CAMBRIA

January 18, 2000

ENVIRONMENTAL PROTECTION

00 JAN 20 PM 3:30

Susan L. Hugo
Alameda County Health Care Services Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, California 94502-6577

LOP 3618

Re: **Letter Response and Work Plan**
Shell-branded Service Station
5755 Broadway
Oakland, California
Incident #98995756
Cambria Project # 241-0483

Dear Ms. Hugo:

On behalf of Equiva Services LLC (Equiva), Cambria Environmental Technology, Inc. (Cambria) is submitting this response to the Alameda County Health Care Services Agency (ACHCSA) November 16, 1999 letter to Equiva. Following is summary of the site background and previous investigations, and a response to specific items requested in the ACHCSA letter in order to further develop a site conceptual model.

BACKGROUND

Site Location: The subject site is located on the north corner at the intersection of Broadway and Taft Street in Oakland California (Figure 1). The neighborhood in the immediate vicinity of the site is mixed commercial and residential.

Soil Lithology: The soil beneath the site has been logged as clay, underlain by sand with gravel. These units overlie hard clay to a maximum onsite explored depth of 11.5 feet below grade (fbg).

Groundwater Depth and Flow Direction: Depth to groundwater has ranged from 0.5 to 4.8 fbg since groundwater monitoring was initiated in January of 1991. The groundwater gradient is generally to the south in the vicinity of the site. Previous groundwater contour maps are included in Attachment A.

1985 Soil and Groundwater Investigation: EMCON Associates (EMCON) conducted a subsurface investigation in July of 1985. The investigation consisted of advancing two onsite soil borings, and converting one boring into groundwater monitoring well S-1. Details of the EMCON investigation are presented in the EMCON report dated August 1, 1985. A summary of soil and groundwater sampling data is included in Attachment B.

Oakland, CA
Sonoma, CA
Portland, OR
Seattle, WA

Cambria Environmental Technology, Inc.

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1992 Product Release and Tank Backfill Well Purging: In December, 1992, Gettler-Ryan of Hayward, California replaced an unleaded pipe fitting reported to have released about 200 gallons of gasoline. Tank backfill well purging was conducted on a daily basis from December 24, 1992 through January 7, 1993, at which point the free product was reduced to a sheen. According to Shell records, a total of about 40,000 gallons of mixed water and gasoline were purged from the tank backfill wells.

1993 Soil Sample and Sanitary Sewer Upgrade: Concurrent with purging free product from tank backfill wells, three trenches at the southeast corner of the site were excavated to identify hydrocarbon impacted areas near sewer piping. The highest concentration of TPHg from the sewer trench excavations was 1,300 ppm collected at 4 fbg. Soil samples collected within the trench excavations were collected from 4 to 12 fbg.

The onsite sanitary sewer piping and portions of the offsite sewer piping were replaced with piping resistant to hydrocarbon penetration. Additionally, a horizontal groundwater extraction well was installed within the excavated sewer trench below the onsite sewer piping. A grout barrier was also installed in the sewer trench to prevent further off site migration of residual hydrocarbons. Approximately 126 cubic yards of soil were excavated during sewer upgrade activities. Details of the soil investigation, sewer replacement, grout barrier installation, and horizontal well installation were presented in Weiss Associates' June 18 1993 report. A summary of soil sampling locations and results as well as sewer piping, horizontal well and grout barrier figures are included in Attachment C.

1998 Dispenser Upgrade: This service station was upgraded by Paradiso Mechanical of San Leandro, California, in March of 1998. Paradiso added secondary containment to the existing dispensers and the turbine pumps. A soil sample was collected below each dispenser which showed field indications of hydrocarbons. Each sample was collected at a depth of approximately 2 fbg. Highest reported concentrations of total petroleum hydrocarbons as gasoline (TPHg) were 990 parts per million (ppm), in sample D-4 (Figure 1). The highest concentration of MTBE was 9.8 ppm, in sample D-3, by EPA method 8020. The highest benzene concentration was 1.8 ppm, in sample D-4, the highest toluene concentration was 3.4 ppm, in sample D-3, the highest ethylbenzene concentration was 6.5 ppm, in sample D-3, and the highest xylenes concentration was 68 ppm, in sample D-4. A summary of soil sampling data is included in Attachment D. Details of the dispenser upgrades activities were presented in Cambria's *Dispenser Sampling Report* dated April 9, 1998.

SITE CONCEPTUAL MODEL DEVELOPMENT

In the November 16, 1999 letter to Equiva, the ACHCSA requested further development of a site conceptual model (SCM) for the subject site. While portions of a SCM exist for this site, the following specific elements of the SCM were requested:

Contaminant Delineation in Soil and Groundwater

The highest detected concentrations of TPHg beneath the site were from the sewer trench excavations on the southeast portion of the site. Maximum TPHg was 1,300 ppm and maximum benzene was 1.1 ppm. The highest concentrations of residual hydrocarbons in soil during the March 1998 dispenser soil sampling event were from the area beneath dispenser 4 (Figure 1). Concentrations of TPHg were 990 ppm from beneath dispenser 4 at 2 fbg,

The extent of dissolved hydrocarbons and MTBE in groundwater has not been fully defined at this site. Concentrations of MTBE in downgradient monitoring well S-2 were 22,800 part per billion (ppb) by EPA method 8020 in the September 1999 sampling event. Confirmation analysis for MTBE by EPA Method 8260 was performed once in 1996 from well S-2 only. Well S-2 showed a concentration of 51,000 ppb in 1996 by EPA method 8260. Cambria proposes conducting confirmation analysis of MTBE by EPA Method 8260 for the highest detected concentration of MTBE by EPA Method 8020 for all future sampling events. Additionally, well S-2 will be moved to quarterly sampling beginning first quarter of 2000.

Further intrusive investigations are not proposed at this time. An intrusive investigation may be proposed after evaluation of MTBE confirmation sampling and an evaluation of the effectiveness of remediation efforts proposed later in this letter response.

Sensitive Receptors

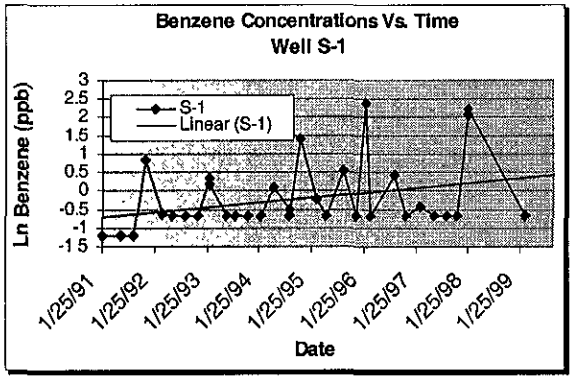
During April 1998, Cambria identified potential sensitive receptors within a ¼-mile radius of the site. Department of Water Resources records were reviewed in April 1998 to identify potential water wells and topographic maps were reviewed to identify any surface bodies of water. Results of the receptor survey are included in Attachment E.

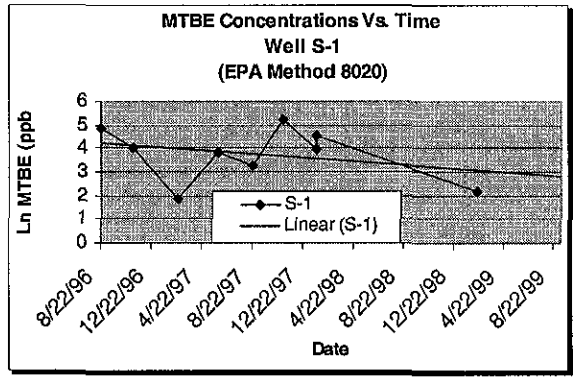
Rockridge branch of Glen Echo Creek is located approximately ¼ mile southeast of the site (cross gradient). Clairmont Creek is located approximately ¼ mile west of the site (cross gradient). One domestic well was identified ¼ mile west of the site (cross gradient).

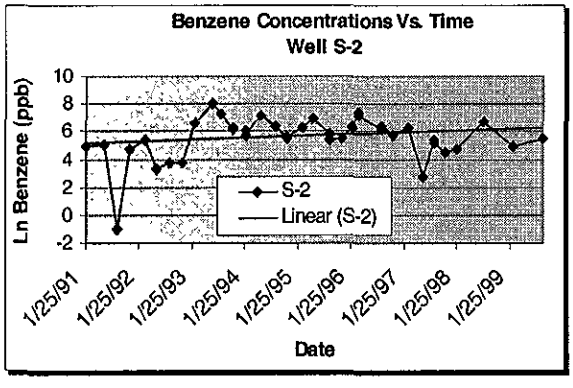
It appears unlikely that the onsite plume will impact the receptors identified as the creeks and domestic well, as these are cross gradient and located approximately ¼ mile from the site.

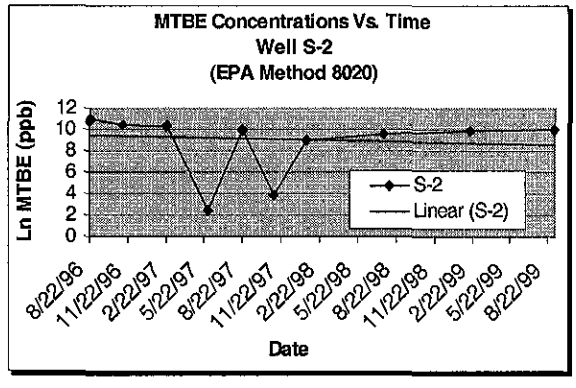
Contaminant Plume Stability

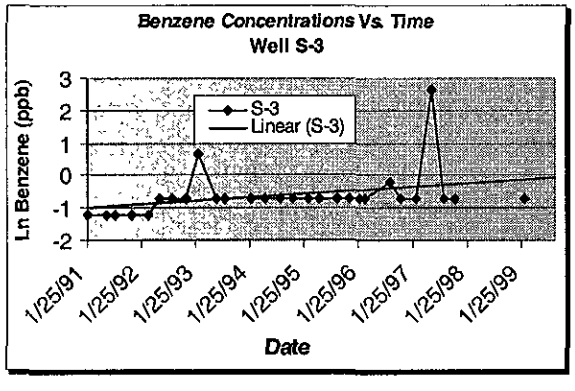
Following are plots of concentrations of benzene and MTBE (EPA Method 8020) versus time for site wells S-1, S-2, and S-3. Per ASTM Standard E 1943-98, the natural log of concentration values was used so that concentration trends could be differentiated from random concentration fluctuations.

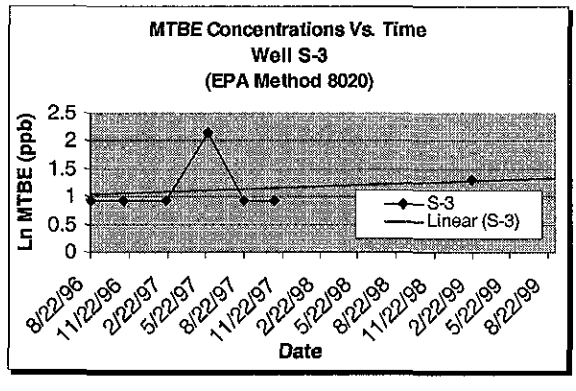












The above figures illustrate increasing trends for benzene, however, benzene concentrations in wells S-1 and S-3 have been below or near method detection limits, therefore the increasing trends are not significant. Concentrations of benzene in well S-2 appear to fluctuate, but generally appear stable.

