Feb 1994

CORRECTIVE ACTION PLAN
ALAMEDA HOUSING AUTHORITY
1916 WEBSTER STREET
ALAMEDA, CALIFORNIA

(ESE PROJECT #6-94-5199)

PREPARED FOR:

ALAMEDA HOUSING AUTHORITY
701 ATLANTIC AVENUE
ALAMEDA, CALIFORNIA 94501

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This report has been prepared by Environmental Science & Engineering, Inc. for the exclusive use of the Alameda Housing Authority as it pertains to its site located at 1916 Webster Street in Alameda, California. Our professional services have been performed using that degree of care and skill ordinarily exercised under similar circumstances by other geologists and engineers practicing in this field. No other warranty, express or implied, is made as to professional advice in this report.

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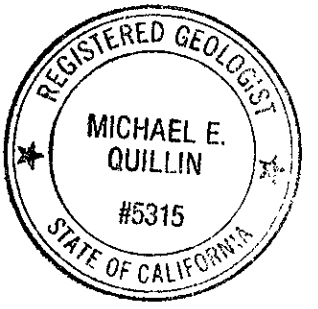

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1.0 INTRODUCTION

This Corrective Action Plan (CAP) presents the objectives, technical approach, proposed cleanup goals, and proposed schedule for the implementation of remedial measures for soil and ground water cleanup at the Alameda Housing Authority (AHA) site located at 1916 Webster Street in Alameda, California (Figure 1). Environmental Science & Engineering, Inc. (ESE) prepared this CAP on behalf of the AHA for submittal to the Alameda County Health Care Services Agency (ACHCSA) and the Regional Water Quality Control Board (RWQCB), San Francisco Bay Region for review and approval. The ACHCSA is the lead agency for this site and is responsible for approving site closure with RWQCB concurrence.

Based on the available site assessment data, and an evaluation of remedial alternatives, soil excavation with off-site thermal treatment/recycling and limited ground water extraction/treatment have been selected as the preferred methods for soil and ground water remediation at this site.

1.1 OBJECTIVES

The proposed corrective action is intended to achieve the following objectives:

- Remove the source of hydrocarbons from site soils; and
- Reduce hydrocarbon concentrations in the onsite soils and ground water to acceptable levels.

1.2 SITE DESCRIPTION

The site is located at the intersection of Webster Street and Atlantic Avenue in Alameda. The site is at an approximate elevation of six feet above mean sea level (msl) and has relatively flat topography (U.S.G.S, 1980). The site is located approximately 1/2-mile south of the Oakland Inner Harbor and 3/4 - mile north of San Francisco Bay. Several residential units, schools and commercial businesses are located near the site.

2.0 BACKGROUND

2.1 UNDERGROUND STORAGE TANK REMOVAL

The site is the former operating office for AHA, and consists of a warehouse, offices and a parking lot. The potential for petroleum hydrocarbon impacts to soil and ground water was identified during the removal of a 280-gallon gasoline underground storage tank (UST) on July 16, 1986. Reportedly, the UST had not been in service for many years but contained a mixture of water and leaded gasoline. The UST contents were evacuated prior to the tank removal. Reportedly, there were no visible holes in the UST, however, laboratory analysis of soil samples collected from the excavation identified elevated concentrations of benzene, toluene, and xylenes (Aqua Science, 1986a).

Based on the results of the soil analysis, additional contaminated soil was excavated and additional samples were collected in July and August 1986. These analytical results are shown in Table 1. During this time, eight boreholes (B1 through B6; MW1 and MW2) were drilled on the site (Figure 2). Two of these boreholes were converted to monitoring wells (MW1 and MW2). Ground water samples were collected from the borings and the monitoring wells (Aqua Science, 1986b). These ground water analytical results are presented in Table 2.

A review of the site investigation reports indicated that soil excavation was terminated near the northern site boundary after field screening and visual observations indicated that all contaminated soil had been removed. It was reported that approximately 130 cubic yards of contaminated soil was excavated and aerated on the site. The treated soil was used as backfill in the excavation (Aqua Science, 1986c).

2.2 SITE INVESTIGATIONS

No additional work was conducted at the site until 1990 when PRC Environmental Management, Inc. collected ground water samples from the two monitoring wells (MW1 and MW2) as part of the sampling program for the nearby Alameda Naval Air Station. The

samples were analyzed for volatile organic compounds (VOCs) by EPA Method 624 and extractable organic compounds (EOCs) by EPA Method 625. No VOCs or EOCs were reported from either of the monitoring wells (PRC Environmental Management, 1990).

One additional monitoring well (MW3) was installed by Versar in July 1991. MW3 was installed to determine the local ground water gradient and to evaluate the ground water quality. The two previously installed monitoring wells (MW1 and MW2) were evaluated as to their condition and were determined to be suitable for use as monitoring wells. MW1, MW2 and MW3 were developed and ground water samples were collected. The ground water samples were analyzed for total petroleum hydrocarbons as gasoline (TPH-G) and for benzene, toluene, ethylbenzene, and xylenes (BTEX).

TPH-G or BTEX were not detected in the ground water samples collected from MW1 and MW3. TPH-G or toluene were not detected in the ground water sample collected from MW2. However, benzene at 3.7 micrograms per liter (μg/L), ethylbenzene at 0.50 μg/L, and xylenes at 5.1 μg/L were detected in the MW2 sample. The benzene concentration was slightly above the California Maximum Contaminant Level (Cal MCL) of 1.0 μg/L (Versar, 1991a).

In addition to MW3, a shallow soil boring (BH-7) was drilled at the north end of the previously excavated area to verify the areal extent of soil contamination. Soil samples from BH-7 contained concentrations of TPH-G and BTEX, indicating that impacted soil was present north of the previous excavation limits (Versar, 1991b). Analytical results are shown in Table 3.

In July 1992, Versar drilled six borings B8 through B13 (Figure 2) to delineate the limits of hydrocarbon impacted soil and ground water (Versar, 1992a). Soil and ground water samples were collected from each boring and analyzed for TPH-G and BTEX. The soil and ground water samples from boring B8 were also analyzed for total lead. The soil and ground water analytical results are presented in Tables 4 and 5 respectively.

3.0 SITE GEOLOGY/HYDROGEOLOGY

The site is located in the Coast Ranges geomorphic province, at an approximate elevation of six feet above mean sea level. The area is tectonically active, being situated between the Hayward fault on the east and the San Andreas Fault on the west. The underlying bedrock consists of Mesozoic sedimentary and volcanic rocks found throughout the Coast Ranges. The general area surrounding the site is underlain by unconsolidated Pleistocene marine and nonmarine sediments that are known as the Merritt Sand (Helley & LaJoie, 1979). The unit is composed primarily of loose, well sorted, fine to medium grained sand particles with interbedded clays and silts which dominate the shallow subsurface at the site. The local soil stratigraphy at the site consists of sandy fill overlying sandy clays and sands.

The first ground water at the site occurs at approximately five feet below ground surface. Historical ground water level data are presented in Table 6. The ground water gradient indicated by January 26, 1993 water levels was approximately .04 foot per foot (220 feet per mile) toward the north east (Figure 3).

4.0 SUMMARY OF ANALYTICAL TEST RESULTS

4.1 SOIL ANALYTICAL RESULTS

Soil analytical results from samples collected in 1992 after the original excavation was completed are presented in Table 4. TPH-G and BTEX were not detected in the samples from borings B8 and B10 through B13. Xylenes were detected at 63 micrograms per kilogram (μg/kg) in the sample from boring B9. The sample from boring B8 was also analyzed for total lead. Lead was detected at 18,000 μg/kg in the B8 sample. Hydrocarbon impacted soils appear to be confined to the area of the original excavation. The estimated extent of impacted soil is shown on Figure 4. Soil hydrocarbons are present from approximately 2 feet below ground surface (bgs) to the water table at approximately five feet bgs. Versar estimated that approximately 50 cubic yards of soil with TPH-G concentrations greater than 10 mg/Kg (average TPH-G of 100 mg/Kg) were present within the impacted area (Versar 1993a).

4.2 GROUND WATER ANALYTICAL RESULTS

Ground water analytical results from samples collected in 1992 are presented in Table 7. TPH-G and BTEX were not detected in ground water samples from borings B8, B10, B11 and B13. TPH-G (2,000 μg/L), benzene (620 μg/L), and xylenes (180 μg/L), were detected in the sample from boring B9. Benzene was also detected at 1.5 μg/L in boring B12. The sample from boring B8 was also analyzed for total lead. Lead was detected at 140 μg/L in the B8 sample. An approximately 2300 square foot area of ground water is estimated to be impacted by hydrocarbons based on data from 1992 (Figure 5).

Historical ground water analytical data from quarterly monitoring at wells MW-1 through MW-3 are presented in Table 7. TPH-G and BTEX were not detected in the most recent monitoring performed on January 26, 1994 (Figure 6). Total lead was detected at 70 μg/L in well MW-2, while organic lead was not detected in samples from any of the monitoring wells (Table 7). Laboratory results are included as Appendix A. The extent of impacted ground water appears to be confined to the area shown on Figure 5.

5.0 REMEDIAL ALTERNATIVES EVALUATION

Versar identified and evaluated the following alternatives for their ability to meet the remedial objectives in a cost effective manner (Versar 1993a):

Soil

- No action;
- Soil excavation and disposal;
- Soil excavation and bioremediation;
- Soil excavation and thermal desorption; and
- In-situ soil vapor extraction.

Ground Water

- Ground water monitoring (no action);
- In-situ bioremediation;
- Ground water extraction and treatment; and
- Excavation dewatering and treatment.

Based on Versar's evaluation of remedial options, AHA selected: (1) excavation and off-site thermal desorption for soil remediation, and (2) limited excavation dewatering and treatment for ground water if analytical results show that TPH-G is detectable or if BTEX are present above their MCL in excavation ground water.

During selection as the remediation contractor, ESE recommended that AHA implement off-site thermal oxidation treatment/recycling rather than thermal desorption for hydrocarbon impacted soils. The impacted soil will be transported to a "soil recycler" where soil will be treated by thermal oxidation and reused to manufacture lightweight aggregate. The soil recycler, Port Costa Materials (PCM), receives hydrocarbon-impacted soil and manufactures a lightweight aggregate for use by the construction and landscaping industry. Disposal of hydrocarbon-impacted soil presents no continued generator liability as this soil is used in the manufacturing process and sold.

6.0 RECOMMENDED REMEDIAL ACTION

6.1 DESCRIPTION

6.1.1 Soil

Excavation, off-site treatment by thermal oxidation and recycling is the remedial method selected by the AHA. The estimated volume of hydrocarbon impacted soils is 50 yards. However, the total soil volume to be excavated is approximately 160 yards. The proposed limits of excavation are shown on Figure 7. The estimated aerial extent of excavation is about 1,900 square feet. The excavation will be terminated at the soil/water interface. Because of the shallow depth of the excavation, shoring will not be required. Instead the excavation will be benched in accordance with applicable health and safety regulations.

Paving overlying the excavation area will be removed and disposed. Impacted soil will be segregated from clean soil during excavation by screening with a photoionization detector. After reaching the proposed limits of excavation, soil samples will be collected from the side walls of the excavation and analyzed for TPH-G and BTEX by EPA 8015/8020 to confirm that cleanup levels have been achieved. A total of five sidewall samples, one from each wall, are proposed. If the hydrocarbon concentrations in the samples exceed the proposed cleanup limits, the appropriate face of the excavation will be advanced and resampled.

The segregated soil will be tested prior to backfilling to ensure that only clean soil (below 10 ppm TPH-G, and below 1 ppm BTEX) is used as backfill. Four composite samples (one composite sample per 25 cubic yards) will be collected from the segregated soil and analyzed by EPA 8015/8020 to evaluate its use as backfill. Clean native soil will be backfilled along with clean, imported fill. The impacted soil will be stored in hazardous waste containers pending subsequent removal and off site treatment/recycling.

Following completion of remedial action, backfilling and compaction will be performed as follows:

- Place soil in 8-inch uncompacted lifts and mechanically compact;
- Place and compact 6 inches of aggregate base (or match existing base) above the compacted subsoil;
- Saw cut edges of existing pavement and dispose of debris; and
- Replace asphalt paving over excavation area to match existing grade.

6.1.2 Ground Water

Excavation dewatering will be performed if required. Ground water from the excavation will be analyzed by EPA Methods 8015/8020 to determine if TPH-G or BTEX are present above regulatory thresholds. Ground water encountered during excavation will be extracted only if analytical results indicate presence of BTEX above their MCLs or TPH-G above its detection limit. It is estimated that up to approximately 10,000 gallons of ground water may have to be extracted. Ground water from the excavation will be extracted by lowering a portable submersible pump into the excavation and pumping to a nearby 10,000 gallon above-ground temporary storage tank. The excavation water will be resampled after extracting approximately three excavation volumes, and analyzed by EPA 8015/8020 to verify cleanup prior to backfilling the excavation.

The extracted ground water will be treated through granular activated carbon (GAC) and stored in a tank on site prior to testing and discharge. The treated water will be sampled and analyzed by EPA Methods 8015/8020 to test for compliance with sanitary sewer requirements prior to discharge.

6.2 HEALTH AND SAFETY

ESE has prepared a site specific health and safety plan (HASP). The HASP has been prepared by a Certified Industrial Hygienist (CIH) and includes general and site specific safe work practices to be employed at the site. All ESE personnel and subcontractors, as

well as other regulatory personnel and authorized visitors to the site will be required to adhere to the HASP. The HASP is included as Appendix B.

6.3 PERMITTING

Proper approvals are required from various government agencies to implement the proposed remediation system. The CAP will be submitted to the ACHCSA and RWQCB for approval.

The Bay Area Air Quality Management District (BAAQMD) will be notified before beginning excavation in accordance with BAAQMD regulations.

A sanitary sewer permit and an exemption for treating groundwater from the RWQCB will be required for discharge of treated groundwater from the excavation dewatering. If ground water remediation is required, the necessary permit will be obtained from the ACHCSA.

6.4 TARGET CLEANUP LEVELS

6.4.1 Soil

In proposed amendments to its resolution No. 92-131, the RWQCB has proposed a soil cleanup level of 1 mg/Kg for total VOCs. Therefore, we propose that 1 mg/Kg be the cleanup level for total BTEX at this site. The State Water Resources Control Board's LUFT manual methodology (leaching potential analysis) is not applicable at this site because of shallow ground water (5 feet). However, a maximum allowable level of 10 mg/Kg for TPH-G in soil is frequently cited for the protection of ground water. Therefore we propose 10 mg/Kg as the cleanup level for TPH-G.

Soil remediation should be considered complete if the sidewall sample analytical results meet the proposed level for TPH-G (10 mg/Kg), and if BTEX are detected at up to one mg/Kg.

6.4.2 Ground Water

The California Department of Toxic Substances Control (DTSC), Office of Drinking Water, has promulgated maximum contaminant levels (MCLs) for benzene, ethylbenzene, and xylenes and an action level for toluene. These MCLs/action levels are benzene (1 μg/L), toluene (100 μg/L), ethylbenzene (680 μg/L) and xylenes (1,750 μg/L). No MCLs or action levels have been set for TPH. Only benzene is presently above its MCL of 1 μg/L at this site. It is proposed that MCLs/action levels be considered target cleanup levels for BTEX, and 50 μg/L (detection limit) for TPH-G.

7.0 WELL INSTALLATION AND GROUND WATER MONITORING

7.1 WELL INSTALLATION

Two wells will be installed at the locations shown on Figure 7. The proposed wells will be constructed of two-inch diameter PVC with a screened interval from fifteen feet below to one foot above the current ground water table. Subsequent to their installation, the wells will be developed to ensure that the filter pack prevent sediments from entering the well, and surveyed to a relative datum.

Soil cuttings generated during well installation will be stored on site. All purge water and equipment rinse water will be contained on site in 55-gallon drums pending analysis and proper disposal.

7.2 GROUND WATER MONITORING

One year's quarterly ground water monitoring is proposed subsequent to completing remedial action at the site. Monitoring activities will be performed in accordance with ESE standard operating procedures (appendix A) and will include water level measurements in each well, and purging and sampling each ground water monitoring well. All purge water and equipment rinse water will be contained on site in 55-gallon drums pending analysis and proper disposal.

Ground-water samples collected from each well will be analyzed at a state certified laboratory for TPH-G, BTEX and total lead by EPA Methods 8015 (modified), 8020, and 7421 respectively. These samples will also be analyzed for organic lead by the California Department of Health Services method as specified in the Leaking Underground Fuel Tank Manual (State Water Resources Control Board, 1987). Quarterly monitoring reports will be prepared for submission to the ACHCSA and the RWQCB.

8.0 SCHEDULE

The estimated schedule for soil/ground water remediation at the site is as follows:

Activity	Completion Date
Receive ACHCSA Approval	February 25, 1994
Notify BAAQMD, ACHCSA and Mobilize	February 28, 1994
Begin Excavation and stockpile soil	March 2, 1994
Collect Soil Samples for Disposal Facility Profiling	March 3, 1994
Sample Sidewalls, "clean" Stockpiles and Ground Water	March 4, 1994
Receive Analytical Results, File Soil Profile, and File Sanitary Sewer Permit	March 11, 1994
Report analytical results to AHA and ACHCSA	March 14, 1994
Haul Impacted Soils, Receive Fill Materials, and Extract Ground Water	March 18, 1994
Resample Ground Water and Report Results to ACHCSA	March 25, 1994
Receive ACHCSA Approval for Backfill	April 1, 1994
Backfill and Restore Site	April 8, 1994
Install Monitoring Wells	April 15, 1994
Corrective Action Report	April 31, 1994

9.0 REFERENCES

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_____, 1991b, Stage One Site Assessment of the Housing Authority of the City of Alameda Site at 1916 Webster Street, Alameda, California, dated November 4, 1991.

_____, 1992a, Quarterly Ground Water Sampling Report, Housing Authority of the City of Alameda Site at 1916 Webster Street, Alameda, California, dated January 27, 1992.

_____, 1992b, Quarterly Ground Water Sampling Report, Housing Authority of the City of Alameda Site at 1916 Webster Street, Alameda, California, dated June 9, 1992.

_____, 1993a, Quarterly Ground Water Sampling Report, Housing Authority of the City of Alameda Site at 1916 Webster Street, Alameda, California, dated March 12, 1993.

