GET
Geo Environmental Technologies

3275 Stevens Creek Blvd. #208
San Jose, CA 95117
408-241-1798
FAX 408-248-7685

8/21/01

AUG 2 4 2001

Alameda County Environmental Health Services
Attention: Ms. Eva Chu
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

Dear Ms. Chu:

Following the preliminary site investigation of 2/2/01, you requested a workplan for follow-up groundwater investigation downgradient of the Livermore Gas and Mini Mart located at 160 Holmes Street, in Livermore.

The requested workplan is enclosed for your review and comment.

Sincerely,

Costas Orountiotis
Project Manager

Any GW extracting done in county -

GET
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San Jose, CA 95117
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FAX 408-248-7685

468/316-4507 alle

Ask to clarify qty of GW to be extracted for storage, when GW will be sampled

WORKPLAN:
ADDITIONAL INVESTIGATION
EXTRACTION WELL INSTALLATION

Livermore Gas and Mini Mart
160 Holmes Street
Livermore, California

AUG 2 4 2001

8/17/01

INTRODUCTION

This document is a workplan for the further characterization of off-site contamination originating from the Livermore Gas and Mini Mart, 160 Holmes Street, in Livermore.

Based on the results of the 2/2/01 off-site preliminary soil and groundwater investigation, Ms. Eva Chu of the Alameda County Environmental Health Services (ACEHS) requested a workplan for further investigation in the downgradient direction, the installation of additional monitoring wells during this investigation and the installation of a groundwater extraction well on the subject property for the performance of a pump test. The ACEHS directive is attached in Appendix A.

The objectives of the workplan are threefold: a) to delineate the extent of off-site groundwater contamination, b) to install monitoring wells at key locations and if possible at the zero-contamination line, and c) to use the extraction well and perform an aquifer pump test and MTBE treatment study during groundwater discharge.

The property is an old gas station that has been recently upgraded; it is located on the corner of First and Holmes Streets (the property is bounded by First, Second and Holmes Streets). Figure 1 is the Site Vicinity Map and Figure 2 is the Site Plan.

PAST WORK ON SITE

On 2/26/99, a boring was advanced in the northern section of the property, about 10 feet from the edge of the First Street sidewalk. A groundwater grab sample was collected and analyzed for Total Petroleum Hydrocarbons as gasoline (TPHg), benzene, toluene, ethyl-benzene, total xylenes (BTEX) and methyl tertiary butyl ether (MtBE). The sample was found to be impacted by petroleum hydrocarbons (TPHg: 100,000 ug/l, Benzene: 6,100 ug/l) and MTBE (60,000 ug/l).

On 4/5/99, three gasoline USTs and one diesel UST, associated dispensers and piping were removed, manifested and disposed, under permit by the LPFD. The pit was over excavated and

samples were collected from native soil beneath the USTs. Sample analysis indicated the presence of petroleum hydrocarbons in soil. Total Petroleum Hydrocarbons as diesel (TPHd) was detected at low levels (61 mg/kg) in the soil stockpile but not beneath the diesel tank; TPHg concentrations ranged from not detectable (ND) to 80 mg/kg; MTBE concentrations ranged from 24 to 110 mg/kg.

On 5/20/99 samples were collected from soil beneath the dispenser islands. TPHg was found beneath the east dispenser-island in varying concentrations ranging from 32 mg/kg to 6,500 mg/kg. TPHd beneath the diesel dispenser was detected at 1300 mg/kg. No MTBE was detected beneath the dispenser islands.

On 7/26/00 groundwater monitoring wells MW1, MW2 and MW3 were installed on site. Groundwater samples were analyzed for TPHd, TPHg, BTEX, and MTBE. Analytical results indicated that downgradient well MW1 was contaminated with 57,000 ug/L TPHd, 170,000 ug/L TPHg, 320,000 ug/L MTBE and 6,400 ug/L Benzene. Groundwater in crossgradient well MW2 contained 4,500 ug/L TPHg, 3,000 ug/L MTBE and 220 ug/L Benzene; upgradient well MW3 contained traces of TPHd and TPHg, but no BTEX or MTBE above detection limits.

On 10/19/00 the monitoring wells were sampled as part of a quarterly sampling program. MW1 remained impacted with 17,000 ug/L TPHd, 170,000 ug/L TPHg, 200,000 ug/L MTBE and 8,400 ug/L Benzene. Crossgradient well MW2 remained impacted, with 1,300 ug/L TPHd, 3,400 ug/L TPHg, 1,900 ug/L MTBE and 150 ug/L Benzene. The sample upgradient well MW3 contained no TPHd, TPHg, BTEX or MTBE above detection limits. As directed by Ms. Chu of the ACEHS, the samples were also analyzed for fuel oxygenates, confirming the presence of MTBE.

