R0251

ConocoPhillips

Alameda County

SEP 16 2005

Environmental Health

76 Broadway
Sacramento, CA 95818
phone 916.558.7676
fax 916.558.7639

September 14, 2005

Mr. Don Hwang
Alameda County Health Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Re: **Document Transmittal**
Fuel Leak Case
76 Station #3538
411 West MacArthur
Oakland, CA

Dear Mr. Hwang:

Please find attached TRC's *Soil and Groundwater Investigation Work Plan, dated 9/14/05* for the above referenced site. I declare, under penalty of perjury, that to the best of my knowledge the information and/or recommendations contained in the attached proposal or report are true and correct.

If you have any questions or need additional information, please call me at (916) 558-7666.

Sincerely,

Thomas H. Kosel
Site Manger, Risk Management and Remediation
ConocoPhillips
76 Broadway, Sacramento, CA 95818

Attachment
cc: Keith Woodburne, TRC

TRC

Customer-Focused Solutions

September 14, 2005

TRC Project No. 42010605

Mr. Don Hwang
Hazardous Materials Specialist
Alameda County
Health Care Services Agency
1131 Harbor Bay Parkway
Alameda, CA 94502-6577

SITE: 76 Service Station #3538
411 West MacArthur
Oakland, California

RE: SOIL AND GROUNDWATER INVESTIGATION WORK PLAN

Dear Ms. Lee:

On behalf of ConocoPhillips, TRC submits this work plan for additional site assessment at 76 Station No. 3538, located at 411 West MacArthur in Oakland, California (Figure 1). This work plan has been prepared at the request of the Alameda County Health Care Services (ACHCS) and the scope of work outlined within is based on technical comments included in their May 18, 2005 letter.

1.0 PROJECT OBJECTIVES AND SCOPE OF WORK

The objective of this assessment is to define the distribution of dissolved-phase hydrocarbons, including methyl tertiary butyl ether (MTBE), in site soils and groundwater, and in groundwater downgradient of onsite monitoring wells MW-2 and MW-3. Additionally, this assessment will identify potential migration pathways and potential conduits for horizontal and vertical hydrocarbon migration in the vicinity of the Site.

Pursuant to the request in the above-referenced letter, TRC has included the following information with this workplan:

- Historic Hydraulic Gradients
- Underground Tank Removal Report, July 1989 (Appendix A)
- Fee Title Owners list (Appendix B)

The scope of work for this assessment includes the following:

- Advancement of three onsite and two offsite soil borings.
- Collection of soil and groundwater samples for analysis at a state-certified laboratory.

1590 Solano Way, Suite A • Concord, California 94520
Telephone 925-688-1200 • Fax 925-688-0388

- Preferential pathway survey

- Preparation of a final technical report documenting soil boring activities, groundwater sampling procedures, laboratory results, waste characterization, and disposal. The report will include results of assessment activities and preferential pathway survey as well as discussion of findings and recommendations for future action.

2.0 SITE DESCRIPTION

The subject site was a former Tosco (76) service station, and is located on the southwest corner of MacArthur Boulevard and Webster Street in Oakland, California (Figure 1). The site is currently a used car sales lot and is entirely fenced. All petroleum storage and dispensing equipment were removed in September of 1998 during station demolition activities. Six groundwater monitoring wells are present at and in the site vicinity (Figure 2).

Geology and Hydrogeology

Based on review of regional geologic maps the site is underlain by Late Pleistocene Alluvium. This Alluvium is considered to be alluvial fan deposits, and is described as consisting of weakly consolidated, slightly weathered, irregularly interbedded clay, silt, sand and gravel. The maximum thickness of these deposits is unknown, but is considered to be at least 150 feet thick.

Based on subsurface investigations performed at the site, the first 1.5 feet of the subsurface is composed of artificial fill. The fill is underlain by an unsaturated zone consisting of clay with minor amounts of sand and gravel, to a depth of approximately 18 feet below ground surface (bgs). The saturated zone, extending from approximately 18 to 30 feet bgs (limit of exploration), is composed of gravel with silt and sand, interbedded with clayey sand and clayey silt.

Monitoring and sampling of wells at the Site has been performed since September 1989. Depth to groundwater has varied from approximately 11 to 19 feet bgs. Groundwater flow direction has been predominantly towards the south and south-southeast with occasional deviations to the east-southeast and southwest. A rose diagram plot of 23 flow directions based on groundwater monitoring data from 1995 to 2005 is presented as Figure 3.

3.0 SITE BACKGROUND

July 1989: One 10,000-gallon and one 12,000-gallon gasoline underground storage tanks (USTs) were removed and replaced with two new 12,000-gallon USTs. One 550-gallon waste oil UST and associated piping for all three tanks were also removed. No holes or cracks were observed in the gasoline USTs; however, holes were observed in the waste oil UST. Groundwater was encountered in the former UST pit at a depth of approximately 10.5 feet bgs, which prohibited the collection of soil samples below the former gasoline tanks. Confirmation soil samples from the sidewalls contained moderate maximum concentrations of total petroleum

hydrocarbons as gasoline (TPH-g), and low maximum concentrations of benzene.

These sample areas were subsequently removed during overexcavation. Soil samples from the base of the waste oil UST pit were non-detect for TPH-g and benzene, toluene, ethyl benzene, and xylenes (BTEX).

September 1989: Karpealian Engineering, Inc. (KEI) installed four groundwater monitoring wells at the site. The four wells were installed to depths of approximately 30 feet bgs.

November 1992: Two additional groundwater monitoring wells were installed offsite to a depth of 30 feet bgs.

September 1998: Two 12,000-gallon gasoline USTs and associated product piping and dispensers were removed from the site during station demolition activities. No holes or cracks were observed in the tanks. Confirmation soil samples contained low maximum concentrations of TPH-g and benzene, and methyl tertiary butyl ether (MTBE) was not detected.

October 2003: Site environmental consulting responsibilities were transferred to TRC.

4.0 SITE ASSESSMENT ACTIVITIES

TRC proposes to advance three onsite and two offsite soil borings for the purpose of collecting soil and groundwater samples. The proposed onsite borings will be located in the vicinity of the USTs and dispenser islands. The proposed offsite borings will be located along the east and west side of Webster Street, in the established downgradient direction from the existing USTs and dispenser islands. The proposed boring locations are shown on Figure 2. Soil and grab groundwater samples will be collected from each boring for subsequent laboratory analysis.

4.1 Pre-Field Activities

Prior to commencing soil boring activities, permits will be acquired from the ACHCS. Underground Service Alert (USA) will be notified at least two days prior to field activities to mark underground utilities at the property boundaries. In addition, a private utility locator will be used to confirm the absence of buried utilities at each boring location. Prior to drilling each boring, a pilot hole will be cleared with an air knife to approximately 5 feet bgs to verify the absence of buried utilities.

A site and job specific health and safety plan that promotes personnel safety and preparedness during the planned activities has been developed and is included in Appendix C. On the morning of the day that the field activities are to commence, a "tailgate" meeting will be conducted with all exclusion zone workers to discuss the health and safety issues and concerns related to the specific work.

4.2 Soil and Groundwater Sampling

Three onsite soil borings (SB-1 through SB-3) and two offsite borings (SB-4 and SB-5) will be advanced to a depth of approximately 30 feet bgs, or until groundwater is encountered, at the locations shown on Figure 2. The proposed locations may be adjusted based on access issues and the location of buried utilities. Soil sampling will be completed by direct-push techniques using a truck-mounted direct-push rig. Soil samples will be collected continuously to the total depth of each boring. Samples will be collected for soil description in accordance with the Unified Soil Classification System (ASTM D-2487) and field hydrocarbon vapor testing using a hand-held photo-ionization detector (PID). A minimum of two soil samples will be collected from each boring and held for laboratory analysis. General field procedures to be followed during this investigation are discussed in Appendix D.

Each boring will be completed to a depth sufficient to obtain a representative grab groundwater sample. When groundwater is encountered, a grab sample will be collected by placing a temporary ¾-inch PVC well screen into the boring. All water samples will be collected using a stainless steel or disposable polyethylene bailer. Collected samples will be analyzed for:

- Total purgeable petroleum hydrocarbons (TPPH) by EPA Method 8260B
- Benzene, toluene, ethyl benzene, total xylenes (BTEX) by Method 8260B
- Fuel oxygenates, including: methyl tertiary butyl ether (MTBE), tertiary butyl alcohol (TBA), di-isopropyl ether (DIPE), tertiary amyl methyl ether (TAME), ethyl tertiary butyl ether (ETBE) 1,2-dichloroethane (1,2-DCA), 1,2-dibromoethane (EDB), and ethanol, by EPA Method 8260B.

All laboratory analyses will be performed by a state-certified laboratory. Chain of Custody protocol will be followed for all samples selected for analysis, providing a continuous record of sample possession prior to analysis.

After sampling is completed, all borings will be properly sealed with neat cement grout. A tremie pipe will be used to place the grout from the bottom of the boring to one fbg in one continuous pour. The boring will then be completed to grade level with asphalt or concrete, dyed to match the surrounding area.

4.3 Waste Disposal

Soil cuttings and water generated during site assessment activities will be temporally stored onsite in Department of Transportation (DOT)-approved 55-gallon drums pending disposal to an approved disposal/recycling facility. Waste manifests will be prepared for proper transport and disposal of the waste.

4.4 Site Assessment Report

Upon completion of the site assessment activities, a final report will be prepared which will include boring logs, laboratory analytical results, findings, and conclusions. The report will also include the results of the preferential pathway survey, with maps and cross sections showing location and depths of all utility lines, utility trenches and any other potential conduits for hydrocarbon migration at and near the Site. The report will be submitted to the ACHCS within eight weeks of completion of field activities.

5.0 WORK SCHEDULE

Planned activities will be performed according to the following estimated completion schedule:

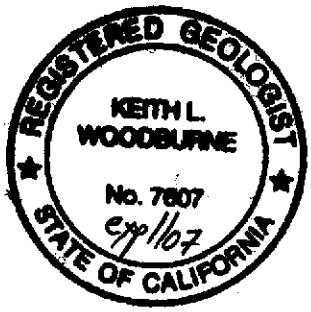
- Agency approval of work plan expected within six weeks of submittal.
- Conduct site assessment field activities within six weeks of agency approval of the work plan.
- Submit technical report within six weeks of completion of field activities.

If you have any questions regarding this work plan, please call Keith Woodburne at (925) 688-2488.

Sincerely,
TRC

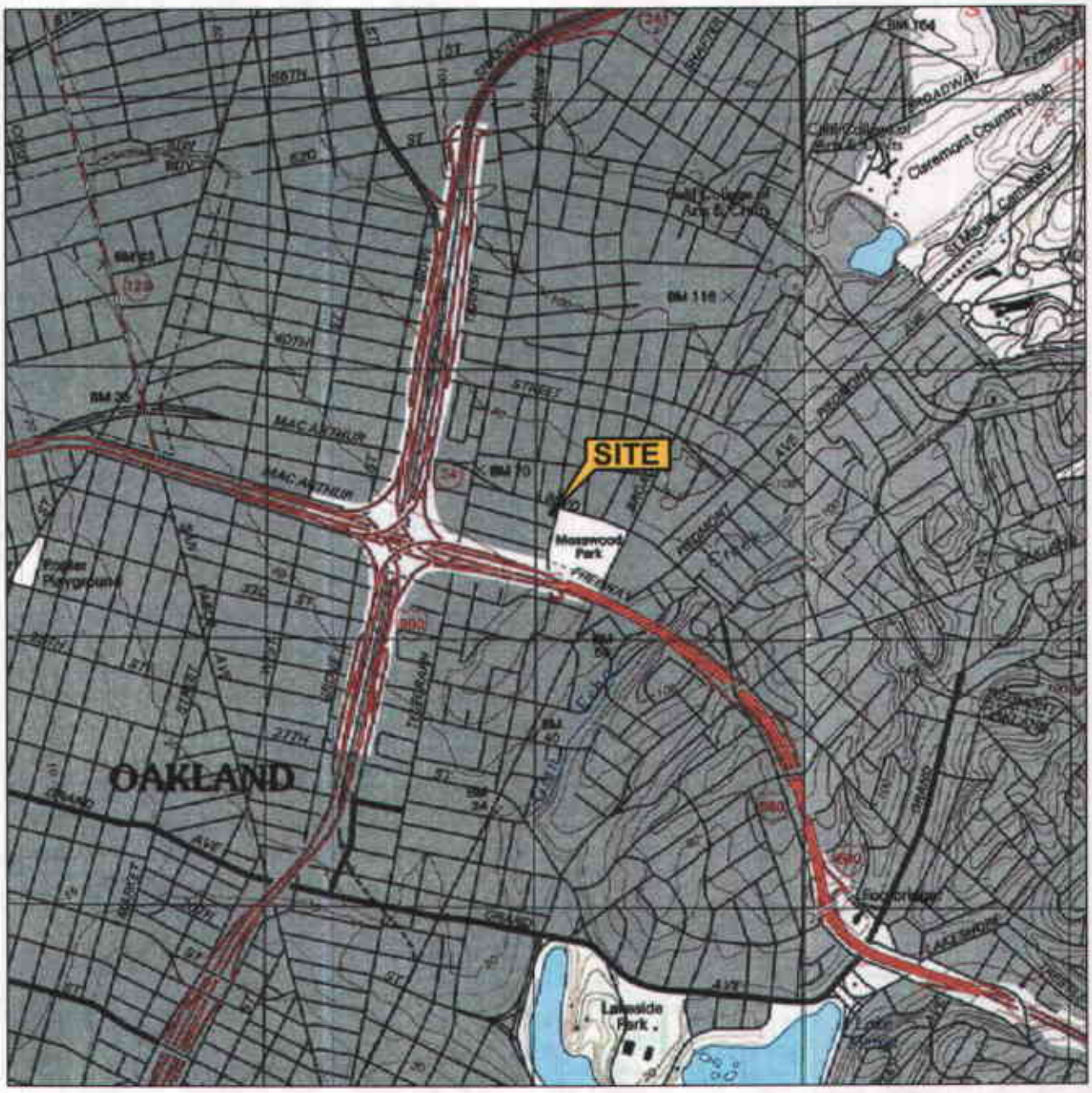
Mark Trevor
Project Geologist

Keith Woodburne, R.G.
Senior Project Geologist



Attachments:
Figure 1: Vicinity Map
Figure 2: Site Plan Showing Proposed Boring Locations
Figure 3: Historical Groundwater Flow Directions
Appendix A: Underground Tank Removal Report (KEI, July 1989)
Appendix B: Fee Title Owners
Appendix C: Site Health and Safety Plan
Appendix D: General Field Procedures

cc: Thomas Kosel, ConocoPhillips (electronic upload only, without attachments)



1 MILE 3/4 1/2 1/4 0 1 MILE

SCALE 1 : 24,000

N

SOURCE:

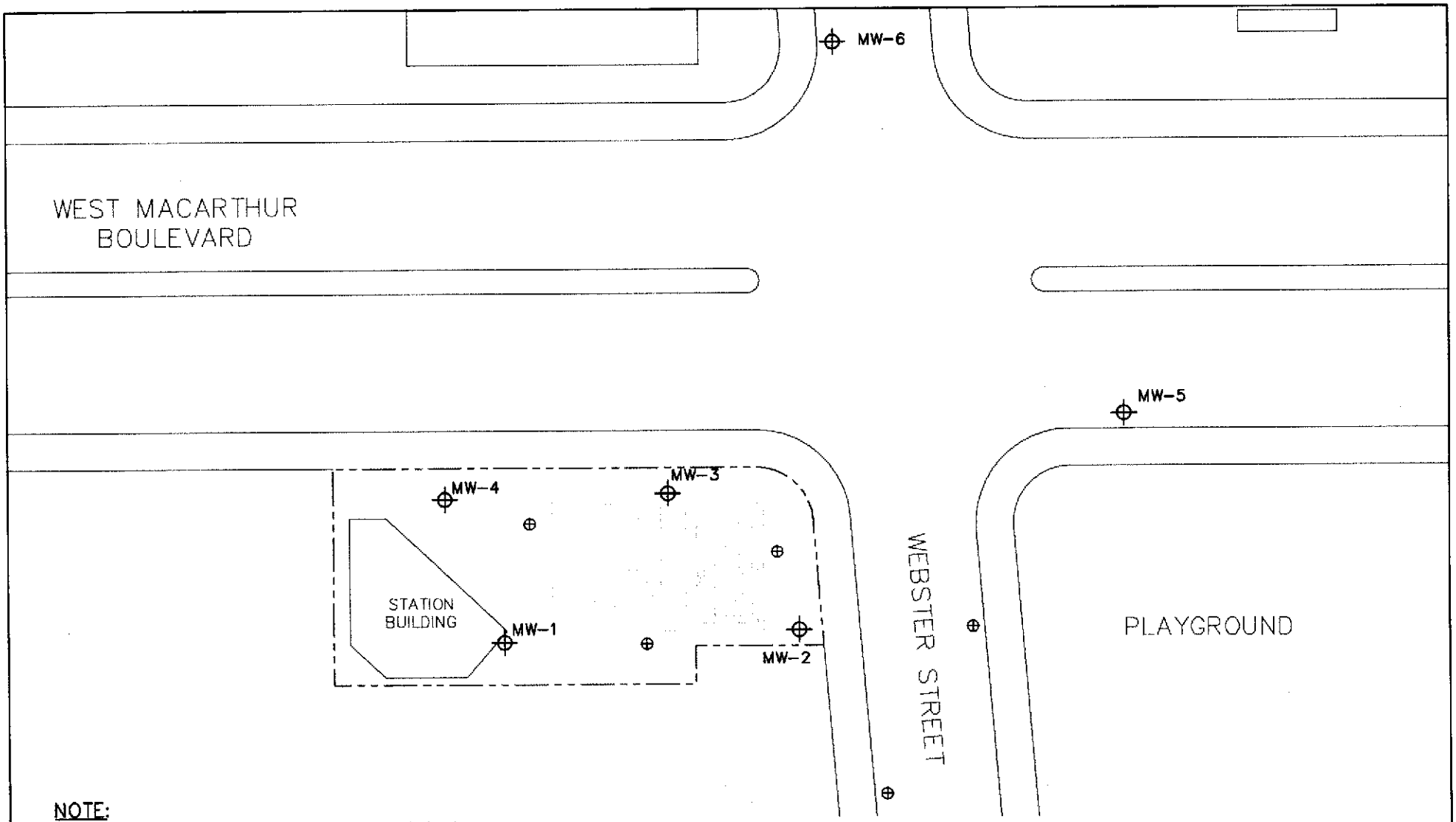
United States Geological Survey
7.5 Minute Topographic Maps:
Oakland East and Oakland West
Quadrangles, California

VICINITY MAP

76 Service Station #3538
411 West MacArthur Boulevard
Oakland, California

TRC

FIGURE 1



NOTE:
USTs, dispenser island, and associated product piping removed in September 1998.

LEGEND

- Approximate property line
- MW-6 ⊕ Groundwater monitoring well
- ⊕ Proposed soil boring location

SOURCE: Site plan by Gettler-Ryan, August 2000.