Concentration trends of MTBE in site wells S-1 appear stable to decreasing. Well S-2 shows fluctuations of MTBE, but generally appears stable. Well S-3 shows an increasing concentration trend for MTBE; however, concentrations of MTBE in well S-3 have been below or near method detection limits and therefore the increasing trend is not significant.

The existing monitoring well network of wells S-1, S-2, and S-3 does not present a center line of monitoring points through the contaminant plume, therefore, concentration versus distance plots are not presented.

Preferential Migration Pathways

Cambria performed a site reconnaissance and reviewed City of Oakland engineering maps to identify utility conduits downgradient of the site. Storm drain and sanitary sewer locations are shown on Figure 2. Two sewer mains were identified downgradient of the site within Broadway and Taft Street. The sewer main diameters are 18-inch and buried approximately 6 feet above mean sea level (msl). Storm drain conduits were identified within Broadway. The storm drain is 12-inch in diameter and is buried approximately 5 feet above msl. The sewer and storm drain conduits downgradient of the site are graded to flow west and south.

Depth to groundwater has ranged from 0.5 to 4.8 fbg, thus the groundwater table may have infiltrated the sewer and storm drain trenches and flowed preferentially within porous backfill. An effort to deter contaminant flow towards backfill utility conduits was performed in the 1993 sewer upgrades. A grout barrier was installed within the sewer lateral onsite and a horizontal groundwater extraction well was installed below the sewer conduit trench for future remediation. Also, approximately 126 cubic yards of hydrocarbon impacted soil were excavated in 1993 from the southwest portion of the site which served to remove secondary sources of contaminants.

Cambria proposes performing monthly groundwater extraction with a vacuum truck from the onsite horizontal well and well S-2. The objective of the monthly vacuum truck operations is to facilitate contaminant source removal and potentially control offsite migration of dissolved contaminants. Cambria will coordinate sampling of the horizontal well and well S-2 prior to conducting monthly groundwater extraction so that mass removal estimates can be calculated.

Cambria will report volume of groundwater extracted and mass removal estimates in forthcoming quarterly monitoring reports.

Risk Management Plan

In summary, Cambria proposes the following activities to minimize any potential risk to human health and environment associated with the contaminant release originating from the subject site:

- Obtain confirmation analysis of MTBE in groundwater using EPA Method 8260 for the highest MTBE concentration detected by EPA Method 8020,
- Increase sample frequency in well S-2 to quarterly,
- Initiate monthly groundwater extraction from the horizontal groundwater extraction well and well S-2 to facilitate source removal and potential migration control,
- Evaluate the effectiveness of monthly groundwater extraction in forthcoming groundwater monitoring reports, and
- Continue groundwater monitoring to evaluate the stability of the contaminant plume and the effectiveness of monthly groundwater extraction.

CLOSING

We appreciate the opportunity to work with you on this project. Please call Darryk Ataide at (510) 420-3339 if you have any questions or comments.

Sincerely,
Cambria Environmental Technology, Inc

Darryk Ataide, REA I
Project Manager

Ailsa S. Le May, R.G.
Senior Geologist

Attachments:
A- Previous Groundwater Contour Maps
B- 1985 Investigation Results
C- 1993 Investigation Results
D- 1998 Dispenser Upgrade Results
E- Sensitive Receptor Survey Results

cc: Karen Petryna, Equiva Services LLC, P.O. Box 7869 Burbank, California 91501-7869

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01/06/00

G:\OAK5755\FIGURES\3Q99-MPA1

FIGURE

1

Shell-branded Service Station
5755 Broadway
Oakland, California
Incident #98995756

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Ground Water Elevation Contours
September 7, 1999

01/18/00

FIGURE 2

Underground Conduit Locations

EXPLANATION

- S-1 — Monitoring well location
- T-1 — Tank backfill well
- D-2 — Dispenser Sample location
- Sanitary Sewer line
- Storm Drain
- Overhead Powerline
- Flow Direction
- Manhole
- 4.5' msl — Elevation above mean sea level

station building

residential

underground storage tanks

water and air

planter

pumps

S-3

T-1

T-2

D-2

D-3

D-4

T-3

Pre-pack 4" monitoring well

24" deep trench containing 4" SCH 40 PVC pipe

Grout barrier

S-1

S-2

TAFT STREET

BROADWAY

18" dia.

6' msl

10' msl

4" horizontal ground water extraction well

4" SCH 40 PVC vertical access pipe to horizontal well

residential

5' msl

2.5' msl

12" dia.

18"

4.5' msl

6.5' msl

6" dia.

2" dia.

N

0 15 30

Scale (ft)

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Shell-branded Service Station

5755 Broadway

Oakland, California

Incident #98995756

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WELL CONCENTRATIONS
Shell-branded Service Station
5755 Broadway
Oakland, CA
Wic #204-5510-0303

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)	DO Reading (ppm)
S-1	1/25/91	<30	<0.3	<0.3	<0.3	<0.3	NA	NA	100.00	3.88	96.12	NA
S-1	6/3/91	<30	<0.3	<0.3	<0.3	<0.3	NA	NA	100.00	3.51	96.49	NA
S-1	8/30/91	<30	<0.3	<0.3	<0.3	<0.3	NA	NA	100.00	4.24	95.76	NA
S-1	11/22/91	<30	2.3	<0.46	0.3	<0.65	NA	NA	100.00	4.29	95.71	NA
S-1	3/13/92	<30	<0.52	<0.3	<0.3	<0.3	NA	NA	100.00	2.87	97.13	NA
S-1	5/28/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	3.79	96.21	NA
S-1	8/19/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	4.43	95.57	NA
S-1	11/18/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	4.34	95.66	NA
S-1	2/10/93	51	1.4	<0.5	<0.5	<0.5	NA	NA	100.00	4.20	95.80	NA
S-1 (D)	2/10/93	<50	1.2	<0.5	<0.5	<0.5	NA	NA	100.00	4.20	95.80	NA
S-1	6/11/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	3.39	96.61	NA
S-1	8/3/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	3.69	96.31	NA
S-1	11/2/93	70a	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	4.26	95.74	NA
S-1	12/16/93	NA	NA	NA	NA	NA	NA	NA	100.00	2.73	97.27	NA
S-1	2/1/94	60a	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	3.38	96.62	NA
S-1	5/4/94	<50	1.1	<0.5	<0.5	<0.5	NA	NA	100.00	3.00	97.00	NA
S-1	8/18/94	<50	0.6	<0.5	<0.5	<0.5	NA	NA	100.00	3.70	96.30	NA
S-1 (D)	8/18/94	60a	0.5	<0.5	<0.5	<0.5	NA	NA	100.00	3.70	96.30	NA
S-1	11/9/94	<50	4	<0.5	<0.5	<0.5	NA	NA	100.00	2.52	97.48	NA
S-1	2/22/95	50	0.8	0.7	<0 5	1.3	NA	NA	100.00	4.08	95.92	NA
S-1	5/2/95	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	2.58	97.42	NA
S-1	8/30/95	<50	1.7	<0.5	<0.5	<0.5	NA	NA	100.00	3.48	96.52	NA
S-1	11/28/95	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	3.99	96.01	NA
S-1	2/2/96	<50	11	<0.5	0.9	<0.5	NA	NA	100.00	2.00	98.00	NA
S-1	3/9/96	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	100.00	3.38	99.62	NA

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S-1	8/22/96	<50	1.5	<0.5	<0.5	<0.5	130	NA	100.00	3.43	96.57	NA
S-1	11/7/96	<50	<0.5	<0.5	<0.5	<0.5	57	NA	100.00	3.70	96.30	4.33
S-1	2/20/97	<50	0.64	<0.50	<0.50	1.6	6.5	NA	100.00	3.60	96.40	2
S-1	5/30/97	<50	<0.50	<0.50	<0.50	<0.50	46	NA	100.00	3.47	96.53	7
S-1 (D)	5/30/97	<50	<0.50	<0.50	<0.50	<0.50	47	NA	100.00	3.47	96.53	7
S-1	8/21/97	<50	<0.50	<0.50	<0.50	0.84	26	NA	100.00	3.01	96.99	3.1
S-1	11/3/97	<50	<0.50	1.1	<0.50	1.3	190	NA	100.00	3.66	96.34	2
S-1	1/20/98	110	7.9	2.8	4.4	13	53	NA	100.00	1.84	98.16	4.6
S-1 (D)	1/20/98	130	9.2	6.9	5.2	15	93	NA	100.00	1.84	98.16	4.6
S-1	2/16/99	<50	<0.50	<0.50	<0.50	<0.50	8.6	NA	100.00	2.43	97.57	2.2
S-1	9/7/99	NA	NA	NA	NA	NA	NA	NA	100.00	2.84	97.16	NA
S-2	1/25/91	450	140	1.8	6.2	15	NA	NA	98.92	4.52	94.40	NA
S-2	6/3/91	490	150	2.7	8.2	7	NA	NA	98.92	4.02	94.90	NA
S-2	8/30/91	70	0.37	<0.3	<0.3	<0.3	NA	NA	98.92	4.70	94.22	NA
S-2	11/22/91	1,600	110	9.3	29	150	NA	NA	98.92	4.72	94.20	NA
S-2	3/13/92	1,300	210	5.7	34	79	NA	NA	98.92	3.47	95.45	NA
S-2	5/28/92	100	28	<0.5	<0.5	<0.5	NA	NA	98.92	4.45	94.45	NA
S-2	8/19/92	470	42	<0.5	8.3	4	NA	NA	98.92	4.84	94.08	NA
S-2	11/18/92	490	43	39	17	29	NA	NA	98.92	4.73	94.19	NA
S-2	2/10/93	19,000	710	760	80	370	NA	NA	98.92	4.83	94.09	NA
S-2	6/11/93	33,000	3,100	1,600	370	1,100	NA	NA	98.92	3.74	95.18	NA
S-2	8/3/93	18,000	1,400	130	81	130	NA	NA	98.92	4.23	94.69	NA
S-2 (D)	8/3/93	19,000	1,400	140	86	150	NA	NA	98.92	4.23	94.69	NA
S-2	11/2/93	12,000a	470	47	31	92	NA	NA	98.92	4.72	94.20	NA
S-2 (D)	11/2/93	13,000a	530	47	35	96	NA	NA	98.92	4.72	94.20	NA

