EINARSON
FOWLER & WATSON
Consultants In Environmental Hydrogeology & Engineering

September 8, 1998
Project No. BNC102

Mr. Balaji Angle
Angle Enterprises
5131 Shattuck Avenue
Oakland, California 94609

Re: Workplan for Additional Downgradient Investigation, B&C Gas Mini Mart, 2008 First Street, Livermore, California

Dear Mr. Angle:

Einarson, Fowler & Watson (EFW) has prepared the following workplan to complete an additional downgradient investigation for the B&C Gas Mini Mart (B&C) at 2008 First Street, Livermore, California (Figure 1). The basis for this work comes as a result of the 1997 downgradient investigation,[1] and has been discussed and agreed upon in concept with Alameda County Environmental Health Services (ACEHS) in meeting on December 10, 1997.

ACEHS requested that further investigation of the petroleum hydrocarbon release at 2008 First Street be conducted, because the most recent investigation performed in 1997 did not fully define the source and extent of the plume. In addition, ACEHS has requested that permanent monitoring wells be installed. The purpose of this scope of work is to delineate the plume with permanent wells and define the vertical distribution of methyl tertiary-butyl ether (MTBE) in the upper and lower aquifer (if any). There are two municipal water-supply wells located to the west of the site, and this investigation is to provide sufficient monitoring to assess the potential for the contaminant plume to impact the water-supply wells. In 1997, the extent of groundwater impact was mapped to be at least 1,400 feet downgradient (west) of the B&C site.[2] The municipal water supply wells are located approximately 2,500 feet west of the site (Figure 2).

This workplan provides background information and outlines the scope of the investigation. Because this investigation is occurring off-site, potentially on both private property and City

[1] Einarson, Fowler & Watson. *Report of Downgradient Investigation, B&C Gas Mini Mart, 2008 First Street, Livermore, California.* November 7, 1997.
[2] Einarson, Fowler & Watson, November 1997.

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of Livermore (City) property, conducting access negotiations and obtaining agreements from all property owners is integral to completing the scope of work. Procedures for boring and well installation, sampling, and chemical analyses are included. A schedule for the work and a detailed cost estimate are also provided.

BACKGROUND

The B&C Gas Mini Mart property is located on the northeast corner of First and South L Streets in Livermore, California, and currently operates as a gasoline station and mini market. From at least 1988 until 1994, Desert Petroleum (DP) owned and operated the site. In January 1994, DP sold the site to the current owner, Mr. Balaji Angle. The following site information has been compiled from reports on file with ACEHS. Site information was also provided by the site owner and ACEHS.

Hydrogeologic Setting

The site is located in the Livermore Valley groundwater basin. The sediments found in the Livermore Valley are a combination of lacustrine to alluvial clay facies and alluvial gravel facies, consisting of cemented gravels and cobbles, and reworked terrace deposits. Sediments consist of oxidized yellowish-brown clay, silt, sand, and gravel deposited in alluvial fans and marsh/deltaic environments. This area of deposition contains braided channel systems and complex interfingering.

In the site vicinity, subsurface investigations at the Livermore Arcade have found an upper unconfined aquifer consisting primarily of gravels with sand and clay. A low-permeability clay unit is found at depths of approximately 75 to 110 feet below ground surface (bgs). Below the clayey unit, the top of a lower, semi-confined aquifer is found at depths ranging from 110 to 145 feet bgs. No evidence of communication between the upper and lower aquifers in the site vicinity has been documented. However, given the complex alluvial depositional environment, and based on the alluvial fan geometry, it is possible that these aquifers converge at some point (north) in the subsurface.[3]

Subsurface work conducted at the site has found the soil to be predominantly sandy clay, silty sand, silty gravel, and sandy gravel to a maximum explored depth of 77 feet. Over the last nine years, static water levels have ranged from 68.7 feet bgs (January 1992) to 17.0 feet bgs (February 1997). The groundwater flow generally is to the west.[4]

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[3] H$^+$GCL, Inc. *Deep Groundwater Conduit Study, Livermore Arcade Shopping Center, First Street and South P Street, Livermore, California.* December 6, 1993.