_____, 1993b, Draft Quarterly Ground Water Sampling Report, Housing Authority of the City of Alameda Site at 1916 Webster Street, Alameda, California, dated August 16, 1993.

TABLES

TABLE 1

SUMMARY OF EXCAVATION AND BOREHOLE SOIL SAMPLING ANALYTICAL RESULTS AQUA SCIENCE, INC. INVESTIGATION (July - August, 1986)

Alameda Housing Authority
1916 Webster Street
Alameda, California

EPA Method 5020/8015			EPA Method 5020/8020		
Sample I.D.	Location	TPH-G (mg/Kg)	Benzene (mg/Kg)	Toluene (mg/Kg)	Xylenes (mg/Kg)
HA #1	excavation	3420	38.5	159	649
HA #2	excavation	2060	18.8	94.2	379
HA #3	excavation	5000	56	230	168
HA #4	excavation	38	0.268	0.122	0.315
HA #5	excavation	3.4	0.224	0.113	0.160
HA #6	excavation	2.1	0.341	0.016	0.010
B1A	borehole	4200	0.022	0.222	0.453
B2A	borehole	<0.10	0.003	0.003	0.003
B3A	borehole	28	0.355	0.177	0.322
B4A	borehole	<0.1	<0.005	<0.005	<0.005
B5A	borehole	0.70	0.024	0.061	0.058
B6A	borehole	0.70	0.014	0.022	0.020
W1A	borehole	<0.060	0.014	0.022	0.057
W2A	borehole	<0.050	0.003	0.008	0.003
HA7	excavation	38	0.12	0.97	1.8
HA8	excavation	3700	28	260	360

Notes:

mg/Kg = Milligrams per Kilogram

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TABLE 2

ANALYTICAL RESULTS: GROUND WATER SAMPLES
AQUA SCIENCES INVESTIGATION

Alameda Housing Authority
1916 Webster Street
Alameda, California

Sample I.D.	Date	TPH-G (mg/L)	Benzene (mg/L)	Toluene (mg/L)	Ethylbenzene (mg/L)	Xylenes (mg/L)
B-1	1986	37	5.1	5.2	NA	1.3
B-2	1986	<0.050	<0.001	<0.001	NA	<0.001
B-3	1986	<0.050	<0.001	0.003	NA	0.004
B-4	1986	<0.050	0.20	0.003	NA	0.005
B-5	1986	20	1.26	0.033	NA	0.32
B-6	1986	<0.050	0.005	0.003	NA	0.024
W1(MW1)	1986	<0.050	0.003	0.003	NA	0.006
W2(MW2)	1986	0.29	<0.010	0.006	NA	0.009

NOTES:

mg/L = milligrams per Liter
NA = Not analyzed for this constituent
Source of data is the Aqua Science Engineers, Inc. reports (1986).

TABLE 3

SUMMARY OF BOREHOLE SOIL SAMPLING ANALYTICAL RESULTS VERSAR, INC. INVESTIGATION (July 1991)

Alameda Housing Authority 1916 Webster Street Alameda, California

EPA Method 5030/DHS Method		EPA Method 5030/Modified 8020			
Sample I.D.	TPH-G (µg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Xylenes (µg/Kg)	Ethylbenzene (µg/Kg)
MW3-2	ND	ND	ND	ND	ND
MW3-4	ND	ND	5.2	45	8.6
B7-2	1,300,000	130,000	390,000	190,000	42,000
B7-4	59,000	2,200	6,400	7,300	2,100

NOTES:

mg/L = milligrams per Liter
ND = Not detected at or above the reporting limit (for TPH-G: 500 µg/Kg; for Toluene: 5.0 µg/Kg; for Ethylbenzene: 5.0 µg/Kg; for Xylenes: 15 µg/Kg)
Source of data is the Aqua Science Engineers, Inc. reports (1986).

TABLE 4

LABORATORY ANALYTICAL RESULTS FOR SOIL DRIVE-CORE BORING SAMPLES VERSAR, INC. INVESTIGATION (July 1992)

Alameda Housing Authority 1916 Webster Street Alameda, California

Sample I.D.	TPH-G (µg/Kg)	Benzene (µg/Kg)	Toluene (µg/Kg)	Ethylbenzene (µg/Kg)	Xylenes (µg/Kg)	Total Lead (µg/Kg)
B8-5	<500	<5	<5	<5	<15	18,000
B9-5	<500	<5	<5	<5	63	NA
B10-6	<500	<5	<5	<5	<15	NA
B11-5	<500	<5	<5	<5	<15	NA
B12-6	<500	<5	<5	<5	<15	NA
B13-6	<500	<5	<5	<5	<15	NA

NOTES:

µg/Kg = Micrograms per Kilogram
NA = Not analyzed for this constituent.

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TABLE 5

LABORATORY ANALYTICAL RESULTS FOR GROUND WATER
DRIVE-CORE BORING SAMPLES
VERSAR, INC. INVESTIGATION
(July 1992)

Alameda Housing Authority
1916 Webster Street
Alameda, California

Sample I.D.	TPH-G (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Total Lead (µg/L)
B8	<50	<0.50	<0.50	<0.50	<1.5	140
B9	<2,000	620	<25	<31	180	NA
B10	<50	<0.50	<0.50	<0.50	<1.5	NA
B11	<50	<0.50	<0.50	<0.50	<1.5	NA
B12	<50	<1.5	<0.50	<0.50	<1.5	NA
B13	<50	<0.50	<0.50	<0.50	<1.5	NA

NOTES:

µg/L = Micrograms per Liter
NA = Not analyzed for this constituent.

TABLE 6

GROUND WATER ELEVATION DATA

Alameda Housing Authority
1916 Webster Street
Alameda, California

Well No.	Date	TOC-Elevation (feet)	DTW (feet)	Ground Water Elevation (feet)
MW-1	10/22/92	9.23	4.94	4.29
	03/19/93	9.23	3.72	5.51
	04/19/93	9.23	3.91	4.92
	05/30/93	9.23	3.94	5.29
	06/29/93	9.23	4.36	4.87
	08/04/93	9.23	4.55	4.68
	01/26/94	9.23	4.14[1]	5.09
MW-2	10/22/92	10	5.22	4.78
	03/19/93	10	3.39	6.61
	04/19/93	10	3.78	6.22
	05/30/93	10	3.86	6.14
	06/29/93	10	4.41	5.59
	08/04/93	10	4.72	5.28
	01/26/94	10	3.98[1]	6.02
MW-3	10/22/92	9.44	4.66	4.78
	03/19/93	9.44	3.18	6.26
	04/19/93	9.44	3.44	4.65
	05/30/93	9.44	3.45	5.99
	06/29/93	9.44	3.95	5.49
	08/04/93	9.44	4.13	5.31
	01/26/94	9.44	3.7[1]	5.74

NOTES:

TOC = Top of Well Casing
DTW = Depth to Water
(1) = Data reported by ESE. Data prior to 01/26/94 reported by Versar, Inc.

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TABLE 7

ANALYTICAL RESULTS: GROUND WATER SAMPLES

Alameda Housing Authority
1916 Webster Street
Alameda, California

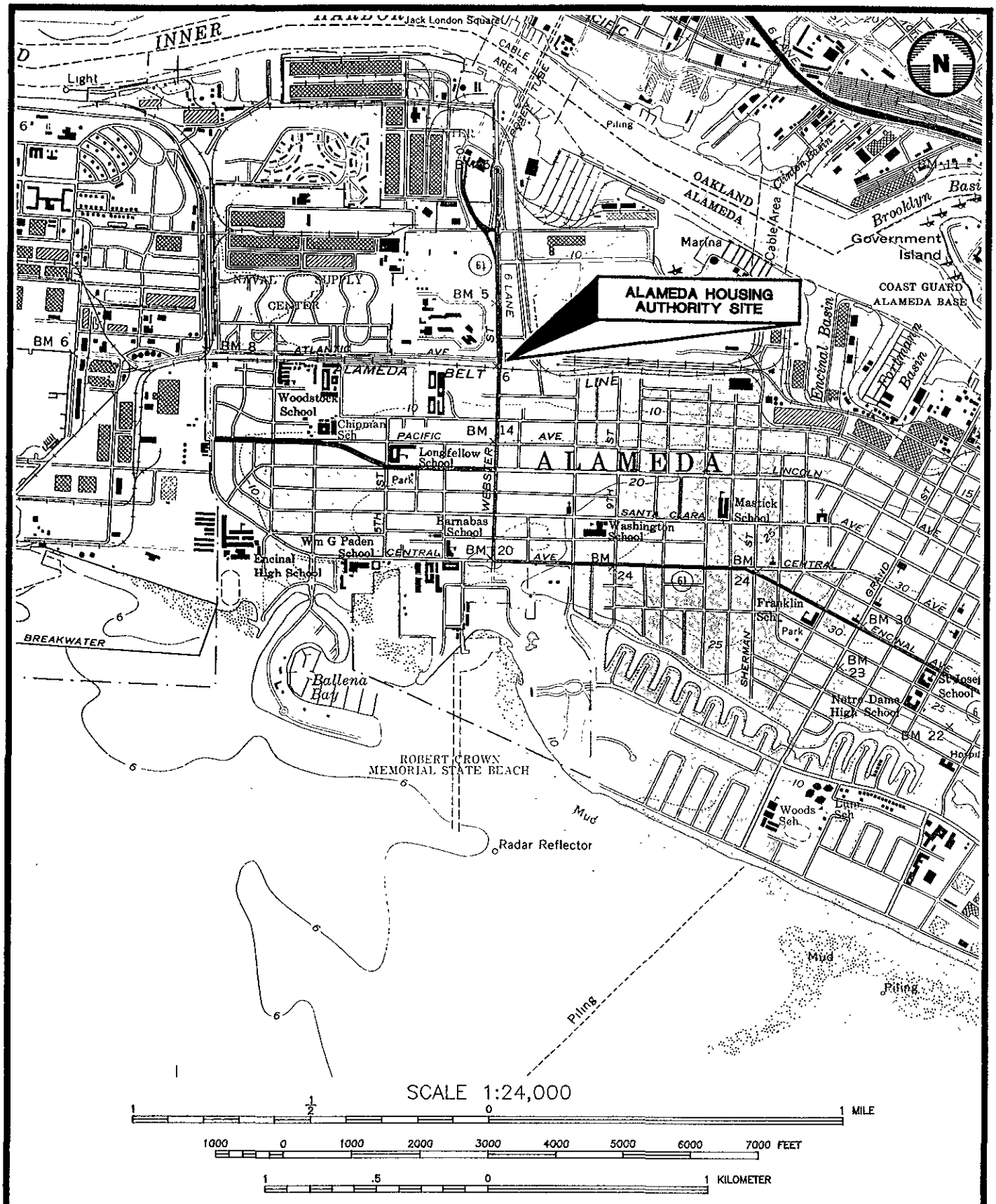
Sample I.D.	Date	TPH-G (µg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)	Total Lead (µg/L)	Organic Lead (µg/L)
MW1	07/91	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	11/91	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	02/92	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	07/92	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	03/93*	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	04/93*	NS	NS	NS	NS	NS	NA	NA
	06/93	<50	<0.30	<0.30	<0.30	<0.50	NA	NA
	01/94(1)	<50	<0.50	<0.50	<0.50	<0.50	<3	<50
MW2	07/91	<50	3.7	<0.50	0.50	5.1	NA	NA
	11/91	<50	1.1	<0.50	<0.50	4.5	NA	NA
	02/92	<50	<0.50	<0.50	<0.50	1.6	NA	NA
	07/92	<50	<0.50	0.59	<0.50	<1.5	NA	NA
	03/93*	<250	<52	<50	<59	<150	NA	NA
	04/93*	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	06/93	<50	<0.30	<0.30	<0.30	.95	NA	NA
	01/94(1)	<50	<0.50	<0.50	<0.50	<0.50	70	<50
MW3	07/91	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	11/91	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	02/92	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	07/92	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	03/93*	<250	<52	<50	<59	<152	NA	NA
	04/93*	<50	<0.50	<0.50	<0.50	<1.5	NA	NA
	06/93	<50	<0.30	<0.30	<0.30	<0.50	NA	NA
	01/94(1)	<50	<0.50	<0.50	<0.50	<0.50	<3	<50
Cal MCL	--	--	1	100	680	1,750	50	--

NOTES:

µg/L = Milligrams per Liter
NA = Not analyzed for this constituent.
(1) = Data reported by ESE. Data prior to 1/94 reported by Versar, Inc. (Versar 1991b, Versar 1992a, Versar 1992b, Versar 1993a and Versar 1993b)

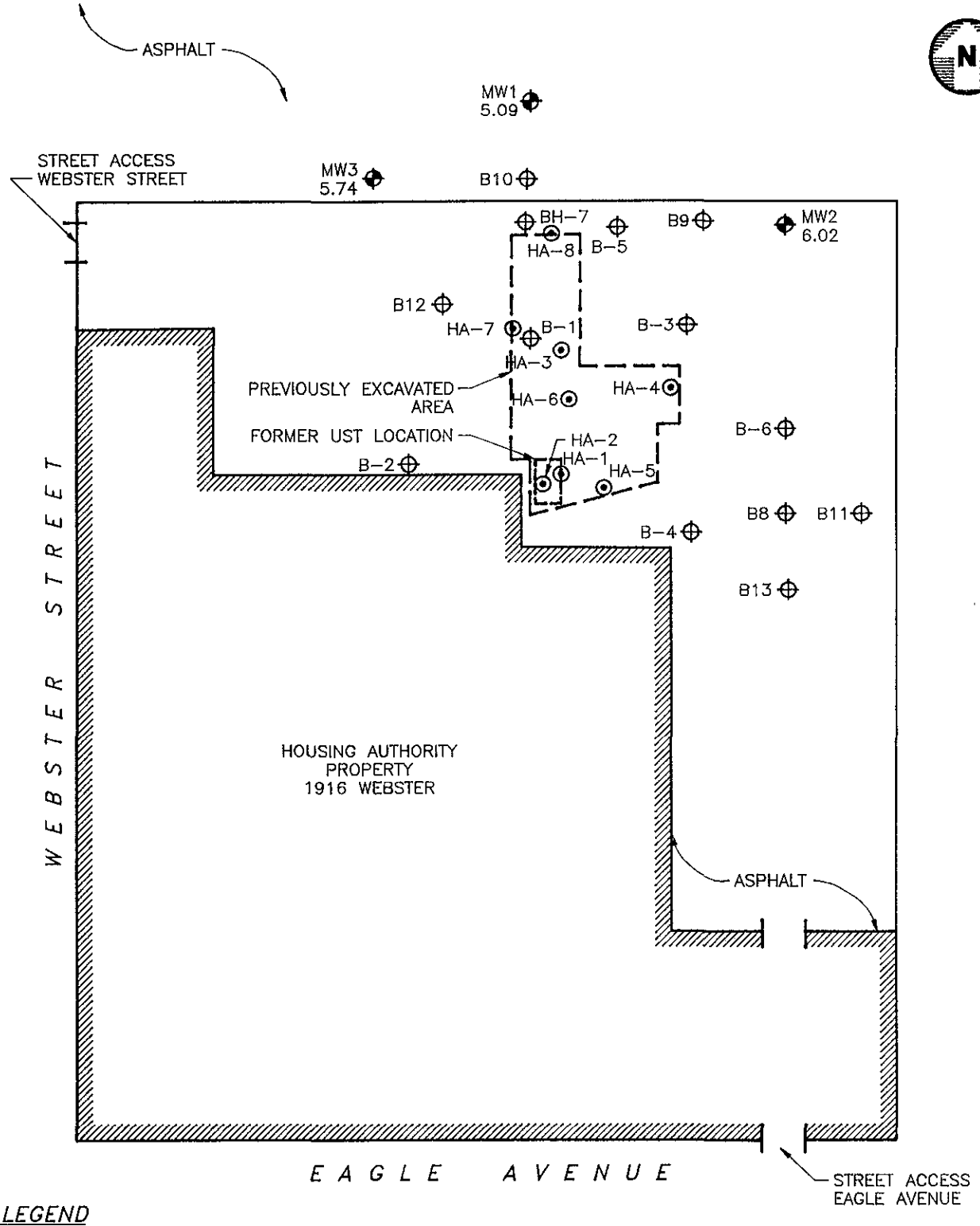
F:\6945199\TABLE7

FIGURES



ADAPTED FROM U.S.G.S. OAKLAND WEST 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP, 1959, PHOTOREVISED 1980.