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S-2	12/16/93	NA	NA	NA	NA	NA	NA	NA	98.92	3.00	95.92	NA
S-2	2/1/94	31,000a	430	46	50	130	NA	NA	98.92	3.48	95.44	NA
S-2 (D)	2/1/94	31,000a	300	33	30	100	NA	NA	98.92	3.48	95.44	NA
S-2	5/4/94	3,900	1,200	31	53	71	NA	NA	98.92	3.26	95.66	NA
S-2 (D)	5/4/94	4,500	1,200	37	57	110	NA	NA	98.92	3.26	95.66	NA
S-2	8/18/94	24,000	600	8.3	15	27	NA	NA	98.92	3.98	94.94	NA
S-2	11/9/94	1,400a	240	9.3	13	20	NA	NA	98.92	3.10	95.82	NA
S-2 (D)	11/9/94	1,800	260	8.5	13	21	NA	NA	98.92	3.10	95.82	NA
S-2	2/22/95	29,000	550	18	12	63	NA	NA	98.92	4.02	94.90	NA
S-2 (D)	2/22/95	28,000	530	17	10	60	NA	NA	98.92	4.02	94.90	NA
S-2	5/2/95	4,400	1,000	25	38	77	NA	NA	98.92	2.86	96.06	NA
S-2 (D)	5/2/95	4,400	1,000	26	41	83	NA	NA	98.92	2.86	96.06	NA
S-2	8/30/95	800	350	20	6.7	16	NA	NA	98.92	4.06	94.86	NA
S-2 (D)	8/30/95	960	220	22	12	48	NA	NA	98.92	4.06	94.86	NA
S-2	11/28/95	2,000	230	220	50	230	NA	NA	98.92	4.48	94.44	NA
S-2 (D)	11/28/95	2,100	240	230	51	230	NA	NA	98.92	4.48	94.44	NA
S-2	2/2/96	18,000	540	18	12	22	NA	NA	98.92	1.99	96.93	NA
S-2 (D)	2/2/96	11,000	600	18	13	28	NA	NA	98.92	1.99	96.93	NA
S-2	3/9/96	3,800	1,500	27	30	58	NA	NA	98.92	3.27	95.65	NA
S-2 (D)	3/9/96	3,500	1,300	24	21	53	NA	NA	98.92	3.27	95.65	NA
S-2	8/22/96	<20,000	490	<200	<200	<200	43,000	NA	98.92	3.85	95.07	NA
S-2 (D)	8/22/96	<20,000	570	<200	<200	<200	59,000	51,000	98.92	3.85	95.07	NA
S-2	11/7/96	<5,000	290	<50	<50	<50	32,000	NA	98.92	4.00	94.92	3.51
S-2 (D)	11/7/96	<5,000	290	<50	<50	<50	32,000	NA	98.92	4.00	94.92	3.51
S-2	2/20/97	<10,000	520	<100	<100	<100	28,000	NA	98.92	3.20	95.72	1
S-2 (D)	2/20/97	<10,000	520	<100	<100	<100	35,000	NA	98.92	3.20	95.72	1

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S-2	5/30/97	150	15	11	3.5	15	11	NA	98.92	3.87	95.05	6
S-2	8/21/97	1,600	220	<10	20	<10	18,000	NA	98.92	3.29	95.63	3.3
S-2 (D)	8/21/97	1,500	180	<10	16	<10	21,000	NA	98.92	3.29	95.63	3.3
S-2	11/3/97	1,000	94	<10	<10	<10	<50	NA	98.92	4.02	94.90	1.8
S-2	1/20/98	590	110	8.3	18	23	7,800	NA	98.92	1.54	97.38	3.2
S-2	7/23/98	2,600	840	<10	44	22	15,000	NA	98.92	2.89	96.03	NA
S-2	2/16/99	680	140	6.1	10	18	19,000	NA	98.92	1.86	97.06	2.0
S-2	9/7/99	<2,000	248	<20.0	<20.0	<20.0	22,800	NA	98.92	3.66	95.26	1.8
S-3	1/25/91	<30	<0.3	<0.3	<0.3	<0.3	NA	NA	101.67	3.84	97.83	NA
S-3	6/3/91	<30	<0.3	0.3	0.3	0.3	NA	NA	101.67	3.25	98.42	NA
S-3	8/3/91	<30	<0.3	<0.3	<0.3	<0.3	NA	NA	101.67	4.73	96.94	NA
S-3	11/22/91	<30	<0.3	<0.3	<0.3	<0.3	NA	NA	101.67	4.81	96.86	NA
S-3	3/13/92	<30	<0.3	0.3	0.3	0.3	NA	NA	101.67	2.29	99.38	NA
S-3	5/28/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	3.62	98.05	NA
S-3	8/19/92	<50	<0.5	<0.5	<0.5	0.5	NA	NA	101.67	4.66	97.01	NA
S-3	11/18/92	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	4.51	97.16	NA
S-3	2/10/93	30	1.9	3.2	2.4	5.6	NA	NA	101.67	4.36	97.31	NA
S-3	6/11/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	2.91	98.76	NA
S-3 (D)	6/11/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	2.91	98.76	NA
S-3	8/3/93	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	3.70	97.97	NA
S-3	11/2/93	Well inaccessible		NA	NA	NA	NA	NA	101.67	NA	NA	NA
S-3	12/16/93	NA	NA	NA	NA	NA	NA	NA	101.67	2.12	99.55	NA
S-3	2/1/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	2.90	98.77	NA
S-3	5/4/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	2.54	99.13	NA
S-3	8/18/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	3.51	98.16	NA

WELL CONCENTRATIONS
Shell-branded Service Station
5755 Broadway
Oakland, CA
Wic #204-5510-0303

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)	DO Reading (ppm)
S-3	11/9/94	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	2.44	99.23	NA
S-3	2/22/95	80	<0.5	0.5	<0.5	0.5	NA	NA	101.67	4.12	97.55	NA
S-3	5/2/95	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	2.83	98.84	NA
S-3	8/30/95	<50	0.5	<0.5	<0.5	<0.5	NA	NA	101.67	3.16	98.51	NA
S-3	11/28/95	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	3.87	97.80	NA
S-3	2/2/96	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	2.24	99.43	NA
S-3	3/9/96	<50	<0.5	<0.5	<0.5	<0.5	NA	NA	101.67	3.05	98.62	NA
S-3	8/22/96	<50	0.8	<0.5	<0.5	<0.5	<2.5	NA	101.67	2.85	98.82	4.6
S-3	11/7/96	<50	<0.5	<0.5	<0.5	<0.5	<2.5	NA	101.67	3.35	98.32	4.6
S-3	2/20/97	<50	<0.50	<0.50	<0.50	<0.50	<2.5	NA	101.67	3.00	98.67	1
S-3	5/30/97	140	14	10	3.3	14	8.6	NA	101.67	3.00	98.67	8
S-3	8/21/97	<50	<0.50	<0.50	<0.50	<0.50	<2.5	NA	101.67	2.94	98.73	3.3
S-3	11/3/97	<50	<0.50	<0.50	<0.50	<0.50	<2.5	NA	101.67	3.36	98.31	2.4
S-3 (D)	11/3/97	<50	<0.50	<0.50	<0.50	<0.50	<2.5	NA	101.67	3.36	98.31	2.4
S-3	1/20/98	Well inaccessible		NA	NA	NA	NA	NA	101.67	NA	NA	NA
S-3	7/23/98	NA	NA	NA	NA	NA	NA	NA	101.67	2.69	98.98	NA
S-3	2/16/99	<50	<0.50	0.92	0.59	3.9	3.7	NA	101.67	2.20	99.47	2.8
S-3	9/7/99	NA	NA	NA	NA	NA	NA	NA	101.67	2.81	98.86	NA

T-1	5/30/97	NA	NA	NA	NA	NA	NA	NA	NA	2.65	NA	NA
T-1	8/21/97	NA	NA	NA	NA	NA	NA	NA	NA	2.69	NA	NA
T-1	11/3/97	NA	NA	NA	NA	NA	NA	NA	NA	3.09	NA	NA
T-1	1/20/98	NA	NA	NA	NA	NA	NA	NA	NA	0.61	NA	NA
T-1	7/23/98	NA	NA	NA	NA	NA	NA	NA	NA	2.32	NA	NA
T-1	2/16/99	NA	NA	NA	NA	NA	NA	NA	NA	1.95	NA	NA
T-1	9/7/99	NA	NA	NA	NA	NA	NA	NA	NA	2.48	NA	NA

WELL CONCENTRATIONS
Shell-branded Service Station
5755 Broadway
Oakland, CA
Wic #204-5510-0303

Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)	DO Reading (ppm)
T-2	5/30/97	NA	NA	NA	NA	NA	NA	NA	NA	1.81	NA	NA
T-2	8/21/97	NA	NA	NA	NA	NA	NA	NA	NA	1.89	NA	NA
T-2	11/3/97	NA	NA	NA	NA	NA	NA	NA	NA	2.25	NA	NA
T-2	1/20/98	NA	NA	NA	NA	NA	NA	NA	NA	0.55	NA	NA
T-2	7/23/98	NA	NA	NA	NA	NA	NA	NA	NA	1.21	NA	NA
T-2	2/16/99	NA	NA	NA	NA	NA	NA	NA	NA	1.08	NA	NA
T-2	9/7/99	NA	NA	NA	NA	NA	NA	NA	NA	0.72	NA	NA
T-3	5/30/97	NA	NA	NA	NA	NA	NA	NA	NA	2.31	NA	NA
T-3	8/21/97	NA	NA	NA	NA	NA	NA	NA	NA	1.57	NA	NA
T-3	11/3/97	NA	NA	NA	NA	NA	NA	NA	NA	3.50	NA	NA
T-3	1/20/98	NA	NA	NA	NA	NA	NA	NA	NA	0.76	NA	NA
T-3	7/23/98	NA	NA	NA	NA	NA	NA	NA	NA	0.82	NA	NA
T-3	2/16/99	NA	NA	NA	NA	NA	NA	NA	NA	0.55	NA	NA
T-3	9/7/99	NA	NA	NA	NA	NA	NA	NA	NA	2.89	NA	NA

Abbreviations:
TPPH= Total petroleum hydrocarbons as gasoline by modified EPA Method 8015
BTEX = benzene, toluene, ethylbenzene, xylenes by EPA Method 8020
MTBE = methyl-tertiary-butyl ether
TOC = Top of Casing Elevation
SPH = Separate-Phase Hydrocarbons
GW = Groundwater
DO = Dissolved Oxygen

WELL CONCENTRATIONS
Shell-branded Service Station
5755 Broadway
Oakland, CA
Wic #204-5510-0303

