb

* No detectable amount @ detection limit

Analyst Signature R. N. Lemos

1/87

Laboratory Report

Soil and Water Environmental Laboratory

Drinking Water
Waste Water ◦ Asbestos
Hazardous Waste – Soil
Calderon Testing – Air

14072 W. Park Avenue
Boulder Creek, CA 95006
(408) 338-3053

Client
Tank Protect Engineering
2821 Whipple Rd.
Union City CA 94587

Report Date
04/21/92

Sample Site
City of Emeryville
3310 Powell Street

2038-041592

Date Received
04/16/92

Analysis Requested	Procedure	Date Analyzed
Total Hydrocarbons - Gas	EPA 5030	04/17/92
Total Hydrocarbons - Diesel	EPA 3510	
BTEX	EPA 602	

S&W Ref. #	Client Ref. #	Matrix/Analysis	Concentration	Detection Limit
1072-TP1-I	W-1	Water/TPH-G	6115.0	50 ppb
1072-TP1-I	W-1	Water/TPH-D	12700.0	50 ppb
1072-TP1-I	W-1	Water/BTEX		
		Benzene	5.0	0.5 ppb
		Toluene	30.6	0.5 ppb
		Ethylbenzene	8.4	0.5 ppb
		Xylenes	61.8	0.5 ppb

* No detectable amount @ detection limit

Analyst Signature R. A. Lennon

1/87

TANK PROTECT ENGINEERING
2821 WHIPPLE ROAD
UNION CITY, CA 94587
(415)429-8088
(800)523-8098
FAX(415)429-8089

LAB: S&W Laboratory
TURNAROUND: Normal
P.O. #: 0384

PAGE 1 OF 1

CHAIN OF CUSTODY

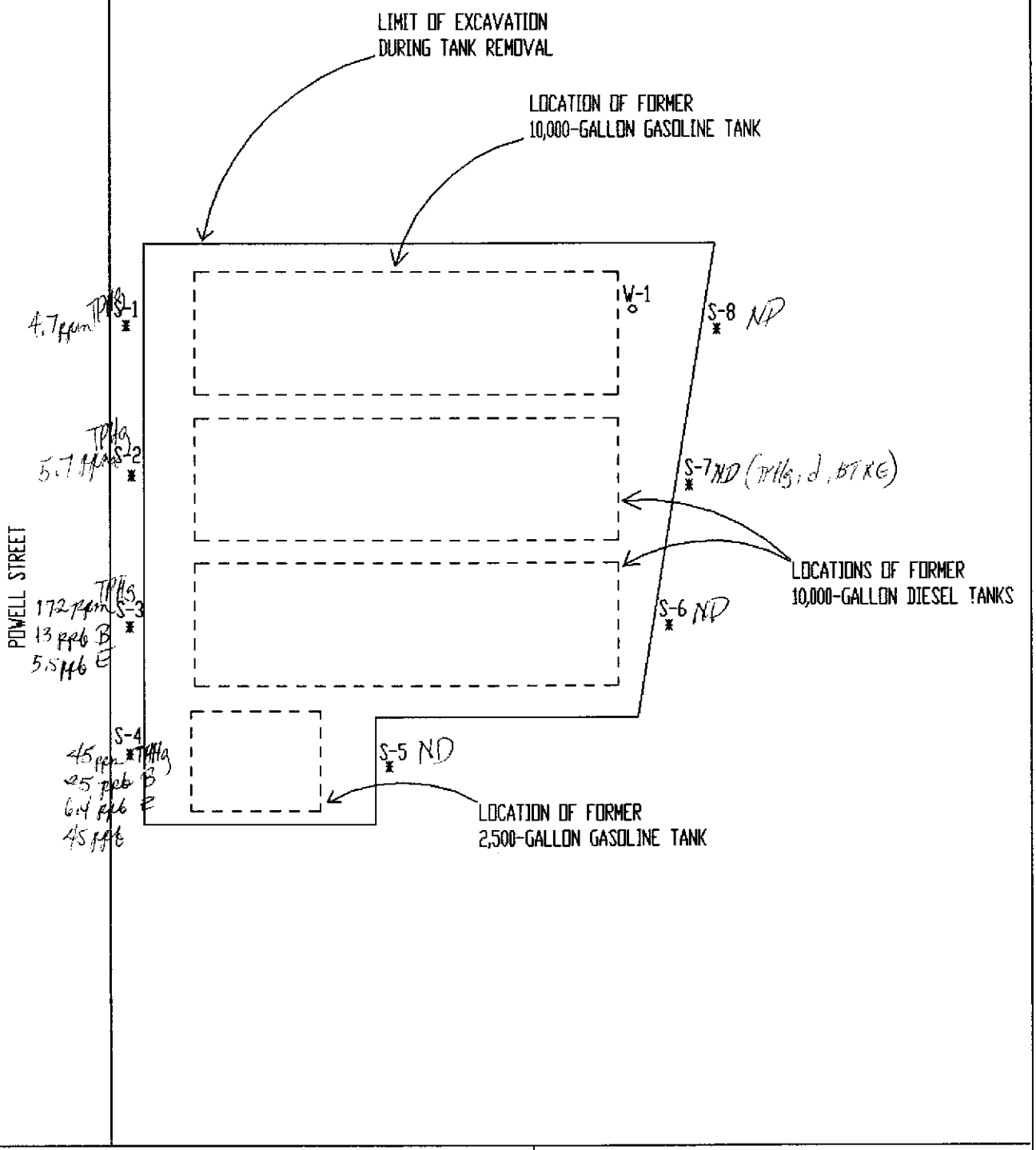
PROJECT NO.: 20A-041592
SITE NAME & ADDRESS: City of Emeryville, 3310 Powell Street, Emeryville, CA
SAMPLER NAME, ADDRESS AND TELEPHONE NUMBER: Michael Casey TPE, 2821 WHIPPLE ROAD, UNION CITY, CA 94587 (415) 429-8088