N

APPROXIMATE SCALE (FEET)

0 40 80

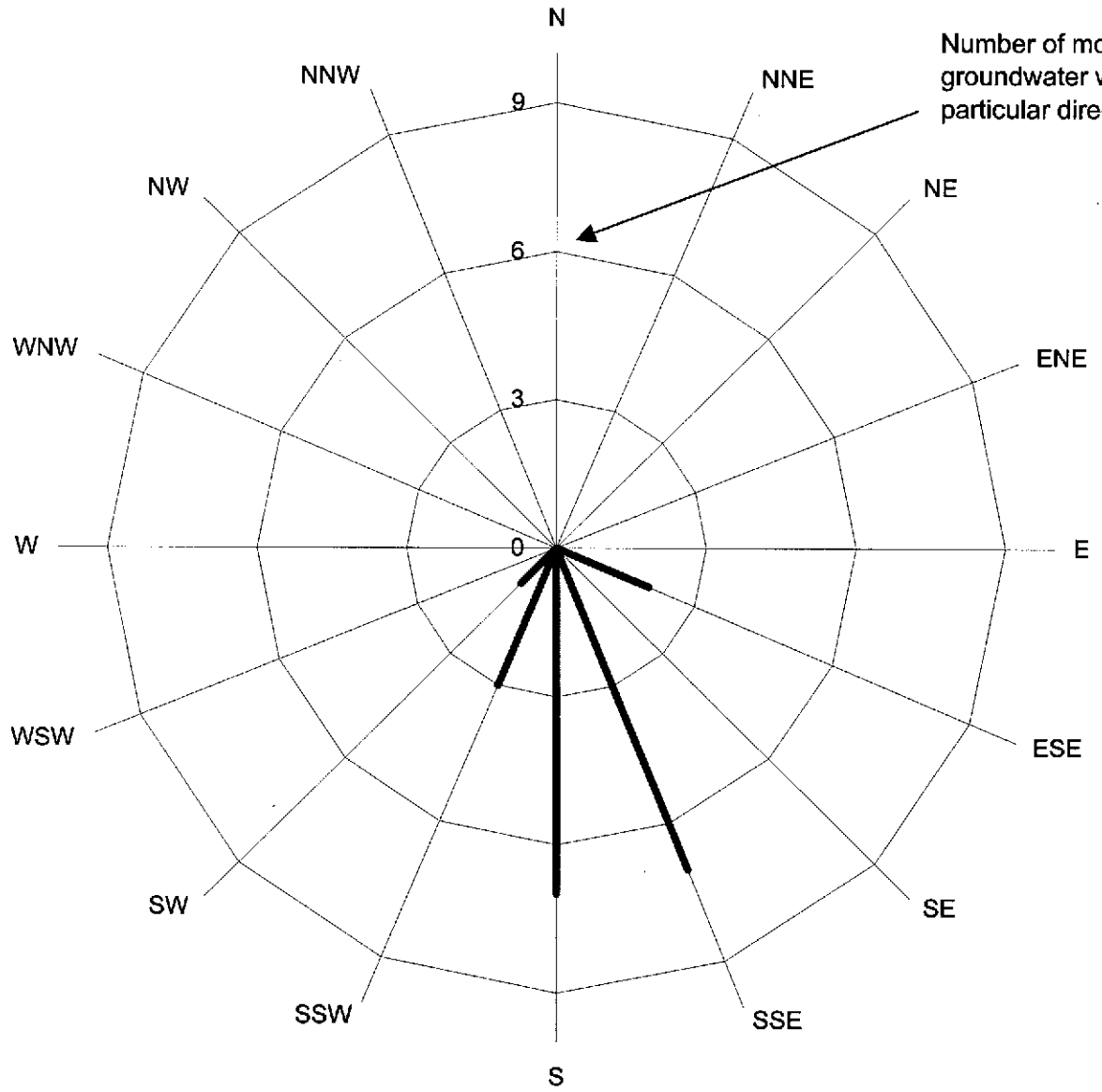
SITE PLAN SHOWING
PROPOSED BORING LOCATIONS

76 Service Station #3538
411 West MacArthur Boulevard
Oakland, California

TRC

FIGURE 2

Historical Groundwater Flow Directions
for 76 Service Station No. 3538
Data from 1995 through 2005



TRC

FIGURE 3

APPENDIX A

UNDERGROUND TANK REMOVAL REPORT
(KEI, July 1989)

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P. O. BOX 913
BENICIA, CA 94510
(707) 746-6915

KEI-J89-0703.R1
July 31, 1989

Unocal Corporation
2175 N. California Blvd., Suite 650
Walnut Creek, CA 94569

Attention: Mr. Rick Sisk

RE: Soil Sampling Report
Unocal Service Station #3538
411 W. MacArthur Blvd.
Oakland, California

Dear Mr. Sisk:

This report summarizes the soil sampling performed by Kaprealian Engineering, Inc. (KEI) at the referenced site. All work was performed in compliance with the guidelines established by the Regional Water Quality Control Board (RWQCB), and the Alameda County Health Agency.

The scope of the work performed by KEI consisted of the following:

Coordination with regulatory agencies.

Collection of samples of native soil from sidewalls of the tank pit.

Collection of composite samples of soil excavated from the waste oil tank pit and stockpiled on-site.

Delivery of samples, including proper Chain of Custody documentation, to a certified analytical laboratory.

Technical review of field data and laboratory analyses, and preparation of this report.

SITE DESCRIPTION AND BACKGROUND

The subject site is presently used as a gasoline station. Site vicinity and site descriptions are shown on the attached sketch. No leaks or previous subsurface work performed at the site are known to KEI.

FIELD ACTIVITIES

KEI's initial field work was conducted on July 12, 1989. On this date, two underground fuel storage tanks and one 550 gallon waste oil tank were removed from the site. The fuel tanks consisted of one 10,000 gallon super unleaded tank, and one 12,000 gallon regular unleaded gasoline tank. The fuel tanks were made of fiberglass and other than damage incurred during removal, no apparent cracks or holes were observed in the tanks. The waste oil tank was made of steel and had four small holes up to 1/2" diameter. Mr. Dennis Byrne of the Alameda County Health Agency was present during tank removal and sampling.

Water was encountered in the fuel tank pit at a depth of 10.5 feet, thus prohibiting the collection of any soil samples from immediately beneath the tanks. Four soil samples, labeled SW1, SW3, SW4 and SW4(2), were collected from the sidewalls of the fuel tank pit approximately six inches above the water table. One sample, labeled WO1, was collected of native soil from beneath the waste oil tank at a depth of 8.5 feet. The undisturbed samples were collected from bulk material excavated by backhoe. The samples were placed in clean, 2" diameter brass tubes, sealed with aluminum foil, plastic caps and tape, and stored in a cooled ice chest for delivery to a certified laboratory. Sample point locations are as shown on the attached Site Plan.

Also on July 12, 1989, three composite soil samples, labeled Comp A, Comp B and Comp C, were collected from approximately 150 cubic yards of soil stockpiled on site. The soil was generated during fuel tank excavation and removal. Stockpiled soil sampling is addressed in KEI's report (KEI-J89-0703.R2) dated July 31, 1989.

KEI returned to the site on July 17, 1989 to complete the fuel tank pit sidewall sampling. Two soil samples, labeled SW1(4) and SW2, were collected from the tank pit sidewalls approximately 6" above the water table. Soil sample SW1(4) was taken at the same location as sample SW1 following lateral excavation of the tank pit sidewall to remove as much contaminated soil as possible. Soil sample SW2 was taken from the previously unsampled west sidewall. Both undisturbed samples were collected from bulk material excavated by backhoe. Samples were handled as described above. Sample point locations are also shown on the attached Site Plan.

Also on July 17, 1989, four samples of native soil were collected from the pipe trenches at depths ranging from 5.5 to 10 feet. The undisturbed soil samples, labeled P1, P2, P3 and P4, were

collected as described above from bulk material excavated by backhoe. After soil sampling, the pipe trenches were excavated to the sample depths, except the area represented by sample P4, where soil was excavated to one foot below ground water. Sample point locations are also as shown on the attached Site Plan.

On July 18, 1989, after soil excavation was completed, approximately 1,500 gallons of ground water were pumped from the fuel tank pit. Since the water did not recharge by July 21, 1989, no water sample was taken.

SUBSURFACE CONDITIONS

The subsurface soils exposed in the excavation consisted primarily of silty clay to a depth of 8.5 feet, with sandy, gravelly clay from 8.5 to 10 feet, and clay below.

ANALYTICAL RESULTS

All soil samples were analyzed by Sequoia Analytical Laboratory in Redwood City, California and were accompanied by properly executed Chain of Custody documentation. All soil samples, except the waste oil stockpile, Comp WOA, were analyzed for total petroleum hydrocarbon (TPH) as gasoline using EPA method 5030 or 3810 in conjunction with modified 8015, and benzene, toluene, xylenes and ethylbenzene (BTX&E) using EPA method 8020. In addition, sample WO1 (from the waste oil tank pit) was analyzed for TPH as diesel using EPA method 3550 in conjunction with modified 8015, total oil and grease (TOG) by EPA 413.1, purgeable halocarbons by EPA 8010, and semi-volatile organics by EPA 8270.

Soil sample analyses from the fuel tank pit indicate levels of TPH as gasoline ranging from non-detectable to 11 ppm, except sample SW1, which showed 3,100 ppm. TPH as gasoline levels were non-detectable for all pipe trench samples, except P4, which showed 170 ppm. Sample WO1, taken from the waste oil tank pit, had 36 ppm TOG, while TPH as diesel, TPH as gasoline, BTX&E, all 8010 constituents, and all 8270 constituents were non-detectable.

Composite stockpile soil sample Comp WOA showed non-detectable levels of both TPH as diesel and TOG. The analytical results are summarized in Table 1. Copies of the laboratory analyses and the Chain of Custody documentation are attached to this report.

DISCUSSION AND RECOMMENDATIONS

Based on the analytical results, the stockpile represented by sample Comp WOA may be disposed of at an approved Class III landfill.

In accordance with the guidelines established by the RWQCB, further work is necessary at the site because of the level of contamination found in the soil samples. To comply with the requirements of the RWQCB and the Alameda County Health Agency, KEI recommends the installation of four monitoring wells at the site to begin to define the extent of the soil contamination, to determine the ground water flow direction, and to determine if the ground water has been impacted. KEI's proposal for this work is attached for your review and consideration.

A copy of this report should be sent to Mr. Dennis Byrne of the Alameda County Health Agency, and to the RWQCB, San Francisco Bay Region.

LIMITATIONS

The results of this study are based on the data obtained from the field work and laboratory analyses. We have analyzed this data using what we believe to be currently applicable engineering techniques and principles in the Northern California region. We make no warranty, either expressed or implied, except that our services have been performed in accordance with generally accepted professional principles and practices existing for such work.

Should you have any questions regarding this report, please feel free to call me at (707) 746-6915.

Sincerely,

Kaprealian Engineering, Inc.

Richard M. Bradish
Staff Engineer

Hagop Kevork
Civil Engineer

Mardo Kaprealian
President

Attachments: Table 1
Site Plan
Laboratory Analyses
Chain of Custody documentation
Proposal

KEI-J89-0702.R1
July 31, 1989

TABLE 1

SUMMARY OF LABORATORY ANALYSES

(Results in ppm)
(Samples collected on July 12 & 17, 1989)

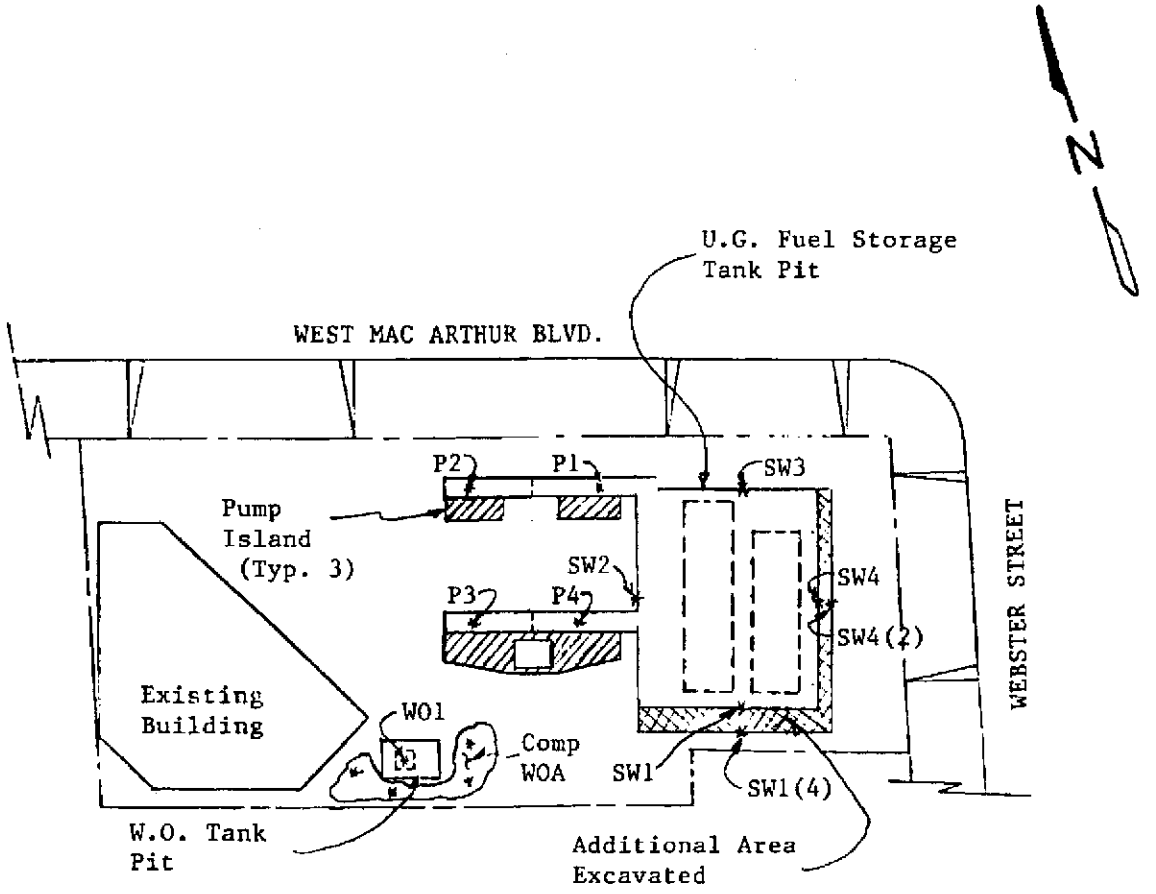
Sample	Depth (feet)	TPH as Diesel	TPH as Gasoline	Benzene	Toluene	Xylenes	Ethyl-benzene
SW1	10	---	3,100	12	300	730	110
SW1(4)	10	---	ND	ND	ND	ND	ND
SW2	10	---	1.1	0.10	ND	0.18	ND
SW3	10	---	5.7	0.26	ND	0.45	0.23
SW4	10	---	2.5	ND	ND	0.24	ND
SW4(2)	10	---	11	0.61	0.51	1.3	0.44
P1	6.5	---	ND	ND	ND	ND	ND
P2	6.5	---	ND	ND	ND	ND	ND
P3	5.5	---	ND	ND	ND	ND	ND
P4	10	---	170	0.71	12	47	6.8
WO1*	8.5	ND	ND	ND	ND	ND	ND
COMP WOA**	---	ND	---	---	---	---	---
Detection Limits		1.0	1.0	0.05	0.1	0.1	0.1

* TOG 36 ppm, and 8010 and 8270 constituents were non-detectable.

** TOG was non-detectable.

ND = Non-detectable.

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P. O. BOX 913
BENICIA, CA 94510
(707) 746-6915



SITE PLAN

* Sample Point Location

Unocal S/S #3538
411 W. MacArthur Blvd.
Oakland, California

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal-Oakland, MacArthur & Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Matrix Descript:	Soil	Received:	Jul 13, 1989
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jul 13, 1989
Attention: Mardo Kaprealian, P.E.	First Sample #:	907-1008	Reported:	Jul 14, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
907-1008	SW1	3,100	12	300	110	730
907-1009	SW4(2)	11	0.61	0.51	0.44	1.3
907-1010	SW3	5.7	0.26	N.D.	0.23	0.45
907-1011	SW4	2.5	N.D.	N.D.	N.D.	0.24
Detection Limits:		**1.0**	**0.05**	**0.1**	**0.1**	**0.1**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

9071005.KEI <2>

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P. O. BOX 913
BENICIA, CA 94510
(415) 676 · 9100 (707) 746 · 6915

CHAIN OF CUSTODY

SAMPLER: HAGOP (Signature)
DATE/TIME OF COLLECTION: 7-12-89
TURN AROUND TIME: 24 HR

SAMPLE DESCRIPTION AND PROJECT NUMBER: Chevron - Oakland
MacArthur & Webster

SAMPLE #	ANALYSES	GRAB OR COMP.	NUMBER OF CONTAINERS	SOIL/ WATER
SW1	TPH-G & BTXE	G	1	S
SW4(2)	" "	G	1	S
SW3	" "	G	1	S
SW4	" "	G	1	S

RELINQUISHED BY*	TIME/DATE	RECEIVED BY*	TIME/DATE
1. Hagop Kavorkian	5:15 7-12-89	Tom Bolan	5:15 7-12-89
2. Tom Bolan	6:10 7-12-89	David Marrant	6:10 7-12-89
3.			

* STATE AFFILIATION NEXT TO SIGNATURE

REMARKS:

NOTE: IF REGULAR TURNAROUND, SOIL ANALYSES MUST BE COMPLETED WITHIN 14 CALENDAR DAYS OF SAMPLE COLLECTION. WATER ANALYSES MUST BE COMPLETED WITHIN 7 CALENDAR DAYS FOR BTX&E (UNLESS SAMPLE HAS BEEN PRESERVED), AND 14 CALENDAR DAYS FOR TPH AS GASOLINE; EXTRACT TPH AS DIESEL WITHIN 14 CALENDAR DAYS.

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, Oakland, MacArthur/Webster	Sampled:	Jul 17, 1989
P.O. Box 913	Matrix Descript:	Soil	Received:	Jul 18, 1989
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jul 19, 1989
Attention: Mardo Kaprealian, P.E.	First Sample #:	907-2018	Reported:	Jul 19, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
907-2018	SW1 (4)	N.D.	N.D.	N.D.	N.D.	N.D.
907-2019	SW2	1.1	0.10	N.D.	N.D.	0.18
Detection Limits:		**1.0**	**0.05**	**0.1**	**0.1**	**0.1**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

9072018.KEI <1>

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, Oakland, MacArthur/Webster	Sampled:	Jul 17, 1989
P.O. Box 913	Matrix Descript:	Soil	Received:	Jul 18, 1989
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jul 19, 1989
Attention: Mardo Kaprealian, P.E.	First Sample #:	907-2020	Reported:	Jul 19, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS with BTEX DISTINCTION (EPA 8015/8020)

Sample Number	Sample Description	Low/Medium B.P. Hydrocarbons mg/kg (ppm)	Benzene mg/kg (ppm)	Toluene mg/kg (ppm)	Ethyl Benzene mg/kg (ppm)	Xylenes mg/kg (ppm)
907-2020	P1	N.D.	N.D.	N.D.	N.D.	N.D.
907-2021	P2	N.D.	N.D.	N.D.	N.D.	N.D.
907-2022	P3	N.D.	N.D.	N.D.	N.D.	N.D.
907-2023	P4	170	0.71	12	6.8	47
Detection Limits:		**1.0**	**0.05**	**0.1**	**0.1**	**0.1**

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

9072018.KEI <2>

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P. O. BOX 913
BENICIA, CA 94510
(415) 676-9100 (707) 746-5915

CHAIN OF CUSTODY

SAMPLER: HAGOP (Signature) DATE/TIME OF COLLECTION: 7-17-89 TURN AROUND TIME: 24 HRS

SAMPLE DESCRIPTION AND PROJECT NUMBER: UNOCAL - OAKLAND - MACARTHUR/WEBSTER

SAMPLE #	ANALYSES	GRAB OR COMP.	NUMBER OF CONTAINERS	SOIL/ WATER	
SW1(4)	TPHG/BTXE	G	1	S	9072018
SW2	TPH-G/BTXE	G	1	S	19
P1	TPH-G/BTXE	G	1	S	20
P2	TPH-G/BTXE	G	1	S	21
P3	TPH-G/BTXE	G	1	S	22
P4	TPH-G/BTXE	G	1	S	23

RELINQUISHED BY*	TIME/DATE	RECEIVED BY*	TIME/DATE
1. Hagop Kaprealian	1:03 7-18-89	Tom Baker	408 7-18.
2. Tom Baker	535 7-18		3:40 pm 7-18-89
3.			

* SIGN AFFILIATION NEXT TO SIGNATURE

REMARKS:

NOTE: IF REGULAR TURNAROUND, SOIL ANALYSES MUST BE COMPLETED WITHIN 14 CALENDAR DAYS OF SAMPLE COLLECTION. WATER ANALYSES MUST BE COMPLETED WITHIN 7 CALENDAR DAYS FOR BTXE (UNLESS SAMPLE HAS BEEN PRESERVED), AND 14 CALENDAR DAYS FOR TPH AS GASOLINE; EXTRACT TPH AS DIESEL WITHIN 14 CALENDAR DAYS.