ESE A CILCORP Company — Environmental Science & Engineering, Inc.	DATE 2/94	LOCATION MAP	FIGURE NO. 1
	REVISED		
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	CAD FILE 51991001	ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET ALAMEDA, CALIFORNIA	PROJ. NO. 6-93-5199



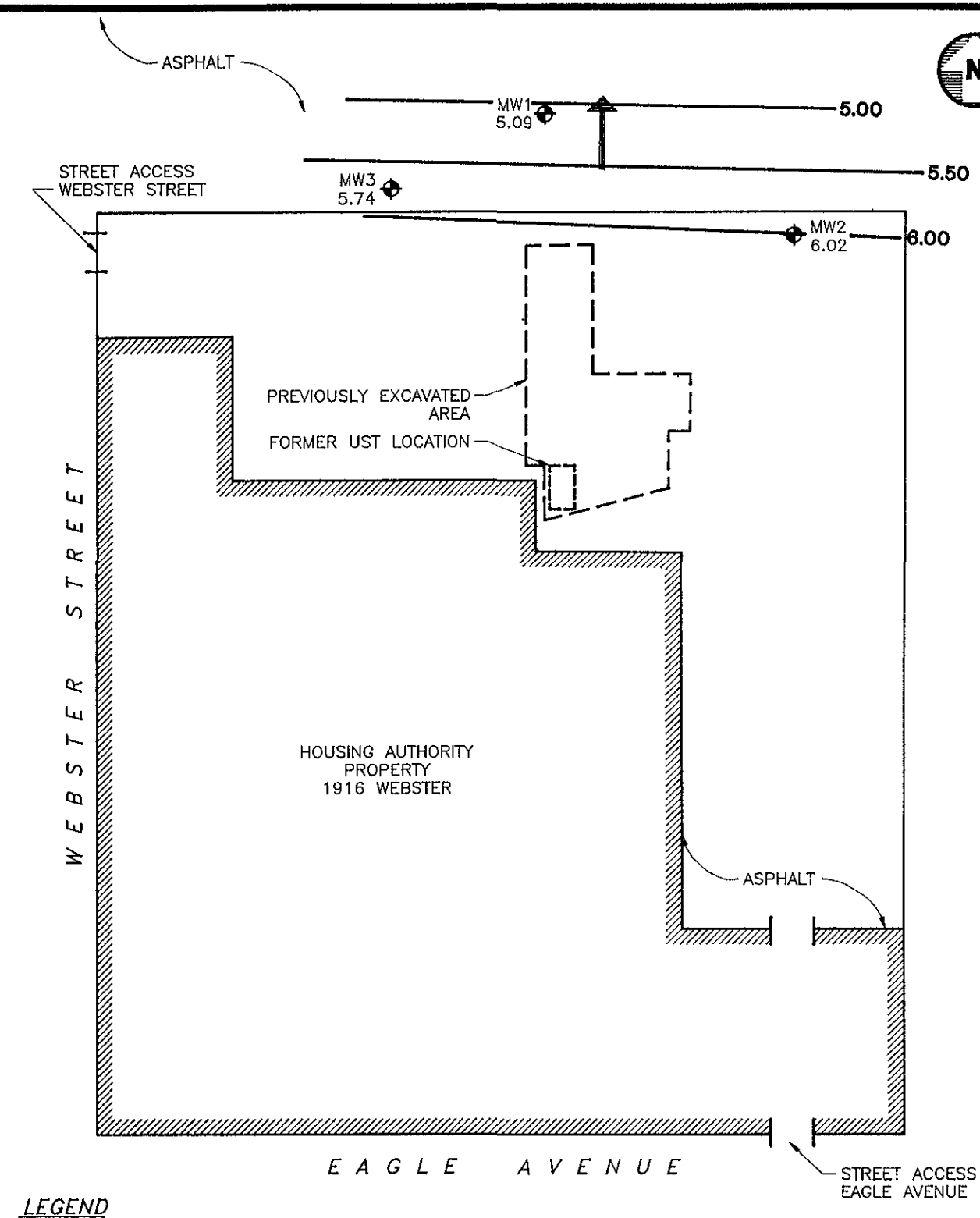
LEGEND

- GROUND WATER MONITORING WELL
- SOIL BORING LOCATION
- SOIL SAMPLE LOCATION

SCALE

0 30 FEET

ESE A CH2M HILL Company — Environmental Science & Engineering, Inc.	DATE 2/94	MONITORING WELL AND BORING LOCATIONS MAP	FIGURE NO. 2
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET ALAMEDA, CALIFORNIA	PROJ. NO. 6-93-5199
	CAD FILE 51991004		

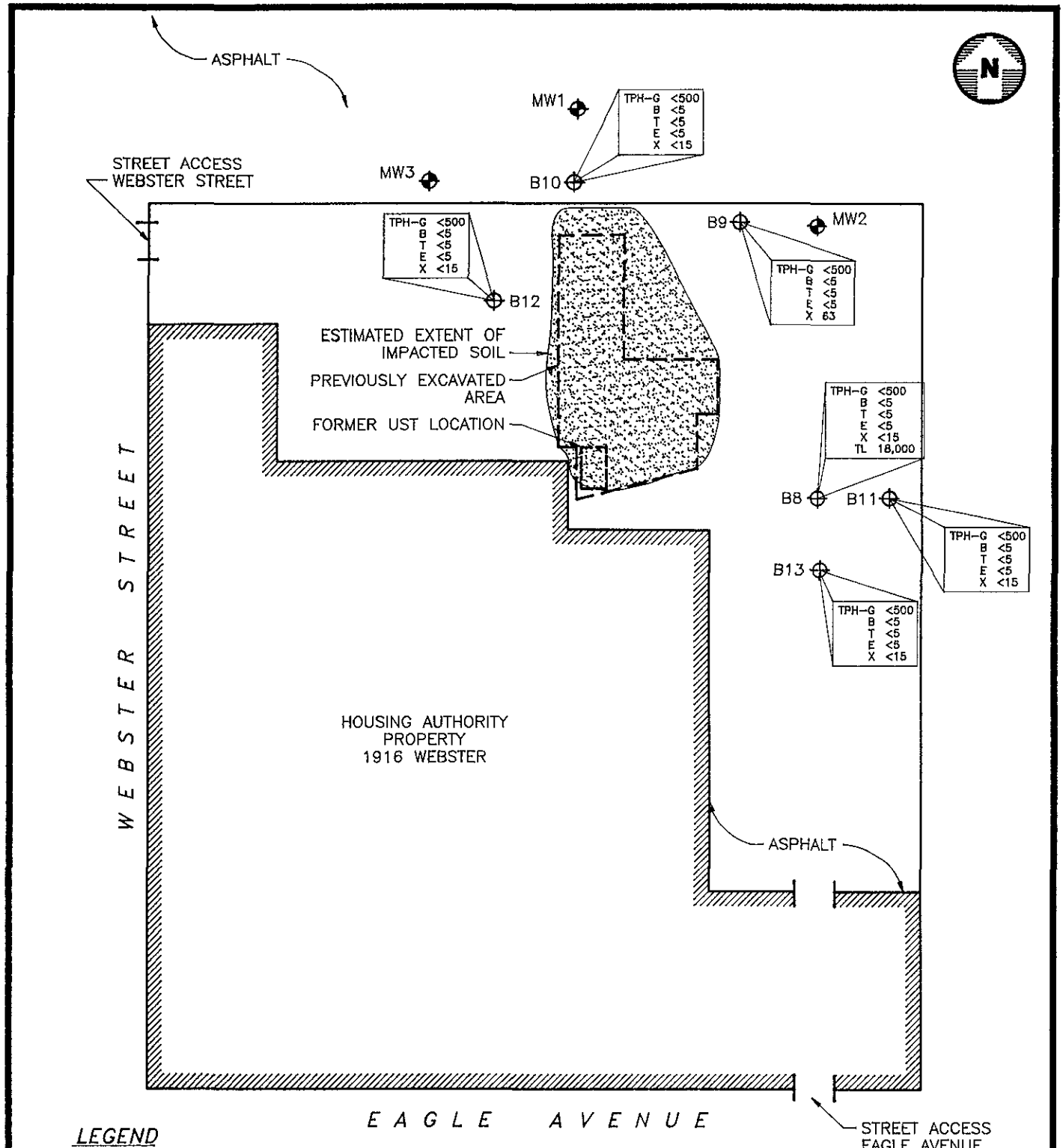


LEGEND

- ◆ GROUND WATER MONITORING WELL
- 5.09 GROUND WATER ELEVATION (IN FEET ABOVE MEAN SEA LEVEL)
- → APPROXIMATE DIRECTION OF GROUND WATER FLOW

SCALE
0 30 FEET

ESE A CH2MHILL Company **Environmental Science & Engineering, Inc.**	DATE 2/94	GROUND WATER ELEVATIONS	FIGURE NO. 3
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET ALAMEDA, CALIFORNIA	PROJ. NO. 6-93-5199
	CAD FILE 51991002		



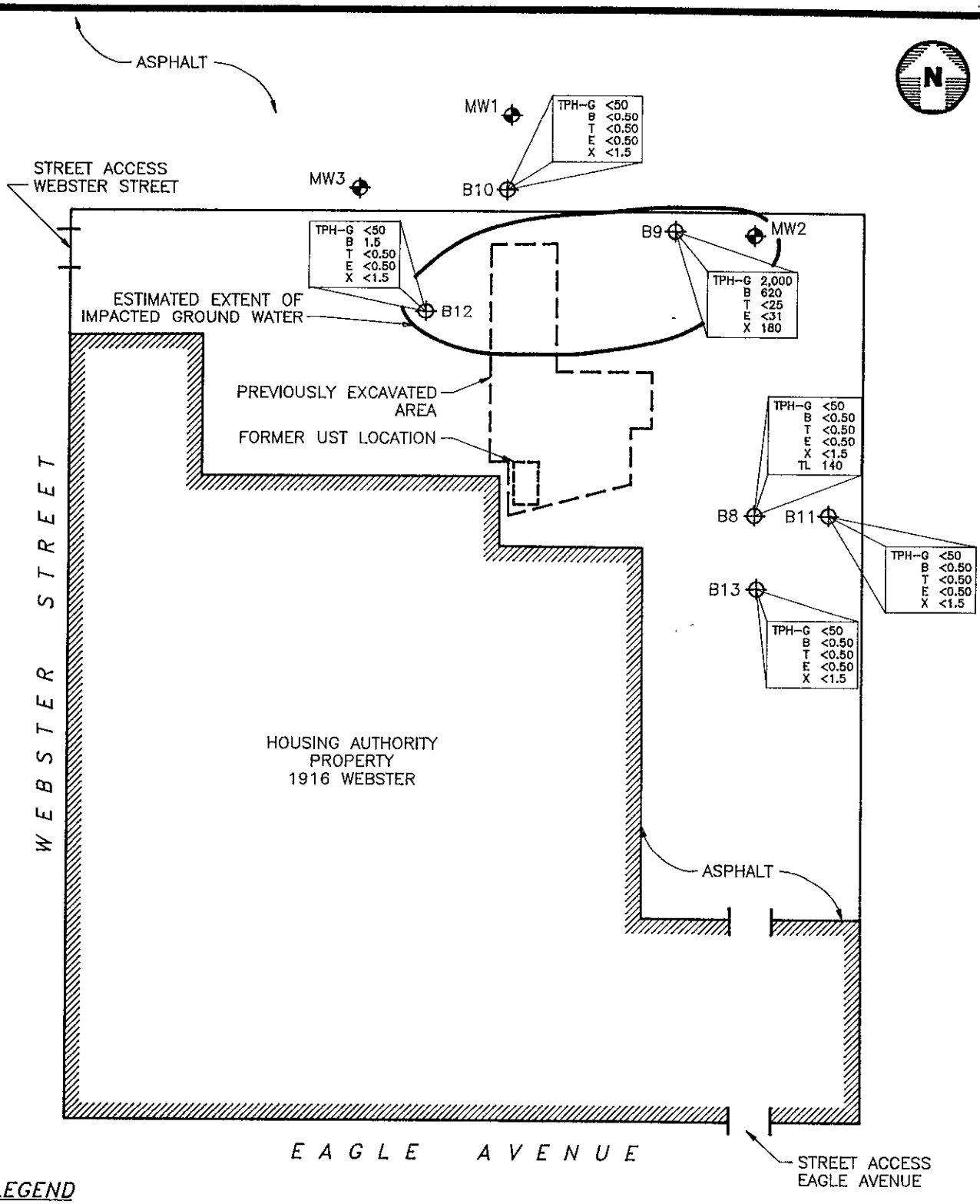
LEGEND

- ◆ *GROUND WATER MONITORING WELL*
- TPH-G TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
- B BENZENE
- T TOLUENE
- E ETHYLBENZENE
- X TOTAL XYLENES
- TL TOTAL LEAD

SCALE
0 30 FEET

ALL CONCENTRATIONS IN MICROGRAMS PER KILOGRAM (ug/kg)

ESE A CalCORP Company — Environmental Science & Engineering, Inc.	DATE 2/94	PETROLEUM HYDROCARBONS IN SOIL JULY 31, 1992	FIGURE NO. 4
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET ALAMEDA, CALIFORNIA	PROJ. NO. 6-93-5199
	CAD FILE 51991005		



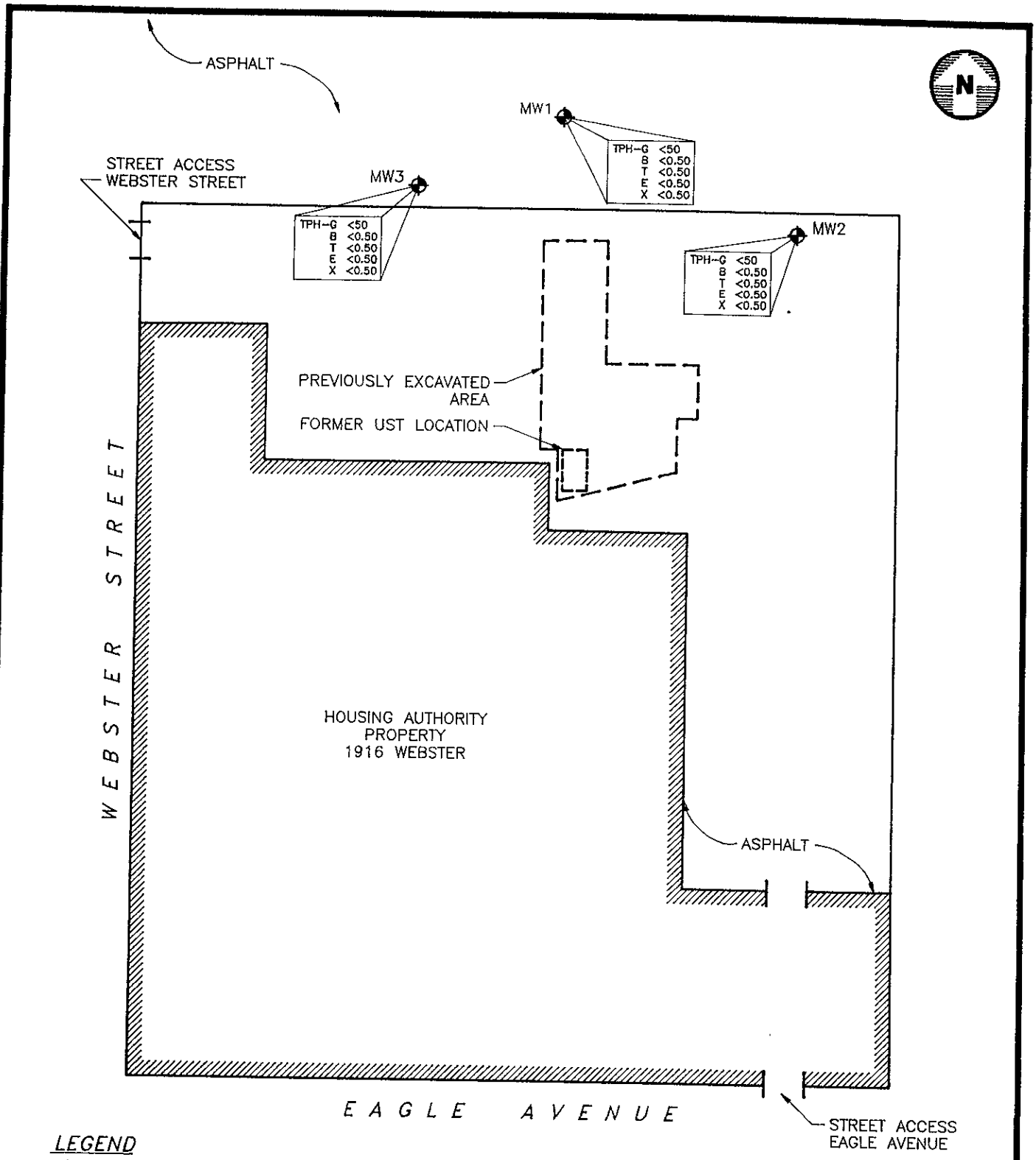
LEGEND

- ⊕ GROUND WATER MONITORING WELL
- TPH-G TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
- B BENZENE
- T TOLUENE
- E ETHYLBENZENE
- X TOTAL XYLENES

SCALE
0 30 FEET

ALL CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

ESE A CILCORP Company **Environmental Science & Engineering, Inc.**	DATE 2/94	PETROLEUM HYDROCARBONS IN GROUND WATER JULY 31, 1992	FIGURE NO. 5
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET ALAMEDA, CALIFORNIA	PROJ. NO. 6-93-5199
	CAD FILE 51991006		



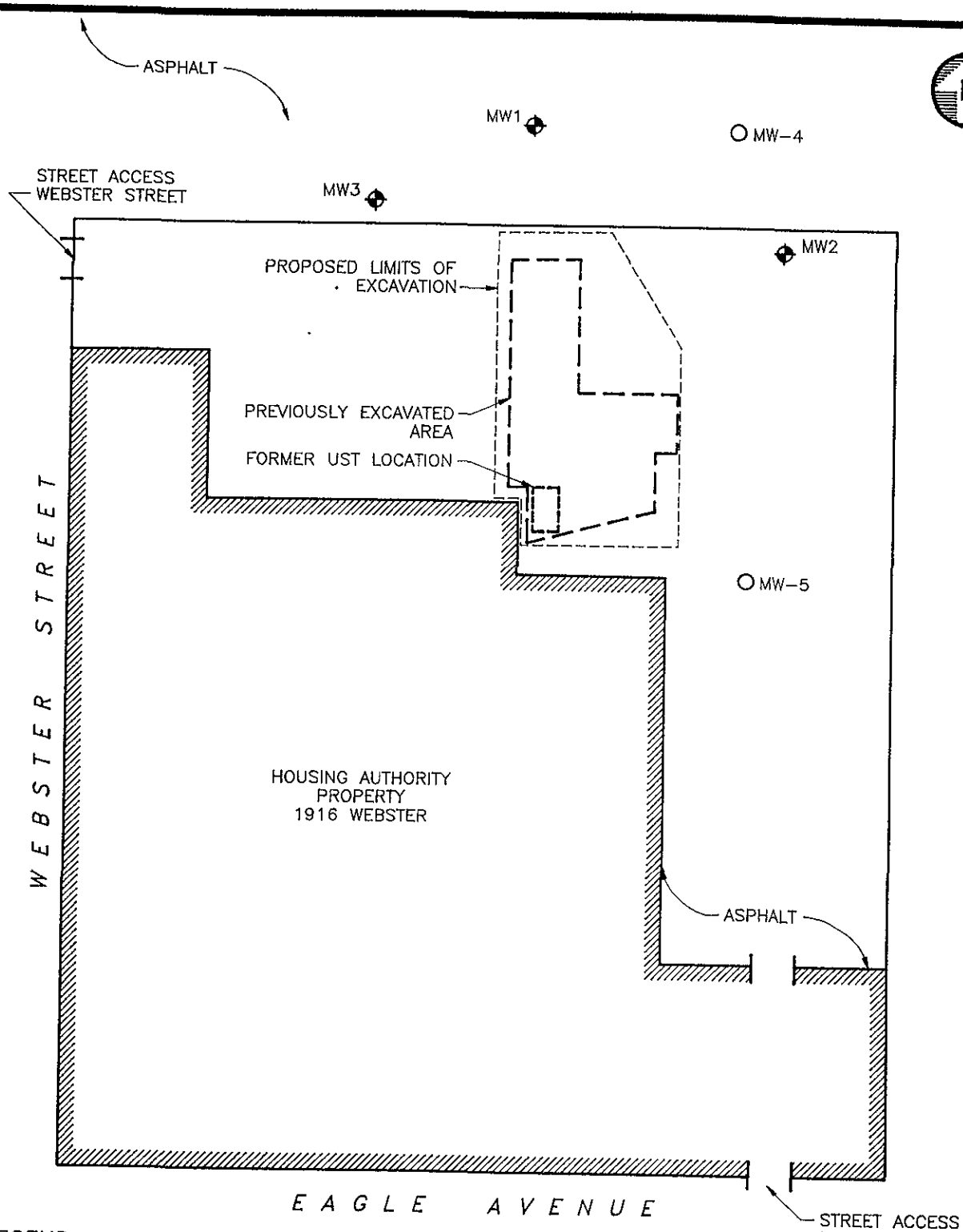
LEGEND

- ◆ GROUND WATER MONITORING WELL
- TPH-G TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
- B BENZENE
- T TOLUENE
- E ETHYLBENZENE
- X TOTAL XYLENES

SCALE
0 30 FEET

ALL CONCENTRATIONS IN MICROGRAMS PER LITER (ug/L)

ESE A CALCORP Company Environmental Science & Engineering, Inc.	DATE 2/94 REVISED	PETROLEUM HYDROCARBONS IN GROUND WATER JANUARY 26, 1994	FIGURE NO. 6
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	CAD FILE 51991007	ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET ALAMEDA, CALIFORNIA	PROJ. NO. 6-93-5199



ESE A GILCORP Company — Environmental Science & Engineering, Inc.	DATE 2/94	PROPOSED MONITORING WELL LOCATIONS AND LIMITS OF EXCAVATION	FIGURE NO. 7
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET ALAMEDA, CALIFORNIA	PROJ. NO. 6-94-5199
	CAD FILE 51991003		

APPENDIX A
LABORATORY ANALYTICAL RESULTS

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

February 2, 1994

ChromaLab File#: 9401267

ENV. SCIENCE & ENGINEERING

Atten: R. M. Qadir

Project: A.H.A.
Submitted: January 26, 1994

Project#: 6-94-5199

re: 3 samples for Gasoline and BTEX analysis.