[4] Remediation Service Int'l. *Soil & Groundwater Investigation Report for 2008 First Street, Livermore, California.* July 22, 1994.

Previous Investigations and Corrective Actions

A preliminary site assessment was conducted in September 1988. Three soil borings were completed, one of which was converted to a monitoring well (MW-1). In March 1994, a 280-gallon waste oil underground storage tank (UST) and 25 cubic yards of soil were removed as part of closing the auto repair shop at the station. Three months later in June, wells MW-2, MW-3, and MW-4 were installed (Figure 2).[5]

In August 1994, free product was encountered in well MW-2, and product removal commenced twice a month. By the end of January 1995, no measurable thickness of product remained, only sheen could be detected.[6] In March 1995, a release was reported to have occurred from the union between a tank subpump and product line. The quantity of the release is unknown.

In 1995, several off-site investigations were conducted. In March, soil borings (H-1 through H-5) were advanced off site, around the perimeter of the B&C site. In completing one of the soil borings about 75 feet downgradient from the site, free product was found on the augers. Free product was also found in off-site well MW-01 at the Mill Springs Park (MSP) Apartments property, 1809 Railroad Avenue, approximately 850 feet downgradient from the site.

In April 1995, an investigation was conducted at the MSP property, a former bulk fuel terminal.[7] Eleven temporary borings (H-1 through H-11) were completed and groundwater samples collected (Figure 2). Results from the groundwater analyses indicated high concentrations of MTBE and benzene (up to 67,000 micrograms per liter [µg/l] MTBE) on the eastern portion of the site, and non-detectable concentrations on the southwestern portion of the site. The investigation led to the conclusion that the free product found in MSP well MW-01 was from an off-site source, most likely the B&C site. However, this has not been proved as no investigation has been conducted at other possible sources, including four other gasoline stations.

One gasoline UST at the B&C site failed an integrity test in September 1995. The tank was immediately taken out of commission and ACEHS was notified. In July 1996 further source removal was conducted. Two more gasoline USTs were removed, and new double-walled fiberglass USTs and fiberglass piping with automated leak detection were installed. Other remedial activities included the removal of two hydraulic lifts and approximately 700 cubic yards of impacted soil. Also, one 1,000-gallon UST discovered during excavation activities was closed in place with approval from ACEHS and the Livermore Fire Department by

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[5] Remediation Service Int'l. *Soil & Groundwater Investigation Report for 2008 First Street, Livermore, California.* July 22, 1994.

[6] Product thickness information from Remediation Service, Int'l field records, "Free Product Removal Logs."

[7] Earth Tech, *Final Report LNAPL Assessment and Groundwater Characterization Evaluation, Mill Springs Park Apartments, 1809 Railroad Avenue, Livermore, California*, October 9, 1995.

grouting with a cement sand slurry. In October 1995, two additional monitoring wells (off-site well MW-5 and well MW-6) were installed for the B&C site (Figure 2).

In September 1997, a downgradient investigation was performed.[8] Five soil borings (B97-1 through B97-5) were completed to first-encountered groundwater (Figure 2). Grab groundwater samples were collected from each of the downgradient borings. Downgradient groundwater monitoring well MW-24 at the former Livermore Arcade Shopping Center (Livermore Arcade) property (currently Vintner's Square) was sampled (Figure 2). Groundwater from three of the borings (B97-2, B97-3, and B97-4) contained MTBE at concentrations ranging from 46 to 470 µg/l, and groundwater from boring B97-1 contained 1.2 µg/l benzene. This data from first-encountered groundwater indicated that the plume was at least 1,400 feet downgradient of the site (Figure 2). Historical groundwater monitoring data for the site groundwater monitoring wells are presented in Table 1.

In July 1998, free product was encountered in site wells MW-2, MW-5, and MW-6 during a quarterly groundwater monitoring event. This could be a result of higher seasonal water levels mobilizing the free product in the capillary fringe.