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal-Oakland, MacArthur & Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Sample Descript.:	Soil, WO1	Received:	Jul 12, 1989
Benicia, CA 94510	Analysis Method:	EPA 5030/8015/8020	Analyzed:	Jul 13, 1989
Attention: Mardo Kaprealian, P.E.	Lab Number:	907-1004	Reported:	Jul 14, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS WITH BTEX DISTINCTION (EPA 8015/8020)

Analyte	Detection Limit mg/kg (ppm)	Sample Results mg/kg (ppm)
Low to Medium Boiling Point Hydrocarbons	1.0	N.D.
Benzene	0.05	N.D.
Toluene	0.1	N.D.
Ethyl Benzene	0.1	N.D.
Xylenes	0.1	N.D.

Low to Medium Boiling Point Hydrocarbons are quantitated against a gasoline standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

9071004.KEI <1>

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal-Oakland, MacArthur & Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Matrix Descript:	Soil	Received:	Jul 12, 1989
Benicia, CA 94510	Analysis Method:	EPA 3550/8015	Analyzed:	Jul 14, 1989
Attention: Mardo Kaprealian, P.E.	First Sample #:	907-1004	Reported:	Jul 14, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons mg/kg (ppm)
907-1004	WO1	N.D.

Detection Limits:	1.0

High Boiling Point Hydrocarbons are quantitated against a diesel fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

9071004.KEI <2>

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal-Oakland, MacArthur & Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Matrix Descript:	Soil	Received:	Jul 12, 1989
Benicia, CA 94510	Analysis Method:	SM 413.1 (Gravimetric)		
Attention: Mardo Kaprealian, P.E.	First Sample #:	907-1004	Analyzed:	Jul 14, 1989
			Reported:	Jul 14, 1989

TOTAL RECOVERABLE OIL & GREASE

Sample Number	Sample Description	Oil & Grease mg/kg (ppm)
907-1004	WO1	36

Detection Limits:	**30.0**

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

9071004.KEI <3>

SEQUOIA ANALYTICAL

690 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal-Oakland, MacArthur & Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Sample Descript:	Soil, WO1	Received:	Jul 12, 1989
Benicia, CA 94510	Analysis Method:	EPA 5030/8010	Analyzed:	Jul 13, 1989
Attention: Mardo Kaprealian, P.E.	Lab Number:	907-1004	Reported:	Jul 14, 1989

HALOGENATED VOLATILE ORGANICS (EPA 8010)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Bromodichloromethane	5.0	N.D.
Bromoform	5.0	N.D.
Bromomethane	5.0	N.D.
Carbon tetrachloride	5.0	N.D.
Chlorobenzene	5.0	N.D.
Chloroethane	25.0	N.D.
2-Chloroethylvinyl ether	5.0	N.D.
Chloroform	5.0	N.D.
Chloromethane	5.0	N.D.
Dibromochloromethane	5.0	N.D.
1,2-Dichlorobenzene	10.0	N.D.
1,3-Dichlorobenzene	10.0	N.D.
1,4-Dichlorobenzene	10.0	N.D.
1,1-Dichloroethane	5.0	N.D.
1,2-Dichloroethane	5.0	N.D.
1,1-Dichloroethene	5.0	N.D.
Total 1,2-Dichloroethene	5.0	N.D.
1,2-Dichloropropane	5.0	N.D.
cis-1,3-Dichloropropene	5.0	N.D.
trans-1,3-Dichloropropene	5.0	N.D.
Methylene chloride	10.0	N.D.
1,1,2,2-Tetrachloroethane	5.0	N.D.
Tetrachloroethene	5.0	N.D.
1,1,1-Trichloroethane	5.0	N.D.
1,1,2-Trichloroethane	5.0	N.D.
Trichloroethene	5.0	N.D.
Trichlorofluoromethane	5.0	N.D.
Vinyl chloride	10.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal-Oakland, MacArthur & Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Sample Descript:	Soil, WO1	Received:	Jul 12, 1989
Benicia, CA 94510	Analysis Method:	EPA 8270	Extracted:	Jul 12, 1989
Attention: Mardo Kaprealian, P.E.	Lab Number:	907-1004	Analyzed:	Jul 13, 1989
			Reported:	Jul 14, 1989

SEMI-VOLATILE ORGANICS by GC/MS (EPA 8270)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
Acenaphthene	100.0	N.D.
Acenaphthylene	100.0	N.D.
Aniline	100.0	N.D.
Anthracene	100.0	N.D.
Benzidine	2,500.0	N.D.
Benzoic Acid	500.0	N.D.
Benzo(a)anthracene	100.0	N.D.
Benzo(b)fluoranthene	100.0	N.D.
Benzo(k)fluoranthene	100.0	N.D.
Benzo(g,h,i)perylene	100.0	N.D.
Benzo(a)pyrene	100.0	N.D.
Benzyl alcohol	100.0	N.D.
Bis(2-chloroethyoxy)methane	100.0	N.D.
Bis(2-chloroethyl)ether	100.0	N.D.
Bis(2-chloroisopropyl)ether	100.0	N.D.
Bis(2-ethylhexyl)phthalate	500.0	N.D.
4-Bromophenyl ether	100.0	N.D.
Butyl benzyl phthalate	100.0	N.D.
4-Chloroaniline	100.0	N.D.
2-Chloronaphthalene	100.0	N.D.
4-Chloro-3-methylphenol	100.0	N.D.
2-Chlorophenol	100.0	N.D.
4-Chlorophenyl phenyl ether	100.0	N.D.
Chrysene	100.0	N.D.
Dibenz(a,h)anthracene	100.0	N.D.
Dibenzofuran	100.0	N.D.
Di-N-butyl phthalate	500.0	N.D.
1,3-Dichlorobenzene	100.0	N.D.
1,4-Dichlorobenzene	100.0	N.D.
1,2-Dichlorobenzene	100.0	N.D.
3,3-Dichlorobenzidine	500.0	N.D.
2,4-Dichlorophenol	100.0	N.D.
Diethyl phthalate	100.0	N.D.
2,4-Dimethylphenol	100.0	N.D.
Dimethyl phthalate	100.0	N.D.
4,6-Dinitro-2-methylphenol	500.0	N.D.
2,4-Dinitrophenol	500.0	N.D.

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal-Oakland, MacArthur & Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Sample Descript:	Soil, WO1	Received:	Jul 12, 1989
Benicia, CA 94510	Analysis Method:	EPA 8270	Extracted:	Jul 12, 1989
Attention: Mardo Kaprealian, P.E.	Lab Number:	907-1004	Analyzed:	Jul 13, 1989
			Reported:	Jul 14, 1989

SEMI-VOLATILE ORGANICS by GC/MS (EPA 8270)

Analyte	Detection Limit µg/kg	Sample Results µg/kg
2,4-Dinitrotoluene	100.0	N.D.
2,6-Dinitrotoluene	100.0	N.D.
Di-N-octyl phthalate	100.0	N.D.
Fluoranthene	100.0	N.D.
Fluorene	100.0	N.D.
Hexachlorobenzene	100.0	N.D.
Hexachlorobutadiene	100.0	N.D.
Hexachlorocyclopentadiene	100.0	N.D.
Hexachloroethane	100.0	N.D.
Indeno(1,2,3-cd)pyrene	100.0	N.D.
Isophorone	100.0	N.D.
2-Methylnaphthalene	100.0	N.D.
2-Methylphenol	100.0	N.D.
4-Methylphenol	100.0	N.D.
Naphthalene	100.0	N.D.
2-Nitroaniline	100.0	N.D.
3-Nitroaniline	100.0	N.D.
4-Nitroaniline	100.0	N.D.
Nitrobenzene	100.0	N.D.
2-Nitrophenol	100.0	N.D.
4-Nitrophenol	500.0	N.D.
N-Nitrosodiphenylamine	100.0	N.D.
N-Nitroso-di-N-propylamine	100.0	N.D.
Pentachlorophenol	500.0	N.D.
Phenathrene	100.0	N.D.
Phenol	100.0	N.D.
Pyrene	100.0	N.D.
1,2,4-Trichlorobenzene	100.0	N.D.
2,4,5-Trichlorophenol	100.0	N.D.
2,4,6-Trichlorophenol	100.0	N.D.

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal-Oakland, MacArthur & Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Sample Descript:	Soil, WO1	Received:	Jul 12, 1989
Benicia, CA 94510	Analysis Method:	EPA 8270 & "Open Scan"	Extracted:	Jul 12, 1989
Attention: Mardo Kaprealian, P.E.	Lab Number:	907-1004	Analyzed:	Jul 13, 1989
			Reported:	Jul 14, 1989

SEMI-VOLATILE ORGANICS by GC/MS, TENTATIVELY IDENTIFIED COMPOUNDS

Analyte	Detection Limit µg/kg	Sample Results µg/kg

No additional peaks > 250 µg/kg were identified by the Mass Spectral Library.

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Arthur G. Burton
Laboratory Director

Please Note:
All identifications are tentative and concentrations are estimates based upon spectral comparison to the EPA/NIH library. Positive identification or specification between isomers cannot be made without retention time standards.

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P. O. BOX 913
BENICIA, CA 94510
(415) 575 · 9100 (707) 746 · 6915

CHAIN OF CUSTODY

SAMPLER: HAGOP (Signature) DATE/TIME OF COLLECTION: 7-12-89 TURN AROUND TIME: 24 Hr

SAMPLE DESCRIPTION AND PROJECT NUMBER: Unocal - Oakland
MacArthur & Webster

SAMPLE #	ANALYSES	GRAB OR COMP.	NUMBER OF CONTAINERS	SOIL/ WATER
W01	TPH-G & BTXE; TPH-D;	G	1	S
	TOG (413.1); 8010		9071004	
	8270 For Creosote			
	PCB, PNA & PCP			

RELINQUISHED BY*	TIME/DATE	RECEIVED BY*	TIME/DATE
1. Hagop Kevorkian	5:15 7-12-89	Tom Baker	515 7-12-89
2. Tom Baker	6:10 7-12 89	Rick Hurst	6:10pm 7-12-89
3.			

* STATE AFFILIATION NEXT TO SIGNATURE

REMARKS:

NOTE: IF REGULAR TURNAROUND, SOIL ANALYSES MUST BE COMPLETED WITHIN 14 CALENDAR DAYS OF SAMPLE COLLECTION. WATER ANALYSES MUST BE COMPLETED WITHIN 7 CALENDAR DAYS FOR BTX&E (UNLESS SAMPLE HAS BEEN PRESERVED), AND 14 CALENDAR DAYS FOR TPH AS GASOLINE; EXTRACT TPH AS DIESEL WITHIN 14 CALENDAR DAYS.

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, Oakland, MacArthur/Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Matrix Descript:	Soil	Received:	Jul 13, 1989
Benicia, CA 94510	Analysis Method:	EPA 3550/8015	Analyzed:	Jul 20, 1989
Attention: Mardo Kaprealian, P.E.	First Sample #:	907-1003 A-B	Reported:	Jul 21, 1989

TOTAL PETROLEUM FUEL HYDROCARBONS (EPA 8015)

Sample Number	Sample Description	High B.P. Hydrocarbons mg/kg (ppm)
9071003 A0B	Composite WOA	N.D.

Detection Limits:	1.0

High Boiling Point Hydrocarbons are quantitated against a diesel fuel standard.
Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

SEQUOIA ANALYTICAL

680 Chesapeake Drive • Redwood City, CA 94063
(415) 364-9600 • FAX (415) 364-9233

Kaprealian Engineering, Inc.	Client Project ID:	Unocal, Oakland, MacArthur/Webster	Sampled:	Jul 12, 1989
P.O. Box 913	Matrix Descript:	Soil	Received:	Jul 12, 1989
Benicia, CA 94510	Analysis Method:	SM 413.1 (Gravimetric)	Extracted:	Jul 17, 1989
Attention: Mardo Kaprealian, P.E.	First Sample #:	907-1003 A-B	Analyzed:	Jul 17, 1989
			Reported:	Jul 21, 1989

TOTAL RECOVERABLE OIL & GREASE

Sample Number	Sample Description	Oil & Grease mg/kg (ppm)
9071003 A-B	Composite WOA	N.D.

Detection Limits:	30.0

Analytes reported as N.D. were not present above the stated limit of detection.

SEQUOIA ANALYTICAL

Arthur G. Burton
Laboratory Director

KAPREALIAN ENGINEERING, INC.
Consulting Engineers
P. O. BOX 913
BENICIA, CA 94510
(415) 676-9100 (707) 746-6915

CHAIN OF CUSTODY

SAMPLER: HAGOP (Signature)

DATE/TIME OF COLLECTION: 7-12-89

TURN AROUND TIME: 5 DAYS

SAMPLE DESCRIPTION AND PROJECT NUMBER: Unocal - Oakland
MacArthur & Webster

SAMPLE #	ANALYSES	GRAB OR COMP.	NUMBER OF CONTAINERS	SOIL/ WATER
Comp #1	TPH-D; TOG(413.1)	C	2	S

RELINQUISHED BY*	TIME/DATE	RECEIVED BY*	TIME/DATE
1. Hagop Kevork	5:15 7-12-89	Tom Bolan	5:15 7-12-89
2. Tom Bolan	6:00 7-12	Dan Kirnt	6:10pm 7-12-89
3.			

* STATE AFFILIATION NEXT TO SIGNATURE

REMARKS:

NOTE: IF REGULAR TURNAROUND, SOIL ANALYSES MUST BE COMPLETED WITHIN 14 CALENDAR DAYS OF SAMPLE COLLECTION. WATER ANALYSES MUST BE COMPLETED WITHIN 7 CALENDAR DAYS FOR BTX&E (UNLESS SAMPLE HAS BEEN PRESERVED), AND 14 CALENDAR DAYS FOR TPH AS GASOLINE; EXTRACT TPH AS DIESEL WITHIN 14 CALENDAR DAYS.

APPENDIX B

FEE TITLE OWNERS LIST

ConocoPhillips

76 Broadway
Sacramento, CA 95818
phone 916.558.7676
fax 916.558.7639

July 15, 2005

COPY

Mr. Don Hwang
Alameda County Health Agency
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502

Re: Fee Title Owners
Fuel Leak Case No. RO0000251
76 Station #3538
411 West MacArthur
Oakland, CA

Dear Mr. Hwang:

In accordance with section 25297.15(a) of Chapter 6.7 of the Health and Safety Code, I, Thomas H. Kosel, certify that the following is a complete list of current fee title owners and their mailing addresses for the above site.

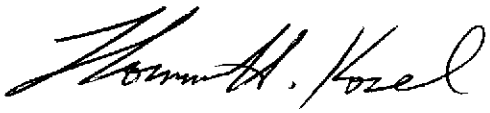
Arthur Yu and Kevin Ma
398 West MacArthur Boulevard
Oakland, CA 94609
510-658-0611

Per your letter dated 5/18/05, attached are the following reports.

Soil Sampling Report, dated 7/31/89
Stockpiled Soil Sampling, dated 7/31/89
Stockpiled Soil Sampling, dated 7/31/89
Stockpiled Soil Sampling, dated 8/7/89

I declare, under penalty of perjury, that to the best of my knowledge the information contained in this letter and the attached reports is true and correct. If you have any questions or need additional information, please call me at (916) 558-7666.

Sincerely,



Thomas H. Kosel
Site Manger, Risk Management and Remediation
ConocoPhillips
76 Broadway
Sacramento, CA 95818

thk
Attachments
cc: Roger Batra, TRC

APPENDIX C

SITE HEALTH AND SAFETY PLAN

SITE SPECIFIC HEALTH AND SAFETY PLAN (HSP)

76 Service Station # 3538
411 West MacArthur
Oakland, California

1.0 INTRODUCTION

The purpose of this Health & Safety Plan (HSP) is to establish responsibilities, requirements, contingencies and procedures for the protection of personnel while performing activities at the 76 Service Station # 3538 site. This site-specific plan conforms to the TRC Corporate Health and Safety Plan, Hazard Communication Program, and Injury and Illness Prevention Program (IIPP).

During site work, the use of proper health and safety procedures, in accordance with applicable OSHA regulations shall be required. The procedures presented in the HSP are intended to serve as guidelines. They are not a substitute for sound judgment by site personnel. If a situation arises where the HSP requires revision, the appropriate changes will be made and communicated by the TRC Site Safety Officer (SSO). Except in the case of emergency situations, no deviations from the plan may be implemented without the prior notification and approval of the TRC Site Safety Officer (SSO).

1.1 ROLES AND RESPONSIBILITIES

RESPONSIBLE PARTY:	ConocoPhillips
DESIGN ENGINEER:	TRC
INSTALLATION CONTRACTOR:	TRC
DRILLING SUBCONTRACTOR:	Woodward Drilling

This Site Health and Safety Plan (HSP) has been prepared as a master HSP and establishes responsibilities, requirements, and procedures for the protection of both TRC and Woodward Drilling personnel while performing activities at the above-referenced project/site. This site-specific plan conforms with the TRC Corporate Health and Safety Plan, Hazard Communication Program, and Injury and Illness Prevention Program (IIPP).

Woodward Drilling has also prepared an HSP for the drilling activities. The Woodward Drilling HSP supplements TRC's HSP. A copy of Woodward drilling HSP is included as an attachment to this HSP.

1.2 SCOPE OF WORK

The proposed work will be performed by TRC and/or TRC's subcontractor, Woodward Drilling, and will include but may not be limited to the following activities:

- Hole clearance with the use of an air knife.
- Direct push drilling of bore holes.

2.0 SITE INFORMATION

This HSP considers the physical, chemical, and environmental hazards that may be encountered during work activities at the site. Operations associated with this HSP will be conducted in accordance with the scope of work and approved design drawings/specifications previously provided. Any changes required or made to the planned activities will be immediately communicated to site personnel by the SSO. Summary information for this project is provided in the following table.

Work Plan date:	September 14, 2005
Principal activities:	Soil Borings
Site description (see Attachment A for site map):	Former Gasoline Service Station
Approximate depth to groundwater:	30 feet below grade (fbg)
Contaminants of concern (see Attachment B):	Gasoline, BTEX, and MTBE in Soil and Groundwater.

3.0 SITE SAFETY AUTHORITY

Contact information and names of authorized personnel are listed below. A description of responsibilities follows.

Role	Name	Contact Information
TRC Personnel		
TRC Project Director	Keith Woodburne	Office (925) 688-2488 Cell (925) 260-1373
TRC Project Safety Manager	Adrienne Collins	Office (925) 688-2479 Cell (925) 260-3952
TRC Site Safety Officer (SSO)	Rachelle Dunn	Office (925) 688-2464 Cell (925) 260-6722
TRC Assistant Site Safety Officer (Assistant SSO)	Mike Sellwood	Office (925) 688-2468 Cell (925) 260-3654
Contractor Personnel		
Contractor Site Safety Officer (SSO)		
Contractor Assistant Site Safety Officer (SSO)		

TRC SSO must report all accidents and incidents to the TRC EHS Supervisor within 24 hours.		
TRC EHS Supervisor	Greg Burket	Office (949) 727-7403 Cell (949) 283-4313

TRC Project Director

- Responsible for the management and technical direction of all aspects of the project.
- Delegate responsibility for the operational implementation of the H&S Plan to Project Safety Manager and Site Safety Officer.

TRC Project Safety Manager

- Responsible for technical oversight of health and safety procedures and decisions related to work completed on the project.
- Ensure the completion of periodic site inspections.
- Conducts (or coordinates the completion of) incident investigations.
- Delegate responsibility for daily implementation of the H&S Plan and procedures to the Site Safety Officers.

Site Safety Officers (SSO) – TRC & Contractor Personnel

- Responsible for the daily implementation of the H&S procedures.
- Ensures H&S Plan is available onsite and that the plan is understood and signed by all personnel entering the site.
- Conducts (or coordinates the completion of) Tailgate Safety Meetings and ensures documentation of these meeting is available for review.
- Reminds site personnel of potential health hazards and appropriate procedures discussed in the H&S Plan, as needed.
- Communicates additional pertinent information whenever other health and safety matters need to be addressed.
- Implements emergency response procedures when necessary.

Assistant Site Safety Officer (Assistant SSO) – TRC & Contractor Personnel

- In the event the SSO is not on site, the Assistant SSO will assume the responsibilities of the SSO.