Matrix: WATER
Sampled on: January 26, 1994
Method: EPA 5030/8015/602

Analyzed on: February 1, 1994
Run#: 2162

Lab # SAMPLE ID	Gasoline (ug/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl Benzene (ug/L)	Total Xylenes (ug/L)
42282 MW-1	N.D.	N.D.	N.D.	N.D.	N.D.
42283 MW-2	N.D.	N.D.	N.D.	N.D.	N.D.
42284 MW-3	N.D.	N.D.	N.D.	N.D.	N.D.
DETECTION LIMITS	50	0.5	0.5	0.5	0.5
BLANK	N.D.	N.D.	N.D.	N.D.	N.D.
BLANK SPIKE RECOVERY(%)	99	92	87	94	89

ChromaLab, Inc.

Billy Thach
Chemist

Eric Tam
Laboratory Director

LIMS

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

CHROMALAB, INC.

Environmental Laboratory (1094)

5 DAYS TURNAROUND

February 8, 1994 ChromaLab File#: 9401267

ENV. SCIENCE & ENGINEERING

Atten: R. M. Qadir

Project: A.H.A. **Project#:** 6-94-5199
Submitted: January 26, 1994

re: 3 samples for Lead analysis.

Matrix: WATER *Extracted:* February 4, 1994
Sampled on: January 26, 1994 *Analyzed on:* February 8, 1994
Method: EPA 3010/6010 *Run#:* 2200

LAB #	CLIENT SAMPLE ID	RESULT (mg/L)	REPORTING LIMIT (mg/L)	BLANK RESULT (mg/L)	BLANK SPIKE RESULT (%)
42282	MW-1	N.D.	0.003	N.D.	83
42283	MW-2	0.070	0.003	N.D.	83
42284	MW-3	N.D.	0.003	N.D.	83

ChromaLab, Inc.

Refaat Mankarious, for

Charles Woolley
Chemist

Refaat Mankarious

Refaat Mankarious
Inorganics Supervisor

UMS

2239 Omega Road,#1 • San Ramon, California 94583
(510) 831-1788 • Facsimile (510) 831-8798
Federal ID #68-0140157

GeoAnalytical Laboratories, Inc.

1031 Kansas Avenue
Modesto, CA 95351

Phone (209) 572-0900
FAX (209) 572-0916

CERTIFICATE OF ANALYSIS

Report # F028-07
ChromaLab
2239 Omega Rd Ste 1
San Ramon CA 94583

Date: 02/01/94
Date Received: 01/28/94
Date Started: 01/31/94
Date Completed: 01/31/94

Project Name:
Project # 9401267

Sample ID	Lab ID	Detection Limit mg/L	Method	Analyte	Results mg/L
MW 1	F30522	0.05	LUFT	Organic Lead	ND
MW 2	F30523	0.05	LUFT	Organic Lead	ND
MW 3	F30524	0.05	LUFT	Organic Lead	ND

Ramiro Salgado
Chemist

Certification # E757

Donna Allsup
Laboratory Director

14933
267/42282 - 42284

SUBM #: 9401267
CLIENT: ESCIENG
DUE: 02/02/94
REF: 14933

DATE Jan 26, 94 PAGE 1 OF 1

PROJECT NAME A.H.A.

ADDRESS 1916 Webster Street, Alameda

PROJECT NO. 6594-5199

SAMPLED BY Rich Mirsky

LAB NAME Chromalab

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	8015 GAS	EPA 8020	Total 7421	Organic Lead LUFT Manual							MATRIX	NUMBER OF CONTAINERS	REMARKS (CONTAINER, SIZE, ETC.)
MW-1	1/26	11:55	Alameda	X	X	X	X							Water	4	3 VOAs, 1 plastic bottle
MW-2	|	1225	|	X	X	X	X							Water	4	" " "
MW-3	|	11:20	|	X	X	X	X							Water	4	" " "

RELINQUISHED BY: (signature)	RECEIVED BY: (signature)	date	time
1. [signature]	[signature] R. Radir	1-26-94	16:20
2. R. Radir	[signature]	1-26-94	1710
3.			
4.			
5.			

TOTAL NUMBER OF CONTAINERS: 12

REPORT RESULTS TO: R.M. Radir

SPECIAL SHIPMENT REQUIREMENTS

SAMPLE RECEIPT

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

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

5 day TAT

APPENDIX B

HEALTH AND SAFETY PLAN

HEALTH AND SAFETY PLAN

ALAMEDA HOUSING AUTHORITY
ALAMEDA, CALIFORNIA

HEALTH AND SAFETY PLAN
for
ALAMEDA HOUSING AUTHORITY

Alameda, California

TABLE OF CONTENTS

1.0 GENERAL INFORMATION

1.1 INTRODUCTION

This Health and Safety Plan shall provide the safety and health requirements for general site work taking place under a contract with Alameda Housing Authority (AHA). This Plan provides the structure for a Site-Specific Health and Safety Plan, and provides information which will apply to all Environmental Science & Engineering, Inc. (ESE) projects. Together, they comprise the Site Health and Safety Plan (HASP). This HASP will be considered complete only with an associated Site-Specific HASP.

The purpose of this HASP is to protect individuals, those working at the site, visitors, and the surrounding populace, and the environment during on site sampling and site characterization activities at petroleum hydrocarbon impacted sites. This plan includes preventive and protective measures against health hazards, fire and explosion hazards, and mechanical hazards which may exist or occur during field activities.

1.2 SITE INFORMATION

The General Information section of each Site-Specific Health and Safety Plan will provide the following information:

1. Name and Location of the Site;
2. Name of Individual Preparing the Plan, and Date of Preparation;
3. Brief Site History;
4. Investigative Objective and Work Plan;
5. Proposed Dates of Investigation; and
6. Assessment of Overall Worker and Public Health Hazards.

1.3 REGULATORY REQUIREMENTS:

Occupational Safety and Health Administration (OSHA) standards 29 Code of Federal Regulations (CFR) 1910 and 1926 apply to work under this site-specific HASP. Title 8 of California Code of Regulations (General Construction Safety Orders and General Safety Orders) must be complied with at California sites. Additional requirements are contained in Code of Federal Regulations title 40, Protection of the Environment.

2.0 PERSONNEL REQUIREMENTS

2.1 ORGANIZATION

The overall project organization as described in this document will be shown in the Site-Specific Health and Safety Plan, and will identify and show responsibilities for all key personnel, employees, and subcontractors.

2.2 ESE HEALTH AND SAFETY POLICY AND RESPONSIBILITY

It is the policy of the management of ESE and also a contract requirement that a safety plan be implemented at hazardous material contamination sites to protect individuals and the environment. All ESE personnel involved in work on these sites will conform and comply with all aspects of this safety program. Each and every individual is, and therefore must regard and conduct him/herself as, a member of the safety team and adhere to the prescribed site safety plan to ensure his/her own safety as well as that of fellow workers, visitors, and the public.

2.3 PERSONNEL RESPONSIBILITIES

For each site, the responsibilities of the Project Manager include:

1. Preparing an effective site safety plan for the project;
2. Categorizing and identifying for the project staff the levels of potential exposure and dangerous levels of hazardous materials possibly encountered on site;
3. Ensuring that adequate and appropriate safety training and equipment are available for project personnel; and
4. Arranging for medical examinations for specified project personnel.
5. Ensuring a qualified on-site field person is designated Site Safety Officer (SSO) and is present when work is in progress. Alternates may also be designated as needed, however, the project manager must ensure the designated (SSO) is familiar with the safety plan and his/her responsibilities.
6. Ensuring any subcontractors (i.e. drillers, excavators) get an advance copy of the Health and Safety Plan and a start-up safety briefing is scheduled.
7. Determining appropriate level of protection and exposure monitoring strategy for the project by task or phase.

Overall responsibility for safety during the site investigative activities rests with the Project Manager. To assist the Project Manager, a qualified Site Safety Officer will be appointed for each site.

The Site Safety Officer's (SSO's) responsibilities include:

1. Implementing all safety procedures and operations on site.
2. Conducting start-up safety briefing with project personnel and subcontractors. Ensure all necessary equipment and procedures are in place before start-up. Addressing any substandard conditions requiring correction prior to start up.
3. Updating equipment or procedures based upon new information gathered during the site inspection.
4. Upgrading or downgrading the levels of personal protection based upon site observations and/or measurements.
5. Determining and posting locations and routes to medical facilities and arranging emergency transportation to medical facilities (as required).
6. Controlling site entry and notifying (as required) local public emergency officers (i.e., police and fire departments) of the nature of the team's operations and making emergency telephone numbers available to all team members.
7. Ensuring that at least one member of the field team is available to stay behind and notify emergency services if the Site Safety Officer must enter an area of maximum hazard or entering this area only after notifying emergency services (police department).
8. Observing work party members for symptoms of on-site exposure or stress.
9. Arranging for the availability of on-site emergency medical care and first aid, as necessary.
10. Documenting field activities and incidents. Keeping Project Manager informed. Consulting with Health and Safety Officer as needed.

The Health and Safety Officer (HSO) is responsible for:

1. Assisting Project Manager with development of the site specific Health and Safety Plan.
2. Providing technical support during normal operations and upsets for hazard assessment, exposure monitoring, level of protection changes.
3. Reviewing and approving the site specific safety plan.

The responsibilities of all other on site personnel include:

1. Complying with all aspects of the project Safety plan, including strict adherence to the buddy system.
2. Obeying the orders of the Site Safety Officer.
3. Notifying the Site Safety Officer of hazardous or potentially hazardous incidents or working situations.

Subcontractors and other non-ESE site personnel are also responsible for complying with this plan and all applicable federal, state and local safety and environmental regulations and codes.

2.4 TRAINING

All ESE site personnel working on the hazardous material contamination site investigations will have completed a safety and health training course for hazardous waste site work meeting the requirements of 29CFR1910.120 and have worked at least 3 days of supervised on the job training. The course consists of an initial 40-hour session and annual refreshers of 8 hours. Subcontractors and visitors are required to provide proof of equivalent training. The field team leader will have completed an additional 8 hours of waste site supervisory training. For each location, specific training is given by the Project Manager or Site Safety Officer to inform employees of site-specific hazards. Additionally, at least one field team member will be trained to perform cardiopulmonary resuscitation (CPR) and first aid.

2.5 MEDICAL MONITORING PROGRAM

All ESE on site personnel, subcontractors, and visitors for this project will be required to have the medical examination outlined in Table 1. This examination is given annually and more often if specified by the attending physician. All medical examinations include certification by the physician of the employee's ability to wear a negative-pressure respirator and to perform strenuous work. If a person sustains an injury or contracts an illness related to work on site that results in lost work time, he must obtain written approval from a physician to regain access to the site.

2.6 RECORDS DOCUMENTATION

Air monitoring data generated during the project will become part of the written record. Both medical and air monitoring data will be retained for the time period required by OSHA in various standards [29 CFR 1910.20(D)(i), 1910.20(D)(ii), 1910.1018, 1910.1025]. Training records are maintained in project files and on ESE's personal identification cards and are available for inspection at all times. Subcontractors are required to have similar documents available for inspection as required.

All personnel associated with work at a site will be required to sign a statement indicating that they have read, and will comply with the site safety plan. This signature page will also include information on their training and medical surveillance status.

Table 2.1

Medical Examination--Monitoring Program

Basic physical exam
Heart status and functions (EKG) baseline only except if >40
Chest X-ray (Roentgenogram posterior-anterior)
Pulmonary function--forced vital capacity, forced expiratory volume at 1 second and reserve volume
Blood--full SMAC Series
Hemoglobin--cell counts, protein levels
Liver function--full enzyme profile
Renal function--BUN, Creatinine, Creatine/Creatinine ratio, lipoprotein count and differential, uric acid
Urinalysis
Audiometry--audio spectrum response of ear
Eye--physical condition, visual acuity

Other laboratory tests may be ordered depending on actual or expected exposures and physician recommendations.

The individuals listed in the Site-Specific Plan organization chart will be certified to wear respirator protection in accordance with criteria from the ANSI Z88.2 and 29 CFR 1910.134.

3.0 HAZARD EVALUATION

3.1 CHEMICAL CONTAMINANTS

Potential site contaminants at petroleum contamination sites include gasoline, gasohol, motor oil, fuel oils (including kerosene, diesel fuel), and aviation grade gasoline. These materials may exist as free product in soil or on groundwater, and/or as contaminants to soil and water, and/or in tanks, piping, and systems. Fuel products include materials in and around storage tanks, such as gasoline, kerosene, diesel, and their derivatives, xylene, toluene, benzene, tetraethyl lead (TEL), and chlorinated solvents. The chlorinated solvents include trichloroethylene and tetrachloroethylene.

3.2 PHYSICAL AND MECHANICAL HAZARDS

Activities on site may include site visits, soil gas sampling, headspace sampling, installation and sampling from monitor wells, installation of free product recovery systems, installation of groundwater recovery systems, installation of soil venting systems, installation of biological treatment systems, installation of air strippers, installation of carbon absorption units, removal of tanks, piping, and systems, and removal of contaminated soil.

Hazards associated with these activities are varied and include vehicle/pedestrian collisions, fire, collapse of excavation and trenching, handling of heavy materials and equipment operations resulting in contact and crushing type injuries, and use of air- and electrically-powered tools which may result in abrasions, contusions, lacerations, etc.

3.3 JOB HAZARD ANALYSIS AND RISK ASSESSMENT

The chemical contaminants which may be present and the hazardous activities which may be performed at the site will be identified through preliminary site assessment activities, such as site visits or records search. Based on this preliminary information, initial risk assessments will be made by the Site Safety Officer, in consultation with an ESE Regional Health and Safety Officer, defining hazards (both chemical and physical) to workers and other on site personnel, the surrounding populace, and the environment.

The identities of potential hazards and resultant initial risk assessments will be included in the Hazard Evaluation section of the Site-Specific Plan, will be reviewed daily, and will be updated as necessary by the Site Safety Officer. Updated information will be communicated to all other on site personnel immediately.

3.4 AIR MONITORING

An air monitoring program is fundamental to the safety of on site and off site personnel. Total organic vapor (TOV) levels associated with on site activities will be monitored with a Photoionization Detection (PID) instrument (Photovac® TIP or HNU PI-101). This instrument will be the primary source of information for upgrading personal protection. Calibration and maintenance of monitoring equipment will be in accordance with manufacturer recommendations.

The Site Safety Officer, or designee, will establish daily a background TOV prior to initiating on site activities. Under most circumstances, this level can be determined by taking multiple readings at representative locations along the perimeter of the site and averaging the results of sustained measurements. (A sustained measurement is defined as the arithmetic average of six readings taken at 10-second intervals.) If, due to site conditions, it appears that perimeter readings will not yield a truly representative background level, the Site Safety Officer or an ESE Regional Health and Safety Officer will be consulted for guidance.

Decisions to upgrade personal protection will be based on sustained breathing zone TOV that exceeds background levels. Breathing zone refers to the area from the top of the shoulders to the top of the head.

Explosivity levels associated with on site activities will be monitored with an explosimeter or combustible gas meter. This will be the primary source of information for determining the potential hazard due to explosion or fire in confined spaces and other enclosed areas with little or no ventilation.

Prior to entry of any area which may contain an explosive or flammable atmosphere, the Site Safety Officer or designee will take representative readings of the suspect area. Representative readings include readings from top, middle, and lower levels of the area, and at various points at each level in larger areas. Areas in which any one reading exceeds 20% of the lower flammable limit will be considered potentially explosive, and will be vented to below 20% of the lower flammable limit before the introduction of any personnel or non-explosion proof powered equipment.

4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment to be used at petroleum contamination sites will consist of several components. These components will protect the respiratory system, eyes and face, hands, feet, body, and head from a variety of chemical and physical hazards. Levels of personal protection will be categorized in accordance with the criteria described in accordance with the guidelines given in Section 3, Air Monitoring. Additional guidance for personal protective equipment can be found in the ESE Corporate Respiratory Protection Program, or can be obtained from an ESE Regional Health and Safety Officer.