SCOPE OF WORK

The purpose of this scope of work is to delineate the plume with permanent wells and define the vertical distribution of MTBE in the upper and lower aquifer (if possible). This work involves the installation of nine groundwater monitoring wells in the upper aquifer and two groundwater monitoring wells in the lower aquifer. The scope of work is divided into several tasks:

1. Pre-field access negotiations, scheduling, and permitting.

2. Vertical definition of the plume in the upper aquifer at two locations.

3. Installation of two groundwater monitoring wells in the main part of the plume in the upper aquifer (MW-7 and MW-8).

4. Installation of three groundwater monitoring wells (guard wells) in the upper aquifer between the downgradient end of the plume and the water supply wells (MW-9, MW-10, and MW-11).

5. Installation of four groundwater monitoring wells to define the perimeter of the plume in the upper aquifer (MW-12, MW-13, MW-14, and MW-15).

6. Identification of the aquitard between the upper unconfined and lower confined aquifers, and installation of two deep, lower-aquifer, groundwater monitoring wells between the downgradient end of the plume and the water supply wells.

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[8] Einarson, Fowler & Watson, November 1997.

7. Well surveying and groundwater sampling and analysis.

8. Reporting of field work and analytical results.

Task 1 - Pre-Field Access Negotiations, Scheduling, and Permitting

All of the wells proposed in this workplan will be located off-site of the B&C property. Access has to be granted by several property owners and encroachment permits issued by the City of Livermore. Under this task, the wells will be permitted with Zone 7 of the Alameda County Water District. Underground utilities will be cleared for boring installation by contacting the Underground Service Alert (USA) and contracting a private utility locator.

Task 2 - Vertical Definition of the Plume in the Shallow Aquifer

Research of plumes at leaking UST sites has shown that vertical chemical stratification can exist within a plume. The location of the plume core is believed to depend primarily on the geometry of the source zone and the regional groundwater flowpath, not necessarily the location of the water table.[9] The dependence on the regional groundwater flowpath is important at this site. If there is a sufficient hydraulic connection between the upper and lower aquifers, as the plume travels downgradient, it may be drawn down toward the deep water supply wells. In addition, the site has a relatively thick upper aquifer in which the saturated zone historically has varied from 25 to 50 feet thick. To define possible stratification of the plume, the soil borings for proposed wells MW-7 and MW-8 (Figure 2) will be completed to the top of the aquitard and depth-discrete grab groundwater samples will be obtained at approximate 5-foot intervals within the upper aquifer.

The grab groundwater samples will be obtained using SimulProbe™ or HydroPunch® technology to ensure the integrity of the samples. The samples will be analyzed for petroleum hydrocarbons (TPH-gasoline [TPH-G], MTBE, benzene, toluene, ethylbenzene, and xylenes [BTEX]). These groundwater samples will be analyzed within 24-hours to enable interpretation of possible plume stratification and modification of well construction if necessary.

Task 3 - Installation of Wells Within the Upper Aquifer Plume

The purpose of installing two groundwater monitoring wells (MW-7 and MW-8) in the main part of the plume in the upper aquifer is to provide permanent monitoring locations from which to monitor plume migration and the progress of biodegradation. These wells will be located roughly equidistant between the B&C site and the proposed downgradient guard wells (Figure 2). Grab groundwater samples have been obtained previously near the locations of proposed wells MW-7 and MW-8 (H-6 and B97-4).

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[9] Hubbard, C.E. and M.D. Einarson. "Overview of the Borden MTBE Field Experiments: Implications for Assessing Natural Attenuation of MTBE at Real LUST Sites." Workshop notes from Santa Clara Valley Water District Workshop, MTBE: A New LUFT Challenge. April 25, 1997.

The borings for the wells will be drilled using an 8-inch-diameter hollow-stem auger. The borings are anticipated to be drilled approximately 5 feet into the top of the aquitard, which is reported to be at a depth of 70 to 80 feet. Continuous soil samples will be collected while drilling below a depth of 25 feet, where first groundwater may be encountered. Soils will be logged by an EFW geologist according to the Unified Soil Classification System (USCS) under the supervision of a California Certified Engineering Geologist. Periodic soil samples will be screened in the field using an organic vapor analyzer (OVA) to evaluate the presence of hydrocarbons in the soil.