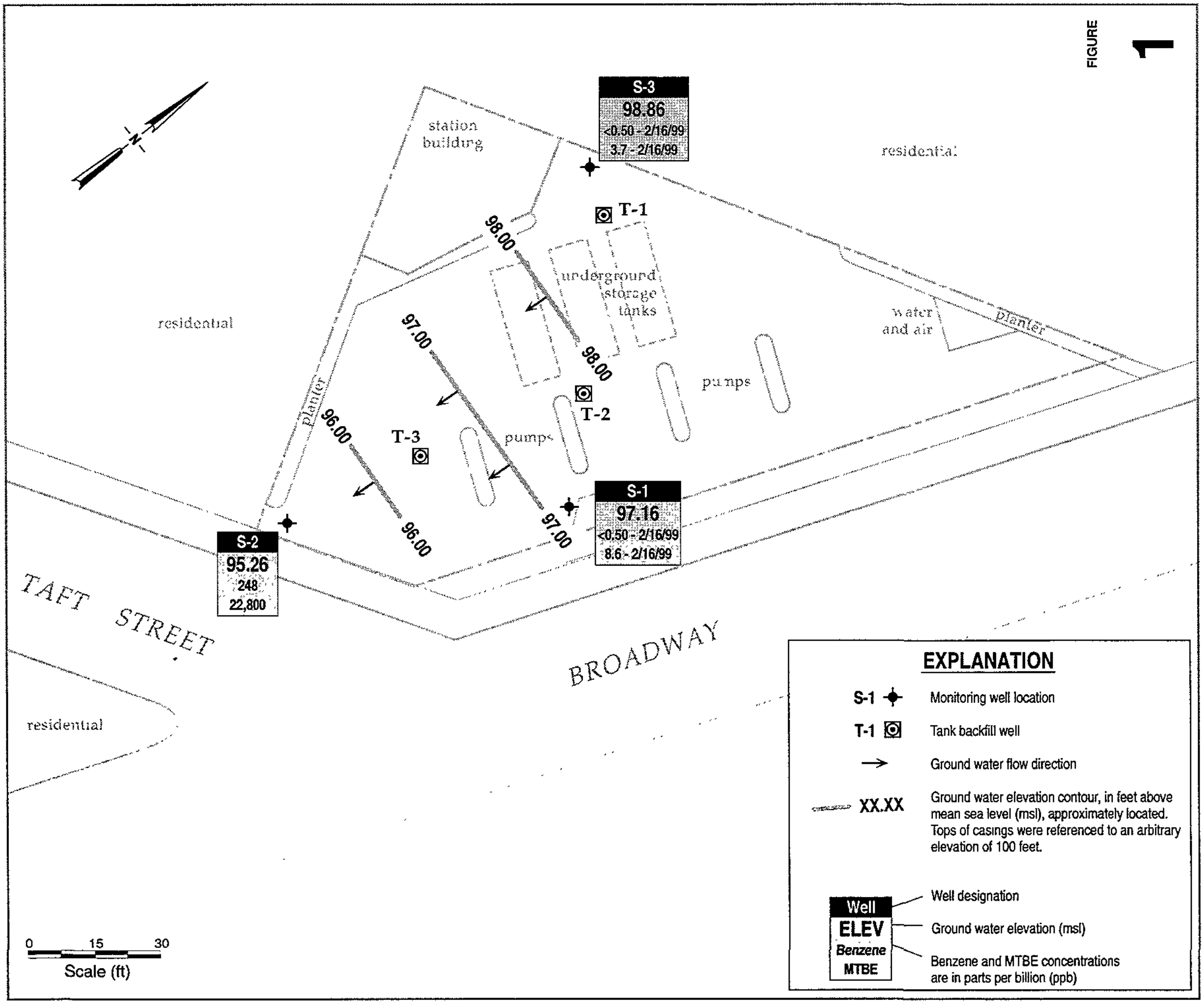
Well ID	Date	TPPH (ug/L)	B (ug/L)	T (ug/L)	E (ug/L)	X (ug/L)	MTBE 8020 (ug/L)	MTBE 8260 (ug/L)	TOC (MSL)	Depth to Water (ft.)	GW Elevation (MSL)	DO Reading (ppm)

ug/L = parts per billion
msl = Mean sea level
ft = Feet
<n = Below detection limit
D = Duplicate sample
NA = Not applicable

Notes:
a = Chromatogram pattern indicated an unidentified hydrocarbon.
Top of casing elevations referenced to arbitrary elevation of 100 ft.

Attachment A

Previous Groundwater Contour Maps



Ground Water Elevation Contours

September 7, 1999

CAMBRIA

Shell-branded Service Station

5755 Broadway
Oakland, California
Incident #98995756

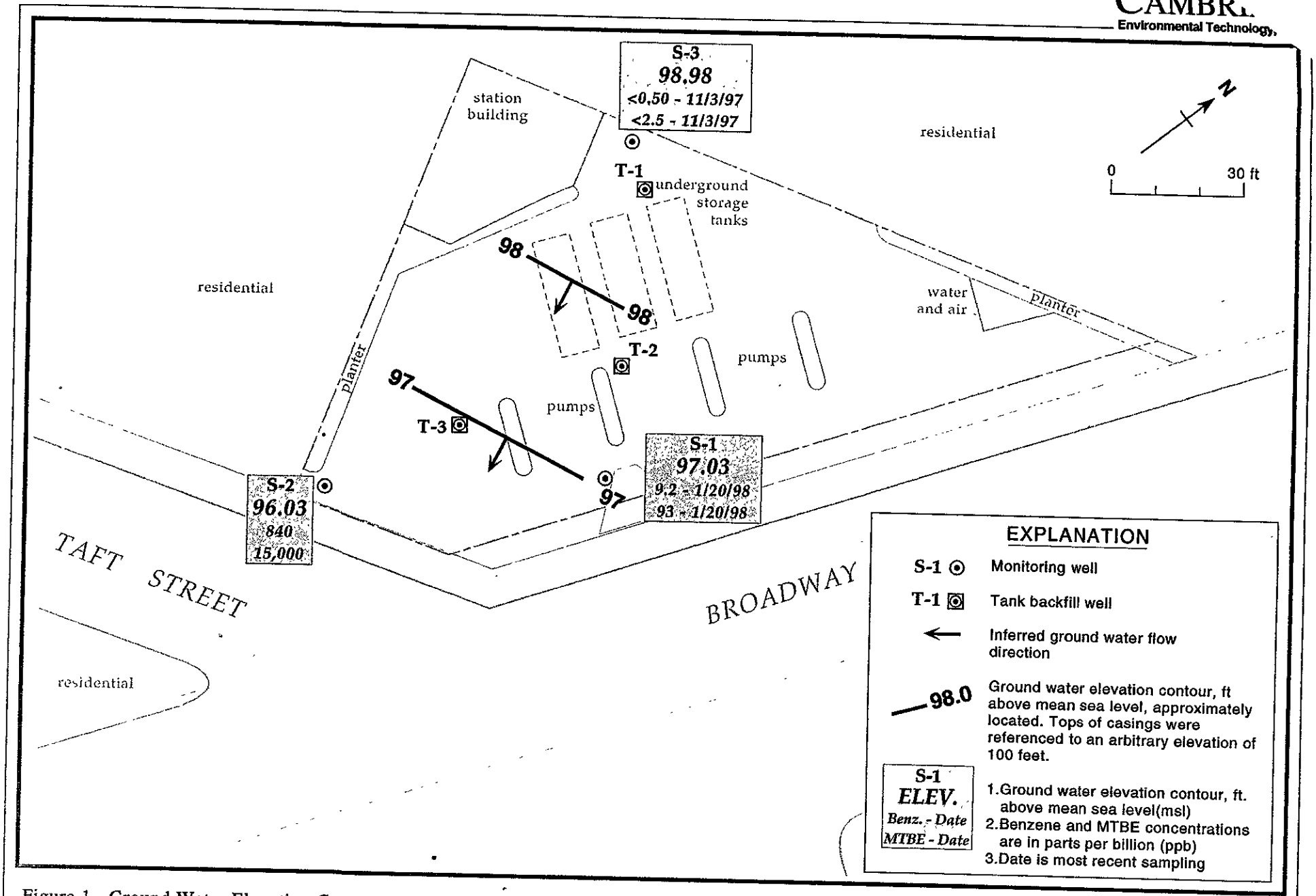


Figure 1. Ground Water Elevation Contours - July 23, 1998 - Shell-branded Service Station WIC# 204-5510-0303, 5755 Broadway, Oakland, California.

G:\OAK5755\FIGURES\3QM98-MP.AI

10/21/98

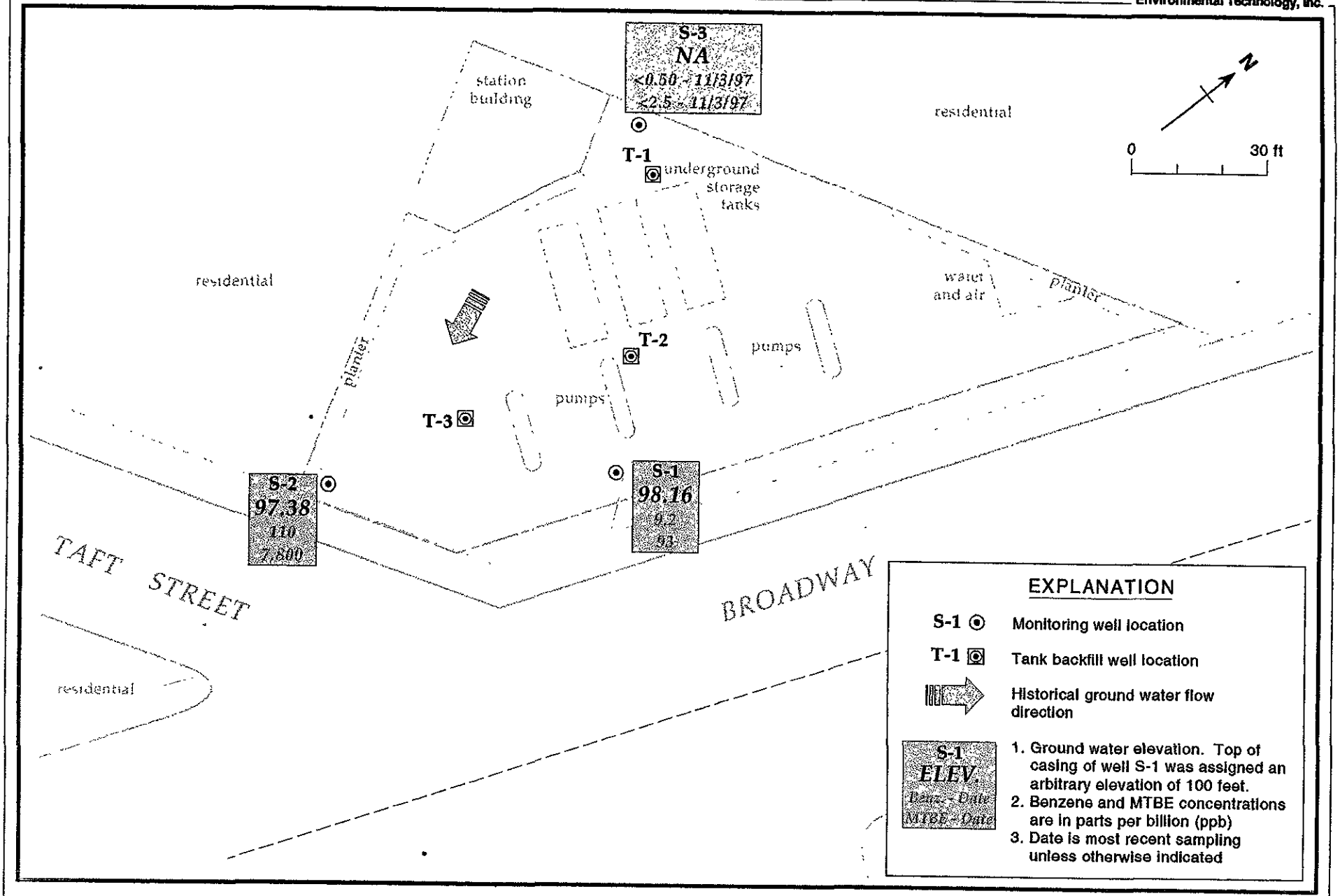


Figure 1. Ground Water Elevation Map - January 20, 1998 - Shell Service Station, 5755 Broadway, Oakland, California.