Action levels for upgrading to the various protective levels and levels of personal protection required for the various tasks to be performed on each site, as well as any special site requirements, will be given in the Personal Protective Equipment section of the Site-Specific Plan.

PERSONAL PROTECTIVE EQUIPMENT--LEVEL A

1. Open-circuit, pressure-demand, self-contained breathing apparatus (SCBA);
2. Totally encapsulated suit;
3. Gloves, inner (surgical type);
4. Gloves, outer, chemical protective;
5. Boots, chemical protective, steel toe and shank; and
6. Booties, chemical protective.

CRITERIA

1. Sites known to contain hazards which:
   a. Require the highest level of respiratory protection (as previously stated),
   b. Will cause illness as a result of personal exposure,
   c. Permit a reasonable determination that personal exposure could occur to any part of the body; or
2. Sites for which the Project Manager and/or Site Safety Officer make a reasonable determination that, based on the lack of information to the contrary, the site may be described as previously stated.

PERSONAL PROTECTIVE EQUIPMENT--LEVEL B

1. Open-circuit, pressure-demand SCBA;
2. Chemical protective
   a. Overalls and long-sleeved jacket, or
   b. Coveralls;
3. Gloves, inner (surgical type);
4. Gloves, outer, chemical protective;
5. Boots, chemical protective, steel toe and shank; and
6. Booties, chemical protective.

CRITERIA

1. Sites known to contain hazards which:
   a. Require the highest level of respiratory protection (as previously stated),
   b. Will cause illness as a result of personal exposure,
   c. Permit a reasonable determination that personal exposure to areas of the body not covered by Level B protective clothing is unlikely; and
2. Sites for which the Project Manager and/or Site Safety Officer make a reasonable determination that, based on the lack of information to the contrary, the site may be described as previously stated.

PERSONAL PROTECTIVE EQUIPMENT--LEVEL C

1. Full face-piece, air-purifying respirator (high-efficiency particulate/organic vapor cartridges);
2. Emergency escape oxygen pack (carried);
3. Chemical protective (Tyvek® is the minimum protection)
   a. Overalls and long-sleeved jacket, or
   b. Coveralls, or
   c. Apron;
4. Gloves, inner (surgical type) (Latex);
5. Gloves, outer, chemical protective (Nitrile);
6. Boots, chemical protective (neoprene or NBR), steel toe and shank; and
7. Booties, chemical protective (Latex).

CRITERIA

1. Sites known to contain hazards which:
   a. Do not require a level of respiratory protection greater than the level afforded by air-purifying respirators (nominal protection of 10), as previously stated;
   b. Will cause illness as a result of personal exposure; or
   c. Permit a reasonable determination that personal exposure to areas of the body not covered by Level C protective clothing is unlikely; and
2. Sites for which the Project Manager and/or Site Safety Officer make a reasonable determination that, based on the lack of information to the contrary, the site may be described as previously stated.

PERSONAL PROTECTIVE EQUIPMENT--LEVEL D

1. Coveralls, cotton;
2. Boots/shoes, safety;
3. Safety glasses;
4. Hard hat with optional face shield (where overhead hazards exist); and
5. Air-purifying respirator (readily available).

CRITERIA

Sites where the Project Manager and/or Site Safety Officer make a reasonable determination that hazards due to exposure to hazardous materials are unlikely.

ADDITIONAL PERSONAL PROTECTION

In addition to personal protective equipment, field personnel having duties on or near the hazard site should have ready access to:

1. A fully stocked industrial-size first-aid kit;
2. An eyewash kit; and
3. At least 6 gallons of potable water in a pressurized container to permit decontamination in event of accidental skin or eye contact with chemicals.

5.0 STANDARD WORK PRACTICES

5.1 GENERAL SAFETY RULES:

In addition to the specific requirements of the Site-Specific Plan, common sense should prevail at all times.

The following general safety rules and practices will be in effect at the site.

1. The site will be suitably marked or barricaded as necessary to prevent unauthorized visitors, but will not hinder emergency services if needed.
2. All open holes, trenches, and obstacles will be properly barricaded in accordance with local site needs. These needs will be determined by proximity to traffic ways, both pedestrian and vehicular, and site of the hole, trench, or obstacle. If holes are required to be left open during nonworking hours, they will be adequately decked over or barricaded and sufficiently lighted.
3. Prior to conducting any digging or boring operations, underground utility locations will be identified. The site representative and local utility authorities will be contacted to provide locations of underground utility lines and product piping. All boring, excavation, and other site work will be planned and performed with consideration for underground lines.
4. Smoking and ignition sources in the vicinity of flammable or contaminated material is prohibited.
5. Drilling, boring, movement and use of cranes and drilling rigs, erection of towers, movement of vehicles and equipment, and other activities will be planned and performed with consideration for the location, height, and relative position of aboveground utilities and fixtures, including signs, lights, canopies, buildings, and other structures and construction, and natural features such as trees, boulders, bodies of water, and terrain.
6. When working in areas where flammable vapors may be present, particular care must be exercised with tools and equipment that may be sources of ignition. All tools and equipment so provided must be properly bonded and/or grounded.
7. Approved and appropriate safety equipment, as specified in this site-specific HASP, such as eye protection, hard hats, foot protection, and respirators, must be worn in areas where required by the site-specific HASP. In addition, eye protection must be worn when handling free product, contaminated soil or water, or fill dirt.
8. Beards that interfere with respirator fit are not allowed within the site boundaries. This is necessary because all site personnel may be called upon to use respirator protection in some situations, and beards do not allow for proper respirator fit.
9. No smoking, eating, or drinking will be allowed in the contaminated areas.
10. Tools and hands must be kept away from the face.
11. Personnel must shower at the end of the shift or as soon as possible after leaving the site.
12. Each sample must be treated and handled as though it were extremely toxic.
13. Tank pit excavations must be sampled cautiously, using a remote sampling device or securing samples from excavated soil, and the pit should be entered only as a last resort and only if it is properly shored or sloped. The pit may meet the criteria for a confined space, in which case any entry must be made in accordance with NIOSH recommended Confined Space Entry Procedures. No confined space entry except by written procedure approved by the Health and Safety Officer.
14. Persons with long hair and/or loose-fitting clothing that could become entangled in power equipment are not permitted in the work area.
15. Horseplay is prohibited in the work area.
16. Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited.

5.2 WORK LIMITATIONS:

HOURS

Work shall be limited to daylight hours and during normal weather conditions. Extremes in temperature and weather condition (i.e., wind and lightning) will restrict working hours.

HEAT STRESS

For monitoring the body's recuperative ability toward excess heat, the following techniques will be used as a screening mechanism. Monitoring of personnel wearing protective clothing will commence when the ambient temperature is 70 degrees Fahrenheit (°F) or above. When temperatures exceed 85°F, workers will be monitored after every work period. Monitoring will include visual observations for signs of heat stress and measurement of radial pulse rate for 30 seconds at the beginning of each rest period. If the heart rate exceeds 110 beats per minute (beats/min) at the beginning of a rest period, the next work period will be shortened by 10 minutes, and the rest period stays the same. If the pulse rate is 100 beats/min at the beginning of the next rest period, the following work cycle will be shortened another 10 minutes.

Also, good hygienic standards must be maintained by frequent change of clothing and daily showering. Clothing should be permitted to dry during rest periods. If skin problems occur, consult medical personnel.

COLD STRESS

The human body "senses" cold as a result of two factors, the air temperature and the wind velocity. Cooling of the flesh increases rapidly as wind velocity goes up. Frostbite can occur at relatively mild temperatures if wind penetrates the body insulation. For example, when the air temperature is 40°F and the wind velocity is 30 miles per hour (mph), the exposed skin would perceive an equivalent still air temperature of 13°F. Table 5-1 illustrates windchill indices and the associated hazards to exposed flesh. Precautions will be taken to minimize exposed flesh, and layered clothing will be provided, as appropriate.

Table 5-1.

Windchill Index

Windspeed (mph)	Actual Thermometer Reading (°F)									
	50	40	30	20	10	0	-10	-20	-30	-40
Calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116

Source: National Safety Council, 1982.

5.3 ACCIDENT PREVENTION PLAN/ACCIDENT REPORTING:

The purpose of the Safety Plan is to prevent accidents and minimize the impact of an accident if one should occur.

All accidents must be reported to the Site Safety Officer immediately. Prompt reporting is essential to the prevention of future incidents in addition to the well-being of the affected individual or individuals. The Site Safety Officer will notify the Project Manager of any serious accidents. The Site Safety Officer or other key members of the field team will be trained in first aid and CPR. First aid will be administered to affected personnel under the direction of the Site Safety Officer. For serious accidents, the nearest ambulance service will be contacted for transport of injured personnel to the nearest medical facility (see Section 6.0). The Site Safety Officer will have established contact and liaison with medical authorities (see Section 6.0) whose personnel will be knowledgeable of the activities of the field team. Telephone numbers and addresses of ambulance and medical services will be posted on site.

A formal report of any OSHA-recordable accident will be filed with ESE. All reports must be received within 2 working days.

5.4 WORK ZONES AND DECONTAMINATION PROCEDURES:

Work zones will be established in the field by the SSO. These zones may be modified to fit applicable field conditions; however, proposed modifications must be approved by the Project Manager and Site Safety Officer prior to being implemented in the field.

Personnel decontamination will be initiated on site. Disposable clothing will be removed and stored in designated containers. If additional decontamination is necessary, based on preliminary or subsequent risk assessment by the Site Safety Officer in consultation with ESE Regional Safety and Health Officer, additional decontamination procedures will be implemented. Site specific decontamination procedures will be listed in the Site-Specific Plan.

All heavy equipment will be decontaminated on site. Water in the form of steam cleaning and/or pressure washing may be used to remove any visual contamination from drilling equipment and backhoe.

5.5 SITE SECURITY AND ENTRY:

Site security measures, including barricading, fencing, and lighting, and any special site entry procedures will be described in the Section 5 of the Site-Specific Plan.

6.0 EMERGENCY INFORMATION AND CONTINGENCY PLANS

All emergency information, including phone numbers, site resources, and routes to emergency medical care, will be maintained on site in the Site-Specific Plan by each field team.

The phone list will include the following numbers:

AMBULANCE:
FIRE DEPARTMENT:
HOSPITAL (primary):
HOSPITAL (secondary):
POISON CONTROL CENTER:
POLICE:
TOXIC WASTE AND OIL SPILL:
CLIENT CONTACT:
AGENCY CONTACT:
PROJECT MANAGER:
CORPORATE SAFETY AND HEALTH OFFICER:

The list of site resources will include fire extinguishers, first aid equipment, eyewash units, communications (telephone), emergency personal protective equipment, spill containment equipment and materials, and any other special equipment, supplies or resources.

6.1 INJURY CONTINGENCY PLAN

First aid equipment will be kept on site during all site activities. Additionally, one member of the field team will be trained in first aid. Emergency telephone numbers for ambulance and poison control will be maintained on site in a readily accessible location. Names, addresses, and routes to two emergency medical care providers (hospitals or emergency clinics) will be verified prior to any site activity, and will be listed in the Site-Specific Plan. Maps showing the location of the site, the emergency medical care providers, and hotels and restaurants (if any) used by the field team should be provided in each vehicle. In the event of an injury that cannot be treated on site, the injured person will be immediately transported to the medical provider either by support vehicle or ambulance on determination by the Site Safety Officer, Project Manager, and/or first aid provider.

6.2 FIRE CONTROL AND CONTINGENCY PLAN

No smoking will be allowed during field activities. Fire extinguishers will be available at sites for use on small fires. All samples must be treated as flammable or explosive. The Site Safety Officer will have available the telephone number of the nearest fire station and local law enforcement agencies in case of a major fire emergency.

6.3 SPILL CONTROL AND CONTINGENCY PLAN

In the event of a spill, the Site Safety Officer will be notified immediately. The important factors are that no personnel are overexposed to vapors, gases, or mists and that the liquid does not ignite. Waste spillage must not be allowed to contaminate any local water source. Small dikes will be erected to contain spills, if necessary, until proper disposal can be completed. Subsequent to cleanup activities, the Site Safety Officer will survey the area to ensure that no toxic or explosive vapors remain.

6.4 OFF SITE INCIDENT CONTINGENCY PLAN

The Site Safety Officer will provide field team members with emergency medical care information similar to that kept on site in event of an off site emergency, such as a motor vehicle accident, food poisoning, or other injury sustained off the site.

6.5 COMMUNITY THREAT CONTINGENCY PLAN

The potential for exposure to the surrounding community will be assessed in conjunction with the preliminary site assessment.

The Site Safety Officer will consult with a representative of the local emergency services agency (police or fire department, in accordance with local governmental procedures), and will outline procedures in the Site-Specific Plan to be followed in the event of an emergency threat to the surrounding populace. Situations requiring specified procedures include fire, explosion, accidental ingestion, large spills consisting of free product, and accumulation of potentially explosive vapors off site.

The Site-Specific Plan will identify individuals who will respond to reports of non-emergency community threats arising from site activities. This non-emergency response will include sampling of air, wells and ground water, and soil. Situations requiring specified procedures include small spills and presence of existing concentrations of potentially explosive vapors on site.

APPENDIX A

SITE SPECIFIC HEALTH AND SAFETY PLAN

ENVIRONMENTAL SCIENCE & ENGINEERING

SITE SPECIFIC INFORMATION

PROJECT NAME: Alameda Housing Authority, 1916 Webster Street, Alameda, CA

PROJECT NUMBER: 6-94-5199

PROJECT MANAGER: Riffat Maqbool Qadir

HEALTH AND SAFETY OFFICER: Lionel S. Reynolds, CIH

SITE SAFETY OFFICER (ALTERNATE): Michael K. Foget

THIS HEALTH AND SAFETY PLAN HAS BEEN REVIEWED AND APPROVED BY:

Lionel S. Reynolds
CERTIFIED INDUSTRIAL HYGIENIST

DECLARATION OF UNDERSTANDING

I have read and understand the Health and Safety Plan and agree to abide by it.

NAME	EMPLOYEE NUMBER OR COMPANY NAME	SOCIAL SECURITY NUMBER	DATE

A. GENERAL PROJECT INFORMATION

SITE: Alameda Housing Authority DATE PREPARED: 02-04-94

LOCATION: 1916 Webster Street, Alameda, California

PREPARED BY: Michael Foget, ESE

OBJECTIVE (S) AND WORKPLAN: Excavate and sample soil potentially impacted with petroleum hydrocarbons or gasoline. Installation of two shallow groundwater monitoring wells (each well approximately 20 ft. in depth), perform quarterly monitoring of ground water.

PROPOSED DATE(S) OF ON-SITE WORK: February 1994 - April 1995

BRIEFING DATE(S):

BACKGROUND REVIEW:

COMPLETE: __

PRELIMINARY: x

----------PROJECT H.A.S.P. SUMMARY----------

LEVEL(S) OF PROTECTION: A__ B__ C__ D x MIXED__ MODIFIED x

OVERALL HAZARD ESTIMATE: HIGH__ MODERATE__ LOW x UNKNOWN__

ADDITIONAL DOCUMENTATION: TLV TABLE__ FULL HASP x METHODS__

OTHER__

B. SITE/MATERIAL CHARACTERISTICS

MATERIAL/WASTE TYPE(S): LIQUID x SOLID x GAS_ SLUDGE_

MATERIAL PRESENT IN: DRUMS__ TANKS__ OPEN x OTHER__

CHARACTERISTICS: IGNITABLE x CORROSIVE__ TOXIC x REACTIVE__

RADIOACTIVE__ VOLATILE x UNKNOWN__ OTHER

FACILITY TYPE: Former Operating Office CLOSED__ OPEN x

FACILITY SIZE: 29,600 square feet

TOPOGRAPHY: Relatively flat, low relief

PRINCIPAL DISPOSAL METHOD AND LOCATION(S): The soil generated during this investigation will be stockpiled on the propertyata location designated by client and covered with plastic sheeting. Water generated during this investigation will be placed in 55-gallon drums pending analytical results and proper disposal by the client.

C. HAZARD EVALUATION

INSTRUCTIONS: Evaluate principal hazards expected at this site. Be specific; complete all entries.

HAZARDS

Physical: Drilling equipment containing cables, augers etc. can be a hazard to the workers hands and feet. Heavy excavation equipment, slumping of excavation walls can also be potential hazards to site workers. Vehicles and heavy equipment will be continually active during the work day.

Chemical: Some of the soil samples collected and excavated may contain petroleum hydrocarbons, Benzene, Toluene, Ethylbenzene, Xylenes and/or toxic fumes which can be hazardous to an individual through inhalation and/or physical contact.

Biological: None anticipated.

CORRECTIVE ACTIONS

Physical: Site will be inspected at start up and personal protective equipment will be worn (hardhat, steel-toed safety boots, earplugs if loud noises). Identified safety hazards, accident prevention, and emergency procedures will be discussed at start up safety meeting and mitigated to extent feasible prior to work.No person shall enter a 50-foot exclusion zone radius unless proof of 40-hour OSHA training produced on-site to HSO, medical records made available to HSO on-site, individual participates in discussion with HSO pertaining to hazards at site, and individual has justifiable purpose for entering exclusion zone.

Chemical: Should breathing conditions exceed work action level while drilling or excavating, then all workers within the 50-foot exclusion zone will be required to wear a respirator (half-face mask) with organic cartridges. If a worker becomes sick, he should leave the work area immediately, breathe fresh air and seek medical attention if needed. Contact the HSO as soon as possible. All work will stop and will not resume until investigation and testing has been completed and corrective actions (as appropriate) have been taken to ensure adequate protection of personnel. Recommended work Action Level = 5 ppm in workers' breathing zone for 3 minutes (sustained).

Biological: None Anticipated

D. WORK PLAN INSTRUCTIONS

PERSONAL PROTECTION REQUIRED:

Level of protection: A___ B___ C___ D_x_ MIXED___ MODIFICATIONS___

For MIXED levels of protection describe areas and levels:_____

_____

_____

For MODIFICATIONS identify action levels: This site will involve D level protection which includes a hard hat, gloves, steel-toe boots. Respirator for 5 ppm or greater in working area. Ear plugs will be used for noisy conditions. Eye protection will be worn by workers._____

ADDITIONAL PERSONAL PROTECTIVE EQUIPMENT (PPE): Goggles, respirator, etc. should be available and ready for use._____

MONITORING EQUIPMENT: PID_x_ FID___ TOXIC GAS___ OXYGEN___

DETECTOR TUBES___ EXPLOSIMETER___ PERSONAL MONITOR___

OTHER INSTRUMENTS: N/A

EQUIPMENT CALIBRATION: PID instrument will be calibrated each day.