The wells will be constructed within the 8-inch hollow-stem augers using 2-inch-diameter, Schedule 40, flush-threaded polyvinyl chloride (PVC) casing. Twenty-foot well screens will be placed so that the water table is intersected considering the historical variability of groundwater elevations. Should groundwater be encountered more than 20 feet above the top of the aquitard, the lower portion of the boring will be backfilled with bentonite prior to well construction. A sand pack compatible with the aquifer will be placed from the bottom of each boring to approximately 2 feet above the top of the screened interval. A bentonite seal of at least 2 feet will be placed above the sand pack. A sanitary seal of neat cement will be placed to within one foot of ground surface. A traffic-rated well vault box will be installed at the surface and the well heads will be capped with water-tight locking expansion caps and locks. The well design described above may be modified, if the results from the vertical plume definition (Task 2) indicate that the plume is stratified and would be more appropriately monitored with a different well construction scheme.

The wells will be developed prior to groundwater sampling. The wells will be developed by bailing and surging the groundwater in the wells until the water is free of sediment, and the temperature, pH, and specific conductance of the water has stabilized. The purge water generated during development will be contained and subsequently disposed of properly.

Task 4 - Installation of Downgradient Guard Wells

The purpose of the three guard wells (MW-9, MW-10, and MW-11) is to provide monitoring points in the upper aquifer that can provide an early warning for the possible future impact to the area of the water supply wells, should the plume continue to progress in their direction (Figure 2). These wells will be located roughly equidistant between the downgradient end of the plume (as it is currently defined) and the water supply wells. A grab groundwater sample obtained near these proposed wells (B97-5) indicated that the plume had not reached this area.

The borings will be drilled as described above, but will only extend to a depth of approximately 20 feet below the water table, or to the top of the aquitard, which ever is reached first. The wells will be constructed and developed as described above under Task 3. This task may be modified based on the results of Task 2.

Task 5 -Installation of Perimeter Wells

The four groundwater monitoring wells proposed to define the perimeter of the plume (MW-12, MW-13, MW-14, and MW-15) will be installed in the upper aquifer at locations both north and south of the currently defined plume (Figure 2). The purpose of these wells is to provide monitoring points that define the northern and southern boundaries of the plume, and to provide monitoring locations that demonstrate that the plume is not travelling around the downgradient guard wells. Grab groundwater samples (H-1 and B97-2) previously obtained near two of these proposed well locations did not contain detectable petroleum hydrocarbons, and two grab groundwater sample (B97-1 and B97-3) contained low hydrocarbon concentrations. The borings will be drilled as described above, but will only extend to a depth of approximately 20 feet below the water table, or to the top of the aquitard, which ever is reached first. The wells will be constructed and developed as described above under Task 3. This task may also be modified based on the results of Task 2.

In summary, the proposed upper aquifer monitoring network will provide two wells within the known plume (MW-7 and MW-8), three downgradient guard wells (MW-9, MW-10, and MW-11), and four perimeter wells defining the edges of the plume (MW-12, MW-13, MW-14, and MW-15).

Task 6 – Identification of Aquitard and Installation of Lower Aquifer Wells

The vertical migration of groundwater within the area is probably impeded by the stratification of the subsurface alluvial sediments. However, given the site's hydrogeologic setting, the upper and lower aquifers may be connected. According to investigations conducted at the Livermore Arcade site (Figure 2), the water-supply wells are separated from the upper aquifer in the vicinity of their volatile organic compound (VOC) plume for approximately a one-mile radius.[10] This aquifer separation may prevent the potential downward migration of the plume from the B&C site to the water-supply wells, on the assumption that similar subsurface conditions exist between the VOC contaminant plume and the B&C site. Increased gradients and groundwater flowpath changes due to operation of the water supply wells may increase the possibility of downward hydrocarbon migration. Therefore, characterization of the aquitard between the plume and the water supply wells is recommended.

Deep wells (D-1 and D-2, Figure 2) will provide monitoring points to evaluate whether the hydrocarbon plume has migrated toward the water supply wells in the lower aquifer. In addition, should the plume not be detected in these deep wells, the wells will provide permanent monitoring points to act as guard wells for the lower aquifer.