On 2/2/01 a soil and groundwater investigation was performed, for the delineation of off-site groundwater contamination using geoprobe technology. The investigation found that soil contamination was confined to the saturated zone immediately above the surface of groundwater. Groundwater contamination was detected in all three borings located within Hanson Park, downgradient of the site. The highest TPHg levels (12,000 ug/l) were found in boring B4, which also contained 6,000 ug/l of MTBE; boring MW5 contained the highest MTBE levels (16,000 ug/l), and no detectable levels of TPHg, however the instrument detection limit for TPHg was reported as 25,000 ug/l, so TPHg concentrations are unknown. Only traces of TPHg and MTBE were detected in Boring B2 located adjacent to Holmes Street on the north corner of the site at the border with the Livermore Inn. Boring B1, on site, contained floating product and is the proposed location for the scheduled groundwater extraction well.

On 2/22/01 the monitoring wells were sampled again. MW1 remained impacted, with 11,000 ug/L TPHd, 82,000 ug/L TPHg, 190,000 ug/L MTBE and 5,100 ug/L Benzene. Crossgradient well MW2 was impacted with 880 ug/L TPHd, 7,600 ug/L TPHg, 2,200 ug/L MTBE and 25 ug/L Benzene. The sample from upgradient well MW3 again contained no TPHd, TPHg, BTEX or MTBE above detection limits.

Cumulative analytical results from all quarterly groundwater sampling events, as presented in the latest quarterly monitoring report, are presented in Appendix B; the table of analytical results from the geoprobe borings also is presented in Appendix B.

PROPOSED METHODOLOGY

Groundwater contamination patterns will be determined during a one-day mobilization of exploration equipment. GET proposes advancing up to six soil borings off-site and converting at least three of these borings into monitoring wells. The general groundwater direction of flow is to the northwest of the subject site through Hanson Park and likely towards the Livermore Valley Memorial Hospital; therefore, the five borings will be located within and past Hanson Park and in the parking lot of Noah's Bagels as follows:

Proposed monitoring well MW4 will be located in the central section of Hanson Park between borings B5 (TPHg: < 25,000 ug/l and MTBE: 16,000 ug/l) and boring B3 (TPHg: 6,200 ug/l and MTBE: 47 ug/l).

Proposed monitoring well MW5 will be located in the landscape or parking lot of Noah's Bagels, about 120 feet northwest of boring B4 (TPHg: 12,000 ug/l, MTBE: 6,000 ug/l).

Proposed monitoring well MW6 will be located beyond Hanson Park and if possible into the hospital grounds used as a construction yard. If we cannot obtain permission to install the well within the hospital property, then the well will be installed either on South S Street, or at a City of Livermore-owned landscaped area between the hospital and South S Street.

Proposed groundwater extraction well EX1 will be located on site, near the location of geoprobe boring B1, where floating product was encountered.

The fifth and final boring, BhpS, will be drilled at the southern end of Hanson Park so as to determine the southerly boundary of a zero contamination isopleth. This boring is not scheduled to be converted into a monitoring well.

Borings for the wells will be drilled with truck mounted continuous flight, 8"-outside diameter hollow stem augers. The anticipated depth of the monitoring wells is 30 feet and that of the extraction well is 40 feet. The borings will be extended into the groundwater aquifer and terminated at a depth of 10 feet below the groundwater level.

The three monitoring wells will be constructed using 2" diameter, schedule 40 PVC, factory threaded and factory slotted (0.010"). Sand (No. 2/12) will be placed such that it extends 2 feet above the screened section. One to two feet of bentonite pellets will be placed over the sand-pack and hydrated with water to initiate expansion. The remaining borehole will be sealed with neat cement slurry. A 12"-diameter traffic rated enclosure (christie box) will be used to protect and provide access to each well. The top of each well will be secured with a locked expansion plug.

The groundwater extraction well will be constructed using 6"-diameter, schedule 40 PVC, factory threaded and factory slotted (0.020"). Sand (No. 3 Monterey) will be placed such that it extends 2 feet above the screened section. One to two feet of bentonite pellets will be placed over the sand-pack and hydrated with water to initiate expansion. The remaining borehole will be sealed with neat

cement slurry. An 18"-diameter traffic rated christie box will be used to protect and provide access to the well. The top of the well will be secured with a locked expansion plug.