MONITORING STRATEGY: Measurements of potential vapor source, excavated soil, will be collected continuously during work.

DECONTAMINATION PROCEDURES: Steam clean drill rig, heavy equipment and tools. Steam clean or wash brass tubes in Alconox and rinse in potable water. Excavation equipment to be steam cleaned. Personal gear (e.g. boots) wash in Alconox, rinse in potable water.

SITE CONTROL MEASURES: Set up 50-foot perimeter with traffic cones or surveyor's tape. Visitors within perimeter to read and sign H&S plan and abide by directions of site H&S officer.

SPILL CONTAINMENT PROCEDURES: Spread plastic beneath excavated soil piles. In the event of petroleum hydrocarbons are discovered on the water in the excavation, the fluids will be pumped into a storage tank for disposal.

NOTES: N/A

E. EMERGENCY PROCEDURES

FIRE OR EXPLOSION: Evacuate the area and call the Fire Department at 911 immediately. All burn victims should seek medical attention immediately.

INJURY: Call 911 and administer first aid to victims who have severe injuries. Ensure all injured are transported to the nearest medical facility doctor.

WEATHER: Avoid extremes in temperature (i.e. very cold or very hot conditions)

OTHER:

CHEMICAL EXPOSURE ACTIONS:
(See Appendix B for Optional Material Safety Data Sheets)

EMERGENCY TELEPHONE NUMBERS

POLICE/FIRE/AMBULANCE: 911

POISON CONTROL: (800) 523-2222

ESE CONCORD OFFICE: (510) 685-4053

CHEMTREC: (800) 424-9300

UNDERGROUND SERVICE ALERT: (800) 642-2444

PROJECT CONTACTS

AGENCY CONTACT: Julliette Shin, Alameda County Health Agency (510) 271-4320

SITE CONTACT: Ms. Sasha George, Alameda Housing Authority (510) 522-8422

CLIENT CONTACT: Ms.Sasha George, Alameda Housing Authority (510) 522-8422

F. EMERGENCY PRECAUTIONS

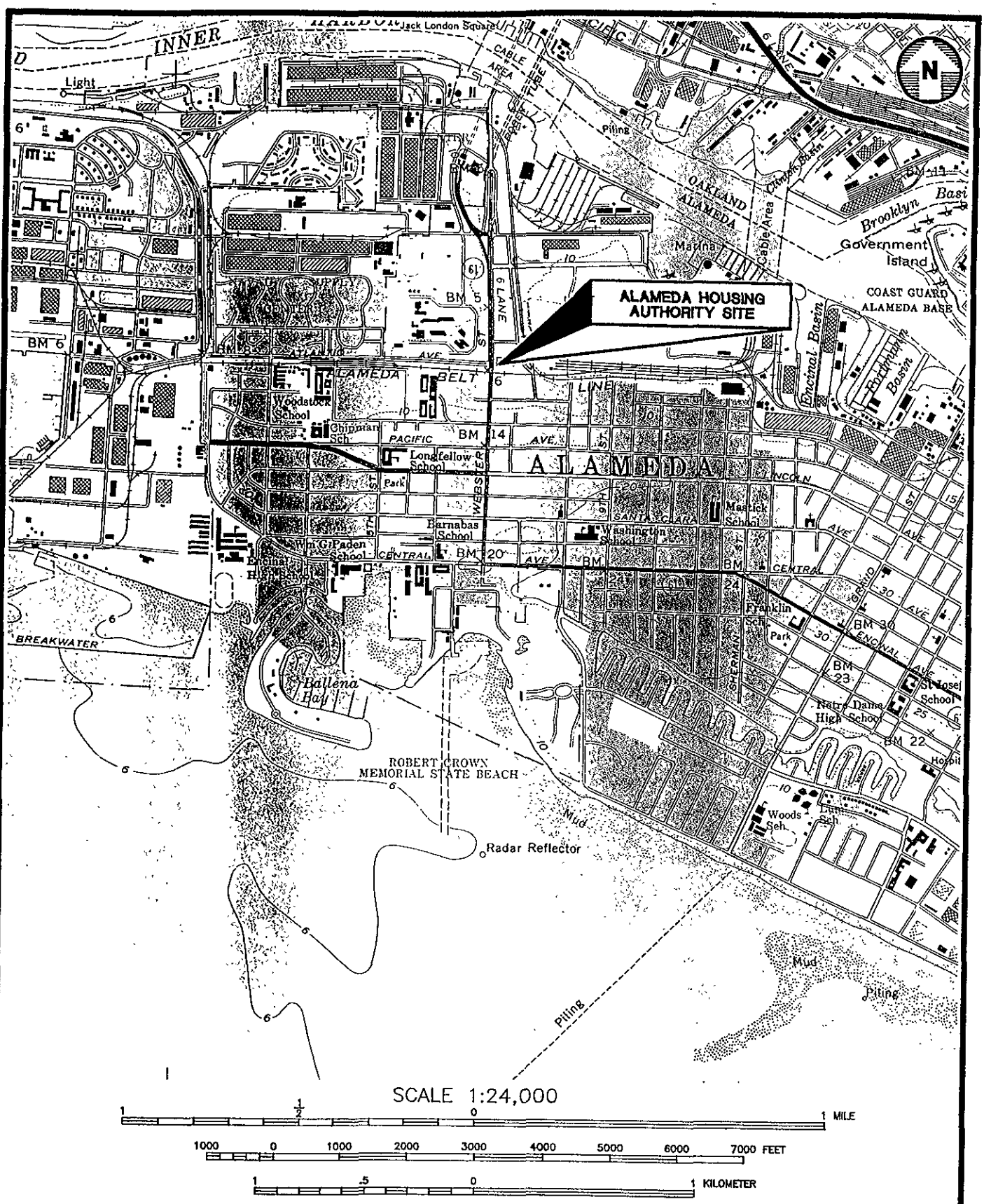
PRIMARY HOSPITAL/INFIRMARY:

Name: Alameda Hospital

Address: 2070 Clinton Ave, Alameda, CA Telephone Number: (510) 523-4357 (emergency)

Directions from site to emergency unit: Head south on Webster Street, then turn left onto Central Avenue. Turn right onto Encinal Avenue, from Encinal turn right onto Willow Street. Alameda Hospital is located on the right hand side at the corner of Clinton Avenue and Willow Strret.

Remarks: See Figure A



SCALE 1:24,000

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

ADAPTED FROM U.S.G.S. OAKLAND WEST 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAP, 1959, PHOTOREVISED 1980.

ESE A CILCORP Company — Environmental Science & Engineering, Inc.	DATE 2/94	LOCATION MAP	FIGURE NO. 1
4090 NELSON AVENUE, SUITE J CONCORD, CA 94520	REVISED	ALAMEDA HOUSING AUTHORITY 1916 WEBSTER STREET ALAMEDA, CALIFORNIA	PROJ. NO. 6-93-5199
	CAD FILE 51991001		

APPENDIX B

MATERIAL SAFETY DATA SHEETS

MATERIAL SAFETY DATA SHEET

UNOCAL 76

1201 West 5th Street
Los Angeles, California 90017

Product Name: UNOCAL 76 LEADED REGULAR GASOLINE
Product Code No: 00301

Issue Date: 04/15/91
Status: FINAL

Responsible Party:

UNOCAL REFINING & MARKETING DIVISION
UNION OIL COMPANY OF CALIFORNIA
1201 WEST 5TH STREET
LOS ANGELES, CALIFORNIA 90017

CONTACT FOR FURTHER INFORMATION:
MSDS COORDINATOR 213-977-7589

Transportation Emergencies:
CHEMTREC
(800) 424-9300 Cont. U.S.
(202) 483-7616 (Collect)
from Alaska & Hawaii
Health Emergencies:
LOS ANGELES POISON
CONTROL CENTER (24 hrs)
(800) 356-3129

PRODUCT IDENTIFICATION

PRODUCT NAME:	UNOCAL 76 LEADED REGULAR GASOLINE
SYNONYMS:	UNION 76 LEADED REGULAR GASOLINE
GENERIC NAME:	LEADED GASOLINE
CHEMICAL FAMILY:	PETROLEUM HYDROCARBON MIXTURE
DOT PROPER SHIPPING NAME:	GASOLINE
ID NUMBER:	UN1203
DOT HAZARD CLASSIFICATION:	FLAMMABLE LIQUID

PRECAUTIONARY WARNING

DANGER
EXTREMELY FLAMMABLE. VAPORS MAY EXPLODE. HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. ASPIRATION HAZARD IF SWALLOWED. CAN ENTER LUNGS AND CAUSE DAMAGE. POSSIBLE CANCER HAZARD BASED ON TESTS WITH LABORATORY ANIMALS. NO SMOKING OR OPEN FLAME. KEEP AWAY FROM HEAT, SPARKS, FLAMES OR OTHER SOURCES OF IGNITION (e.g. STATIC ELECTRICITY, PILOT LIGHTS OR MECHANICAL/ELECTRICAL EQUIPMENT). VAPORS MAY BE IGNITED BY SPARK OR FLAME SOURCE MANY FEET AWAY. DO NOT OVERFILL TANK. USE ONLY WITH ADEQUATE VENTILATION. DO NOT TASTE OR SWALLOW. KEEP CONTAINER CLOSED. DO NOT BREATHE VAPOR OR MISTS. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. WASH THOROUGHLY AFTER HANDLING. NEVER SIPHON BY MOUTH. FOR USE AS MOTOR FUEL ONLY. DO NOT USE FOR ANY OTHER PURPOSE. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, GRIND OR DRILL ON OR NEAR CONTAINER. "EMPTY" CONTAINER RETAINS RESIDUE (LIQUID AND/OR VAPOR) AND MAY EXPLODE IN HEAT OF A FIRE. KEEP OUT OF REACH OF CHILDREN. FAILURE TO USE CAUTION MAY CAUSE SERIOUS INJURY OR ILLNESS.

SECTION I - COMPONENTS	PERCENT	EXPOSURE LIMIT	UNITS	AGENCY	TYPE
HAZARDOUS COMPONENTS					
GASOLINE CAS #: 8006-61-9		300.000	ppm	ACGIH	TWA
		500.000	ppm	ACGIH	STEL
		300.000	ppm	OSHA	TWA
		500.000	ppm	OSHA	STEL

UNION OIL CO.

Product Name: UNOCAL 76 LEADED REGULAR GASOLINE
Product Code No: 00301

Issue Date: 04/15/91
Status: FINAL

SECTION I - COMPONENTS	PERCENT	EXPOSURE LIMIT	UNITS	AGENCY	TYPE
		300.000	ppm	CAL OSHA	TWA
BENZENE					
CAS #: 71-43-2	1.000 - 5.000	10.000	ppm	ACGIH	TWA
		25.000	ppm	MSHA	CEIL-SKIN
		1.000	ppm	OSHA	TWA
		5.000	ppm	OSHA	STEL
		50.000	ppm	CAL OSHA	CEIL
		25.000	ppm	CAL OSHA	EXCUR
		10.000	ppm	CAL OSHA	TWA-SKIN
LEAD COMPOUND		NOT ESTABLISHED			
CAS #: NONE	0.1 GM/GAL				
TOLUENE					
CAS #: 108-88-3	1.000 - 15.000	100.000	ppm	ACGIH	TWA
		150.000	ppm	ACGIH	STEL
		100.000	ppm	MSHA	TWA
		100.000	ppm	OSHA	TWA
		150.000	ppm	OSHA	STEL
		200.000	ppm	CAL OSHA	EXCUR
		100.000	ppm	CAL OSHA	TWA-SKIN
		500.000	ppm	CAL OSHA	CEIL-SKIN
XYLENES					
CAS #: 1330-20-7	1.000 - 21.000	100.000	ppm	ACGIH	TWA
		150.000	ppm	ACGIH	STEL
		100.000	ppm	MSHA	TWA
		100.000	ppm	OSHA	TWA
		150.000	ppm	OSHA	STEL
		200.000	ppm	CAL OSHA	EXCUR
		100.000	ppm	CAL OSHA	TWA-SKIN
		300.000	ppm	CAL OSHA	CEIL-SKIN
N-HEXANE					
CAS #: 110-54-3		50.000	ppm	ACGIH	TWA
		500.000	ppm	MSHA	TWA
		50.000	ppm	OSHA	TWA
		50.000	ppm	CAL OSHA	TWA
ETHYLBENZENE					
CAS #: 100-41-4	1.000 - 5.000	100.000	ppm	ACGIH	TWA
		125.000	ppm	ACGIH	STEL
		100.000	ppm	MSHA	TWA
		100.000	ppm	OSHA	TWA
		125.000	ppm	OSHA	STEL
		100.000	ppm	CAL OSHA	TWA
1,2,4-TRIMETHYLBENZENE		NOT ESTABLISHED			
CAS #: 95-63-6	1.000 - 5.000				
OTHER COMPONENTS					
		--NONE--			

THIS PRODUCT CONTAINS THE FOLLOWING CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA 313 AND 40 CFR 372:

	CAS NUMBER	WEIGHT %
BENZENE	71-43-2	1-5
LEAD COMPOUND	NONE	0.1 GM/GAL
TOLUENE	108-88-3	1-15
XYLENES	1330-20-7	1-21
ETHYLBENZENE	100-41-4	1-5

UNION OIL CO.

Product Name: UNOCAL 76 LEADED REGULAR GASOLINE
Product Code No: 00301

Issue Date: 04/15/91
Status: FINAL

SECTION I

METHYL TERT-BUTYL ETHER	1634-04-4	0-11
1,2,4-TRIMETHYLBENZENE	95-63-6	1-5

SECTION II - EMERGENCY AND FIRST AID PROCEDURES ***EMERGENCY***
Have physician call LOS ANGELES POISON CONTROL CENTER (24 hrs) (800) 356-3129

EYE CONTACT:

IF IRRITATION OR REDNESS DEVELOPS, MOVE VICTIM AWAY FROM EXPOSURE AND INTO FRESH AIR. FLUSH EYES WITH CLEAN WATER. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION.

SKIN CONTACT:

WIPE MATERIAL FROM SKIN AND REMOVE CONTAMINATED SHOES AND CLOTHING. CLEANSE AFFECTED AREA(S) THOROUGHLY BY WASHING WITH MILD SOAP AND WATER AND, IF NECESSARY, A WATERLESS SKIN CLEANSER. IF IRRITATION OR REDNESS DEVELOPS AND PERSISTS, SEEK MEDICAL ATTENTION.

INHALATION (BREATHING):

IF RESPIRATORY SYMPTOMS OR OTHER SYMPTOMS OF EXPOSURE DEVELOP, MOVE VICTIM AWAY FROM SOURCE OF EXPOSURE AND INTO FRESH AIR. IF SYMPTOMS PERSIST, SEEK IMMEDIATE MEDICAL ATTENTION. IF VICTIM IS NOT BREATHING, IMMEDIATELY BEGIN ARTIFICIAL RESPIRATION. IF BREATHING DIFFICULTIES DEVELOP, OXYGEN SHOULD BE ADMINISTERED BY QUALIFIED PERSONNEL. SEEK IMMEDIATE MEDICAL ATTENTION.

INGESTION (SWALLOWING):

ASPIRATION HAZARD: DO NOT INDUCE VOMITING OR GIVE ANYTHING BY MOUTH BECAUSE THIS MATERIAL CAN ENTER THE LUNGS AND CAUSE SEVERE LUNG DAMAGE. IF VICTIM IS DROWSY OR UNCONSCIOUS, PLACE ON THE LEFT SIDE WITH THE HEAD DOWN. IF POSSIBLE, DO NOT LEAVE VICTIM UNATTENDED. SEEK MEDICAL ATTENTION.

COMMENTS:

NOTE TO PHYSICIANS: EXPOSURE TO HIGH CONCENTRATIONS OF THIS MATERIAL (e.g. IN ENCLOSED SPACES OR WITH DELIBERATE ABUSE) MAY BE ASSOCIATED WITH CARDIAC ARRHYTHMIAS. EPINEPHRINE AND OTHER SYMPATHOMIMETIC DRUGS MAY INITIATE CARDIAC ARRHYTHMIAS IN PERSONS EXPOSED TO THIS MATERIAL. OTHER DRUGS WITH LESS ARRHYTHMOGENIC POTENTIAL SHOULD BE CONSIDERED. IF SYMPATHOMIMETIC DRUGS ARE ADMINISTERED, OBSERVE FOR THE DEVELOPMENT OF CARDIAC ARRHYTHMIAS.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

EYE CONTACT:

THIS MATERIAL MAY CAUSE MILD EYE IRRITATION. DIRECT CONTACT WITH THE LIQUID OR EXPOSURE TO VAPORS OR MISTS MAY CAUSE STINGING, TEARING AND REDNESS.

SKIN CONTACT:

THIS MATERIAL MAY CAUSE MILD SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY CAUSE REDNESS, BURNING, AND DRYING AND CRACKING OF THE SKIN. CONTACT MAY RESULT IN SKIN ABSORPTION BUT SYMPTOMS OF TOXICITY ARE NOT ANTICIPATED BY THIS ROUTE ALONE UNDER NORMAL CONDITIONS OF USE. PERSONS WITH PRE-EXISTING SKIN DISORDERS MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS MATERIAL.

INHALATION (BREATHING):

WHILE THIS MATERIAL HAS A LOW DEGREE OF TOXICITY, BREATHING HIGH CONCENTRATIONS OF VAPORS OR MISTS MAY CAUSE FLUSHING, BLURRED VISION, NAUSEA AND SIGNS OF NERVOUS SYSTEM DEPRESSION (e.g. HEADACHE, DROWSINESS, DIZZINESS, LOSS OF COORDINATION AND FATIGUE).

UNION OIL CO.

Product Name: UNOCAL 76 LEADED REGULAR GASOLINE
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Issue Date: 04/15/91
Status: FINAL

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

EXPOSURE TO HIGH CONCENTRATIONS MAY CAUSE LOSS OF CONSCIOUSNESS, CONVULSIONS, RESPIRATORY COLLAPSE AND DEATH. RESPIRATORY SYMPTOMS ASSOCIATED WITH PRE-EXISTING LUNG DISORDERS (e.g. ASTHMA-LIKE CONDITIONS) MAY BE AGGRAVATED BY EXPOSURE TO THIS MATERIAL.