The borings will be drilled using 8-inch-diameter hollow-stem augers. Because these wells will be located adjacent to guard wells in the upper aquifer (MW-9 and MW-10), the borings

[10] H⁺GCL, Inc., *Deep Groundwater Conduit Study, Livermore Arcade Shopping Center, First Street and South P Street, Livermore, California.* December 6, 1993.

will be sampled only below the depth of the adjacent shallow boring. The borings will extend through the aquitard, anticipated to be encountered at depths between 70 to 120 feet, and 15 feet into the underlying lower aquifer.

The wells will be constructed within the 8-inch hollow-stem augers using 2-inch-diameter, Schedule 40, flush-threaded polyvinyl chloride (PVC) casing. Well screens will be placed across the uppermost 10 feet of the lower aquifer. A sand pack compatible with the aquifer will be placed from the bottom of each boring to approximately 2 feet above the top of the screened interval. A bentonite seal of at least 2 feet will be placed above the sand pack. A sanitary seal of neat cement will be placed to within one foot of ground surface. A traffic-rated well vault box will be installed at the surface and the well heads will be capped with water-tight locking expansion caps and locks. This well design may be modified if the results from the soil sampling or from previous tasks indicate that the plume would be more appropriately monitored with a different well construction scheme. The wells will be developed as described under Task 3.

Task 7 – Well Surveying and Groundwater Sampling and Analysis.

Following well installation, the top of casing of each new well and existing unsurveyed site wells will be surveyed to mean sea level using local benchmarks. Depth to groundwater will then be measured and groundwater elevations calculated for production of a groundwater contour map of the plume area. In addition, vertical gradients between the upper and lower aquifers will be evaluated to assess the potential for flow between the two aquifers.

Groundwater samples will be obtained from each of the groundwater monitoring wells installed in this investigation according to EFW's standard sampling methods. Field measurements of electrical conductivity (EC), dissolved oxygen (DO), oxidation-reduction potential (ORP), temperature, and pH will be taken at each monitoring well and recorded on water sample field data sheets. All purge water will be contained and will be properly disposed of consistent with analytical results. All groundwater samples will be analyzed for TPH-G, MTBE, and BTEX by a state-certified laboratory.

Task 8 - Reporting of Field Work and Analytical Results.

The data collected during this investigation will be evaluated and a report will be prepared presenting the results of the investigation. The report will include a description of the field methods, an evaluation of the subsurface conditions and analytical results, maps illustrating the plume conditions, geologic sections, boring logs, and copies of laboratory analytical reports. Recommendations for continued monitoring of the wells, or additional characterization for corrective action will be included in the report.

SCHEDULE AND COST ESTIMATE

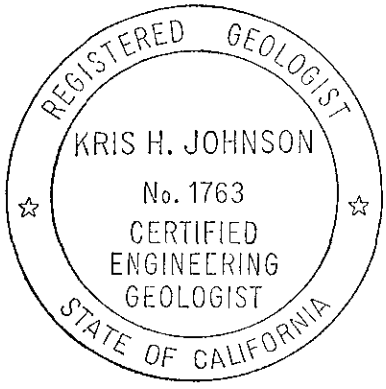
We are prepared to begin work immediately following approval from the State of California Underground Storage Tank Cleanup Fund. We estimate that the finalization of access and

encroachment, and clearance of boring locations will take up to two weeks. Well installation will start immediately following underground utility clearance and is anticipated to take 7 to 10 days. Well development and groundwater sampling will be performed immediately after well installation and will take three days. With the exception of Task 2, laboratory analyses will be performed on a standard turn-around time of two weeks. The report preparation is anticipated to be complete two weeks after receiving the analytical results.

A detailed cost estimate spreadsheet is attached. EFW will not exceed the cost estimate without prior authorization. All charges will be provided on a time-and-expense basis in accordance with our terms and conditions.

If you are in agreement with the scope of work, estimated costs, and schedule outlined in this proposal, please sign and return the attached work authorization form. We look forward to helping you with this project. Please feel free to call me if you have any questions.

Please call if you have any questions about this workplan.