The proposed borings/well locations, existing wells, previous geoprobe borings and UST locations are shown on Figure 3, which includes the latest data from the wells and geoprobe borings.

using lat/long. ± 5ft meter accuracy

The wells will be surveyed to obtain data for the determination of the groundwater gradient and direction of flow.

After a minimum of 72 hours, the wells will be purged of 4 to10 well casing volumes each. A groundwater sample will be collected from each well using a disposable bailer. Groundwater samples will be collected by decanting the bailer into duplicate 40-ml VOA bottles in such a way that no air bubbles are retained and into duplicate 1-liter amber bottles.

Sample information will be entered onto a Chain of Custody (COC) document; the samples and COC will be submitted to Chromalab Inc., a State certified hazardous materials analysis laboratory. Samples will be analyzed for TPHd, TPHg and BTEX compounds using EPA Methods 5030/8015/602. The samples from distant wells MW5 and MW6 also will be subjected to a one-time analysis for fuel oxygenates using EPA method 8260.

The aquifer pump test will be combined with the MTBE treatment study. Groundwater extraction will be initiated from well EX1 and stored in a 20,000-gallon Baker tank on site. The pump test will provide information on aquifer yield and recovery rates and capture zones. How much water is will be extracted?.

The MTBE treatment study will be performed using the groundwater stored in the Baker tank; contaminated groundwater will be treated using wet oxidation prior to discharge into the sewer; a 200-pound activated carbon drum will be on site as a polisher if needed. When will Baker tank water be sampled.

A permit to discharge treated groundwater into the sewer will be negotiated with the City of Livermore prior to any discharge from the Baker tank.

PROPOSED SCHEDULE

When all laboratory results have been obtained, the data will be reviewed and a technical report will be prepared the following time frame is anticipated:

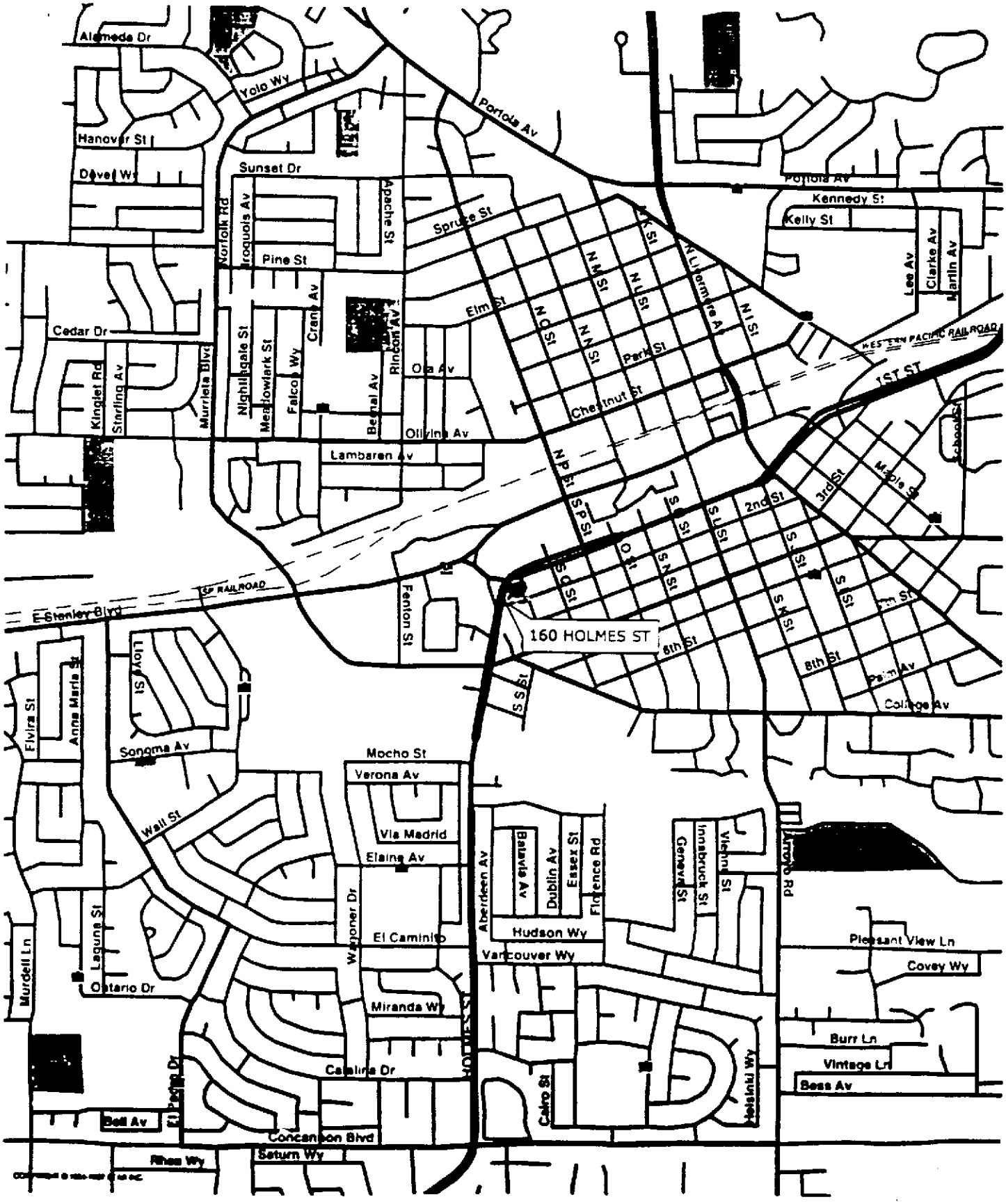
21 days	Permits, driller scheduling, agency coordination
15 days	Install borings/wells, survey, sample, sample analysis
15 days	Submit technical report on the off site contamination distribution
21 days	Complete pump test, MTBE treatment study
15 days	Submit technical report