G:\SHELL\OAK5755\FIGURES\1QM98-MP.AI

05/04/98

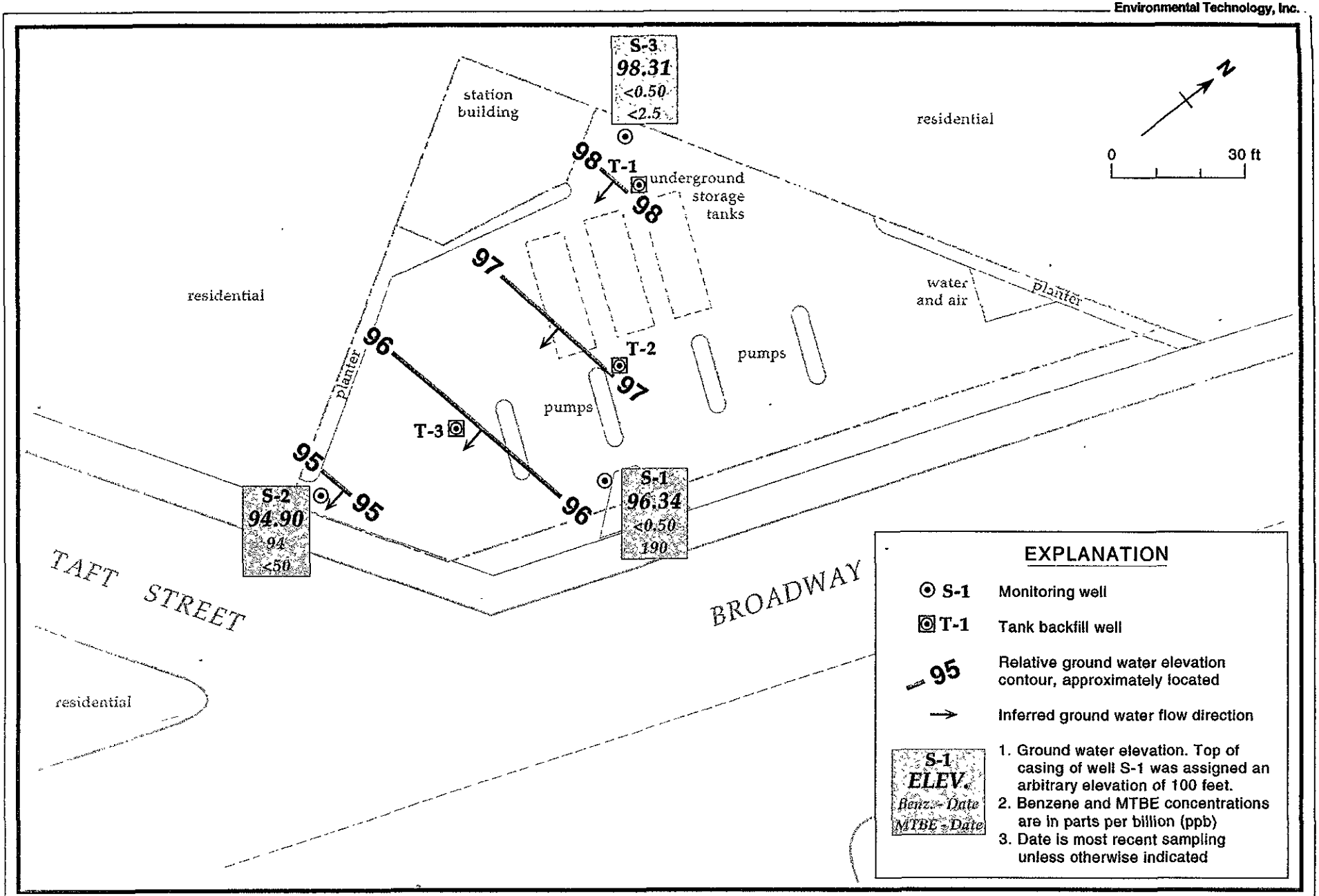


Figure 1. Ground Water Elevation Contours - November 3, 1997 - Shell Service Station, 5755 Broadway, Oakland, California.

CAMBRIA
Environmental Technology, Inc.

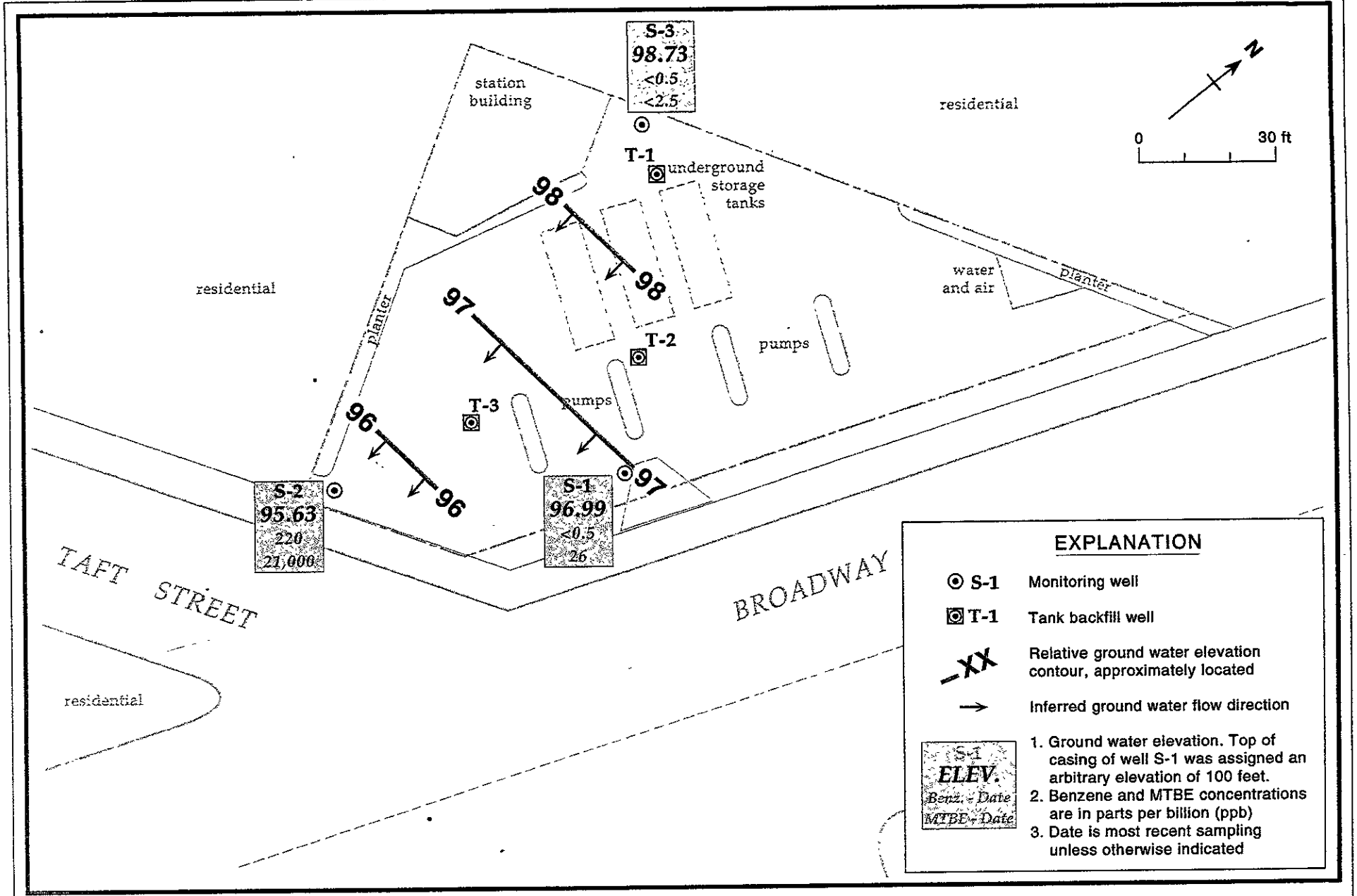


Figure 1. Ground Water Elevation Contours - August 21, 1997 - Shell Service Station WIC#204-5510-0303, 5755 Broadway, Oakland, California.