Sincerely,
Einarson, Fowler & Watson

Kris H. Johnson
Senior Engineering Geologist
C.E.G. 1763

Martha J. Watson
Principal Environmental Engineer

Attachments:

Tables
Table 1 - Historical Groundwater Analytical Results

Figures
Figure 1 - Site Location
Figure 2 - Site Vicinity and Proposed Well Locations

Appendices
Appendix A – Cost Estimate Spreadsheet

cc: Ms. Eva Chu, ACEHS (without Appendix A)
Mr. Craig Mayfield, Alameda County Zone 7 (without Appendix A)
RWQCB, USTCF

Table 1
Historical Groundwater Analytical Results
B&C Gas Mini Mart
Livermore, California

Well No.	Sample Date	TPH-G (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethylbenzene (ug/L)	Xylenes (ug/L)	MTBE (ug/L)
MW-1	Aug-90	24	1,300	1,300	400	2,700	NA
	Oct-91	2	430	170	100	290	NA
	Jan-92	1	200	120	30	150	NA
	May-93	0.96	66	8	41	90	NA
	Sep-93	1.9	311	118	34	112	NA
	May-94	10	690	1,100	340	1,200	NA
	Aug-94	13	290	690	120	670	NA
	Nov-94	19	400	770	230	130	NA
	Mar-95	6	900	100	980	740	NA
	Jun-95	2.4	210	380	53	280	13,000
	Sep-95	7.8	69	1,300	220	1,200	2,000
	Feb-96	0.12	4.2	1.4	4.7	5.6	14
	Feb-97	NS*	NS*	NS*	NS*	NS*	NS*
MW-2	Jun-94	290	18,000	36,000	4,600	26,000	NA
	Aug-94	NS**	NS**	NS**	NS**	NS**	NA
	Nov-94	NS**	NS**	NS**	NS**	NS**	NA
	Mar-95	NS**	NS**	NS**	NS**	NS**	NA
	Jun-95	25	2,300	3,400	720	3,100	16,000
	Sep-95	NS**	NS**	NS**	NS**	NS**	NS**
	Feb-96	57	2,500	650	3,700	3,100	6,500
	Feb-97	20	860	1,500	480	1,000	1,300
MW-3	Jun-94	11	640	580	270	790	NA
	Aug-94	41	1,600	2,300	330	1,800	NA
	Nov-94	18	8,000	10,000	900	5,000	NA
	Mar-95	44	1,600	1,300	5,000	6,600	NA
	Jun-95	15	600	1,900	490	2,600	4,200
	Sep-95	8	710	1,100	180	870	2,700
	Feb-96	13	260	200	200	1,100	1,500
	Feb-97	11	260	550	170	600	900
MW-4	Jun-94	0.81	12	25	<0.5	22	NA
	Aug-94	0.85	37	51	9.5	35	NA
	Nov-94	1.7	110	110	5.8	58	NA
	Mar-95	1.3	180	8	52	77	NA
	Jun-95	ND	3	1	ND	1	ND
	Sep-95	<0.05	0.69	<0.5	<0.5	<0.5	<2.5
	Feb-96	87	<0.5	<0.5	<0.5	<0.5	<0.5
	Feb-97	<0.05	<0.5	<0.5	<0.5	<0.5	2.9
MW-5	Oct-95	120	16,000	26,000	3,100	15,000	39,000
	Feb-96	47	3,400	4,200	860	4,100	20,000
	Feb-97	28	1,300	1,500	480	1,000	2,200
MW-6	Oct-95	110	9,900	22,000	3,200	17,000	47,000
	Feb-96	23	2,000	460	2,900	2,600	6,300
	Feb-97	12	450	780	200	590	790

mg/l = milligrams per liter
TPH-G = Total Petroleum Hydrocarbons as Gasoline
MTBE = Methyl-tert-butyl Ether
NA= not analyzed
NS= not sampled * = well inaccessible ** = floating hydrocarbon present
ND = not detected above reporting limit, limit not available

Base map: USGS 7.5' topography, Livermore, California (1961; photorevised 1980)