INGESTION (SWALLOWING):

ASPIRATION HAZARD - THIS MATERIAL CAN ENTER LUNGS DURING SWALLOWING OR VOMITING AND CAUSE LUNG INFLAMMATION AND DAMAGE. INGESTION OF EXCESSIVE QUANTITIES OF THIS MATERIAL MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT AND SIGNS OF NERVOUS SYSTEM DEPRESSION (e.g. HEADACHE, DROWSINESS, DIZZINESS, LOSS OF COORDINATION, AND FATIGUE).

COMMENTS:

GASOLINE IS A POSSIBLE CANCER HAZARD BASED ON TESTS IN LABORATORY ANIMALS. FOLLOW-UP STUDIES SUGGEST THAT THIS MAY BE A UNIQUE EFFECT IN MALE RATS. UNLEADED GASOLINE HAS BEEN IDENTIFIED AS A POSSIBLE CARCINOGEN BY IARC. BENZENE, A COMPONENT OF THIS PRODUCT, IS A KNOWN CANCER (LEUKEMIA) HAZARD. RESULTS OF TESTS IN HUMANS HAVE SHOWN THAT EXPOSURE TO BENZENE CAN CAUSE IRREVERSIBLE CHANGES IN THE GENETIC MATERIAL (DNA) OF A CELL. THE HUMAN HEALTH CONSEQUENCES OF THESE CHANGES IS NOT FULLY UNDERSTOOD. BENZENE HAS BEEN IDENTIFIED AS A CARCINOGEN BY IARC, NTP AND OSHA. THERE IS INSUFFICIENT EVIDENCE TO SHOW THAT GASOLINE POSES ANY HAZARD RELATED TO ITS LOW BENZENE CONTENT. INTENTIONAL MISUSE BY DELIBERATE INHALATION OF LEADED GASOLINE MAY RESULT IN CHANGES IN BEHAVIOR CHARACTERIZED BY IRRITABILITY, AGGRESSIVENESS AND HALLUCINATIONS; MORE SEVERE OVEREXPOSURE MAY RESULT IN TREMORS AND SEIZURES. PERSONS WITH PRE-EXISTING HEART DISORDERS MAY BE MORE SUSCEPTIBLE TO IRREGULAR HEARTBEATS (ARRHYTHMIAS) IF EXPOSED TO HIGH CONCENTRATIONS OF THIS MATERIAL (SEE SECTION II - NOTE TO PHYSICIANS). GASOLINE ENGINE EXHAUST HAS BEEN IDENTIFIED AS A POSSIBLE HUMAN CANCER HAZARD BY IARC. THIS CLASSIFICATION IS BASED ON THE FINDING THAT SOLVENT EXTRACTS OF GASOLINE EXHAUST SOOT CAUSED SKIN CANCER IN LABORATORY ANIMALS.

SECTION IV - SPECIAL PROTECTION INFORMATION

VENTILATION:

IF CURRENT VENTILATION PRACTICES ARE NOT ADEQUATE TO MAINTAIN AIRBORNE CONCENTRATIONS BELOW THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I), ADDITIONAL VENTILATION OR EXHAUST SYSTEMS MAY BE REQUIRED. WHERE EXPLOSIVE MIXTURES MAY BE PRESENT, ELECTRICAL SYSTEMS SAFE FOR SUCH LOCATIONS MUST BE USED.

RESPIRATORY PROTECTION:

THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I). DEPENDING ON THE AIRBORNE CONCENTRATION, USE A RESPIRATOR OR GAS MASK WITH APPROPRIATE CARTRIDGES AND CANNISTERS (NIOSH APPROVED, IF AVAILABLE) OR SUPPLIED AIR EQUIPMENT.

PROTECTIVE GLOVES:

THE USE OF GLOVES IMPERMEABLE TO THE SPECIFIC MATERIAL HANDLED IS ADVISED TO PREVENT SKIN CONTACT AND POSSIBLE IRRITATION.

EYE PROTECTION:

APPROVED EYE PROTECTION TO SAFEGUARD AGAINST POTENTIAL EYE CONTACT, IRRITATION OR INJURY IS RECOMMENDED.

OTHER PROTECTIVE EQUIPMENT:

IT IS SUGGESTED THAT A SOURCE OF CLEAN WATER BE AVAILABLE IN THE WORK AREA FOR FLUSHING EYES AND SKIN. IMPERVIOUS CLOTHING SHOULD BE WORN AS NEEDED.

UNION OIL CO.

Product Name: UNOCAL 76 LEADED REGULAR GASOLINE
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SECTION V - REACTIVITY DATA

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING.

EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE.

CONDITIONS AFFECTING REACTIVITY:

AVOID ALL POSSIBLE SOURCES OF IGNITION (SEE SECTIONS VII AND VIII).

INCOMPATIBLE MATERIALS:

CONTACT WITH STRONG OXIDIZING AGENTS SUCH AS CHLORINE, PERMANGANATES AND DICHROMATES MAY CAUSE FIRE OR EXPLOSION.

HAZARDOUS DECOMPOSITION PRODUCTS:

COMBUSTION MAY YIELD SIGNIFICANT AMOUNTS OF CARBON MONOXIDE AND SMALL AMOUNTS OF OXIDES OF SULFUR AND NITROGEN, BENZENE AND OTHER ORGANIC COMPOUNDS.

HAZARDOUS POLYMERIZATION:

WILL NOT OCCUR

POLYMERIZATION CONDITIONS TO AVOID:

NONE KNOWN

SECTION VI - SPILL AND LEAK PROCEDURES

HIGHWAY OR RAILWAY SPILLS
Call CHEMTREC (800) 424-9300 Cont. U.S.
(Collect) (202) 483-7616 from Alaska & Hawaii

PRECAUTIONS IN CASE OF RELEASE OR SPILL:

EXTREMELY FLAMMABLE. KEEP ALL SOURCES OF IGNITION AND HOT METAL SURFACES AWAY FROM SPILL/RELEASE. STAY UPWIND AND AWAY FROM SPILL/RELEASE. ISOLATE HAZARD AREA AND LIMIT ENTRY TO EMERGENCY CREW. STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). PREVENT SPILLED MATERIAL FROM ENTERING SEWERS, STORM DRAINS, OTHER UNAUTHORIZED TREATMENT DRAINAGE SYSTEMS AND NATURAL WATERWAYS. DIKE FAR AHEAD OF SPILL FOR LATER RECOVERY OR DISPOSAL. SPILLED MATERIAL MAY BE ABSORBED INTO AN APPROPRIATE ABSORBENT MATERIAL. NOTIFY FIRE AUTHORITIES AND APPROPRIATE FEDERAL, STATE AND LOCAL AGENCIES. IMMEDIATE CLEANUP OF ANY SPILL IS RECOMMENDED. IF SPILL OF ANY AMOUNT IS MADE INTO OR UPON U.S. NAVIGABLE WATERS, THE CONTIGUOUS ZONE, OR ADJOINING SHORELINES, NOTIFY THE NATIONAL RESPONSE CENTER (PHONE NUMBER 800-424-8802).

WASTE DISPOSAL METHOD:

DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SECTION VII - STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:

KEEP CONTAINER(S) TIGHTLY CLOSED. USE AND STORE THIS MATERIAL IN COOL, DRY, WELL VENTILATED AREAS AWAY FROM HEAT, DIRECT SUNLIGHT, HOT METAL SURFACES AND ALL SOURCES OF IGNITION. POST AREA "NO SMOKING OR OPEN FLAME." BOND AND GROUND ALL EQUIPMENT WHEN TRANSFERRING FROM ONE VESSEL TO ANOTHER. STORE ONLY IN APPROVED CONTAINERS. KEEP AWAY FROM ANY INCOMPATIBLE MATERIALS (SEE SECTION V). PROTECT CONTAINER(S) AGAINST PHYSICAL DAMAGE. THE USE OF EXPLOSION-PROOF EQUIPMENT IS RECOMMENDED AND MAY BE REQUIRED (SEE APPROPRIATE FIRE CODES.) DO NOT ENTER CONFINED SPACES SUCH AS TANKS OR PITS WITHOUT FOLLOWING PROPER ENTRY PROCEDURES SUCH AS ASTM D-4276. OUTDOOR OR

SECTION VII - STORAGE AND SPECIAL PRECAUTIONS

DETACHED STORAGE IS PREFERRED. INDOOR STORAGE SHOULD MEET OSHA STANDARDS AND APPROPRIATE FIRE CODES. THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED ANY ESTABLISHED EXPOSURE LIMITS (SEE SECTIONS I AND IV). WASH THOROUGHLY AFTER HANDLING. DO NOT WEAR CONTAMINATED CLOTHING OR SHOES. USE GOOD PERSONAL HYGIENE PRACTICE. "EMPTY" CONTAINERS RETAIN RESIDUE (LIQUID AND/OR VAPOR) AND CAN BE DANGEROUS. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. "EMPTY" DRUMS SHOULD BE COMPLETELY DRAINED, PROPERLY BUNGED AND PROMPTLY SHIPPED TO THE SUPPLIER OR A DRUM RECONDITIONER. ALL OTHER CONTAINERS SHOULD BE DISPOSED OF IN AN ENVIRONMENTALLY SAFE MANNER AND IN ACCORDANCE WITH GOVERNMENTAL REGULATIONS. BEFORE WORKING ON OR IN TANKS WHICH CONTAIN OR HAVE CONTAINED THIS PRODUCT, REFER TO OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS, ANSI Z49.1, AND OTHER GOVERNMENTAL AND INDUSTRIAL REFERENCES PERTAINING TO CLEANING, REPAIRING, WELDING, OR OTHER CONTEMPLATED OPERATIONS.

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

			HAZARD RANKING	
NFPA HAZARD CLASS	HEALTH HAZARD:	2	0 = LEAST	FLASH POINT
	FLAMMABILITY:	3	1 = SLIGHT	
	REACTIVITY:	0	2 = MODERATE	-45 F (TCC)
	OTHER:		3 = HIGH	
			4 = EXTREME	

EXTINGUISHING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, HALON, FOAM OR WATER SPRAY IS RECOMMMENDED. WATER MAY BE INEFFECTIVE.

UNUSUAL FIRE & EXPLOSION HAZARDS:

THIS MATERIAL IS EXTREMELY FLAMMABLE AND MAY BE IGNITED BY HEAT, SPARKS, FLAME OR OTHER SOURCES OF IGNITION (e.g. STATIC ELECTRICITY, PILOT LIGHTS, MECHANICAL/ELECTRICAL EQUIPMENT). VAPORS MAY TRAVEL CONSIDERABLE DISTANCES TO A SOURCE OF IGNITION WHERE THEY MAY IGNITE, FLASHBACK OR EXPLODE. VAPOR/AIR EXPLOSION HAZARD INDOORS/OUTDOORS OR IN SEWERS. VAPORS ARE HEAVIER THAN AIR AND MAY ACCUMULATE IN LOW AREAS. IF CONTAINER IS NOT PROPERLY COOLED, IT MAY EXPLODE IN THE HEAT OF A FIRE.

SPECIAL FIRE FIGHTING PROCEDURES:

WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. MOVE UNDAMAGED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. WATER SPRAY MAY BE USEFUL IN MINIMIZING OR DISPERSING VAPORS AND COOLING EQUIPMENT EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSES.

SECTION IX - PHYSICAL DATA

***UNLESS OTHERWISE NOTED, VALUES ARE AT 20 C/68 F AND 760 mm Hg/1 atm.

APPROX BOILING POINT	(AIR = 1) VAPOR DENSITY	(N-BUTYL ACETATE = 1) EVAPORATION RATE	% VOLATILE
85-430F / 29-221C	>1	<1	100

% SOLUBILITY IN WATER

NEGLIGIBLE

SPECIFIC GRAVITY

0.80

UNION OIL CO.

Product Name: UNOCAL 76 LEADED REGULAR GASOLINE
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Issue Date: 04/15/91
Status: FINAL

SECTION IX - PHYSICAL DATA

APPEARANCE

BRONZE COLORED LIQUID

ODOR

GASOLINE

SECTION X - DOCUMENTARY INFORMATION

ISSUE DATE: 04/15/91 PRODUCT CODE NO. 00301

PREV. DATE: 05/04/90 PREV. PROD. CODE NO. NONE

MSDS NO: NONE PREV. MSDS NO: NONE

DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

The information in this document is believed to be correct as of the date issued. HOWEVER, NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY IS EXPRESSED OR IS TO BE IMPLIED REGARDING THE ACCURACY OR COMPLETENESS OF THIS INFORMATION, THE RESULTS TO BE OBTAINED FROM THE USE OF THIS INFORMATION OR THE PRODUCT, THE SAFETY OF THIS PRODUCT, OR THE HAZARDS RELATED TO ITS USE. This information and product are furnished on the condition that the person receiving them shall make his own determination as to the suitability of the product for his particular purpose and on the condition that he assume the risk of his use thereof.

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MATERIAL SAFETY DATA SHEET

UNOCAL 76

1201 West 5th Street
Los Angeles, California 90017

Product Name: UNOCAL PERFORMANCE PLUS 89
Product Code No: 00401

Issue Date: 04/15/91
Status: FINAL

Responsible Party:	Transportation Emergencies:
UNOCAL REFINING & MARKETING DIVISION UNION OIL COMPANY OF CALIFORNIA 1201 WEST 5TH STREET LOS ANGELES, CALIFORNIA 90017 CONTACT FOR FURTHER INFORMATION: MSDS COORDINATOR 213-977-7589	CHEMTREC (800) 424-9300 Cont. U.S. (202) 483-7616 (Collect) from Alaska & Hawaii Health Emergencies: LOS ANGELES POISON CONTROL CENTER (24 hrs) (800) 356-3129

PRODUCT IDENTIFICATION

PRODUCT NAME: UNOCAL PERFORMANCE PLUS 89

SYNONYMS: UNOCAL 76 UNLEADED GASOLINE

GENERIC NAME: UNLEADED GASOLINE

CHEMICAL FAMILY: PETROLEUM HYDROCARBON MIXTURE

DOT PROPER SHIPPING NAME: GASOLINE

ID NUMBER: UN1203

DOT HAZARD CLASSIFICATION: FLAMMABLE LIQUID

PRECAUTIONARY WARNING

DANGER
EXTREMELY FLAMMABLE. VAPORS MAY EXPLODE. HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. POSSIBLE CANCER HAZARD BASED ON TESTS WITH LABORATORY ANIMALS. ASPIRATION HAZARD IF SWALLOWED. CAN ENTER LUNGS AND CAUSE DAMAGE. NO SMOKING OR OPEN FLAME. KEEP AWAY FROM HEAT, SPARKS, FLAMES OR OTHER SOURCES OF IGNITION (e.g. STATIC ELECTRICITY, PILOT LIGHTS OR MECHANICAL/ELECTRICAL EQUIPMENT). VAPORS MAY BE IGNITED BY SPARK OR FLAME SOURCE MANY FEET AWAY. DO NOT OVERFILL TANK. USE ONLY WITH ADEQUATE VENTILATION. DO NOT TASTE OR SWALLOW. DO NOT BREATHE VAPOR OR MIST. DO NOT GET IN EYES, ON SKIN OR ON CLOTHING. WASH THOROUGHLY AFTER HANDLING. NEVER SIPHON BY MOUTH. FOR USE AS MOTOR FUEL ONLY. DO NOT USE FOR ANY OTHER PURPOSE. KEEP CONTAINER CLOSED. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, GRIND OR DRILL ON OR NEAR CONTAINER. "EMPTY" CONTAINER RETAINS RESIDUE (LIQUID AND/OR VAPOR) AND MAY EXPLODE IN HEAT OF A FIRE. KEEP OUT OF REACH OF CHILDREN. FAILURE TO USE CAUTION MAY CAUSE SERIOUS INJURY OR ILLNESS.

SECTION I - COMPONENTS	PERCENT	EXPOSURE LIMIT	UNITS	AGENCY	TYPE
HAZARDOUS COMPONENTS					
GASOLINE CAS #: 8006-61-9		300.000	ppm	ACGIH	TWA
		500.000	ppm	ACGIH	STEL
		300.000	ppm	OSHA	TWA
		500.000	ppm	OSHA	STEL

UNION OIL CO.

Product Name: UNOCAL PERFORMANCE PLUS 89
Product Code No: 00401

Issue Date: 04/15/91
Status: FINAL

SECTION I - COMPONENTS	PERCENT	EXPOSURE LIMIT	UNITS	AGENCY	TYPE
		300.000	ppm	CAL OSHA	TWA
BENZENE					
CAS #: 71-43-2	1.000 - 5.000	10.000	ppm	ACGIH	TWA
		25.000	ppm	MSHA	CEIL-SKIN
		1.000	ppm	OSHA	TWA
		5.000	ppm	OSHA	STEL
		50.000	ppm	CAL OSHA	CEIL
		25.000	ppm	CAL OSHA	EXCUR
		10.000	ppm	CAL OSHA	TWA-SKIN
TOLUENE					
CAS #: 108-88-3	1.000 - 9.000	100.000	ppm	ACGIH	TWA
		150.000	ppm	ACGIH	STEL
		100.000	ppm	MSHA	TWA
		100.000	ppm	OSHA	TWA
		150.000	ppm	OSHA	STEL
		200.000	ppm	CAL OSHA	EXCUR
		100.000	ppm	CAL OSHA	TWA-SKIN
		500.000	ppm	CAL OSHA	CEIL-SKIN
XYLENES					
CAS #: 1330-20-7	1.000 - 14.000	100.000	ppm	ACGIH	TWA
		150.000	ppm	ACGIH	STEL
		100.000	ppm	MSHA	TWA
		100.000	ppm	OSHA	TWA
		150.000	ppm	OSHA	STEL
		200.000	ppm	CAL OSHA	EXCUR
		100.000	ppm	CAL OSHA	TWA-SKIN
		300.000	ppm	CAL OSHA	CEIL-SKIN
N-HEXANE					
CAS #: 110-54-3		50.000	ppm	ACGIH	TWA
		500.000	ppm	MSHA	TWA
		50.000	ppm	OSHA	TWA
		50.000	ppm	CAL OSHA	TWA
ETHYLBENZENE					
CAS #: 100-41-4	1.000 - 5.000	100.000	ppm	ACGIH	TWA
		125.000	ppm	ACGIH	STEL
		100.000	ppm	MSHA	TWA
		100.000	ppm	OSHA	TWA
		125.000	ppm	OSHA	STEL
		100.000	ppm	CAL OSHA	TWA
1,2,4-TRIMETHYLBENZENE		NOT ESTABLISHED			
CAS #: 95-63-6	1.000 - 5.000				

OTHER COMPONENTS

--NONE--

THIS PRODUCT CONTAINS THE FOLLOWING CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SARA 313 AND 40 CFR 372:	CAS NUMBER	WEIGHT %
BENZENE	71-43-2	1-5
TOLUENE	108-88-3	1-9
XYLENES	1330-20-7	1-14
ETHYLBENZENE	100-41-4	1-5
METHYL TERT-BUTYL ETHER	1634-04-4	0-10
1,2,4-TRIMETHYLBENZENE	95-63-6	1-5

UNION OIL CO.