Will Extract GW at various rates 5 gpm, 10 gpm, 20 gpm etc. GW will will sample at each change in pump rate to see if only clean water pumped

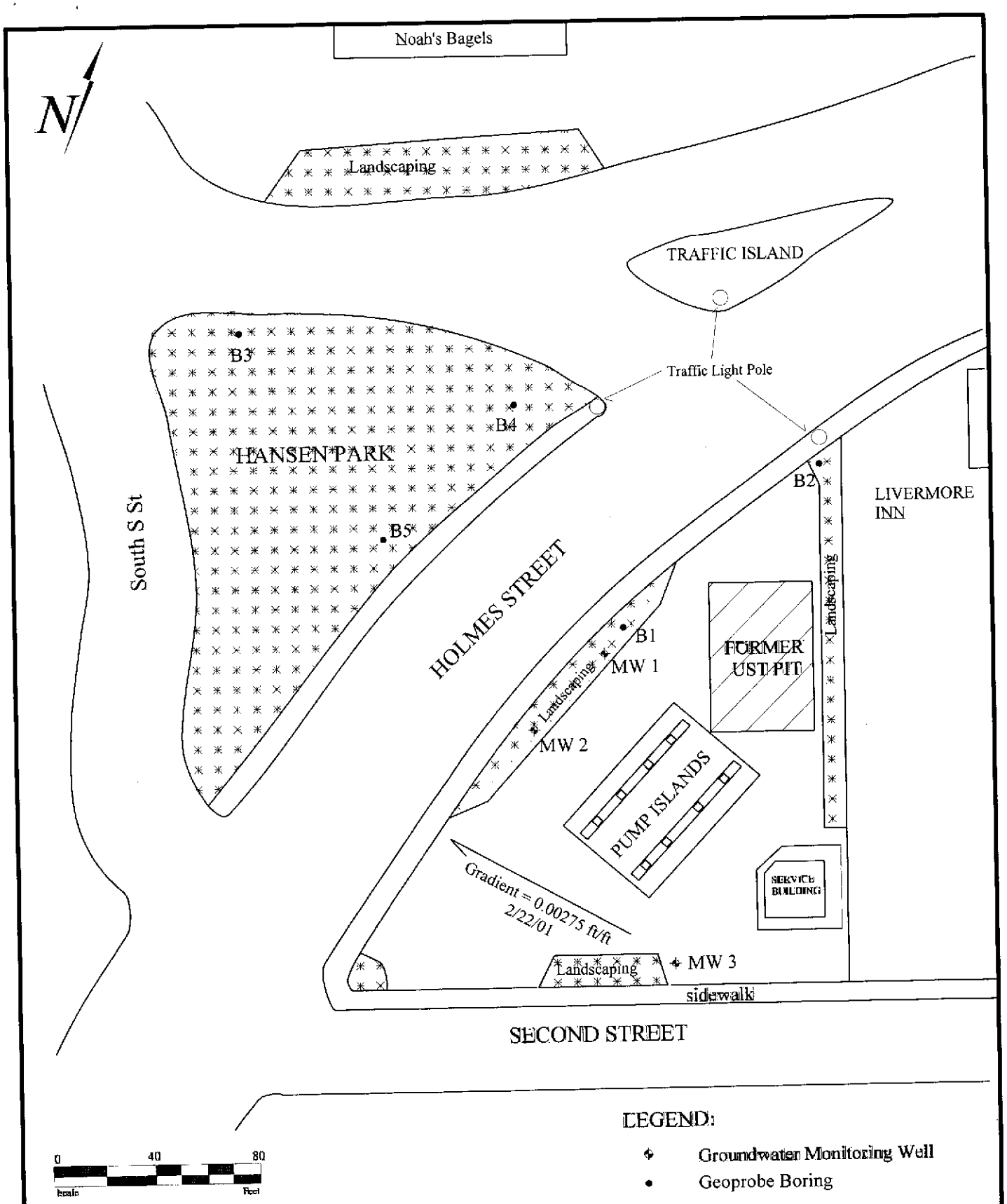
This workplan may be discussed by calling the undersigned at (408) 241-1798.