SCALE: 0 2,000 4,000 FEET

I/BNC/103/FIGURES/SITELOC.DSF 9/4/98

EINARSON FOWLER & WATSON	GROUNDWATER MONITORING B & C GAS MINI MART LIVERMORE, CALIFORINA	FIGURE 1
	SITE LOCATION MAP	PROJECT NO. BNC103

DMW-01

CWS#8

W-E
<5, <0.5 (3/96)

MW-11

MW-12

B97-2
<5, <0.5 (9/97)

W-3
<5, 13 (3/96)

W-B <5,000, 9,800 (3/96)
W-1 <500, 580 (3/96)
W-A NA, 6,800 (4/91)
W-2
ND, ND (9/95)

ARROW RENTALS

D-2
MW-10

PAUL'S CLEANERS

FORMER MILLER'S OUTPOST SHOPPING CENTER
(Currently Livermore Valley Square)

D-1
MW-9
B97-5
<5, <0.5 (9/97)

Approximate lateral extent of 100 ug/l MTBE in groundwater

Approximate lateral extent of 100 ug/l benzene in groundwater

46, <0.5 (9/97)
B97-3
MW-14

B97-4 470, <0.5 (9/97)
MW-8

B97-1 60, 1.2 (9/97)
MW-13

RAILROAD AVENUE

MW-24
<5, <0.5 (9/97)

CWS#3

MIKE'S CLEANERS

FORMER LIVERMORE ARCADE SHOPPING CENTER
(Currently Vintner's Square)

150, 46 (10/95)

15,000, 3,000 H-8 (8/95)

14,000, 3,200 H-7 (8/95)

67,000
7,700 H-6 (8/95)
MW-7

MILL SPRINGS PARK APARTMENTS

MW-1
210, 190 (8/95)

14,000
1,300 H-5 (8/95)

H-9 <2, <0.5 (8/95)

H-10 <2, <0.5 (8/95)
H-11 <2, <0.5 (8/95)
H-1 <2, <0.5 (8/95)
MW-15
H-2 <2, <0.5 (8/95)
H-3 28,10 (8/95)
H-4 29, 9.2 (8/95)

G-4
G-2 9.4, 2.5 (10/95)

GROTH BROTHERS OLDSMOBILE

G-1 80, 61 (10/95)

18,000
11,000 G-3 (10/95)

2,200
1,300 MW-5 (2/97)

B & C GAS MINI MART

MW-1
<2, <0.5 (8/95)

MW-2 1,300, 860 (2/97)
MW-1 14, 4.2 (2/97)
790,450 (2/97) MW-6
MW-4 ND, 2.9 (2/96)
900,260 (2/97) MW-3
NA, 57 (3/95) H-4
H-5 NA, 22 (3/95)

SOUTH FIRST STREET

<5, 5.3 (6/97)
MW-5

MW-6
<100, 3,900 (6/97)

NA, <0.5 (12/95)
MW-3
MW-4 NA, <0.5, (12/95)

<500, 7,800 (6/97) MW-2
<5, 29 (6/97) MW-7
MW-1
<50,180 (6/97)

BEACON STATION

FIRST STREET

APPROXIMATE GROUNDWATER FLOW DIRECTION (Hydraulic gradient is 0.02)

SECOND STREET

L STREET

ABANDONED GAS STATION

N

EXPLANATION

- Proposed Groundwater Monitoring Well
  MW - Upper Aquifer, D - Deep Aquifer
- Groundwater Monitoring Well
- Soil Boring with Grab Groundwater Sample (1997)
- Soil Boring with Grab Groundwater Sample
- Municipal Water Supply Well
- 60, 180 (12/95) — Month/Year Analyzed; Benzene Concentration (ug/l); MTBE Concentration (ug/l)
- NA Not Analyzed
- ND Not Detected

NOTES
Most recent data for each sampling location is presented
Lateral extent of MTBE and benzene in groundwater based on analytical data from 1995 and 1997

\bnc\102\propwells.as1 08/98

SCALE. 0 200 400 FEET
(APPROXIMATE)

WATER QUALITY EVALUATION
B & C GAS MINI MART
LIVERMORE, CALIFORNIA

MTBE AND BENZENE CONCENTRATIONS IN GROUNDWATER

FIGURE
2

PROJECT NO
BNC102