09/26/97

F:\PROJECT\SHELL\OAK5755\FIGURES\3QM97-MP.AI

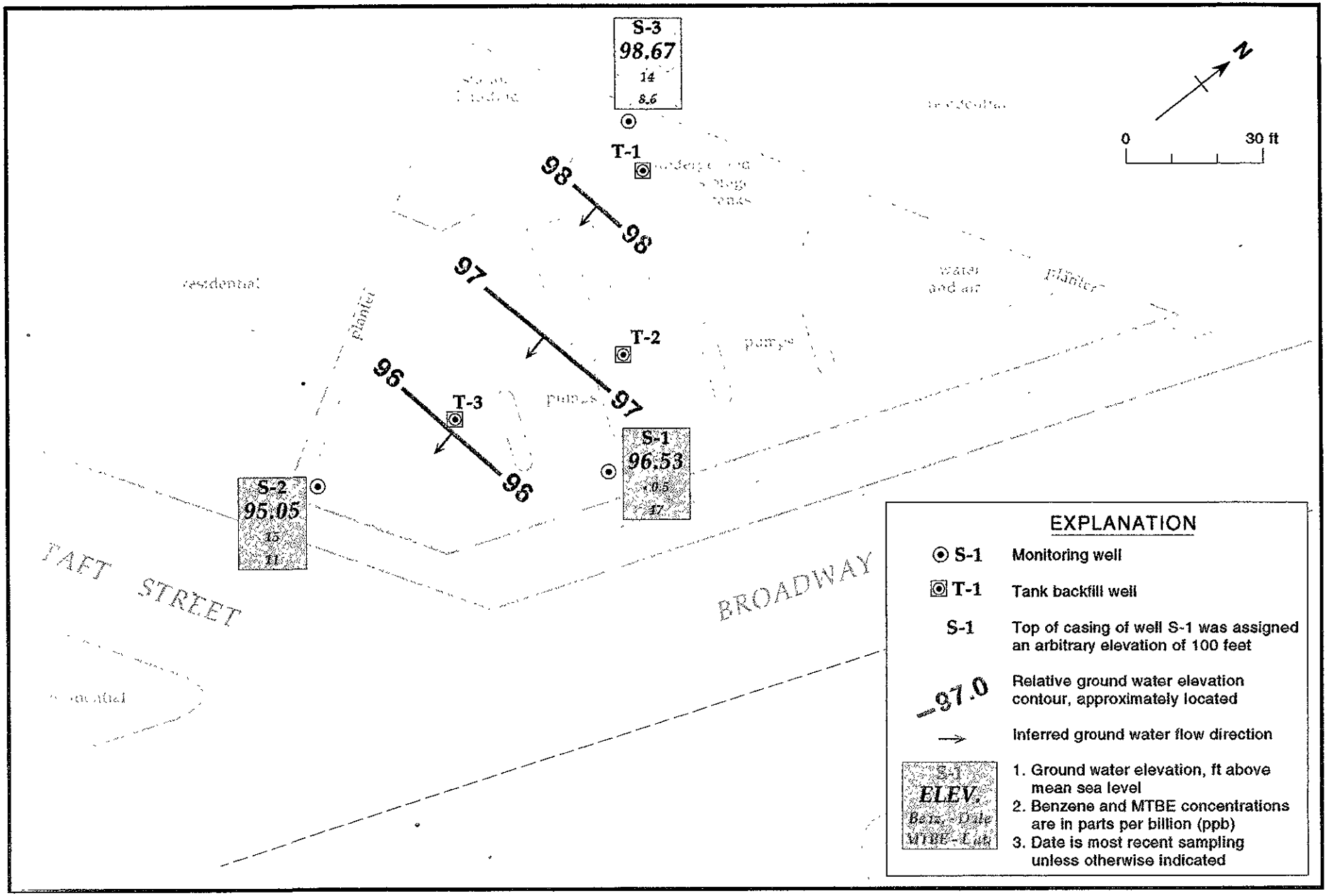


Figure 1. Ground Water Elevation Contours - May 30, 1997 - Shell Service Station WIC#204-2004-0204, 5755 Broadway, Oakland, California.

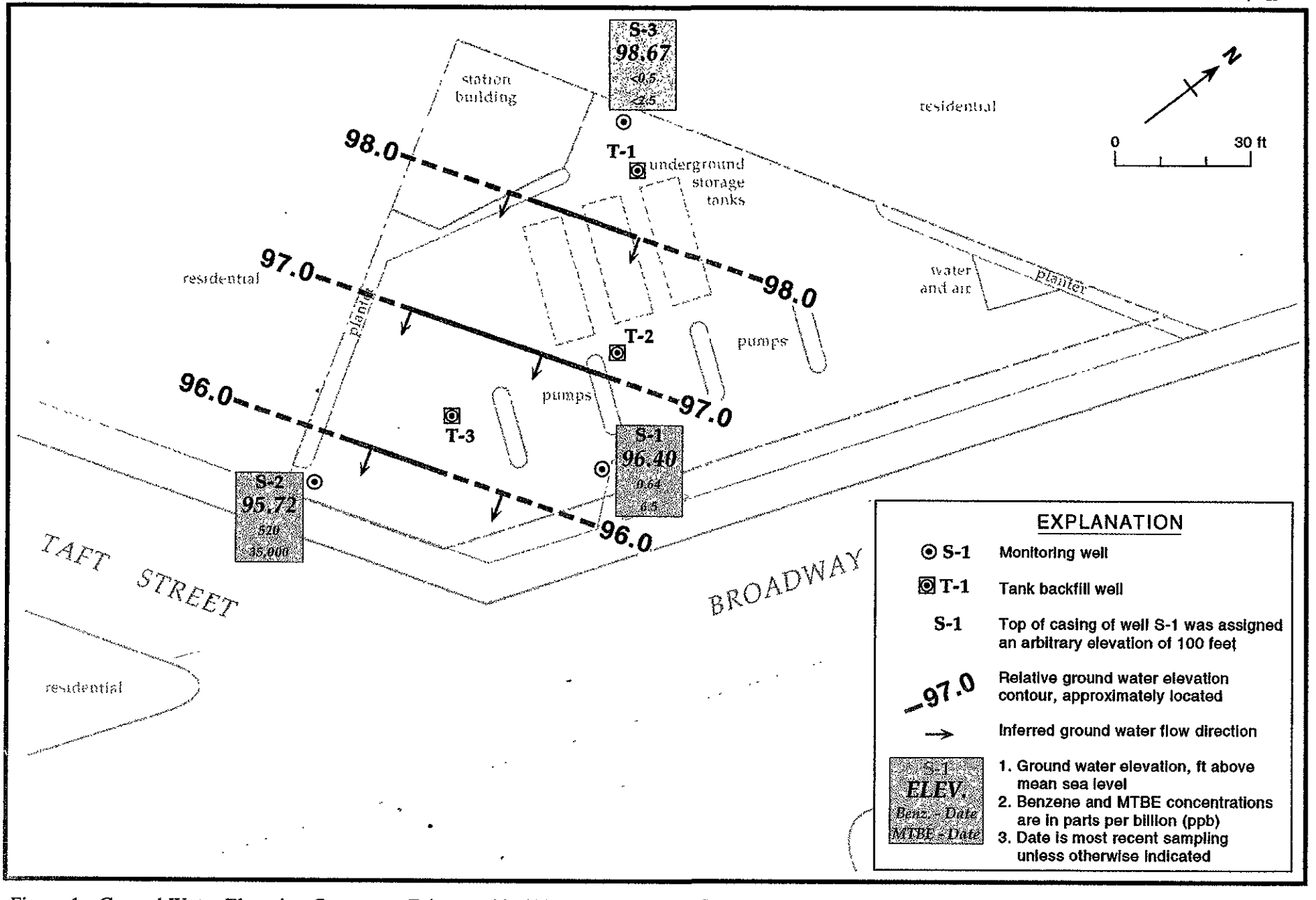


Figure 1. Ground Water Elevation Contours - February 20, 1997 - Shell Service Station WIC#204-2004-0204, 5755 Broadway, Oakland, California.

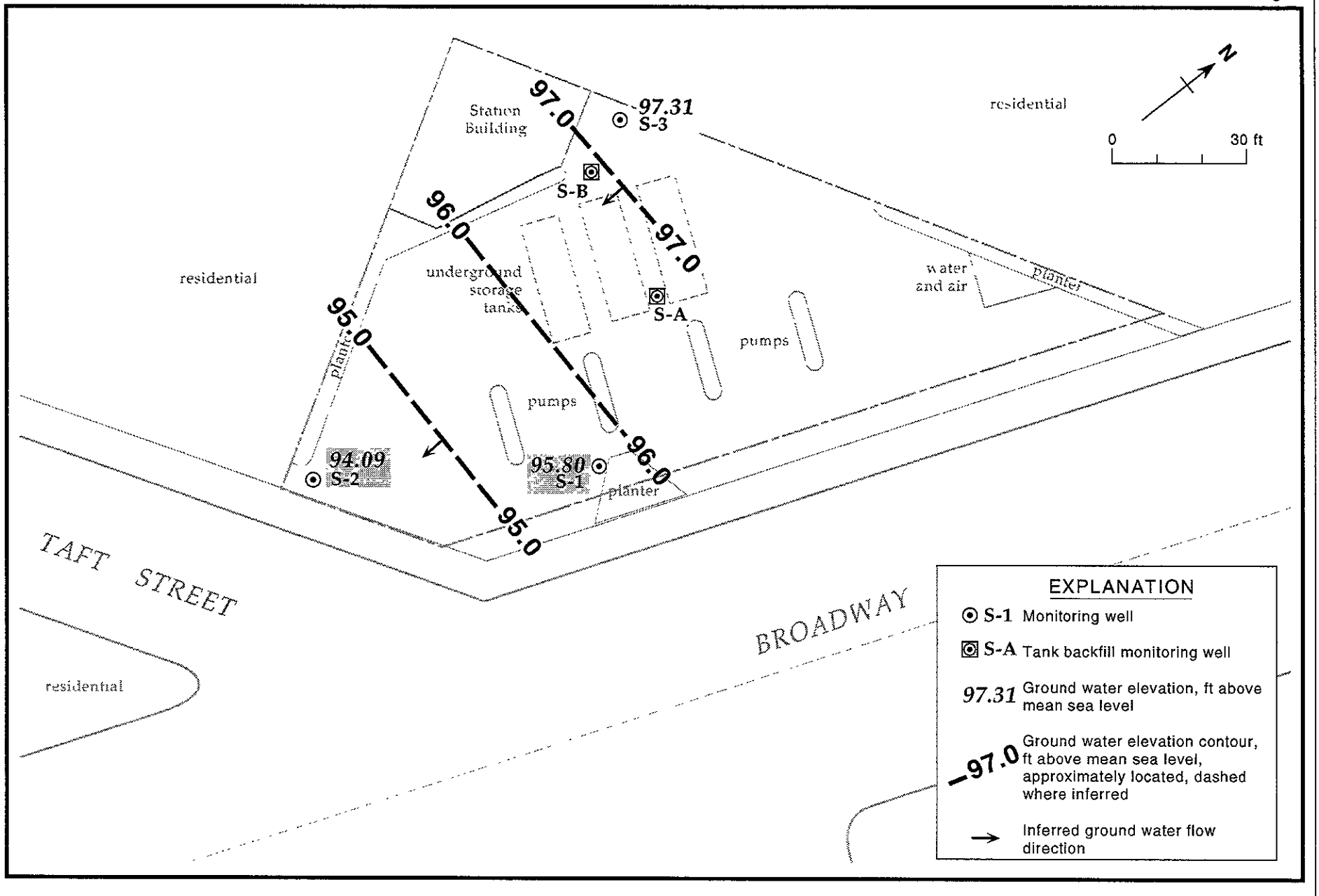


Figure 5. Monitoring Well Locations and Ground Water Elevation Contours - February 10, 1993 - Shell Service Station WIC#204-2004-0204, 5755 Broadway, Oakland, California

4/29/93

Attachment B

1985 Investigation Results

Case No. 20551

Site: 01-35510-0303
Proj. ☐ Rem. ☐ Rpt. ☑ Bill ☐
1☐ 2☐ 3☐ 4☐ 5☐ 6☐

ASSOCIATES
Consultants in Wastes
Management and
Environmental Control

August 1, 1985
Project 738-04.01

Gettler-Ryan, Incorporated
1992 National Avenue
Hayward, California 94545

Attention: Mr. Jeffrey M. Ryan

Re: Shell Service Station,
Broadway and Taft
Streets, Oakland,
California

Gentlemen:

This letter presents the results of a soil and ground-water investigation conducted by EMCON Associates at the Shell service station located at Broadway and Taft Streets in Oakland, California. The purpose of this investigation was to examine soil and ground-water conditions adjacent to the subsurface product storage tanks located at the site.