Costas Orountiotis
Project Manager

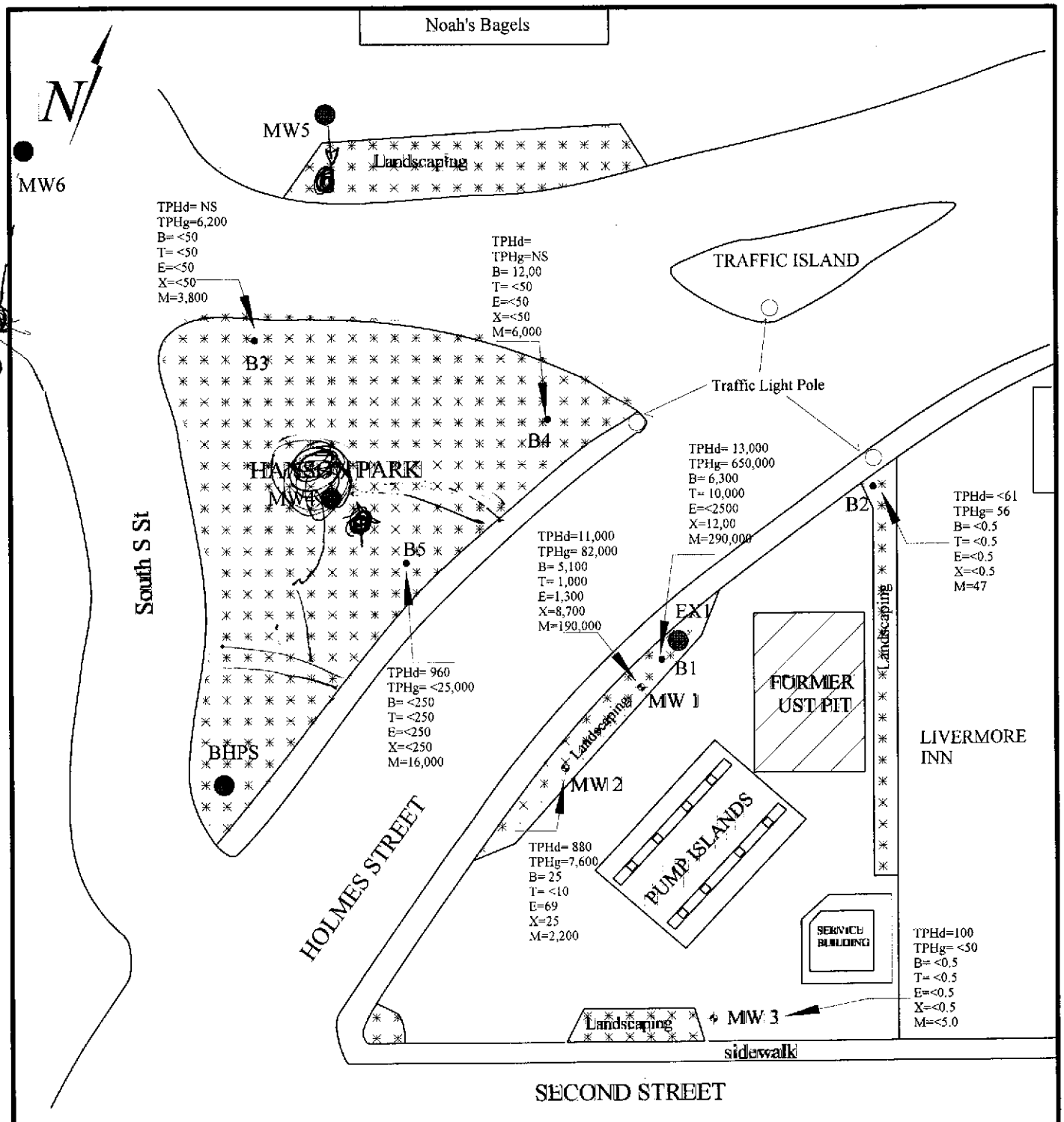
Kenneth L. Meleen, P. E.
Licensed Civil Engineer #C 17487
License expires 6/30/05