It is TRC's intent to have either the SSO or Assistant SSO available onsite during work activities. On the occasion neither the SSO nor Assistant SSO are physically onsite, they will be available by phone or pager. See page 3 for contact information.

TRC Employees

- Responsible for understanding and complying with this H&S Plan.
- Are required to participate in briefings prior to commencement of site work (e.g., Tailgate Safety Meetings), as applicable.
- Must acknowledge an understanding of the H&S Plan by signing the "Safety Compliance Agreement" (See Appendix A).

Contractors

TRC has hired contractors to apply their technical expertise to specific work tasks, such as construction, grading, heavy equipment operation and landfill gas system operation and maintenance. Although TRC has a certain level of knowledge in these areas, the contractor is most knowledgeable of the hazards within their particular area of expertise and therefore is in the best position to implement and monitor an effective H&S program. Therefore, TRC will rely heavily on the contractor to apply their technical expertise, safety knowledge and established safe work practices to protect against accidents, injury or illness.

For this reason, safety of contractor employees is primarily the responsibility of the contractor. Contractors are required to follow and operate within their company's health and safety program and policies. Contractors are to designate a company representative as their own Site Safety Officer. This individual shall monitor the contractor's employees and ensure that safe working procedures are being followed. The contractor shall identify their Site Safety Officer and, if applicable, Assistant Safety Officer to the TRC in writing.

Contractors shall provide their own safety equipment and personal protective equipment. Contractors shall be ultimately responsible for ensuring their equipment is in proper working order and their employees are trained and medically fit to complete the work assigned to them. Contractors shall also provide evidence that personnel working at the site have received the necessary training and, if applicable, medical surveillance.

As operator and manager of the site, TRC oversees all general site activities and associated health & safety issues. TRC policy requires intensive monitoring to ensure health & safety issues continue to receive the highest priority. As mentioned, TRC expects contractors to apply their expertise, safety knowledge and established safe work practices when completing work tasks at the project site. TRC will exercise reasonable care to prevent and detect safety violations on the site. However, direct supervision of contractor employee safety is the responsibility of the contractor.

The requirements stated in this H&S Plan are not intended to replace existing programs and policies, rather they are meant to expand upon them. The TRC H&S Plan also provides procedures for safety-related matters that present a small risk of occurring during site activities. Such matters include: air monitoring for hazardous atmospheres, the use of respiratory protection, and persons entering hazardous excavations and/or confined spaces, etc. Even though these safety-related matters present a small risk of occurring, TRC insists the contractor inform TRC if the risks associated with a particular task exceeds day-to-day safety requirements and necessitates additional safety precautions to protect the employees performing the particular task. In such cases, TRC may dictate that additional safety precautions outlined in the TRC H&S Plan are implemented. In the event a discrepancy arises between contractor safety policies or procedures and those of TRC, the more stringent is to be implemented.

A copy of the H&S Plan will be made available to each designated Contractor Site Health and Safety Officer (SSO) prior to coming to the site. Upon review or briefing of the H&S Plan, each contractor and their personnel working at the site will be required to sign the "Safety Compliance Agreement" (See Appendix A) to verify their understanding of the document.

Visitors

- All visitors are required to sign-in at the Guinn trailer/office (located at the entrance of the site) each time they enter the project site.
- At a minimum, authorized visitors will be provided a copy of basic site safety information. Upon request, a copy of this H&S Plan will be made available for review.
- Visitors should be escorted by a TRC or designated contractor employee and should not be allowed to move about the site alone.

4.0 SITE CONTROL

Site control requires the establishment of a regulated area with designated work zones, evacuation protocol, location of medical assistance, site security, and communication guidelines that include a "Buddy System."

4.1 REGULATED AREA(S)

Each site will have an established Exclusion Zone with controlled access, and a Support Zone. Supervision and strict control of access to regulated areas is necessary to protect site personnel as well as the public.

Exclusion Zone: (*a.k.a. "Hot Zone"*) This is the area where personnel may be subject to chemical or physical hazards. It is the zone of known or suspected contamination, where equipment operation and/or environmental sampling will take place. The Exclusion Zone is to be clearly identified and isolated with cones, barricades, or high visibility caution tape. Personnel working in the Exclusion Zone will at a minimum use Level D personal protective equipment. Refer to **Section 7.0** for a complete description of PPE requirements.

The outer boundary of the Exclusion Zone *("Hot Line")* will be established by the SSO, so that sufficient area is available to conduct operations while providing a protective buffer for persons and property outside the zone.

Support Zone: *(a.k.a. "Safe Zone")* This is the area outside the Exclusion Zone where administrative and other support functions are located. Adverse exposure to contaminants and physical hazards are unlikely in the Support Zone.

4.2 EVACUATION PROTOCOL

Evacuation protocol and routes from the site will be established by the SSO, and communicated to Field Personnel during the Tailgate Safety Meeting(s) prior to initiating work. Evacuation protocol

will be implemented as needed in emergency situations. In the event of an evacuation, personnel will meet at a pre-established location and the TRC or Woodward Drilling's SSO will do a "head count" to see that everyone has left the hazard area.

Emergency Response procedures are outlined in **Section 12.0.** Directions to the nearest medical facilities are provided in **ATTACHMENT C.**

4.3 SITE SECURITY

Appropriate security measures will be established in coordination with the site owner/operator and communicated to site personnel. The objective of these measures is to (1) protect the public from potential exposure to physical/chemical hazards; (2) avoid public interference with personnel and safe work practices; and (3) prevent theft or vandalism of equipment at the site.

4.4 COMMUNICATION

Communication is an important aspect of the site control program as well as the entire HSP. Personnel should keep in mind that hazard assessment is a continuous process, and any potentially unsafe condition must be reported immediately to the SSO.

Onsite personnel will use the "Buddy System" and maintain communication or visual contact between team members during site operations. The Buddy System is used to provide assistance, monitor for chemical exposure and heat stress, and obtain emergency assistance for co-workers when necessary.

Site personnel will be familiar with the following emergency hand signals:

Hand gripping throat:	Can't breathe. Respirator problems.
Grip team member's wrist or both hands on team member's waist:	Leave site immediately, no debate!
Thumbs up:	Yes. I'm alright. I understand.
Thumbs down:	No. Negative.

5.0 HAZARD ASSESSMENT

Hazard assessment is essential for establishing hazard reduction measures. Hazard assessment will consist primarily of site inspections and monitoring. Known operational hazards (heavy equipment, overhead lines, etc.) and site characterization data (contaminant location, concentration, etc.) are also considered in the assessment. The following is a list of potential hazards associated with the activities planned for this site:

Physical Hazards	Excavation and trenching Heavy equipment Overhead lines and underground utilities Explosion and fire Traffic - vehicular and pedestrian Tripping, slipping, and falling Head, foot, eye, and back injuries Falling objects Sharp objects Electrical equipment Welding hazards
Chemical Hazards	Diesel, gasoline / benzene, toluene, ethylbenzene, xylenes (BTEX), methyl tert butyl ether (MTBE), waste oil (eliminate dermal exposure) Environmental samples, soil cuttings, decontamination water, dust (nuisance, silica)
Environmental Hazards	Noise exposure Weather - heat, cold, rain, fog Biological - plants, animals/insects, pathogens
Confined Spaces	Hazardous atmospheres (Oxygen content; flammable, explosive, or toxic gases) Engulfment potential Restricted movement; limited space for entry/exit

Walk-though safety inspections will be conducted by the SSO daily and as conditions change. Inspection results will be communicated to the work crews during the morning Tailgate Safety Meetings and as needed.

6.0 HAZARD REDUCTION

Personnel are required to exercise reasonable caution at all times during work activities. Failure to follow safety protocols and/or continued negligence of health and safety policies will result in expulsion of a crew member from the site and may result in termination of employment. In general, the potential for hazardous situations will be reduced by the following activities:

- ***Implementing engineering controls***
- ***Using personal protective equipment***
- ***Performing air monitoring***

Engineering Controls, corresponding to the hazard assessment for work at this site, are outlined below in **Sections 6.1 through 6.4**. Personal protective equipment (PPE) and air monitoring guidelines are outlined in **Sections 7.0 and 8.0**, respectively.

This section of the H&S Plan will present the general safety rules applicable to all persons working at the project site. The section will also discuss each of the hazards identified and provide guidelines and procedures necessary to avoid injury or illness.

Personnel are required to exercise reasonable caution at all times during work activities. Failure to follow safety protocols and/or continued negligence of health and safety policies will result in expulsion of a worker from the site and may result in termination of employment.

6.1 GENERAL SAFETY RULES

- Horseplay, fighting, gambling, possession of firearms, alcoholic beverages, illegal drugs, or usage of unauthorized medically prescribed drugs are not permitted.
- Work shall be well planned and supervised to prevent injuries. Supervisors shall assure that employees observe and obey safety rules and regulations.
- An employee reporting for work who, in the opinion of his supervisor, is unable to perform his assigned duties in a safe and reasonable manner shall not be allowed on the job.
- No employee shall be assigned a task without first having been instructed on proper methods, including safety training, of carrying out the task. Any employee who feels they have not received proper instruction shall notify their supervisor prior to carrying out the task.
- Injuries and accidents shall be reported immediately to the immediate supervisor, who will then report it to the SSO.

- There shall be no consumption of food or drink in operational areas of the site. Hands should be thoroughly cleansed prior to eating.
- Smoking is not permitted on the site.
- When personnel are conducting hazardous operations, there shall be at least one other person (buddy system) on duty in the immediate area as a backup in case of emergency.

6.2 PHYSICAL HAZARDS AND CONTROLS

Heavy Equipment

The operation and use of heavy equipment presents the greatest potential for injury to personnel. To minimize these hazards, designated routes and specific traffic patterns will be established. Trucks will use spotters for backing. If personnel need to approach heavy equipment during operation, they will observe the following protocols: make eye contact with the operator, signal the operator to cease heavy equipment activity, and then approach the equipment to inform operator of intentions.

Only equipment that is in safe working order will be used. Only qualified personnel will be allowed to operate heavy equipment. Subcontractors will supply proof of qualifications to operate the equipment.

Those crew members directly involved in spotting for the operator will be the only personnel allowed within the operating radius of the heavy equipment. Other personnel will remain at a safe distance from these operations.

Overhead Lines and Underground Utilities

When operating heavy equipment near overhead power lines, care will be taken to ensure that elevated portions of the equipment maintain a distance of ***at least 10 feet*** from high voltage lines of 50,000 volts or less. See article 86, Title 8, High Voltage Electrical Safety Orders for minimum clearance of high voltage lines in excess of 50,000 volts.

If subsurface work (excavations, drilling or potholing) is performed, a USA utility mark-out is required to mark/clear underground utilities prior to work It is recommended that the first 5 feet of any subsurface operation be excavated using an air-knife or hand auger to ensure clearance of underground utility lines.

Explosion and Fire

Liquid petroleum products readily vaporize from standing pools or saturated soil. Ignition sources pose an explosion and fire hazard (e.g., engines, impact sparking, and heat or arc from inappropriate equipment or instrumentation). A direct-reading combustible gas indicator (CGI) will be used to evaluate the possible formation of flammable atmospheres in and around the work area. **See Section 8.0: Air Monitoring.**

Emergency services (911) are to be called immediately in case of a fire or explosion. A portable fire extinguisher will be kept onsite for use on small fires only. Only personnel trained in the proper use of fire extinguishers are authorized to use the onsite fire extinguisher.

Traffic - Vehicular and Pedestrian

Work to be conducted in the public right-of-way requires an approved traffic control plan and traffic control setup and operation. Project personnel are required to follow state and local traffic laws. Vehicles driven by company personnel will yield to bikes and pedestrians, and at railroad crossings.

Access to work areas will be limited by the SSO to essential personnel. Delineators, barriers, and/or taping will be used to cordon off the work areas, and prevent pedestrian and vehicular traffic from entering the work zones.

Tripping, Slipping, and Falling

Personnel will be reminded daily to maintain sure footing on all surfaces. Use of safety harnesses is required for personnel working ***6 feet or more*** above any surface that does not have handrails (includes riding on manlifts). Work surfaces of unknown or suspect integrity will be strengthened or overlaid with a work platform capable of supporting personnel and equipment working in the area. To minimize tripping hazards caused by construction and other debris, material will be removed daily from the work areas and stockpiled in appropriate designated storage areas. This "housekeeping" effort will be enforced by the SSO at the end of each day.

Head, Foot, Eye, and Back Injuries

Hard hats, steel toe boots, and safety glasses will be worn during site operations. To avoid back injuries, personnel must be trained in and is required to use proper equipment and lifting techniques for manual material handling.

Falling Objects

Equipment and material will be lowered to the ground "slowly" using a grapple and/or skip bucket. Personnel shall not work under this equipment; nor shall personnel other than the operator ride on the equipment.

Sharp Objects

Nails, wires, saws, and cutting equipment pose potential hazards such as cuts and punctures during site work. *Only appropriate work tools are to be used.* Personnel are required to exercise caution, and should wear leather work gloves when handling or operating cutting tools, saws, and other sharp objects. A consistent housekeeping effort at the site will also help to reduce hazards from sharp objects.

Electrical Equipment

In order to prevent accidents caused by electric shock, electrical connections will be inspected on a daily basis. Equipment found to have frayed wiring or loose connections will be shut down and locked-out until a qualified electrician has effected repairs. Electrical equipment will be de-energized and tested before any electrical work is started. Equipment will be properly grounded prior to and during work.

In addition, ground fault circuit interrupters (GFCIs) will be installed whenever possible in each circuit between the power source and tool, unless the presence of a potentially explosive atmosphere precludes this procedure. In the event that generators are used to supply power, they will be equipped with GFCIs.

Welding Hazards

Personnel who perform or observe welding operations are required to use approved welding shields or glasses. This protective equipment will be inspected prior to each use for scratches and pits that could inhibit the ability to shield harmful ultraviolet light. Personnel are required to wear protective clothing to shield their skin from the harmful ultraviolet light produced by welding operations. Personnel working near welding operations that could ignite chemical protective clothing must wear flame-retardant outer apparel (Nomex or equivalent).

Excavation and Trenching

For this project (i.e., installation of remediation system at 76-5678) the maximum anticipated depth for trenching is approximately 24-inches (2 feet).

Excavations and/or trenching ***5 feet or more*** in depth will incorporate a system of shoring, sloping of the ground, benching, or other means, as provided in CCR Title 8 Construction Orders, to prevent caving. Excavations/trenching will be inspected daily by a qualified person, and after every rainstorm or other hazard-increasing occurrence. Excavations less than 5 feet deep shall also be inspected for indications of potentially hazardous ground movement.

When employees are working in trenches ***4 feet or more*** in depth, a safe means of access/egress shall be provided and located so that no more than 25 feet of lateral travel is necessary to reach the access/egress point.

No equipment will be allowed and no materials will be piled within ***2 feet*** of the edge of any trench or excavation. Adequate barrier protection shall be provided to keep mobile equipment and personnel from inadvertently falling into a trench or an excavation.

No excavation work shall take place below the level of the base of an adjacent foundation, retaining wall, or other structure until (1) a qualified person has characterized the situation as one that will not create a hazard to workers; or (2) adequate safety measures have been taken for the protection of workers.

Workers shall not be permitted underneath loads handled by excavation or loading equipment. Soil excavation, handling, stockpiling, and backfilling will not be conducted under high-wind conditions. Under these conditions, the work area, excavated material, and unpaved roadways will be watered down until the surface is moist, and maintained in a moist condition to minimize dust.

6.3 CHEMICAL HAZARDS AND CONTROLS

Chemical Characteristics

Hazardous chemicals that may be encountered at this site include diesel and gasoline hydrocarbons. These chemicals are volatile, flammable, and moderately to extremely toxic when inhaled, ingested, or absorbed above certain concentrations. See **ATTACHMENT B** for specific exposure limits and basic toxicology information.

Personnel will use engineering controls and PPE (based on hazard assessment) to prevent chemical exposure.

Sample Collection

Workers who must come in direct contact with known or suspected contaminated soil or groundwater to collect samples are required to wear protective gloves and other PPE, as needed, to reduce the potential for exposure. Safety glasses will be worn to avoid potential splashing of chemicals into the eyes.

Soil Cuttings, Decontamination Water, and Dust

As with sample collection, precautions are to be followed for handling materials such as soil cuttings and cleaning/decontamination water. Exposure and potential inhalation of dust (nuisance, silica) will be minimized by wearing dust masks or other appropriate PPE/respiratory protection.

Disposition of Materials

Excavated soil will be stockpiled and covered, or stored in closed drums or roll-off bins. Purged water will be stored in closed drums or tanks. Drums, tanks, and/or roll-off bins containing soil or water will be labeled in accordance with the hazard communication standard and removed from the site in accordance with client-approved protocol.

Hygiene

Eating, smoking, and drinking is NOT ALLOWED in the work area. Site personnel will wash their hands, arms, and faces thoroughly prior to eating or drinking, and at the end of their shift. Food should never be stored where it may come into contact with, or be contaminated by, petroleum products or other toxic materials.

6.4 ENVIRONMENTAL HAZARDS AND CONTROLS

Noise Exposure

Hearing protection (ear plugs or ear muffs) will be worn when project personnel enter high-noise areas. The TRC and Subcontractor SSOs should ensure ear plugs are available onsite.

Heat Stress

Heat stress may be caused by the combination of ambient factors such as high air temperature, high relative humidity, and low air movement. This condition can result in heat rash, heat cramps, heat exhaustion, and/or heat stroke. It can impair worker coordination and judgement and directly impact health and safety. Heat stress is more likely when PPE is worn. Personnel are to drink plenty of water and take breaks (in shaded rest areas) as needed to help prevent heat stress. As part of the Buddy System, personnel should watch for signs and symptoms of heat stress in coworkers as well as themselves.

Cold Exposure

To guard against cold injury (frostbite and hypothermia), which is a danger when the temperature and wind-chill factor are low, employees will wear appropriate clothing, have warm shelter readily available, and maintain carefully scheduled work and rest periods.

Biological Hazards

Personnel will assess their surroundings for potential biological hazards, which may be posed by poisonous plants, insects, animals, and indigenous pathogens. Protective clothing and respiratory equipment can help reduce the chances of exposure. Thorough washing of any exposed body parts and equipment will help protect against infection from biological hazards. ***"Universal Precautions"*** (e.g., wearing latex gloves) must be taken any time there is potential for exposure to human blood, such as when an employee renders first aid to a coworker.

6.5 CONFINED SPACE HAZARDS

Confined space entry is NOT ANTICIPATED during the course of construction/installation activities. However, if such a situation is encountered, workers are prohibited from entering confined spaces until the company plan specifically addressing confined spaces entry has been implemented.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 LEVEL OF PROTECTION

Personnel are required to wear PPE appropriate for the task and anticipated exposure to known contaminants. Selection of PPE will be based on hazard assessment, task performance, and air

monitoring. Based on the history of this site, the initial level of protection will be Level D. At a minimum, Level D PPE will consist of the following:

- ☐ Hardhat
  at all times in work area
- ☐ Boots: chemical-resistant, steel toe and shank
  at all times in work area
- ☐ Safety glasses, splash goggles, or hardhat with face shield
  when there is risk of hazardous substances (sampling) or flying particles (drilling, excavation, etc.) getting into eyes
- ☐ Ear plugs / hearing protection
  when high-noise equipment is in operation (jack hammer, saw cutting, etc.)
- ☐ Gloves: chemical-resistant
  when handling soil cuttings or soil/water samples

Site personnel also are required to *be prepared* with the following items:

- ☐ Dust masks
- ☐ Tyvek coveralls and other suitable protective clothing
- ☐ Traffic safety vest
- ☐ Leather work gloves and back brace/lifting belt

Air monitoring information will dictate when and if a site will be upgraded to Level C (PPE with air purifying respirator).

7.2 RESPIRATORY PROTECTION

Respiratory protection is mandatory if workers are required to complete tasks within a hazardous atmosphere. According to OSHA, a hazardous atmosphere is defined as:

- ❑ Flammable gas, vapor, or mist in excess of 10% of LEL.
- ❑ Atmospheric oxygen is below 19.5% or above 23.5%.
- ❑ When concentration of a known contaminant is greater than the permissible exposure limit (PEL).

- Airborne combustible dust exceeds its LEL (approximated when dust obscures vision at a distance of 5 feet or less).