Product Name: UNOCAL PERFORMANCE PLUS 89
Product Code No: 00401

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Status: FINAL

SECTION II - EMERGENCY AND FIRST AID PROCEDURES ***EMERGENCY***
Have physician call LOS ANGELES POISON CONTROL CENTER (24 hrs) (800) 356-3129

EYE CONTACT:

IF IRRITATION OR REDNESS DEVELOPS, MOVE VICTIM AWAY FROM EXPOSURE AND INTO FRESH AIR. FLUSH EYES WITH CLEAN WATER. IF SYMPTOMS PERSIST, SEEK MEDICAL ATTENTION.

SKIN CONTACT:

WIPE MATERIAL FROM SKIN AND REMOVE CONTAMINATED SHOES AND CLOTHING. CLEANSE AFFECTED AREA(S) THOROUGHLY BY WASHING WITH MILD SOAP AND WATER AND, IF NECESSARY, A WATERLESS SKIN CLEANSER. IF IRRITATION OR REDNESS DEVELOPS AND PERSISTS, SEEK MEDICAL ATTENTION.

INHALATION (BREATHING):

IF RESPIRATORY SYMPTOMS OR OTHER SYMPTOMS OF EXPOSURE DEVELOP, MOVE VICTIM AWAY FROM SOURCE OF EXPOSURE AND INTO FRESH AIR. IF SYMPTOMS PERSIST, SEEK IMMEDIATE MEDICAL ATTENTION. IF VICTIM IS NOT BREATHING, IMMEDIATELY BEGIN ARTIFICIAL RESPIRATION. IF BREATHING DIFFICULTIES DEVELOP, OXYGEN SHOULD BE ADMINISTERED BY QUALIFIED PERSONNEL. SEEK IMMEDIATE MEDICAL ATTENTION.

INGESTION (SWALLOWING):

ASPIRATION HAZARD: DO NOT INDUCE VOMITING OR GIVE ANYTHING BY MOUTH BECAUSE THIS MATERIAL CAN ENTER THE LUNGS AND CAUSE SEVERE LUNG DAMAGE. IF VICTIM IS DROWSY OR UNCONSCIOUS, PLACE ON THE LEFT SIDE WITH THE HEAD DOWN. IF POSSIBLE, DO NOT LEAVE VICTIM UNATTENDED. SEEK MEDICAL ATTENTION.

COMMENTS:

NOTE TO PHYSICIANS: EXPOSURE TO HIGH CONCENTRATIONS OF THIS MATERIAL (e.g. IN ENCLOSED SPACES OR WITH DELIBERATE ABUSE) MAY BE ASSOCIATED WITH CARDIAC ARRHYTHMIAS. EPINEPHRINE AND OTHER SYMPATHOMIMETIC DRUGS MAY INITIATE CARDIAC ARRHYTHMIAS IN PERSONS EXPOSED TO THIS MATERIAL. OTHER DRUGS WITH LESS ARRHYTHMOGENIC POTENTIAL SHOULD BE CONSIDERED. IF SYMPATHOMIMETIC DRUGS ARE ADMINISTERED, OBSERVE FOR THE DEVELOPMENT OF CARDIAC ARRHYTHMIAS.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

EYE CONTACT:

THIS MATERIAL MAY CAUSE MILD EYE IRRITATION. DIRECT CONTACT WITH THE LIQUID OR EXPOSURE TO VAPORS OR MISTS MAY CAUSE STINGING, TEARING AND REDNESS.

SKIN CONTACT:

THIS MATERIAL MAY CAUSE MILD SKIN IRRITATION. PROLONGED OR REPEATED CONTACT MAY CAUSE REDNESS, BURNING, AND DRYING AND CRACKING OF THE SKIN. CONTACT MAY RESULT IN SKIN ABSORPTION BUT SYMPTOMS OF TOXICITY ARE NOT ANTICIPATED BY THIS ROUTE ALONE UNDER NORMAL CONDITIONS OF USE. PERSONS WITH PRE-EXISTING SKIN DISORDERS MAY BE MORE SUSCEPTIBLE TO THE EFFECTS OF THIS MATERIAL.

INHALATION (BREATHING):

WHILE THIS MATERIAL HAS A LOW DEGREE OF TOXICITY, BREATHING HIGH CONCENTRATIONS OF VAPORS OR MISTS MAY CAUSE FLUSHING, BLURRED VISION, NAUSEA AND SIGNS OF NERVOUS SYSTEM DEPRESSION (e.g. HEADACHE, DROWSINESS, DIZZINESS, LOSS OF COORDINATION AND FATIGUE). EXPOSURE TO HIGH CONCENTRATIONS MAY CAUSE LOSS OF CONSCIOUSNESS, CONVULSIONS, RESPIRATORY COLLAPSE AND DEATH. RESPIRATORY SYMPTOMS ASSOCIATED WITH PRE-EXISTING LUNG DISORDERS (e.g. ASTHMA-LIKE CONDITIONS) MAY BE AGGRAVATED BY EXPOSURE TO THIS MATERIAL.

SECTION III - HEALTH HAZARDS/ROUTES OF ENTRY

INGESTION (SWALLOWING):

ASPIRATION HAZARD - THIS MATERIAL CAN ENTER LUNGS DURING SWALLOWING OR VOMITING AND CAUSE LUNG INFLAMMATION AND DAMAGE. INGESTION OF EXCESSIVE QUANTITIES OF THIS MATERIAL MAY CAUSE IRRITATION OF THE DIGESTIVE TRACT AND SIGNS OF NERVOUS SYSTEM DEPRESSION (e.g. HEADACHE, DROWSINESS, DIZZINESS, LOSS OF COORDINATION, AND FATIGUE).

COMMENTS:

GASOLINE IS A POSSIBLE CANCER HAZARD BASED ON TESTS IN LABORATORY ANIMALS. FOLLOW-UP STUDIES SUGGEST THAT THIS MAY BE A UNIQUE EFFECT IN MALE RATS. UNLEADED GASOLINE HAS BEEN IDENTIFIED AS A POSSIBLE CARCINOGEN BY IARC. BENZENE, A COMPONENT OF THIS PRODUCT, IS A KNOWN CANCER (LEUKEMIA) HAZARD. RESULTS OF TESTS IN HUMANS HAVE SHOWN THAT EXPOSURE TO BENZENE CAN CAUSE IRREVERSIBLE CHANGES IN THE GENETIC MATERIAL (DNA) OF A CELL. THE HUMAN HEALTH CONSEQUENCES OF THESE CHANGES IS NOT FULLY UNDERSTOOD. BENZENE HAS BEEN IDENTIFIED AS A CARCINOGEN BY IARC, NTP AND OSHA. THERE IS INSUFFICIENT EVIDENCE TO SHOW THAT GASOLINE POSES ANY HAZARD RELATED TO ITS LOW BENZENE CONTENT. PERSONS WITH PRE-EXISTING HEART DISORDERS MAY BE MORE SUSCEPTIBLE TO IRREGULAR HEARTBEATS (ARRHYTHMIAS) IF EXPOSED TO HIGH CONCENTRATIONS OF THIS MATERIAL (SEE SECTION II - NOTE TO PHYSICIANS). GASOLINE ENGINE EXHAUST HAS BEEN IDENTIFIED AS A POSSIBLE HUMAN CANCER HAZARD BY IARC. THIS CLASSIFICATION IS BASED ON THE FINDING THAT SOLVENT EXTRACTS OF GASOLINE EXHAUST SOOT CAUSED SKIN CANCER IN LABORATORY ANIMALS.

SECTION IV - SPECIAL PROTECTION INFORMATION

VENTILATION:

IF CURRENT VENTILATION PRACTICES ARE NOT ADEQUATE TO MAINTAIN AIRBORNE CONCENTRATIONS BELOW THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I), ADDITIONAL VENTILATION OR EXHAUST SYSTEMS MAY BE REQUIRED. WHERE EXPLOSIVE MIXTURES MAY BE PRESENT, ELECTRICAL SYSTEMS SAFE FOR SUCH LOCATIONS MUST BE USED.

RESPIRATORY PROTECTION:

THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED THE ESTABLISHED EXPOSURE LIMITS (SEE SECTION I). DEPENDING ON THE AIRBORNE CONCENTRATION, USE A RESPIRATOR OR GAS MASK WITH APPROPRIATE CARTRIDGES AND CANNISTERS (NIOSH APPROVED, IF AVAILABLE) OR SUPPLIED AIR EQUIPMENT.

PROTECTIVE GLOVES:

THE USE OF GLOVES IMPERMEABLE TO THE SPECIFIC MATERIAL HANDLED IS ADVISED TO PREVENT SKIN CONTACT AND POSSIBLE IRRITATION.

EYE PROTECTION:

APPROVED EYE PROTECTION TO SAFEGUARD AGAINST POTENTIAL EYE CONTACT, IRRITATION OR INJURY IS RECOMMENDED.

OTHER PROTECTIVE EQUIPMENT:

IT IS SUGGESTED THAT A SOURCE OF CLEAN WATER BE AVAILABLE IN THE WORK AREA FOR FLUSHING EYES AND SKIN. IMPERVIOUS CLOTHING SHOULD BE WORN AS NEEDED.

SECTION V - REACTIVITY DATA

REACTIVITY:

STABLE UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING.

EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE.

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SECTION V - REACTIVITY DATA

CONDITIONS AFFECTING REACTIVITY:

AVOID ALL POSSIBLE SOURCES OF IGNITION (SEE SECTIONS VII AND VIII).

INCOMPATIBLE MATERIALS:

CONTACT WITH STRONG OXIDIZING AGENTS SUCH AS CHLORINE, PERMANGANATES AND DICHROMATES MAY CAUSE FIRE OR EXPLOSION.

HAZARDOUS DECOMPOSITION PRODUCTS:

COMBUSTION MAY YIELD SIGNIFICANT AMOUNTS OF CARBON MONOXIDE AND SMALL AMOUNTS OF OXIDES OF SULFUR AND NITROGEN, BENZENE AND OTHER ORGANIC COMPOUNDS.

HAZARDOUS POLYMERIZATION:

WILL NOT OCCUR

POLYMERIZATION CONDITIONS TO AVOID:

NONE KNOWN

SECTION VI - SPILL AND LEAK PROCEDURES

HIGHWAY OR RAILWAY SPILLS
Call CHEMTREC (800) 424-9300 Cont. U.S.
(Collect) (202) 483-7616 from Alaska & Hawaii

PRECAUTIONS IN CASE OF RELEASE OR SPILL:

EXTREMELY FLAMMABLE. KEEP ALL SOURCES OF IGNITION AND HOT METAL SURFACES AWAY FROM SPILL/RELEASE. STAY UPWIND AND AWAY FROM SPILL/RELEASE. ISOLATE HAZARD AREA AND LIMIT ENTRY TO EMERGENCY CREW. STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). PREVENT SPILLED MATERIAL FROM ENTERING SEWERS, STORM DRAINS, OTHER UNAUTHORIZED TREATMENT DRAINAGE SYSTEMS AND NATURAL WATERWAYS. DIKE FAR AHEAD OF SPILL FOR LATER RECOVERY OR DISPOSAL. SPILLED MATERIAL MAY BE ABSORBED INTO AN APPROPRIATE ABSORBENT MATERIAL. NOTIFY FIRE AUTHORITIES AND APPROPRIATE FEDERAL, STATE AND LOCAL AGENCIES. IMMEDIATE CLEANUP OF ANY SPILL IS RECOMMENDED. IF SPILL OF ANY AMOUNT IS MADE INTO OR UPON U.S. NAVIGABLE WATERS, THE CONTIGUOUS ZONE, OR ADJOINING SHORELINES, NOTIFY THE NATIONAL RESPONSE CENTER (PHONE NUMBER 800-424-8802).

WASTE DISPOSAL METHOD:

DISPOSE OF PRODUCT IN ACCORDANCE WITH LOCAL, COUNTY, STATE, AND FEDERAL REGULATIONS.

SECTION VII - STORAGE AND SPECIAL PRECAUTIONS

HANDLING AND STORAGE PRECAUTIONS:

KEEP CONTAINER(S) TIGHTLY CLOSED. USE AND STORE THIS MATERIAL IN COOL, DRY, WELL VENTILATED AREAS AWAY FROM HEAT, DIRECT SUNLIGHT, HOT METAL SURFACES AND ALL SOURCES OF IGNITION. POST AREA "NO SMOKING OR OPEN FLAME." BOND AND GROUND ALL EQUIPMENT WHEN TRANSFERRING FROM ONE VESSEL TO ANOTHER. STORE ONLY IN APPROVED CONTAINERS. KEEP AWAY FROM ANY INCOMPATIBLE MATERIALS (SEE SECTION V). PROTECT CONTAINER(S) AGAINST PHYSICAL DAMAGE. THE USE OF EXPLOSION-PROOF EQUIPMENT IS RECOMMENDED AND MAY BE REQUIRED (SEE APPROPRIATE FIRE CODES.) DO NOT ENTER CONFINED SPACES SUCH AS TANKS OR PITS WITHOUT FOLLOWING PROPER ENTRY PROCEDURES SUCH AS ASTM D-4276. OUTDOOR OR DETACHED STORAGE IS PREFERRED. INDOOR STORAGE SHOULD MEET OSHA STANDARDS AND APPROPRIATE FIRE CODES. THE USE OF RESPIRATORY PROTECTION IS ADVISED WHEN CONCENTRATIONS EXCEED ANY ESTABLISHED EXPOSURE LIMITS (SEE SECTIONS I AND IV). WASH THOROUGHLY AFTER HANDLING. DO NOT WEAR CONTAMINATED CLOTHING OR SHOES. USE GOOD PERSONAL HYGIENE PRACTICE. "EMPTY" CONTAINERS RETAIN RESIDUE (LIQUID AND/OR VAPOR) AND CAN BE DANGEROUS. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE

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SECTION VII - STORAGE AND SPECIAL PRECAUTIONS

AND CAUSE INJURY OR DEATH. "EMPTY" DRUMS SHOULD BE COMPLETELY DRAINED, PROPERLY BUNGED AND PROMPTLY SHIPPED TO THE SUPPLIER OR A DRUM RECONDITIONER. ALL OTHER CONTAINERS SHOULD BE DISPOSED OF IN AN ENVIRONMENTALLY SAFE MANNER AND IN ACCORDANCE WITH GOVERNMENTAL REGULATIONS. BEFORE WORKING ON OR IN TANKS WHICH CONTAIN OR HAVE CONTAINED THIS PRODUCT, REFER TO OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS, ANSI Z49.1, AND OTHER GOVERNMENTAL AND INDUSTRIAL REFERENCES PERTAINING TO CLEANING, REPAIRING, WELDING, OR OTHER CONTEMPLATED OPERATIONS.

SECTION VIII - FIRE AND EXPLOSION HAZARD DATA

			HAZARD RANKING	
NFPA HAZARD CLASS	HEALTH HAZARD:	2	0 = LEAST	FLASH POINT
	FLAMMABILITY:	3	1 = SLIGHT	
	REACTIVITY:	0	2 = MODERATE	-45 F (TCC)
	OTHER:		3 = HIGH	
			4 = EXTREME	

EXTINGUISHING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, HALON, FOAM OR WATER SPRAY IS RECOMMMENDED. WATER MAY BE INEFFECTIVE.

UNUSUAL FIRE & EXPLOSION HAZARDS:

THIS MATERIAL IS EXTREMELY FLAMMABLE AND MAY BE IGNITED BY HEAT, SPARKS, FLAME OR OTHER SOURCES OF IGNITION (e.g. STATIC ELECTRICITY, PILOT LIGHTS, MECHANICAL/ELECTRICAL EQUIPMENT). VAPORS MAY TRAVEL CONSIDERABLE DISTANCES TO A SOURCE OF IGNITION WHERE THEY MAY IGNITE, FLASHBACK OR EXPLODE. VAPOR/AIR EXPLOSION HAZARD INDOORS/OUTDOORS OR IN SEWERS. VAPORS ARE HEAVIER THAN AIR AND MAY ACCUMULATE IN LOW AREAS. IF CONTAINER IS NOT PROPERLY COOLED, IT MAY EXPLODE IN THE HEAT OF A FIRE.

SPECIAL FIRE FIGHTING PROCEDURES:

WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION AS CONDITIONS WARRANT (SEE SECTION IV). STOP SPILL/RELEASE IF IT CAN BE DONE WITHOUT RISK. MOVE UNDAMAGED CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. WATER SPRAY MAY BE USEFUL IN MINIMIZING OR DISPERSING VAPORS AND COOLING EQUIPMENT EXPOSED TO HEAT AND FLAME. AVOID SPREADING BURNING LIQUID WITH WATER USED FOR COOLING PURPOSES.

SECTION IX - PHYSICAL DATA

***UNLESS OTHERWISE NOTED, VALUES ARE AT 20 C/68 F AND 760 mm Hg/1 atm.

APPROX BOILING POINT	(AIR = 1) VAPOR DENSITY	(N-BUTYL ACETATE = 1) EVAPORATION RATE	% VOLATILE
85-430F / 29-221C	>1	<1	100

% SOLUBILITY IN WATER

NEGLIGIBLE

SPECIFIC GRAVITY

0.75

APPEARANCE

CLEAR LIQUID

ODOR

GASOLINE

UNION OIL CO.

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SECTION X - DOCUMENTARY INFORMATION

ISSUE DATE: 04/15/91 PRODUCT CODE NO. 00401

PREV. DATE: 05/04/90 PREV. PROD. CODE NO. NONE

MSDS NO: NONE PREV. MSDS NO: NONE

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