FIELD INVESTIGATION PROCEDURES

Two exploratory borings (S-A and S-1) were drilled at the locations shown on Figure 1. The borings were drilled using continuous-flight hollow-stem auger drilling equipment and were logged by an EMCON geologist. Soil samples for logging and chemical analysis were obtained from auger-return materials and by advancing a California split-spoon sampler into undisturbed soil beyond the tip of the auger. Soil samples for chemical testing were placed in glass containers, packed on ice and delivered directly to an independent laboratory as authorized by Gettler-Ryan. Laboratory results accompany this report.

Upon completion of Boring S-1 it was converted to a ground-water monitoring well by the installation of 3-inch-diameter PVC casing. Well construction details accompany the attached Exploratory Boring Logs. Boring S-A was backfilled with soil cuttings to a depth of 0.5 foot and cemented to the ground surface.

Headquarters
90 Archer Street San Jose California 95112 408-275-1444
Branch Office 445 W. Garfield Avenue Glendale California 91204

SITE CONDITIONS

Soil Boring S-A was placed within the subsurface gasoline tank complex. Ground-water monitoring Well S-1 was placed downgradient of the tank complex. Subsurface conditions explored by the borings ranged in depth from 11 to 12.5 feet. Boring S-A encountered clay, gravel and sand fill to a depth of 9 feet, underlain by shale bedrock to a depth of 11 feet. Boring S-1 encountered gravelly clay fill to a depth of 3.5 feet, underlain by gravelly clay to a depth of 12 feet. The gravelly clay is underlain by gravel to a depth of 12.5 feet. Ground water was encountered in both borings at a depth of approximately 3 feet.

Product odor was noted in soils from Boring S-A to a depth of 11 feet and in Boring S-1 to a depth of 6 feet.

LABORATORY INVESTIGATIONS AND RESULTS

Three soil samples collected from Boring S-A between a depth of 4 to 11.5 feet were analyzed for gasoline. Relatively low concentrations were detected in the soil between 4 and 10 feet at 2 to 3 parts per million (ppm). No gasoline was detected in the soil sample analyzed from a depth of 10 to 11.5 feet.

Laboratory analysis of ground water from Well S-1 revealed dissolved gasoline concentrations of 2,400 micrograms per liter or 2,400 parts per billion (see attached laboratory results).

If you have any questions regarding the contents of this letter, please do not hesitate to call.

Very truly yours,

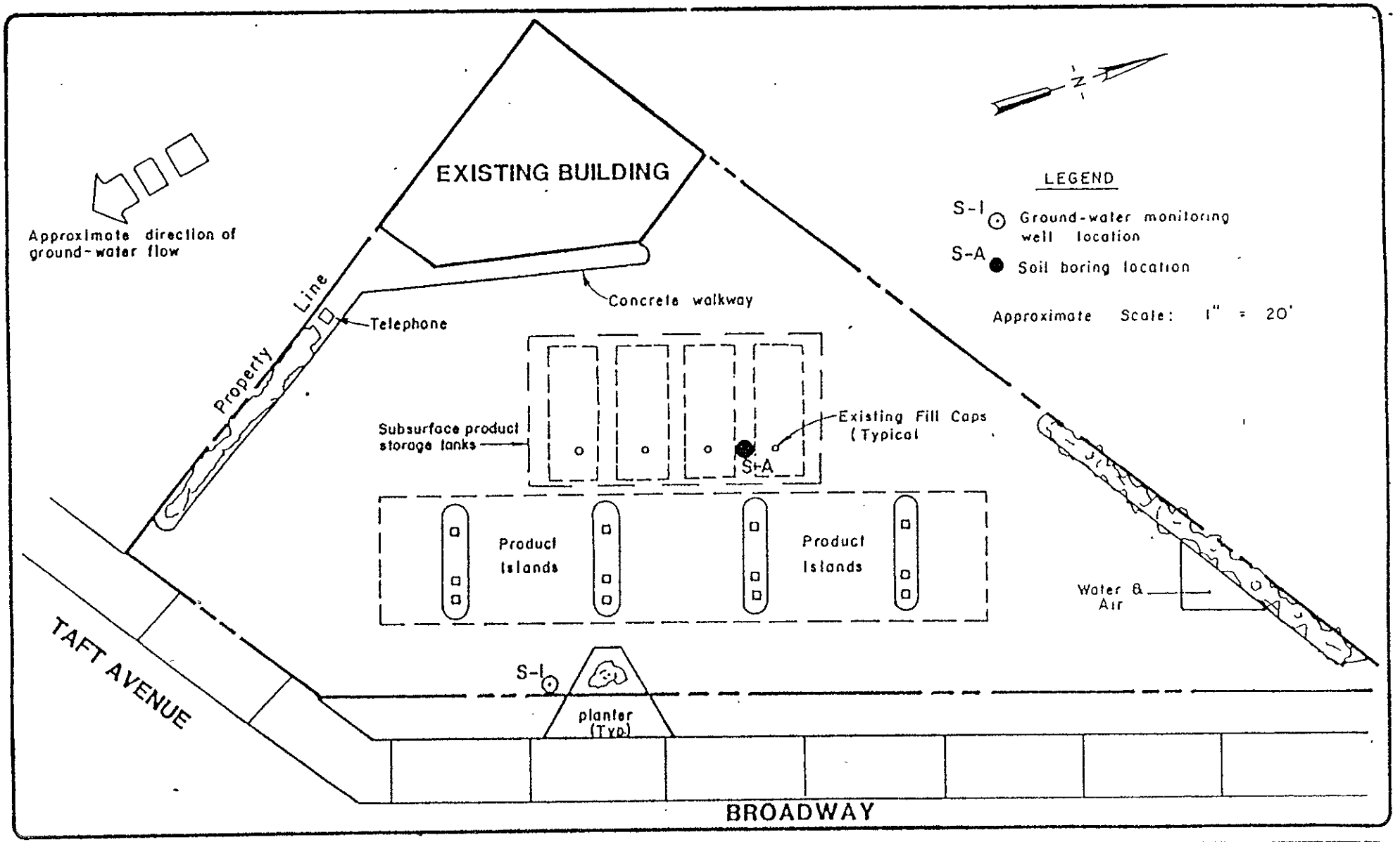
EMCON Associates

Erin Garner
Staff Geologist

Susan M. Willhite
Project Geologist

EG/SMW:mtg

Enclosures



EMCON Associates
San Jose, California

GETTLER-RYAN, INC.
SUBSURFACE HYDROGEOLOGIC INVESTIGATION
SHELL STATION, 5755 BROADWAY
OAKLAND, CALIFORNIA

MONITORING WELL LOCATION MAP

FIGURE 1

PROJECT NO. 738-04.01

Attachment C

1993 Investigation Results

Table 1. Analytic Results for Soil, Shell Service Station, WIC #204-2004-0204, 5755 Broadway, Oakland, California

Excavation/ Sample ID	Sample Depth	Date Sample	TPH-G	B	E	T	X
			<----------parts per million (mg/kg)---------->				
S-A[a]	5.5	06/12/85	3	---	---	---	---
	10.0	06/12/95	2	---	---	---	---
	11.5	06/12/85	ND	---	---	---	---
S-2-1[b]	3.0	09/18/89	92	0.12	0.58	0.80	4.2
S-3-1[b]	3.0	09/18/89	<10	<0.025	<0.025	0.062	0.120
S-C	1.5	02/02/93	7.9	0.094	0.12	0.0098	1.1
S-E	3.5	02/04/93	150	0.90	1.5	2.3	7.7
S-F	5.0	02/04/93	<1	0.021	<0.0025	<0.0025	<0.0025
S-G	2.5	02/04/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
S-H	3.5	02/04/93	<1	0.024	<0.0025	<0.0025	<0.0025
	5.0	02/04/93	290	0.55	1.8	1.8	6.5
	8.0	02/12/93	2.1	0.074	0.0097	0.064	0.075
	10.0	02/12/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
	11.5	02/12/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
S-I	5.0	02/04/93	1.7	0.074	0.0038	0.095	0.10
	8.0	02/11/93	<1	0.011	<0.0025	0.0079	0.013
	10.0	02/11/93	<1	0.021	<0.0025	0.011	0.021
	12.0	02/11/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
S-J	2.0	02/09/93	140	0.40	0.71	1.1	4.1
	4.0	02/09/93	1,300	1.1	8.1	9.5	44
S-K	6.5	02/09/93	1.0	0.35	0.31	0.23	0.64
S-L	2.0	02/10/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
	4.0	02/10/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
	6.0	02/10/93	320	0.99	1.5	2.0	5.2
	7.5	02/11/93	<1	0.039	0.0074	0.042	0.045
	10.0	02/11/93	<1	<0.0025	<0.0025	<0.0025	<0.0025

-- Table 1 continues on next page --

Excavation/ Sample ID	Sample Depth	Date Sample	TPH-G	B	E	T	X
			<----------parts per million (mg/kg)---------->				
	12.0	02/11/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
S-M	2.0	02/10/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
	4.0	02/10/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
	7.5	02/10/93	<1	0.020	0.0072	0.028	0.053
	10.0	02/11/93	5.9	0.020	0.023	0.038	0.17
	12.0	02/11/93	<1	0.0026	0.0028	0.0069	0.027
S-N	2.0	02/10/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
	4.0	02/10/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
	7.5	02/10/93	11	0.067	0.18	0.51	1.1
	10.0	02/10/93	<1	0.0035	0.0033	0.0061	0.019
	12.0	02/10/93	1.2	<0.0025	<0.0025	<0.0025	0.025
S-O	7.5	02/12/93	<1	0.021	<0.0025	<0.0025	0.0043
	10.0	02/12/93	<1	<0.0025	<0.0025	<0.0025	<0.0025
	11.5	02/12/93	1.3	0.013	<0.0025	0.0046	0.032
	14.0	02/12/93	<1	<0.0025	<0.0025	<0.0025	<0.0025

Abbreviations:

TPH-G = Total petroleum hydrocarbons as gasoline by Modified EPA Method 8015
B = Benzene by EPA Method 8020
E = Ethylbenzene by EPA Method 8020
T = Toluene by EPA Method 8020
X = Xylenes by EPA Method 8020
--- = Not analyzed
ND = Not detected, detection limit not known

Analytical Laboratory:

National Environmental Testing, Inc., (NET), of Santa Rosa, California

Notes:

a = From August 1, 1985 Emcon Associates Report
b = From Harding Lawson Associates Report