Hazardous atmospheres are not anticipated during day-to-day operations at the site. Therefore, most tasks to be completed will not require respiratory protection. However since the possibility of hazardous atmospheres does exist, air monitoring will be required to verify the presence or absence of a hazardous atmosphere. Air monitoring is to be conducted whenever a situation or condition arises that could reasonably result in a hazardous atmosphere. Again, respiratory protection is mandatory if workers are required to complete tasks within a hazardous atmosphere.

Use of Air-Purifying Particulate Respirators

Employees involved in construction and earthmoving operations that result in nuisance dust and particulates may use air-purifying respirators. These are commonly referred to as "dust masks" and do not require fit testing. Particulate respirators are to be used in situations where dust and particulates are the only contaminants posing an inhalation hazard. Particulate respirators are not to be used in oxygen deficient atmosphere or if hazardous levels of gas/vapor contaminants are present.

It is highly recommended that a high efficiency particulate air (HEPA) P100 respirator be used in place of commercially available "dust masks.'

Use of Air-Purifying Gas/Vapor Respirators

It is not anticipated that air-purifying gas/vapor respirators will be required at the site. However, LFG or other chemicals present in the subsurface have the potential to result in hazardous atmospheres. Air monitoring will be required to verify the presence or absence of a hazardous gas/vapor atmosphere whenever a situation or condition arises that could reasonably result in a hazardous atmosphere.

Air purifying respirators (APRs) with chemical cartridges can be used for acid gas/organic solvent vapors under the following conditions:

- If the oxygen concentration is between 19.5% and 23.5%.
- If chemical contaminants have been identified.
- The toxic concentrations are known and the respirator cartridges are effective in removing the contaminants.
- The respirator and cartridges are NIOSH/MSHA approved.
- The contaminants have noticeable warning qualities such as odor and visibility characteristics including color.

In the event workers are required to wear air-purifying gas/vapor respirators, the following requirements must be met:

- The SSO must verify that workers are:
  - Medically approved (within one year) to use respiratory protection.
  - Fit-tested for the specific respirator to be used.
  - Trained in the proper use and limitations of the respirator to be used.
- Contractors must provide proof of the above to the SSO before any air-purifying gas/vapor respirators may be used.
- If an employee or contractor has not cleared by the SSO to use a respirator, they will not be assigned tasks that may potentially expose them to contaminants.
- Personnel with interfering facial hair are not permitted to wear respirators and shall not be permitted in areas where respiratory protection is required.

Use of Air-Supplied Respirators

Air-supplied respirators, such as SCBA or airline, full-face respiratory protection, are not anticipated to be required at the site. This level of respiratory protection is utilized in oxygen deficient atmospheres or atmospheres considered to be at or above immediately dangerous to life and health (IDLH) levels. These conditions will only occur in rare, if any, circumstances such as confined space entry or emergency situations. The use of air-supplied respiratory protection is not permitted without approval and guidance from the Project Safety Manager.

For operations that require the use of a respirator, the TRC and Woodward Drilling's SSOs must verify that Field Personnel are medically approved to use respiratory equipment, fit tested, and trained in the proper use of air-purifying respirators. Site personnel are required have their respirator available and ready to use onsite. Only respirators that are NIOSH/MSHA approved are to be used.

Since the depth of excavation is limited to 0 feet or less, it is not anticipated that impacted soil will be encountered that would require the use of a respirator. If air monitoring as described in Section 8.0 indicates the presence of volatile constituents, workers will be required to wear half-face, air-purifying respirators with organic vapor cartridges under the following circumstances:

- If volatile organic compound (VOC) vapors in the work area continuously exceed the threshold limit value- time-weighted average (TLV-TWA) for gasoline (300 parts per million [ppm]).

- ☐ If, at any time, VOC vapors in the work area exceed the threshold limit value - short-term exposure limit (TLV-STEL) for gasoline (500 ppm).

TLV values for gasoline are derived from American Conference of Governmental Industrial Hygienists (ACGIH) standards. Similar precautions will be taken with regard to other toxic chemicals, such as BTEX components. See **ATTACHMENT B** for additional information and regulatory exposure limits.

7.3 REASSESSMENT OF PPE

The levels of personal protective equipment listed above will be upgraded (or downgraded) based on changes in activities, changes in site conditions, measurements of direct-reading instruments (compared to action levels for contaminants), or other findings. Changes in the level of protection require the approval of the SSO.

8.0 AIR MONITORING

Based on OSHA's definition of a hazardous atmosphere, there are 4 different hazards that require monitoring. The table below described each type of hazard, what piece of air monitoring equipment to use and what levels constitute a threat. The information provided in the table does not take into consideration all the possible variations of hazardous atmosphere, however it will provide good guidance when determining the presence of a hazardous atmosphere. Any questions or concerns should be directed to the SSO before work begins.

Hazard	Appropriate Air Monitoring Equipment	Hazardous Levels	Comments
Flammability	Combustible gas indicators (CGI) are direct-reading instruments that measure both % of LEL and oxygen levels.	>25% of the LEL during cold work >10% of the LEL during hot work	Since many flammable vapors are heavier than air, be sure to take readings at ground level. It is highly recommended all work be suspended if CGI readings exceed 10% of LEL.
Oxygen deficiency or abundance	See above	<19.5% and >23.5%	Concentrations >23.5% present a flammability hazard
Exceeding the permissible exposure limit (PEL)	Photoionization detector (PID) can detect organic and inorganic vapors/gases	Varies depending on chemical. See Attachment C for hazardous levels of common chemicals	It is impossible to differentiate the different chemicals using a PID meter. However, the PID will tell you whether chemicals are present at all and at what levels. Measurements taken within worker's breathing zone will be used to determine respiratory protection requirements.

Airborne combustible dust is not anticipated at the work site. Most probable hazards requiring monitoring include depleted oxygen, flammable concentrations of volatile organic chemicals or concentrations above the permissible exposure limit (PEL).

When conducting, air monitoring the following actions should be considered:

- Be familiar with the proper use and limitations of the air monitoring equipment to be used.
- Ensure air-monitoring equipment is in working order and has been properly calibrated.
- Clearly document the results of air monitoring, including:
  - Equipment name / type and calibration data
  - Date, time and site location of air monitoring
  - Indication of what is being measured (LEL, oxygen, or ppm)
  - Results of the air monitoring
- Measurements for volatile organics should be taken at low point where vapors could accumulate.
- Measurements taken to determine the need for respiratory protection should be take within the worker's "breathing zone", keeping in mind the worker's closest proximity to the hazard source.
- An individual should never enter a confined area or excavation in order to conduct initial air monitoring. Instead, actions should be taken to lower the air monitoring equipment into the area to indicate the presence (or absence) of a hazardous atmosphere. Most air monitoring equipment has audible alarms.

Monitoring will be conducted as needed to characterize airborne contaminant levels. The potential hazards associated with the presence of hydrocarbons include (1) personnel exposure to chemicals, and (2) possible formation of flammable atmospheres in and around the work area.

Air sampling will be conducted in accordance with NIOSH, OSHA, or EPA methods. The TRC or Woodward Drilling's SSO will check to see that air monitoring equipment brought onsite is properly calibrated prior to operation and recalibrated during the course of the day, as necessary. The SSO is to document the calibration (i.e. in a field log book).

8.1 PHOTOIONIZATION DETECTOR

A photoionization detector (PID) will be used for the monitoring of VOCs in the work area in accordance with the requirements outlined in Title 8 CCR 5192. Air monitoring will be conducted in the breathing zone of workers, and the data collected will be used to evaluate suitable respiratory

protection against chemicals encountered. Refer to the Respirator Selection guidelines in **Section 7.2** for personal protection measures. Measurements will also be obtained periodically at the top of boreholes or excavation cavities, and during any construction activities in which hydrocarbon-affected soil is encountered; however, only breathing zone measurements will be used to determine whether respiratory protection should be used or discontinued.

8.2 COMBUSTIBLE GAS INDICATOR

A direct-reading, portable CGI that measures VOC concentrations in ppm, or as a percentage of the lower explosive limit (LEL), will be used to monitor airborne concentrations of VOCs and evaluate the possible formation of flammable atmospheres in and around the work area. Data will be used to monitor and evaluate vapor concentrations within or emanating from well bores, excavations, and contaminated soil that is stockpiled, moved, or loaded on or about the site. Measurements will be obtained periodically at the top of boreholes or excavation cavities throughout drilling or excavation operations, and during any construction activities in which hydrocarbon-affected soil is encountered. Periodic measurements also will be taken in areas that may contain an accumulation of combustible vapors.

In the event that CGI readings on the site exceed 10 percent of the LEL, work will be suspended, monitoring will be continued as needed to isolate the area of concern, and the following applicable environmental controls will be implemented:

1. Vapors from pooled petroleum product will be suppressed (if necessary) by spraying with foam, appropriate chemical suppressant, or carbon dioxide in gas form or dry ice.

2. Air movers will be used to ventilate the areas of concentration to below 10 percent LEL.

3. Contaminated soil will be covered with clean soil and/or sprayed with water or deodorizing chemicals in order to reduce vaporization of VOCs.

9.0 DECONTAMINATION

Control of the work site is an important part of maintaining a safe work environment for anyone working on or visiting the site. Supervision and strict control of access to the property is necessary to protect site personnel, visitor and the public.

The primary objective of site control is to minimize the exposure to potentially hazardous substances and/or situations. For the purposes of this HSP, site control will be discussed under two

circumstances, 1) work not involving direct contact with hazardous substances and 2) work involving direct contact with hazardous substances.

Work *not* involving direct contact with hazardous substances

Much of the work conducted at the site does not involve direct (or the potential for direct) contact with chemicals at or near hazardous concentrations. Therefore, the establishment of hot/warm/cold work zones is not necessary. However, the need to control access to the immediate work area and a keen awareness of personnel and visitor safety is essential.

Work involving direct contact with hazardous substances

The concept of site control and the establishment of hot/warm/cold work zones are intended for work involving the exposure (or potential exposure) to hazardous chemical concentrations. Under these circumstances, the purpose of work zones is two-fold: 1) minimize the exposure to potentially hazardous substances and 2) minimize the spread of hazardous substances outside the immediate work area through decontamination procedures.

A brief overview of work zones is provided below:

Exclusion Zone *(a.k.a. "Hot Zone")*

- The area where personnel may be subject to chemical or physical hazards.
- The area where known or suspected contamination exists and may also be where equipment operation and/or environmental sampling will take place.
- The zone is to be clearly identified and should be isolated with cones, barricades, or caution tape.
- The level of personnel protective equipment (PPE) required within the hot zone will vary depending on the work to be performed.

Contamination Reduction Zone *(a.k.a "Warm Zone")*

- The warm zone is located between the hot and cold zones. It begins at the edge of the hot zone and extends to the cold zone.
- The warm zone should be utilized as a control point or corridor for persons entering or exiting the hot zone.
- Personnel and equipment are decontaminated within the warm zone.

Support Zone *(a.k.a. "Cold Zone")*

- The cold zone is the area outside the hot zone where administrative and other support functions are located.
- Adverse exposure to contaminants and physical hazards are unlikely in the cold zone.

Due to the expected low levels and types of contaminants at the site, minimum of a hot and cold zone shall be established. It is anticipated that personnel will not need to perform routine decontamination procedures when leaving the hot zone. Should decontamination become necessary to minimize the spread of hazardous contaminants, it will consist of the following:

- Removal of contaminated garments in an "inside out" manner at a designated decontamination station located where personnel enter/exit the hot zone.
- Placement of contaminated garments in designated plastic bags or drums prior to disposal or transfer offsite. Labels in compliance with the hazard communication standard will be affixed to containers of contaminated debris and clothing.

Due to the expected low levels and types of contaminants at the site, it is anticipated that personnel will not perform routine decontamination procedures when leaving the Exclusion Zone. Project activities will be initially conducted in Level D PPE. When decontamination is necessary, it will consist of the following:

- Removal of contaminated garments in an "inside out" manner at a designated decontamination station located at the step-off location where personnel routinely enter/exit the Exclusion Zone.
- Placement of contaminated garments in designated plastic bags or drums prior to disposal or transfer offsite. Labels in compliance with the hazard communication standard will be affixed to containers of contaminated debris and clothing.

10.0 PERSONNEL TRAINING

Personnel who will perform field activities shall meet the training requirements specified in the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard [29 CFR 1910.120 (e)]. Prior to commencement of work, the SSO will discuss the potential physical and chemical hazards associated with site operations, and review safe work practices with personnel.

TRC and Subcontractor personnel are required to acknowledge their understanding and willingness to comply with this HSP before admission to the site by signing the Compliance Log at the end of the HSP.

Other job-specific training required to perform tasks within this operation will be verified by the SSO. This training may include, but is not be limited to respirator fit testing, safe lifting techniques, confined space entry, hearing conservation, and proper fire fighting procedures.

11.0 MEDICAL PROGRAM

The site medical program has two main components: a baseline medical surveillance program, and emergency medical assistance procedures.

11.1 BASELINE MEDICAL SURVEILLANCE

TRC has established a medical surveillance program to assess, monitor, and help protect the health of employees, in particular, employees who may be exposed to potentially hazardous substances during site work. Personnel undergo medical examinations as follows:

- **Initial:** Pre-employment / prior to any assignment involving work in a hazardous or potentially hazardous environment. The initial examination is used to establish a baseline picture of health against which future changes can be measured, and to identify any underlying illnesses or conditions that might be aggravated by chemical exposures or job activities.
- **Periodic:** At least once every 12 months to measure changes in health status.
- **Upon notification:** As soon as possible upon notification by an employee that they have developed signs or symptoms indicating possible overexposure to hazardous substances, or in response to an injury or exposure during an emergency situation.
- **Exit:** At termination of employment.

11.2 EMERGENCY MEDICAL ASSISTANCE

An emergency medical assistance network will be established prior to work start-up. The nearest fire department, police, ambulance service, and hospital with an *emergency room* will be identified. **See ATTACHMENT C** for Emergency Services contact information. A vehicle shall be available onsite during work activities to transport injured personnel to the identified emergency medical facilities, if necessary. Company vehicles are to be equipped with a fire extinguisher and first aid kit.

12.0 EMERGENCY RESPONSE PLAN

First Aid & CPR

TRC employees and contractors certified in first aid and CPR will be asked to identify themselves at tailgate safety meetings.

Emergency Medical Assistance

An emergency medical assistance network will be established prior to work start-up. The nearest fire department, police, ambulance service, and hospital with an *emergency room* will be identified. A vehicle shall be available onsite during work activities to transport injured personnel to the identified emergency medical facilities, if necessary. Company vehicles are to be equipped with a fire extinguisher and first aid kit.

See ATTACHMENT B for the name, location, and telephone number of emergency response organizations in the vicinity of the project site, and a map to the nearest hospital(s).

Emergency Procedures

In the event of an accident, injury, or other emergency, remember to:

- Stop work and REMAIN CALM.
- Move all non-injured personnel to a safe location (evacuation plan).
- Call 911 or notify other emergency facilities, as necessary.
- Address medical emergencies and apply first aid, as necessary.
  - Move injured or exposed person(s) from immediate area only if it is safe to do so.
  - If serious injury or life-threatening condition exists, call 911. Clearly describe the location, injury and conditions to the dispatcher. Designate a person to direct emergency equipment to the injured person.
- Contain physical hazards. Act only if hazard is minimal and you are trained to deal with the situation. Otherwise evacuate and wait for emergency services to arrive.
- Notify SSO and initiate accident reporting procedures.
  - See page 2 of this HSP for contact information. In the event the SSO is not available, the order of notification should be 1) Assistant SSO, 2) Project Safety Manager and 3) Project Director.
- Do not resume work until the SSO has determined is safe to do so.

The nearest telephone will mostly likely be a cellular phone. A phone is available for use at the site entrance and at any job trailer/office.

Evacuation Protocol

Evacuation protocol, routes and meeting point(s) will be established by the SSO, and communicated to personnel during the Tailgate Safety Meeting(s) prior to initiating work. In the event of an evacuation, personnel will meet at a pre-established location and a "head count" will be conducted to see that everyone has left the hazard area.

Contractors are responsible for being aware of the personnel they have on-site and being able to provide an accurate head-count in the event of an evacuation.

Primary evacuation meeting point = Outside construction trailers at site entrance.

Secondary evacuation meeting point = Gate at northwest corner of landfill property.

The TRC or Woodward Drilling's SSO (depending on which is present) will have controlling authority during an emergency. In the SSO's absence, the Alternate SSO will be in charge. See ATTACHMENT C for the name, location, and telephone number of emergency response organizations in the vicinity of the project site, and a map to the nearest hospital(s).

12.1 EMERGENCY PROCEDURES

In the event of an accident, injury, or other emergency, remember to:

- **Stop work and REMAIN CALM.**
- **Move personnel to a safe location (evacuation plan).**
- **Call 911 or notify other emergency facilities.**
- **Address medical emergencies and apply first aid, if necessary.**
- **Contain physical hazards.**

(NOTE: Act only if hazard is minimal and you are trained to deal with the situation. Otherwise evacuate and wait for emergency services to arrive.)

Notify offsite supervisor and client, and initiate accident reporting procedures.

12.2 INCIDENT REPORTING

In case of an accident, TRC personnel are to immediately report the incident to their supervisor and follow the TRC incident reporting procedures detailed in the TRC IIPP.

Woodward Drilling personnel are to report their supervisor who is then required to report the incident to the TRC SSO, Alternate SSO or TRC representative immediately.

Some important information to include when reporting an incident are:

1. A description of the event (including date and time) that required notification of offsite personnel (i.e., medical facilities, fire department, police department) and the basis for that decision.
2. Date, time, and names of persons/agencies notified, and their response.
3. Details regarding personal injury and property damage, if any.
4. Resolution of incident and the corrective action involved.

All incidents and near misses are to be investigated in accordance with TRC's IIPP. The TRC Incident Report Form is to be completed and submitted to the TRC EHS Supervisor within 24 hours following any accident or injury.

Site Specific Health and Safety Plan (HSP)
Project Name/Site Number: 76 Service Station #3538
Date: 9/14/05

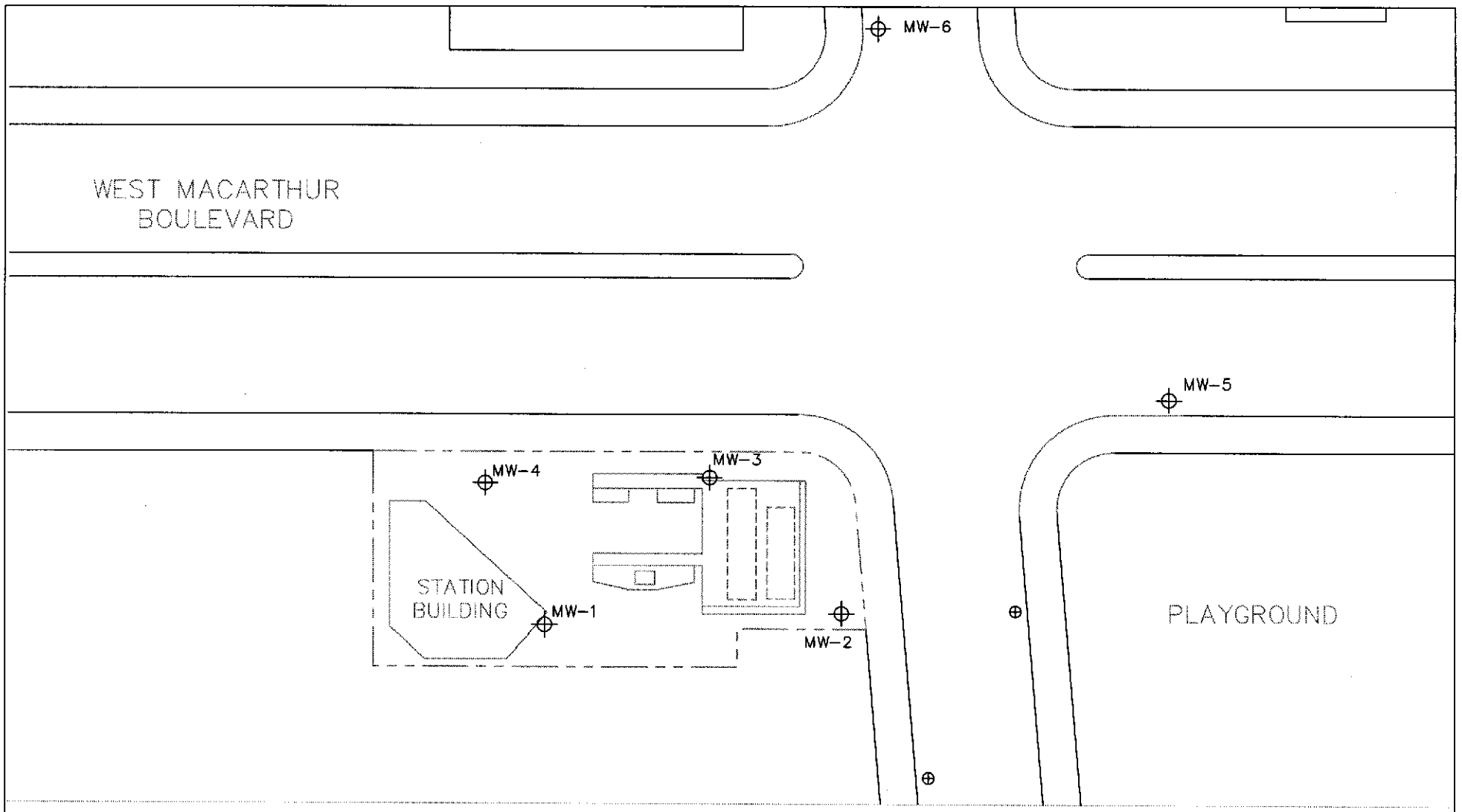
13.0 HEALTH AND SAFETY PLAN (HSP) SIGNATURE PAGE

Job Safety Analysis Author	Date:	Health and Safety Plan Author	Date:

Review/Approvals:

Facility Supervisor	Date:	Project Manager	Date:
Project Supervisor	**Date**	**EH+S Supervisor/ IIPP Coordinator**	**Date**

Additional Information or Instructions:



SOURCE: Site plan by Gettler-Ryan, August 2000.