Geo Environmental Technologies	SITE VICINITY MAP Livermore Gas and Minimart 160 Homes Street. Livermore. CA	Figure No. 1 Project Manwel



Geo Environmental Technologies	Site Plan Livermore Gas and Minimart 160 Homes Street, Livermore, CA	Figure No. 2 Project Manwel



Gea Environmental Technologies	Groundwater Analysis Borings 2/2/01 Monitoring Wells 2/22/01 Livermore Gas and Minimart 160 Homes Street, Livermore, CA	Figure No. 3 Project Marnwel

APPENDIX
A

RO0000324

August 15, 2001

Mr. Manwel Shuwyahat
Livermore Gas and Mini mart
160 Holmes Street
Livermore, CA 94550

RE: Workplan for 160 Holmes Street, Livermore, CA

Dear Mr. Shuwyahat:

I have completed review of Geo Environmental Technologies' (GET) May 2001 *Downgradient Investigation of Groundwater* report prepared for the above referenced site. Two onsite and three offsite borings were advanced to delineate the lateral extent of groundwater contamination. Based on the results of this investigation, GET recommended the installation of permanent offsite groundwater monitoring wells and one onsite extraction well.

GET's recommendations are appropriate at this time. Please provide a workplan for the installation of permanent groundwater monitoring wells. The workplan is due within 45 days of the date of this letter, or **by July 17, 2001**. If you have any questions, I can be reached at (510) 567-6762.

eva chu
Hazardous Materials Specialist

email: Costas Orountiotis

holmes-8

APPENDIX
B

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TABLE 1 - Groundwater Analytical Results

Livermore Gas and Minimart, 160 Holmes, Livermore, California

Well ID.	Date	DTW (ft bgs)	TPHd (µg/L)	TPHg (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethyl-Benzene (µg/L)	Xylenes (µg/L)	MtBE (µg/L)
MW1	08/11/00		57,000	170,000	6,400	7,600	4,200	9,700	320,000
	10/19/00	21.94	17,000	170,000	8,400	3,200	2,700	10,000	200,000
	02/22/01	22.91	11,000	82,000	5,100	1,000	1,300	8,700	190,000
MW2	08/11/00		1,900	4,500	220	52	160	170	3,000
	10/19/00	21.80	1,300	3,400	150	21	100	70	1,900
	02/22/01	22.87	880	7,600	25	< 10	69	25	2,200
MW3	08/11/00		260	59	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	10/19/00	22.45	< 65	< 50	< 0.50	< 0.50	< 0.50	< 0.50	< 5.0
	02/22/01	23.51	100	< 50	< 0.5	< 0.50	< 0.50	< 0.50	< 5.0

Notes:

ft bgs	Feet Below Ground Surface
TPHg	Total Petroleum Hydrocarbons as gasoline
TPHd	Total Petroleum Hydrocarbons as diesel
µg/L	Micrograms per liter
MtBE	Methyl tertiary butyl ether

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TABLE 1 - Groundwater Analytical Results

Sampling date: 2/2/01

Livermore Gas and Minimart, 160 Holmes, Livermore, California

Boring ID	TPHd ug/l	TPHg ug/l	Benzene ug/l	Toluene ug/l	Ethyl-Benzene ug/l	Total Xylenes ug/l	MtBE ug/l
B1	13,000	650,000	6,300	10,000	<2500	12,000	290,000
B2	< 61	56	< 0.5	< 0.5	< 0.5	< 0.5	47
B3	NS	6,200	< 50	< 50	< 50	< 50	3,800
B4	NS	12,000	< 50	< 50	< 50	< 50	6,000
B5	960	< 25,000	< 250	< 250	< 250	< 250	16,000

Notes: NS: not sampled
ug/l: micrograms per liter
< : indicates values less than given laboratory detection limit