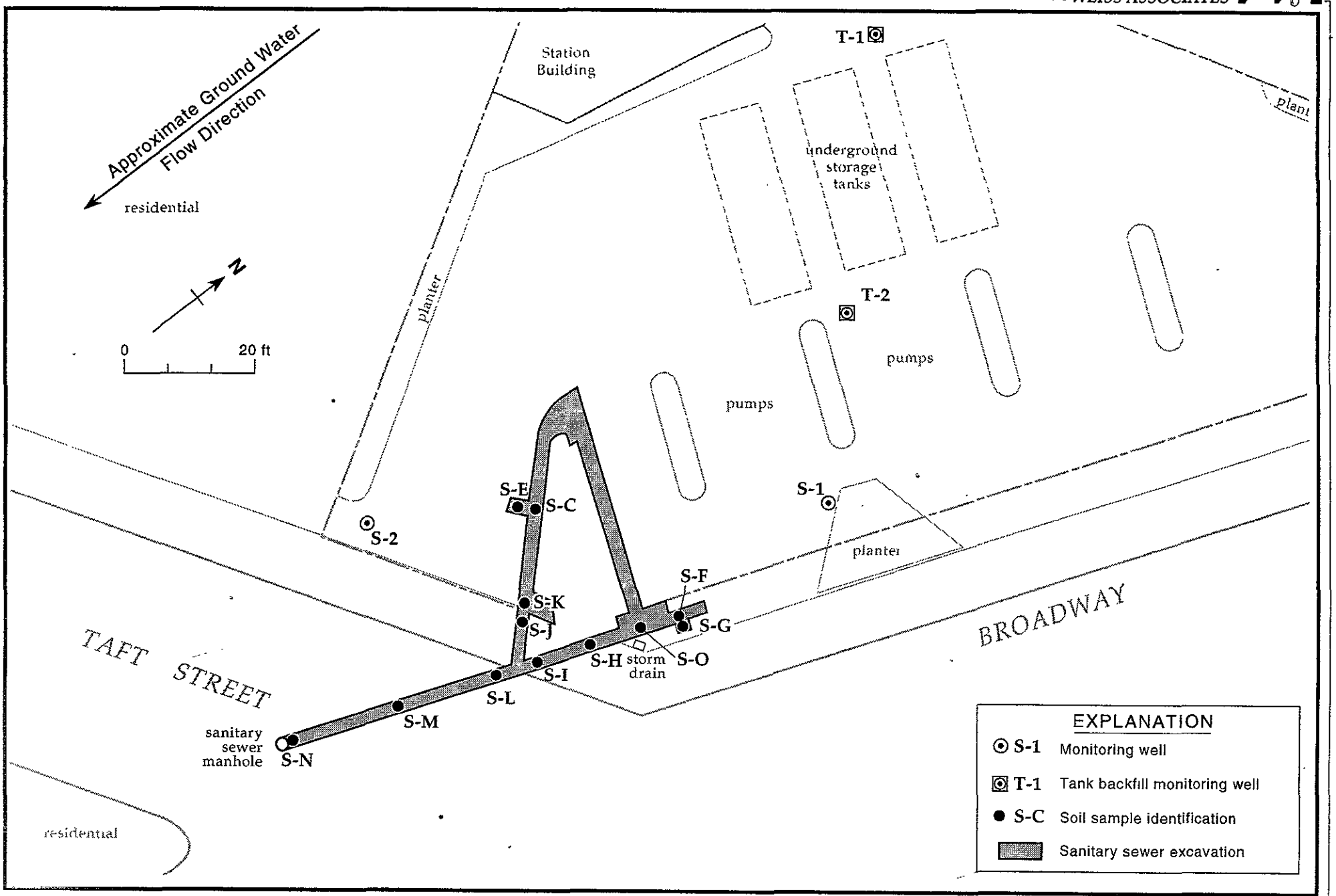


Figure 3. Sanitary Sewer Excavation and Soil Sample Locations - Shell Service Station WIC #204-2004-0204, 5755 Broadway, Oakland, California

Attachment D

1998 Dispenser Upgrade Results

Table 1. Dispenser Sample Analytical Data - Shell Service Station - WIC# 204-5510-0303, 5755 Broadway, Oakland, California

Sample ID	Depth (feet)	TPHg	MTBE	Benzene	Toluene	Ethylbenzene	Xylenes
		(Concentrations reported in milligrams per kilogram)					
March 12, 1998 Samples:							
D-2	2.0	260	<2.5	1.7	<0.50	3.3	5.4
D-3	2.0	750	9.8	<0.50	3.4	6.5	41
D-4	2.0	990	25	1.8	2.3	13	68

Abbreviations and Notes:

TPHg = Total petroleum hydrocarbons as gasoline by modified EPA Method 8015.

MTBE = Methyl tert-butyl ether by EPA Method 8020.

Benzene, ethylbenzene, toluene, xylenes by EPA Method 8020.

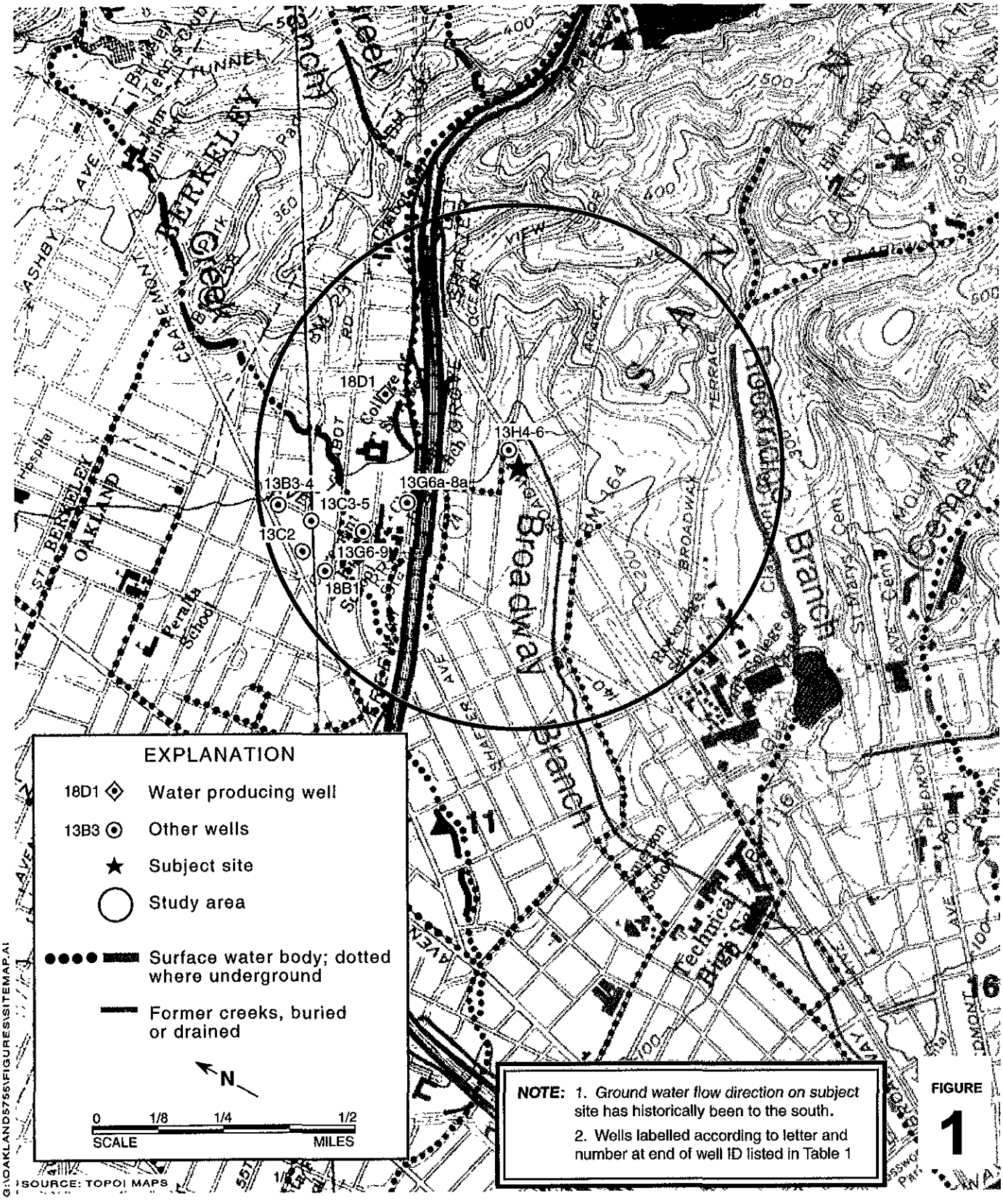
mg/kg = Milligrams per kilogram

<x = Below detection limit of x mg/kg

Attachment E

Sensitive Receptor Survey Results

01/18/00



Shell-branded Service Station

5755 Broadway

Oakland, California

Incident #98995756

CAMBRIA

Vicinity Map

Table 1. Well Survey - Shell Service Station - WIC# 204-5510-0303, 5755 Broadway, Oakland, California

Well ID	Notes	Installation Date	Owner	Use	Depth (feet)
1S/4W-13H2	1	September 1989	Shell Oil Products Company	MON	10
1S/4W-13H3	1	September 1989	Shell Oil Products Company	MON	10
1S/4W-13G6	2	December 1989	Chevron, USA, Inc.	MON	17
1S/4W-13G7	2	December 1989	Chevron, USA, Inc.	MON	17
1S/4W-13G8	2	July 1990	Chevron, USA, Inc.	MON	48
1S/4W-13G9	2	August 1990	Chevron, USA, Inc.	MON	28
1S/4W-13B3	2	January 1990	Shell Oil Products Company	MON	25
1S/4W-13B4	2	January 1990	Shell Oil Products Company	MON	25
1S/3W-18B1	2	July 1981	EBMUD	CAT	27
1S/3W-18D1	2	UNK	H.L. Sorensen	DOM	80
1S/4W-13H1	3	December 1973	Pacific Gas and Electric	CAT	120
1S/4W-13L2	3	May 1975	EBMUD	CAT	50
1S/4W-13N2	3	May 1975	EBMUD	CAT	50
1S/4W-13G6a	2	April 1989	City of Oakland	PIE	28
1S/4W-13G7a	2	April 1989	City of Oakland	PIE	28
1S/4W-13G8a	2	April 1989	City of Oakland	MON	33
1S/4W-13C2	2	August 1991	Shell Oil Products Company	MON	32
1S/4W-13C3	2	July 1991	Dryer's Ice Cream	MON	30
1S/4W-13C4	2	July 1991	Dryer's Ice Cream	MON	28
1S/4W-13C5	2	July 1991	Dryer's Ice Cream	MON	27
1S/4W-13H4	2	August 1992	Chevron, USA, Inc	MON	43

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Well ID	Notes	Installation Date	Owner	Use	Depth (feet)
1S/4W-13H5	2	August 1992	Chevron, USA, Inc	MON	43
1S/4W-13H6	2	August 1992	Chevron, USA, Inc	MON	38

Abbreviations:
MON = Monitoring well
DOM = Domestic well
PIE = Piezometer
CAT = Cathodic protection well
UNK = Unknown

Notes
1 = Not shown on Figure 1, well located on subject site
2 = Wells labelled on Figure 1 by letters and numbers after hyphen in Well ID
3 = Not shown on Figure 1, unable to determine well location