SITE PLAN SHOWING
PROPOSED BORING LOCATIONS

76 Service Station #3538
411 West MacArthur Boulevard
Oakland, California

TRC

FIGURE 2

ATTACHMENT B

OCCUPATIONAL HEALTH GUIDELINES AND TOXICOLOGICAL INFORMATION

Table B-1

OCCUPATIONAL HEALTH GUIDELINES AND TOXICOLOGICAL INFORMATION
Gasoline Constituents

Contaminant	ACGIH TLV-TWA (ppm)	NIOSH REL (ppm)	OSHA PEL (ppm)	STEL (ppm)	IDLH (ppm)	Routes of Exposure	Known or Suspected Carcinogen	Symptoms
Diesel (as Stoddard solvent)	for Diesel fuel/ Kerosene 14.4 (skin only)	Approx. 60-98	500	250-500 (NIOSH ceiling)	Approx. 3000-5600	Inhalation, Ingestion, Contact	No	Irritation to eyes, skin, mucous membrane; dermatitis, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions, aspiration, weakness, restlessness, incoordination
Gasoline	300	n/a	n/a	500 (ACGIH)	n/a	Inhalation, Absorption, Ingestion, Contact	Yes	Irritation to eyes, skin, mucous membrane; dermatitis, headache, fatigue, blurred vision, dizziness, slurred speech, confusion, convulsions, aspiration
Benzene	0.5	0.1	1	1 (NIOSH)	500	Inhalation, Absorption, Ingestion, Contact	Yes	Irritation to eyes, skin, nose, resp system, giddiness, headache, nausea, staggered gait, fatigue, anorexia, weakness/exhaustion, dermatitis
Toluene	50	100	200	150 (NIOSH)	500	Inhalation, Absorption, Ingestion, Contact	No	Irritation to eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, tears, nervousness, muscle fatigue, insomnia, dermatitis
Ethyl benzene	100	100	100	125 (NIOSH& ACGIH)	800	Inhalation, Ingestion, Contact	No	Irritation to eyes, skin, mucous membranes; headache, dermatitis, narcosis, coma
Xylenes (o,m,p,)	100	100	100	150 (NIOSH & ACGIH)	900	Inhalation, Absorption, Ingestion, Contact	No	Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait, nausea, vomiting, abdominal pain, dermatitis
Methyl tert butyl ether ((MTBE)	40	n/a	n/a	n/a	n/a	n/a	n/a	n/a

DEFINITIONS

ACGIH TLV-TWA	American Conference of Governmental Industrial Hygienists, Threshold Limit Value-Time Weighted Average
NIOSH REL	National Institute of Occupational Safety & Health, Recommended Exposure Limit
STEL	Short Term Exposure Limit (Gasoline STEL is by ACGIH; BTEX STELs are by NIOSH)
OSHA PEL	Occupational Safety and Health Administration, Permissible Exposure Limit
IDLH	Immediately Dangerous to Life and Health
ppm	parts per million
CNS	Central Nervous System
n/a	not available (i.e., no value has been established)

Threshold Limit Value: Threshold limit values (TLVs) refer to airborne concentrations of substances and represent conditions under which it is believed nearly all workers may be repeatedly exposed, day after day, without adverse health effects.

Threshold Limit Value - Time Weighted Average: The time weighted average (TWA) is a concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect. TLV-TWAs are established by the ACGIH.

Recommended Exposure Limit: Unless otherwise noted, the recommended exposure limit (REL) is a TWA concentration for up to a 10-hour workday during a 40-hour workweek. RELs are established by NIOSH to reduce or eliminate adverse occupational health effects.

Short Term Exposure Limit: A short term exposure limit (STEL) is defined as a 15-minute TWA exposure that should not be exceeded at any time during a workday. When compared to the REL (or TLV-TWA for ACGIH standards), the STEL allows the worker to be exposed to a higher concentration, BUT for a shorter period of time. Exposures above the REL up to the STEL should not be longer than 15 minutes and should not occur more than four times per day.

Permissible Exposure Limit: Permissible exposure limits (PELs) are TWA concentrations that must not be exceeded during any 8-hour work shift of a 40-hour workweek. PELs are established by OSHA (29 CFR 1910.1000).

Immediately Dangerous to Life and Health: Immediately dangerous to life and health (IDLH) values are established as concentrations from which a worker can escape within 30 minutes without suffering loss of life, irreversible health effects, or other deleterious effects that could prevent him/her from escaping the hazardous environment. The purpose of establishing an IDLH exposure concentration is to ensure that workers can escape from a given contaminated environment in the event of failure of respiratory protection equipment.

ATTACHMENT C

EMERGENCY SERVICES
PHONE NUMBERS, DIRECTIONS, AND LOCAL AREA MAP

EMERGENCY SERVICES

FACILITY / LOCATION	TELEPHONE
Emergency Situation	**911**
TRC 24 HOUR Notification Number	**1-800-274-9072**

Hospital Name, Address, Phone
Alta Bates Summit Medical Center (510) 869-6600
350 Hawthorne Ave
Oakland, California

Directions
1. Starting at on **W MACARTHUR BLVD** - go **< 0.1** mi
2. Turn (R) on **WEBSTER ST** - go **0.3** mi
3. Arrive at Alta Bates Summit Medical Ctr

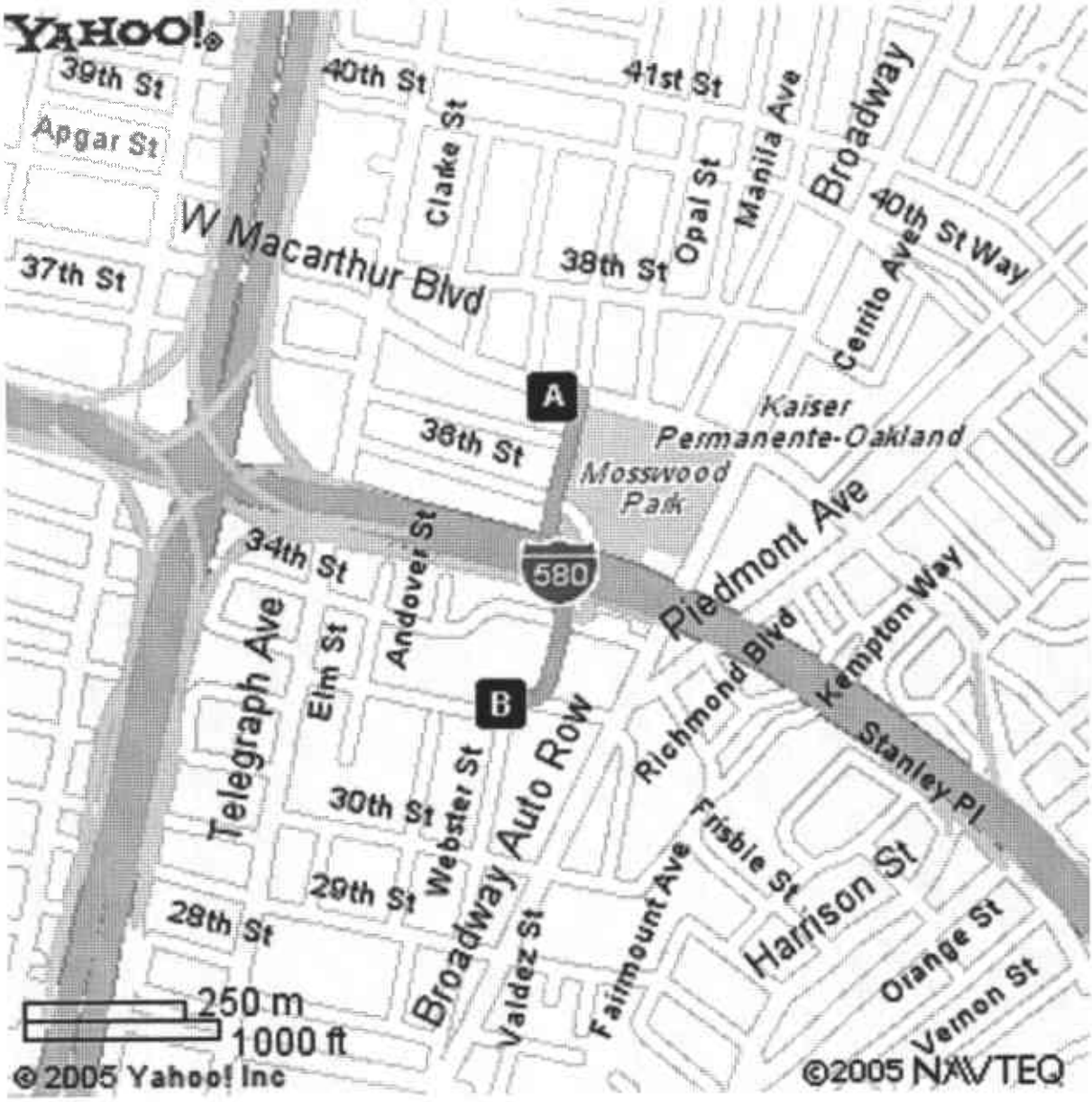
Poison Control Center
California Poison Control System - San Diego Division (800) 876-4766
University of San Diego Medical Center
200 W. Arbor Drive
San Diego, California 92103-8925

Office of Emergency Services (800) 852-7550

USA Dig Alert of Northern California (800) 227-2600

ATTACHMENT D

LOCAL AREA MAP
with routes to hospital


YAHOO!
39th St
40th St
41st St
Apgar St
Clarke St
Opal St
Manila Ave
Broadway
40th St Way
W Macarthur Blvd
37th St
38th St
Cerrito Ave
A
Kaiser
Permanente-Oakland
36th St
Mosswood
Park
34th St
Andover St
580
Piedmont Ave
Kempton Way
Elm St
Telegraph Ave
B
Richmond Blvd
Stanley Pl
Webster St
30th St
Broadway Auto Row
Frisble St
Fairmount Ave
29th St
Harrison St
28th St
Valdez St
Orange St
Vernon St
250 m
1000 ft
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©2005 NAVTEQ

ATTACHMENT E

JOB SAFETY ANALYSIS

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE	☐ NEW ☒ REVISED
TRC 76 Service Station # 3538 411 West MacArthur Blvd., Oakland, California	9/14/2005	

WORK ACTIVITY (Description):
Drilling

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY: POSITION/ TITLE	Signature:
R. Dunn	Site Safety Officer (SSO)	K. Woodburne/PM	
A. Collins	IIPP Coordinator	S. Rieken/Associate	
J.Kearns	Alternate SSO	S. Kemnitz/LPS Director	

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

☒ REFLECTIVE VEST	☒ GOGGLES	☒ AIR PURIFYING RESPIRATOR	☒ GLOVES: per requirements
☒ HARD HAT	☒ FACE SHIELD	☐ SUPPLIED RESPIRATOR	☒ OTHER: PID/LEL
☐ LIFELINE / HARNESS	☒ HEARING PROTECTION	☒ PPE CLOTHING Nomex (if LPH Encountered)	
☒ SAFETY GLASSES	☒ SAFETY SHOES: Protective Toe		

- **ALWAYS CONDUCT AN SPSA PRIOR TO STARTING WORK; WHEN CHANGING TASKS; AND THROUGHOUT THE DAY.**
- **THROUGHOUT THE DAY - MENTALLY FOCUS UPON EACH NEW TASK, DIFFERENT PROCEDURES, AND SKILL SETS TO BE USED.**

[1]JOB STEPS	[2]POTENTIAL HAZARDS	[3]CRITICAL ACTIONS TO MITIGATE HAZARDS
1) Set-up	a. Lack of concentration or focus	a. Review all plans (HASP, Work, Utility Plans, etc.) and logs in field notebook prior to starting a new task. Identify daily tasks and required personnel actions.
	b. Fire and explosion	b. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meter. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are > 300 ppm or >10% of LEL. b. Place 2-20lb ABC Fire extinguishers in accordance site safety officer's direction. c. Have a qualified electrician from power company cut all power connections to the site and remove main breaker from power panel.
	c. Electric Shock / Electrocution	c. De-Energize all circuits/power sources and follow TRC's Lock-Out, Tag-Out (LOTO) procedures.
	d. Malfunctioning Heavy Equipment Safety Devices	d. Inspect drill rig to determine if in good condition. Perform all equipment and safety checks prior to event startup (per operating manual).
	e. Being struck by moving vehicles or equipment onsite.	e. Always wear safety vest, establish eye contact with operators utilizing flag men wear appropriate. e. Vehicles shall use reverse beepers or flagmen.
	f. Bad organization creating confusion and hazard	f. Identify staging area with good access lateral and vertical for loading and unloading of trucks.
	g. Unauthorized Personnel in exclusion zone	g. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area. Use visitor check-in log and allow no-one in exclusion area with out proper PPE (as defined on this JSA)and training documentation (HAZWOPER/LPS).
2) Drilling	a. Contact with subsurface water, gas, electrical, and/or fiber optic lines in the vicinity of drilling locations.	a. Following the hole clearance and drilling procedures outlined in TRC's Subsurface Disturbance Safety Checklist a. If unknown lines or obstructions are encountered, Stop drilling and notify Contact PM. Do not undermine any utilities.
	b. Walking Drill Auger	b. Place conductor casing in open boring prior to start of drilling operations.

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) TRC 76 Service Station # 3538 411 West MacArthur Blvd., Oakland, California	DATE 9/14/2005	☐ NEW ☒ REVISED

WORK ACTIVITY (Description):
Drilling

	c. Broken wire cable or detached drill stem	c. Do not stand directly in front of the drill rig while machinery is operating. Stand off to the side by driller's platform or opposite side of drill rig.
	d. Distracted Driller	d. Always communicate with the driller before approaching the operating drill stem.
	e. Slips, trips, and falls	e. Spread absorbent to soak up any pools of water prior to start of drilling. e. Maintain a clean, unobstructed work area by good house keeping and placing unused equipment away from work area. e. Clean-up work area as you go.
	f. Soil Cross-contamination	f. Place drip pans under hydraulic jacks and pumps on drill rig.
	g. Cut/Pinched fingers or toes; and strained muscles.	g. Wear proper work and protective clothing (long pants, sleeved-shirt, steel-toed boots, safety vest, safety glasses, and safety helmet) at all times while on jobsite. g. Use proper lifting techniques and 2-man rule as outlined in TRC's Employee IIPP Handbook and "Back Injury Prevention Training" handbook, when moving heavy objects (>70 lbs).
	h. Noise	h. All personnel will use hearing protection within work area while heavy machinery is operating.
	i. Flying particles, dust and hazardous substances from clearance activities	i. Safety glasses or splash goggles will be worn at all times.
	j. Exposure to hydrocarbon impacted soil.	j. Wear latex or nitrile gloves during handling of soil or groundwater.
	k. Toxic or explosive atmosphere	k. Periodically monitor ambient atmosphere with PID or LEL meter. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are > 300 ppm or >10% of LEL.
2) Well completion	a. Bad Organization causing cross-contamination of soil, groundwater, or personnel	a. Identify and delineate soil stockpile area or storage area if soil cuttings/purge water sre to be be drummed. a. Blot up puddles of standing water and the work area will be swept.
	b. Moving heavy objects (>70-lbs) and mixing grout/concrete.	b. Get assistance for moving heavy objects and mixing grout/concrete. Use mechanical aids to move objects or mix grout/concrete.
	c. Opening/closing/moving drums	c. Wear leather gloves during the opening and closing of drums to protect fingers. c. Use only drum dolly to move drums with soil, hydrated bentonite grout, or concrete.
	d. Slips, trips, falls and physical injury during auger removal and well casing installation.	d. Place all removed auger piping, well casing and well screen to side, so as not to become a trip hazard d. Do not overload cart or drum dolly being used to move augers.
	e. Overspray and cross-contamination during auger Decontamination	e. Safety glasses, splash goggles, or face shield will be worn at all times when spraying/decontaminating augers. e. Do not overspray while cleaning augers. Create a "clean zone" with plastic liner for placement of decontaminated augers.

[1] Each Job or Operation consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the associated hazards in Column 2

[2] A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

[3] Aligning with the first two columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify some potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

Approvals:

Site Safety Officer	Date	**Project Manager**	Date
EHS Field Safety Advisor	Date	***Alternate Site Safety Officer***	Date

Field Changes:

Steps in Sequence	Hazards Involved	Recommendations for Safe Work

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE	☐ NEW ☒ REVISED
TRC 76 Service Station # 3538 411 West MacArthur Blvd., Oakland, California	9/14/2005	

WORK ACTIVITY (Description):
Hole Clearance

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE
R. Dunn	Site Safety Officer (SSO)	K. Woodburne/PM	
A. Collins	IIPP Coordinator	S. Rieken/Associate	
J.Kearns	Alternate SSO	S. Kemnitz/LPS Director	

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

☒ REFLECTIVE VEST ☒ HARD HAT ☐ LIFELINE / HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION ☒ SAFETY SHOES: Protective Toe	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☒ PPE CLOTHING : Nomex (if LPH detected)	☒ GLOVES leather ☐ OTHER: PID

- **ALWAYS CONDUCT AN SPSA PRIOR TO STARTING WORK; WHEN CHANGING TASKS; AND THROUGHOUT THE DAY.**
- **THROUGHOUT THE DAY - MENTALLY FOCUS UPON EACH NEW TASK, DIFFERENT PROCEDURES, AND SKILL SETS TO BE USED.**

[1]JOB STEPS	[2]POTENTIAL HAZARDS	[3]CRITICAL ACTIONS TO MITIGATE HAZARDS
1. Set-up	a. Lack of concentration or focus	a. Review all plans and logs in field notebook prior to starting a new task. Identify daily tasks and required personnel actions.
	b. Physical Injury from being struck by moving vehicles or equipment.	b. Use the 'buddy system (one person watching traffic, one person working) when working in a high-use traffic area. b. Create an exclusion zone at least 10-feet beyond the limits of the boring to limit access to staging/work area using snow fencing, barricades, delineators, cones and/or caution tape in accordance with TRC's Exclusion Zone Procedures.
	c. Cut/Pinched fingers or toes; and strained muscles.	c. Wear leather gloves when lifting sharp or heavy equipment. c. Use proper lifting techniques and 2-man rule as outlined in TRC's Employee IIPP Handbook and "Back Injury Prevention Training" handbook, when moving heavy objects (>70 lbs).
	d. Equipment Damage / Malfunction	d. Perform all equipment and safety checks prior to event startup (per operating manual).
	e. Safety & first aid.	e. As directed by SSO, set up TRC Safety Center with first aid kit, fire extinguishers, safety instructions, directions to nearest hospital, and potential hazards.
	f. Fatigue	f. Stage materials to reduce moving steps and distances to be covered.
	g. Unauthorized Personnel in exclusion zone	g. Use visitor check-in log and allow no-one in exclusion area with out proper PPE (as defined on this JSA) and training documentation (HAZWOPER/LPS).