	NO.	DATE	TIME	SOIL	WATER	SAMPLING LOCATION	(1) TYPE OF CONTAINER	ANALYTES REQUESTED: TOTAL LIGHT HC	AROMATIC HC (BTX)	TOTAL HEAVY HC	OIL & GREASE	VOC SCAN (624's)	OTHER	Total Lead (AA)	REMARKS
/	S-1	4/15/92	4:12	✓		W. End of Tank #4 Depth = 5.0'	Brass Tube	✓	✓	✓				✓	A
/	S-2		5:24			W. End of Tank #3 Depth = 5.0'									B
/	S-3		5:25			W. End of Tank #2 Depth = 5.0'									C
/	S-4		5:32			W. End of Tank #1 Depth = 5.0'									D
/	S-5		5:41			E. End of Tank #1 Depth = 5.0'									E
/	S-6		5:50			E. End of Tank #2 Depth = 5.0'									F
/	S-7		6:12			E. End of Tank #3 Depth = 5.0'									G
/	S-8		6:22			E End of Tank #4 Depth = 5.0'									H
/	W-1	4/15/92	3:59		✓	NE Corner of Excavation	2-1A Bottles 2-40ml Vials	✓	✓	✓				✓	I

Relinquished by : (Signature)	Date / Time	Received by : (Signature)	Relinquished by : (Signature)	Date / Time	Received by : (Signature)
Michael Casey	4/16/92 | 12:15	[signature]			
[signature]	4/16/92 | 1:20	[signature]	Relinquished by : (Signature)	Date / Time	Received by : (Signature)
Relinquished by : (Signature)	Date / Time	Received for Laboratory by: [Signature]	Date / Time	Remarks	

DATE: April 16, 1992

1072-PETP1



LEGEND

S-8 NAME AND LOCATION OF SOIL SAMPLE

W-1 NAME AND LOCATION OF WATER SAMPLE

N

0 10

SCALE IN FEET

TANK PROTECT ENGINEERING

TANK REMOVAL SITE PLAN

3310 POWELL STREET
EMERYVILLE, CA 94608

DATE	4/15/92
FIGURE	2
FILE #	203A-1
DRAWN BY	MAC
CHECKED BY	JVN