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) TRC 76 Service Station # 3538 411 West MacArthur Blvd., Oakland, California	DATE 9/14/2005	☐ NEW ☒ REVISED
WORK ACTIVITY (Description): Hole Clearance		
2. Hole Clearance	a. Damage to underground utilities/piping	a. Follow procedures outlined in TRC's Subsurface disturbance checklist. Contact TRC PM if utility/piping is encountered.
	b. Physical injury and/or contamination	b. Wear nitrile or latex gloves when handling water or soil. Wear proper work and protective clothing (long pants, sleeved-shirt, steel-toed boots, safety vest, safety glasses, and safety helmet) at all times while on jobsite.
	c. Electric Shock / Electrocution	c. Place electric –insulating matting around work area. Follow Lock-Out, Tag-Out (LOTO) procedures.
	d. Explosion/Fire	d. No smoking or open flame. Periodically monitor ambient air concentrations with PID/LEL Meter. Shut down job and move personnel and equipment upwind if hydrocarbon concentrations are > 300 ppm or >10% of LEL. d. Place 2-20lb ABC Fire extinguishers in accordance site safety officer's direction. d. Follow cell phone use procedures outlined in TRC's Cell Phone Use Guidelines.
	e. High-pressure working fluids	e. Never place fingers or other body parts in front of high-pressure end of air knife/water knife nozzle. Always follow safe working procedures outlined in equipment handbook.
	f. Noise and flying debris	f. Wear ANSI-approved safety glasses with splash guards and hearing protection working around operating equipment.
3. Open Boring Control and Clean-up	a. Slips, trips, and falls	a. Clean as you work. Put equipment away when done using it. Blot up puddles of standing water and sweep work area.
	b. Loss of boring integrity.	b. Cover all unattended open borings with steel-plates. b. Seal the edges of the steel-plates with dry bentonite. b. Delineate and block access to open borings with snow-fencing, delineators, and caution tape.
	c. Run-off and Soil Cross-Contamination	c. Cover all spoils stockpiles with plastic-sheeting and berm in accordance with local regulations.
	d. Security and Thievery	d. Do not leave expensive equipment in open. d. Lock all vehicles and large equipment. Do not leave keys in vehicles. d. Lock gates before leaving at night.

[1] Each Job or Operation consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the associated hazards in Column 2

[2] A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

[3] Aligning with the first two columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify some potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

Approvals:

Site Safety Officer	Date	**Project Manager**	Date
EHS Field Safety Advisor	Date	***Alternate Site Safety Officer***	Date

Field Changes:

Steps in Sequence	Hazards Involved	Recommendations for Safe Work

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State)	DATE	☐ NEW ☒ REVISED
TRC 76 Service Station # 3364 411 West MacArthur Blvd., Oakland, California	9/14/2005	

WORK ACTIVITY (Description):
Work Area and Exclusion Zone Set-up

DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY: POSITION/ TITLE	SIGNATURE:
R. Dunn	Site Safety Officer (SSO)	K. Woodburne/PM	
A. Collins	IIPP Coordinator	S. Rieken/Associate	
J.Kearns	Alternate SSO	S. Kemnitz/LPS Director	

MINIMUM REQUIRED PERSONAL PROTECTIVE EQUIPMENT (SEE CRITICAL ACTIONS FOR TASK-SPECIFIC REQUIREMENTS)

☒ REFLECTIVE VEST ☒ HARD HAT ☐ LIFELINE / HARNESS ☒ SAFETY GLASSES	☐ GOGGLES ☐ FACE SHIELD ☒ HEARING PROTECTION ☒ SAFETY SHOES: Protective Toe	☐ AIR PURIFYING RESPIRATOR ☐ SUPPLIED RESPIRATOR ☐ PPE CLOTHING : Nomex (if LPH detected)	☒ GLOVES leather ☐ OTHER: PID

- **ALWAYS CONDUCT AN SPSA PRIOR TO STARTING WORK; WHEN CHANGING TASKS; AND THROUGHOUT THE DAY.**
- **THROUGHOUT THE DAY - MENTALLY FOCUS UPON EACH NEW TASK, DIFFERENT PROCEDURES, AND SKILL SETS TO BE USED.**

[1]JOB STEPS	[2]POTENTIAL HAZARDS	[3]CRITICAL ACTIONS TO MITIGATE HAZARDS
4. Pre-start meeting and Site Safety Analysis	a. Bad organization creating confusion and hazard	a. Arrive at site prior to planned start time to evaluate vehicle and pedestrian traffic flow in the work area and in the site vicinity. a. Review site plan with traffic control set-up. a. Identify staging area with good access lateral and vertical for loading and unloading of trucks. a. Identify material and equipment laydown areas.
5. Exclusion Zone Set-up	a. Physical injury or equipment damage from onsite and offsite traffic flow.	a. Use the 'buddy system (one person watching traffic, one person working) when working in a high-use traffic area. a. Use of cones/delineators and caution signs to alert foot traffic moving about the site of potential trip hazards. a. Utilize snow fencing, barricades, delineators, cones and caution tape to provide exclusion zone around proposed work locations. Set-up exclusion zone in accordance with TRC's Exclusion Zone Set-up procedures.
6. Control of Work Area and Exclusion Zone	a. Delivery vehicles b. Personnel/vehicle entry onto site c. Fatigue	a. All vehicles moving on site shall use reverse beepers or flaggers. b. Set-up fencing around entire site with gated entry points. Limit access to staging area by keeping gate to work area closed and check documents of all vehicles entering work area. b. Use visitor check-in log and allow no-one into an exclusion area with out proper PPE as designated on this JSA. b. All person onsite must wear proper work and protective clothing (long pants, sleeved-shirt, steel-toed boots, safety vest, safety glasses, and safety helmet) at all times while on jobsite. c. Limit number of times materials, equipment and debris are handled by staging as close to work area as possible. c. Watch on-site personnel for signs of fatigue (shuffling, disorientation, small mistakes, sloppiness, etc.) and have them go to a shaded, protected area where they can rest and rehydrate. c. Set up and maintain rehydrating station.

COMPANY/ PROJECT NAME or ID/ LOCATION (City, State) TRC 76 Service Station # 3364 411 West MacArthur Blvd., Oakland, California	DATE 9/14/2005	☐ NEW ☒ REVISED
WORK ACTIVITY (Description): Work Area and Exclusion Zone Set-up		
	d. Noise and flying debris	d. Always wear safety glasses and hearing protection working around operating heavy equipment.
7. Clean-up and overnight/over weekend storage	a. Slips, trips, and falls b. Bad organization creating confusion and hazard c. Run-off and soil cross-contamination d. Site Security and Anti-Thievery	a. Clean-up work area as you go. Maintain a clean, unobstructed work area by good house keeping and placing unused equipment away from work area. a. Delineate and block access to open pits/trenches with snow-fencing, delineators, and caution tape as a warning and prevent persons from falling into these items overnight. b. Place debris/detritus areas away from soil stockpile for future use. c. Cover all soil stockpiles with plastic-sheeting overnight against possible stormwater run-off and in accordance with local health regulations. d. Do not leave expensive equipment in open. d. Lock all vehicles and large equipment. Do not leave keys in vehicles. d. Lock gates before leaving at night.

[1] Each Job or Operation consists of a set of steps. Be sure to list all the steps in the sequence that they are performed. Specify the equipment or other details to set the basis for the associated hazards in Column 2

[2] A hazard is a potential danger. What can go wrong? How can someone get hurt? Consider, but do not limit, the analysis to: **Contact** - victim is struck by or strikes an object; **Caught** - victim is caught on, caught in or caught between objects; **Fall** - victim falls to ground or lower level (includes slips and trips); **Exertion** - excessive strain or stress / ergonomics / lifting techniques; **Exposure** - inhalation/skin hazards. Specify the hazards and do not limit the description to a single word such as "Caught"

[3] Aligning with the first two columns, describe what actions or procedures are necessary to eliminate or minimize the hazards. Be clear, concise and specific. Use objective, observable and quantified terms. Avoid subjective general statements such as, "be careful" or "use as appropriate".

LIMITATION: As part of TRC's EHS Policy, a JSA is provided by TRC for its employees. The purpose of a JSA is NOT to identify all hazards associated with a task, but to identify some potential hazards to get TRC and other onsite personnel thinking about other potential safety hazards and mitigating actions for unsafe conditions and behavior during various works. TRC recognizes that JSA's may not cover every conceivable step or hazard that emerges during a job, so we've provided a "Field Change" section below to amend a JSA if required. The JSA does not supersede or replace any local, state or federal permit, regulation, statute or other entities policies and procedures but is simply a tool for enhancing the execution of safe work at a jobsite under TRC's supervision. Similarly, all subcontractors are required to provide their own JSA(s) for their specialty prior to performing any work for TRC or its customers in accordance with TRC's EHS Policy; however, any unsafe condition or hazard not covered in any JSA is ultimately the direct responsibility of the person or entity performing the work.

Approvals:

Site Safety Officer	Date	**Project Manager**	Date

EHS Field Safety Advisor Date ***Alternate Site Safety Officer*** Date

_____ _____ _____ _____

Field Changes:

Steps in Sequence	Hazards Involved	Recommendations for Safe Work

ATTACHMENT F

TAILGATE SAFETY MEETING CHECKLIST AND COMPLIANCE LOG

TAILGATE SAFETY MEETING CHECKLIST AND COMPLIANCE LOG

Items to discuss at Tailgate Meeting:

- **Vehicle Inspection:** Driver will perform Driver's Daily Vehicle Inspection Checklist before leaving the yard or if changing drivers during the day.

- **Personnel training/qualifications:** Check cards for OSHA HAZWOPER 40-hour certification/8-hour-refresher training (or any other specialized training to perform the task if appropriate). TRC personnel have been trained on the Company's Drug and Alcohol Policy and will inform all site personnel.

- **Supplies:** Indicate location of first aid kit, fire extinguisher, clean water supply (drinking, eye wash), and Site Health and Safety Plan (HSP).

- **Emergency services:** Discuss location of nearest telephone and directions to hospital. Map, directions, phone numbers are provided in the HASP (Attachment C). The Emergency Twenty-four Hour Number is 1-800-274-0972.

- **Site background:** Discuss types, locations, and concentrations of chemicals found onsite, presence of free product, depth to groundwater, etc.

- **Offsite Permits/Access Permits:** Discuss any permitting requirements for the site.

- **Work activities:** Discuss scope of work for the day and activities to be performed.

- **Potential hazards:** Discuss physical hazards (lifting, pinch points, traffic, working around machinery, etc.); chemical hazards (exposure limits, symptoms, air monitoring); environmental hazards (heat stress, etc.); and any on-site safety precautions. Discuss the prohibiting of any eating, drinking, and/or smoking in the work zone.

- **Personal protective equipment (PPE):** Discuss required level of protection. See that workers have appropriate PPE onsite; includes, but is not limited to, hardhat, steel-toe boots, safety glasses, ear plugs/hearing protection, respirator (with cartridges), gloves, traffic safety vest (other _____). Inspect PPE for defects.

- **Utilities:** Utilities have been cleared/marked by appropriate divisions.

- **Traffic control** (vehicular and pedestrian): Work area is properly delineated and cordoned off from traffic. Technician will put a traffic cone at all four corners of his parked vehicle. Upon completion of work, walk around vehicle to pick up cones and check all four sides and underneath vehicle for obstacles prior to moving truck.

- **Dispenser Emergency Shut-off Switch:** Location has been identified/communicated with field personnel.

- **Dealer Notification:** Notify dealer/owner of site work activities to be performed.

SITE HEALTH AND SAFETY PLAN
COMPLIANCE LOG

- **Compliance log:** I have completed the Tailgate Safety Meeting Checklist, reviewed this Site Health and Safety Plan and the Job Safety Analysis (JSA) and understand their contents. I hereby agree to comply with all safety requirements outlined herein:

Signature: _____ **Onsite Safety Officer** **Company: TRC**

Print Name: _____ **Date:** _____

Signature: _____ **EH+S Supervisor** **Company: TRC**

Print Name: _____ **Date:** _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

SITE HEALTH AND SAFETY PLAN
COMPLIANCE LOG (cont.)

- **Compliance log:** I have completed the Tailgate Safety Meeting Checklist, reviewed this Site Health and Safety Plan and the Job Safety Analysis (JSA) and understand their contents. I hereby agree to comply with all safety requirements outlined herein:

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

Signature: _____ Date: _____

Print Name: _____ Company: _____

ATTACHMENT G

CONTRACTOR'S SITE HEALTH AND SAFETY PLAN

Code of Safe Practices For General & Field Operations

Section One – Safety Program

INTRODUCTION

Safety for the public and for all our employees is a primary concern of Woodward Drilling Co., Inc.

As we all know, almost daily there are changes taking place in city, county, state, and federal safety regulations. Woodward Drilling will make every effort to keep employees up to date and informed of any changes through weekly "tailgate" safety meetings, pay check memos, and other written or verbal forms.

The 40 hour Health and Safety Training, and Safety Manual highlights areas of safety concern which each employee needs to be aware, provides the Pyramid of Responsibility Concept of safety, and details of Woodward Drillings' policies and procedures, as they now exist.

All legislated regulations in effect now or in the future will take precedence over any current company policy.

PROGRAM OBJECTIVES

The primary objective of Woodward Drillings' safety program and code of safe practices is to provide for and ensure the safest work place possible. We at Woodward Drilling want to remain an industry safety leader.

PYRAMID OF RESPONSIBILITY

Safety is the responsibility of every Woodward Drilling employee. To continue the excellent safety program, Woodward Drilling has established a Pyramid of Responsibility for safety starting with the President and Safety & Regulations Manager at the apex and the newest employee at the base.

District Managers

The President/Chief Operating Officer and Safety & Regulations Manager are responsible for all aspects of the safety program.

District Managers' (DM) responsibilities for safety will be to:

- Familiarize themselves with company and site specific health and safety plans (HSP), and ensure their effective implementation;
- Be aware of all safety considerations when introducing a new process, procedure, machine or material into the work place;
- Give maximum support to all programs and committees whose function is to promote health and safety;
- Actively participate on the Safety Committee, as required;
- Review all accidents and near misses to ensure that proper reports are completed and appropriate action is taken to prevent repetition;
- Provide the leadership role for all employees to think and work safely.

Field Operations Managers and Operators

All Field Operations Managers (FOM) and Operators are defined as field safety managers and immediately responsible to the DM for safety.

When on site, FOM will have primary responsibility for site operational safety.

Field Operations Managers Operators, Shared

Along with operators, their shared responsibilities for safety in the field and are to: Responsibilities

- Familiarize themselves with company and site specific health and safety plans;
- Assure complete safety training of employees prior to assignment of duties;
- Consistently and fairly enforce all company safety rules;
- Investigate injuries to determine cause, and take immediate action to prevent repetition;
- See that all injuries, no matter how minor, are treated immediately and reported to their super visor/manager;
- Use company self-inspection checklist as required for frequent work area inspections for unsafe conditions and work practices;
- Review all inspection and safety documents for authenticity;
- Write up disciplinary action for employee infractions of safety rules;
- Review all *"tailgate"* safety meeting material to ensure proper topics are being covered;
- Monitor all personnel under their supervision and demonstrate the leadership which will instill the proper attitude and performance in all matters of safety.

Operators

The operator on any job site is the key person responsible for the safe operation of equipment, safety of crews, enforcing safety policies and preventing accidents.

Specific safety responsibilities include the following:

- Know, follow and periodically review company and site specific health and safety plans;
- Ensure that all components of equipment are in good, safe operating condition;
- Conduct bi-weekly safety inspections (15th and 30th of each month), making sure all items on the checklist are inspected thoroughly, and using crew members to assist with inspections to help keep them alert to safe conditions;
- Correct all unsafe conditions;
- Constantly emphasize safety by observing and immediately correcting any unsafe work practice;
- Conduct and involve crew members in "tailgate" safety meetings;
- Pay particular attention to the on-the-job training of new crew member's safe work practices;
- Set the example for safe practices and behavior for the crew;
- Instruct all crew members in the use of emergency shut down devices

Operators *(continued)*

- Check and test all safety devices of all assigned equipment at the beginning of each operating day, after any mobilization and rig up, and not allow drilling activities until all emergency shutdown and warning devices are functioning properly;
- Maintain a list of site specific emergency addresses and telephone numbers and inform crew members of the list's location;
- Only operate the rig from the console;
- Ensure safe "housekeeping" practices are followed on work site.

Drill Crew Members

Crew members' specific safety responsibilities are to:

- Know, follow and periodically review company and site specific health and safety plans;
- Be responsible for their own and the safety of other crew members;
- Follow supervisory personnel instructions;
- Take all steps necessary to correct any unsafe conditions or hazards when seen and report them to their supervisor;
- See that all injuries, no matter how minor, are treated immediately and reported to a supervisor/manager;
- Maintain an alert, aggressive and ambitious attitude toward their job;
- Take an active part in safety meetings;
- Not accept any job for which they feel unqualified or not trained to perform safely;
- Wear proper personal safety protection and use all safety equipment properly;
- Ensure all machine guards are in place and functioning.

New Crew Members

Safe practices are equally as important as the skills they will learn.

In addition to general crew member responsibilities, new crew member responsibilities also include:

- Be sure to know how to do something they are asked to do;
- Ask if not sure about an assignment. Correct on the job training is important.

Drivers

All drivers' specific responsibilities are to:

- Obey all traffic rules;
- Know, follow and periodically review safety policies and procedures.
- Drive defensively and stay alert behind the wheel;

Drivers *(continued)*

- Exercise courtesy at all times when driving;
- Give up right-away;
- Do not exceed DOT or state driving periods, and take all DOT or state required rest periods;
- Inspect truck/trailer before and after each trip, and report any unsafe conditions or hazards to supervisor.

PERSONAL PROTECTION PROGRAMS

In addition to the personal protective equipment normally required for our industry, Woodward Drilling Co., Inc. also maintains personal protection programs:

- Respiratory Protection (See Respiratory Protection Program).
- Hearing Conservation Program

Under Title 8, California Code of Regulations, Article 105, Control of Noise Exposure, Section 5095, "Agriculture, construction, and oil and gas drilling and servicing operations are exempt from the provisions of Sections 5097 through 5100)", which outline the establishment of a comprehensive Hearing Conservation Program (5097), Hearing Protectors (5098), Training Program (5099), and Record keeping (5100).

According to the Standard Industrial Classification (SIC), Woodward Drilling is classified as 1781 which is Special Trades Contractors, Well Drilling. Defined as such, Woodward Drilling Co., Inc. is exempt from establishment of a Hearing Conservation Program.

However, in the interests of employees' health, Woodward Drilling Co., Inc. does conduct a modified Hearing Conservation Program.

During the initial physical examination, all new employees are given an audiometric screening test which establishes a baseline for hearing acuity; and all employees are given audiometric surveillance tests during the annual monitoring physical.

Hearing Conservation

Further, employees are required to wear approved hearing protection on drill sites at all times during drilling operations, and in the shop areas when necessary.

All employees are required to wear approved hearing protection at any time at any work site when the noise level exceeds 85 db (decibels), or when the noise level is so intense that to be heard from 3 feet the voice has to be raised above a normal conversational level.

To support this program and encourage compliance:

- Training in hearing protection and use of ear protection is delivered during the initial 40 hour training and annual update;
- Woodward Drilling Co., Inc. provides a variety of approved hearing protection devices for all employees.

GENERAL SAFE PRACTICES
Personal Protection

Hard hats shall be worn on all drilling sites, shop or yard where work might be performed under heavy objects, or where there is the possibility of injury from falling objects; they shall be clearly marked as meeting ANSI Z89.1, Type A or B requirements.

Rings and jewelry shall not be worn during a work shift.

Hair shall be no longer than collar length or must be tied up above the collar.

Safety toe boots shall be worn at all times while in all work areas.

They will have a firm grip, non-slip design sole and flat heel made of puncture proof, chemical and moisture resistant material and comply with ANSI Z41.1 requirements.

Athletic/jogging type safety toe shoes will not be worn in any work area.

When necessary because of wet areas, mixing drilling chemicals, muds, or in contaminated areas, steel toe rubber boots shall be worn.

Employees shall have both types of boots available at the work site.

In addition to protection against chemicals, all drilling crew members and shop or yard personnel shall wear gloves for protection against cuts and abrasions which can occur when handling wire rope, and from sharp edges or burrs on drums, drill rods, or other drilling or sampling tools.

All gloves will be snug fitting with no loose cuffs or draw strings, and proper for the task.

Hearing protection is available and will be worn on all drilling sites when noise levels exceed 85 dB, or it is necessary to raise the voice above a normal conversational level to be heard.

Safety glasses shall be ANSI Z87.1 approved with side shields and will be worn on all drilling sites, or in the shop or yard during grinding operations or anytime when there is potential for eye injuries such as punctures, scrapes, cuts or burns from sharp objects, flying particles, or hazardous substances.

Face shields shall be worn over safety glasses when additional face shielding is required against flying particles and/or splash and spray of water or hazardous liquids.

Clear or shaded lens safety glasses will not be worn for any welding. Only helmets approved for arc welding, or welding glasses approved for gas welding shall be worn. (See Appendix)

Contact lenses will not be worn during a work shift in the shop or on any drill site.

INJURIES AND TREATMENT

No matter how minor, all injuries shall be reported to a supervisor immediately, who will complete and send an Industrial Injury Report (IIR 965, See Appendix) to the safety manager at the Rio Vista office as soon as possible following the injury.

First Aid Kits

Each rig is equipped with a fully supplied, approved first aid kit, and one is located in each of the shops break room. (See IISP, pg. 12)

All field personnel must successfully complete the Red Cross Standard First Aid and CPR training during the 40 hour health and safety class, and maintain current recertification as required.

First aid is emergency medical treatment rendered to an injured person to prevent further injury or death before proper medical treatment can be obtained.

An injury requiring more than first aid is considered serious.

Any seriously injured employee will be accompanied by another Woodward Drilling Co., Inc. employee and taken immediately to the nearest doctor or medical facility.

In the event of an accident on the job involving injury, the injured employee and the crew will be drug tested.

Any employee who becomes ill while at work shall report immediately to his supervisor.

PREVENTION AND PROTECTION (Fires)

Areas around shop equipment, rig decks and the ground area around the rig shall be kept free of oil and other materials which might create or aggravate fire hazards.

Combustible materials such as oily rags and waste shall be stored in covered metal containers and disposed of on a regular schedule.

When conditions require it, a 100' perimeter around the drill site shall be cleared and maintained free of dry combustible material such as grass or weeds.

Spills of any flammable liquid such as diesel or hydraulic fluid shall be immediately cleaned up with absorbent material and properly disposed.

All flammable liquids will be stored in clearly marked, approved containers.

Fire fighting equipment shall not be tampered with nor removed from their designated location except for fire protection or suppression.

Drill rigs will be equipped with a minimum of one 20# multipurpose ABC extinguisher; support vehicles will be equipped with a 5# ABC multipurpose extinguisher; and forklifts will be equipped with a 21/2# ABC multipurpose extinguisher.

Fire extinguishers shall be visually inspected monthly for condition and expiration date, and tag with date of annual inspection and inspector's name.

Extinguishers found to be damaged, unserviceable, expired or have been used shall be sent to the yard as soon as possible for replacement, and recharge by a qualified technician.

A maintenance inspection will be performed annually by a qualified technician.

Lifting and Carrying

Proper lifting techniques as instructed during training shall be used.

Whenever possible, heavy objects will be moved with the aid of hand trucks, forklifts or additional personnel.

When carrying loads with others, all should agree who is leading and what signals are to be used.

Load should not be released until all personnel are ready.

When carrying extended loads such as pipe, watch to avoid striking objects or other workers.

Loads shall not be carried so vision is obstructed.

Drums

Precautions shall be taken when handling full drums.

Gloves shall be used as hand protection against cuts caused by mill burrs or rough edges.

Hand hold shall be released before a hand or fingers can be pinched between other drums or objects.

Drums should be pushed away with feet not with hands. They should not be kicked.

Before drums are pulled over on their sides, all caps/bungs shall be securely in place, and there is sufficient clearance for hands and feet when laying drums down.

When opening closed drums that have been exposed to heat from the sun or other sources, personnel shall stand clear and open slowly until the pressure is relieved.

Material Storage

Bagged material shall be stacked by stepping back the layers and cross-keying bags at least every ten (10) bags high.

Bags around the outside of the stack shall be placed with the mouths of the bags facing the center of the stack.

During unstacking, the top tier shall be kept nearly level and the necessary setback maintained.

Materials shall be stacked so the weight is equally distributed, and do not project into passages or walkways, or fall over.

Material storage areas shall be kept orderly and free of trip hazards.

Material Storage *(continued)*

Pipe, drill rod, casing, augers, and similar cylindrical drill tools shall be stacked orderly on racks or sills to prevent spreading, rolling or sliding.

Unless in racks, pipe and well casing shall not be stacked higher than 5 feet.

Where a batten is used, the outside pipe or casing shall be securely choked, and each tier of pipe shall be tapered back at least one pipe or casing.

Flammable Materials

Oils, greases and other flammable materials shall be labeled and properly stored in approved containers in designated locations.

Materials Disposal

Scrap, trash and other junk material shall be disposed of properly.

Hazardous materials will be separated from non-hazardous waste and disposed of in containers provided for each type of material.

Drilling waste such as cuttings or decon water will not be removed from a drill site under any circumstances.

Waste oil will be disposed of in a designated waste oil tank.

Used oil filters will be drained of waste oil and deposited in a designated 55 gallon barrel for final disposal.

Spent batteries will be stored in a designated area for proper disposal.

Jacks and Jack Stands

No one shall work under any vehicle which is not properly supported by cribbing, jacks, or jack stands designed for that purpose.

Wheels will be blocked, leveling jacks lowered, and the hand brake set before working under any carrier/drill rig.

Rated capacity of any jack shall not be exceeded.

Jacks shall be properly maintained according to the manufacturer's recommendations, and shall be inspected before and after each use.

Jacks leaking hydraulic oil shall be taken out of service for replacement or repair.

Jacks shall not be thrown or dropped.

Handles of hydraulic jacks shall not be left down creating a tripping hazard.

Jack handle swing shall be unobstructed and personnel will stand aside before operating the jack.

Jacks shall be placed on clean level surfaces.

Hardwood blocking at least twice (2x) the size of the base shall be positioned under jacks used on any earthen surface.

·cks and Jack Stands (continued)

Unless a jack is designed to prevent load shifting, metal-to-metal contact between the jack head and the load shall not be permitted.

If necessary, a minimum 2" thick hardwood block larger than the jack head shall be used between the jack and the metal contact surface.

Wood or metal extenders shall not be used to increase a jack's lift

height. All lifts shall be vertical with the jack centered under the load.

After raising a load, it shall be supported by proper jack stands or substantial wooden blocking.

When several jacks are used to lift a heavy load, they shall be raised simultaneously a little at a time in order to keep the load level.

Hand Tools Their are a few general rules which apply to the safe use of several of the hand tools frequently used on and around drill rigs and in the maintenance shop.

The proper tool, in good condition shall be used for the job being performed.

All tools and equipment must be inspected and maintained on a regular basis.

If a tool is damaged, it will be repaired before use or replaced.

All repairs and replacement shall be made without delay.

Employees shall clean and return all tools, equipment and materials to their proper place when a job is finished.

Hand tools that have been subjected to high heat will not be used.

Aluminum pipe wrenches shall not be used.

Adjustable, pipe, end and socket wrenches shall not be used if the jaws are sprung or worn such that slippage might occur.

All pipe wrenches will be kept clean and in good repair.

Jaws of pipe wrenches shall be wire brushed frequently to prevent a buildup of dirt, pipe dope or grease which can cause the wrench to slip.

Hook and heel jaws will be replaced when they become visibly worn.

Pipe wrenches will not be used in place of a drill rod holding device.

Pipe wrench jaws will not be heated. Pliers or pipe wrenches shall not

be used to loosen or tighten nuts.

Tools such as drift pins, wedges and chisels shall be kept free of mushroomed heads.

Files without handles will not be used.

Wooden handles on hand tools shall be kept free of splinters and/or cracks and shall be kept tight on tools.

rinders/ Cut-off Machine *(Continued)*

Hands will be kept clear of cutting area.

All safety guards will be securely in place and properly adjusted before starting machine.

Work will be properly secured in machine vice before operation.

WELDING SAFETY

Employees performing welding, cutting, or heating shall be protected from welding hazards oy appropriate and approved personal protective equipment such as welding leathers, leather gauntlet gloves, welding helmet or welding glasses.

Safety glasses will not be used in place of proper welding glasses for welding or cutting.

Welding will not be done without proper eye protection.

All eye and face protection devices used when welding, cutting, chipping or grinding shall comply with the ANSI Z87.1 standard.

(See Appendix, Welding Lens Density Chart, for selection of proper welding lenses.)

When necessary, proper respiratory protection will be used.

All welding and cutting equipment and operations shall be in accordance with standards and recommended practices of ANSI Z49.1.

Workers and visitors shall be shielded from welding rays, flashes, sparks, molten metal, and slag.

Cables, hoses, and other equipment shall be kept clear of passageways, ladders, and stairways.

All welding, cutting, and metal heating operations shall be ventilated (natural or mechanical) such that personnel exposures to hazardous concentrations of airborne contaminants are kept within acceptable limits.

Before welding or heating any surface covered by preservative coating whose flammability is not known, a test shall be made to determine its flammability: the coating will be scraped and shall be considered highly flammable when scrapings burn with extreme rapidity.

Preservative coatings shall be removed a sufficient distance from the work area to ensure the temperature of the exposed area will not be appreciably raised. Artificial cooling of the metal surrounding the work area may be used to limit the size of the area to be stripped.

Gas Welding

Oil or other petroleum products shall not be used on any threaded portions of oxygen/ acetylene cylinders or gauges.

Regulators shall not be forced onto a cylinder valve.

Regulators shall not be over tightened when installing on cylinders.

"Creeping" regulators, faulty regulators which will not maintain a constant set pressure, shall not be used.

Pressure will not be left on unattended regulators.

Compressed Gas Cylinders

Compressed gas cylinders shall be secured by two chains when in an upright position.

When not in use, the protective cap shall always be in place.

When in storage, all compressed gas cylinders shall be separated from flammables by a noncombustible barrier with at least a half-hour fire rating, or kept at least 20 feet from flammables.

Unless protected by a guard integral to the body of a vehicle, compressed gas cylinders shall only be transported with gauges removed, cylinders properly secured and protective caps in place.

All empty cylinders shall be suitably marked as "EMPTY" or "MT."

Employees will stand to one side and slowly open compressed gas bottles.

Oxygen Cylinders

Oxygen cylinders when transported in a horizontal position shall be properly blocked or secured to prevent rolling or movement.

Oxygen shall not be used as a substitute for compressed air.

Oxygen cylinders shall be stored in an area separate from acetylene.

Oxygen cylinder valve shall be fully open when in use.

Oxygen regulator setting shall not exceed the normal 40 psi working pressure.

Oxygen cylinders shall not be moved with oily hands or gloves.

Acetylene Cylinders

Acetylene bottles shall never be laid down, and shall always be stored or transported in a secure, upright position.

When in use, the acetylene valve shall only be opened 1/4 turn.

Acetylene regulator discharge setting shall not exceed the 15 psi safe working pressure.

If not equipped with a shut-off wheel, the square key wrench or other suitable tool shall be kept with the acetylene cylinder for emergency shut-off.

The acetylene valve shall be pointed away from the oxygen cylinder when in tandem.

Arch Welding

Electric arc welding requires the use of welding helmets fitted with No. 10 or darker filter lenses.

Anyone helping an arc welder shall also wear a No. 10 or darker filter lens.

See Appendix, Welding Lens Density Chart for correct welding lens.

Protection shall be provided for coworkers when welding at night.

Arc welders shall not stand on wet floor or come in contact with a grounded surface.

Arc Welding *(continued)*

All welder-generators shall be properly grounded to vehicles before use.

When welding casing joints together as they are going in the hole, the ground clamp shall be connected to the casing or casing clamp, not the rig.

All welding leads shall be regularly inspected and maintained in good, safe working order.

Cables shall be completely insulated, flexible and capable of carrying the maximum current required for the job.

Coiled welding cable shall be spread out before use.

Cables with splices or repaired insulation within 10 feet of the stinger shall not be used.

When it becomes necessary to connect or splice lengths of cable together, insulated connectors of a capacity at least equivalent to the cable shall be used.

If connections are made by cable lugs, they shall be securely fastened together to provide good electrical contact, and the lug's exposed metal parts shall be completely insulated.

ELECTRICAL SAFETY

Makeshift wiring and equipment will not be permitted.

All wiring will be installed using high quality connectors, fixtures and wire insulated and protected with consideration for a drilling environment.

All wiring and fixtures used to provide electricity for drilling operations shall be installed by qualified personnel in accordance with the National Fire Code (NFPA 70-1984) with consideration of the American Petroleum Institute's recommended practices for electrical installations for production facilities (API-RP-500B).

Live parts of wiring or equipment shall be guarded to protect all persons or objects from harm.

Electrical cables will be guarded and located to prevent damage by drilling operations or by the movement of personnel, tools, or supplies.

Patched, oil soaked, worn or frayed electrical cords shall not be used.

All extension cords shall be of the 3-wire, grounded type of the proper amperage rating for the intended use.

All electrical tools shall have three-pronged, U-blade plugs.

All plug receptacles will be three-pronged, U-blade, grounded type and of the proper amperage rating for the tools that may be used.

Electrical hand tools shall be plugged into a circuit equipped with an approved ground fault circuit interrupter (GFCI).

Electrical tools with "lock-on" devices shall not be used.

All electrical welders, generators, control panels and similar devices shall be properly grounded.

ELECTRICAL SAFETY *(continued)*

Hands, boots and clothing shall be dry when handling electrical equipment.

Control panels, fuse boxes, transformers and similar equipment shall be installed in an approved, properly secured, protective enclosure.

Before working on electrical power or lighting systems, the main distribution panel box will be locked-out and the key shall be kept in personal possession of the employee performing the work until the work is completed.

Power shall be turned off before changing fuses or light bulbs, or performing any repair or maintenance.

Drill Site Lighting

Drilling projects sometimes require working at night or around the clock and require temporary electrical lighting.

All lights in the working areas of drill sites shall be enclosed in cages or similar enclosures to prevent loose or detached lamps or vapor tight enclosures from falling on workers.

Portable light towers will be used when necessary and will exceed the OSHA required 5 foot candles of illumination.

Lights shall be installed in a manner so as to produce the least possible glare or blind spots on tools, ladders, walkways, platforms and the entire work area.

Electric lighting cables shall not be attached to the derrick or other components or the drill rig. If this must be done, only approved fasteners shall be used.

Electrical wiring shall not be "strung" through the derrick.

Poles used to hold wiring and lights shall not be used for any other purpose.

Only plastic ANSI Z89.1 or ANSI Z89.2 approved hard hats shall be worn when electrical lighting is used.

Battery Service

Extreme caution will be used when servicing batteries.

Batteries will only be serviced in well ventilated areas while wearing safety glasses and a face shield.

When removing or charging a battery, the ground cable will be disconnected first to avoid the possibility or making a spark which could ignite flammable battery gases. For the same reason, when installing a battery, the ground will be connected last.

When charging a battery, the power source to the charger will be shut off before connecting or disconnecting the charger leads to the battery posts.

Before charging, cell caps shall be loosened to permit the escape of any explosive hydrogen gas generated during charging.

Cells shall be kept filled with electrolyte.

Battery Service *(continued)*

If necessary to visually check electrolyte level, only a flashlight will be used.

All tools shall kept off battery tops.

Spilled battery acid can burn skin and damage eyes.

In the event of a splash, immediately rinse acid from your skin with lots of cool water.

If acid should get in the eyes, flush immediately with large amounts of cool water for at least 15 minutes, and get medical attention at once.

VEHICLE MAINTENANCE

Except for those repairs or adjustments that can only be made with the engine running, the vehicle engine shall be shut down to make repairs, adjustments, or for lubrication.

During maintenance the ignition key shall be tagged as out of service, or the ignition key will be removed to prevent accidental starting of an engine.

When possible and appropriate, the drill rig shall be reduced to "zero energy state" by relieving pressure on all hydraulic, drilling fluid, and air systems prior to performing maintenance.

Caution will be used when opening drain plugs, radiator caps, and other plugs and caps that might be under pressure.

Before returning the carrier/rig to service, all caps, filler plugs, protective guards or panels, high pressure hose clamps, chains or cables that may have been removed for maintenance will be replaced.

A hot engine or exhaust system will not be touched until it has had time to cool.

FUEL SAFETY

Fuels shall never be used as cleaning solvents.

Fuels shall only be stored or transported in red, approved portable containers equipped with internal flame arresters, and the fuel type clearly marked on the container.

To allow for temperature expansion, portable containers shall not be completely filled.

Fuels shall never be transported inside of cars or truck cabs.

Fuels shall not be poured, handled or stored in open plastic or glass containers, in unventilated areas, near sources of flame, near electrical equipment, or near combustible materials such as cloth, cardboard boxes, paper, etc.

Fuels shall not be siphoned by mouth.

Electrical anti-static bonding cables will be properly connected between the carrier/rig equipment and other vehicle before fueling.

All electrical equipment, heaters in carrier cabs shall be turned off when fueling the carrier or drill rig, or other vehicle.

No smoking or open flame within 50 feet of fuel islands.

All fuel tanks shall be marked appropriately, and care shall be taken to ensure the correct fuel is put into the proper tank.

Only the type and quality of fuel recommended by the engine manufacturer will be used.

Do not spill fuel on hot surfaces; clean up any spillage before starting an engine.

Wool or metallic cloth or other material which can create static electricity will not be used to wipe up spills.

Spilled fuels or other flammable liquids will be contained with adsorbed material and disposed of properly.

OFFICE SAFETY

Desk drawers and file drawers shall be kept closed when not in use.

Heavy materials shall not be stored on top of file cabinets.

Office machine cords shall be kept out of walkways or properly covered to prevent tripping hazards or damage to cords.

Any defective electric cords, light fixtures or switches shall be reported immediately.

Broken glass or other sharp objects shall not be placed in waste baskets.

Razor blades or other sharp objects shall not be left loose in desk drawers. Store such items in a suitable container.

Smoking is not allowed in any office area.

VDTs will be mounted so that their position and height can be adjusted to reduce glare and for general operator comfort.

Chairs will be so designed that their height and position can be adjusted for proper sitting posture, and to prevent tipping.

CODE OF SAFE PRACTICES: SECTION ONE - SAFETY PROGRAM

APPENDICES

- Welding Lens Density Chart
- Industrial Accident Report

WELDING LENS DENSITY

Filter lenses or plates used in welding operations shall be in accordance with the following table.

These are minimum densities. Shades more dense than those listed may be used to suit an individual's needs.

Required Shades for Filter Lenses and Glasses in Welding, Cutting, Brazing, and Soldering:

OPERATION	SHADE NUMBER
Soldering	2
Torch Brazing	3 or 4
Cutting: Light < 1"	3 or 4
Medium, 1 to 6"	4 or 5
Heavy, > 6"	5 or 6
GAS WELDING:	
Light up to 1/8"	4 or 5
Medium 1/8" to 1/2"	5 or 6
Heavy 1/2" + 6 or 8	
ARC WELDING:	
Inert-gas metal-arc 1/16" to 5/32" electrodes (nonferrous)	11
1/16" to 5/32" electrodes (ferrous)	12
Shielded metal-arc welding: 1/16" to 5/32" electrodes	10
3/16" to 1/4"	12
5/16" to 3/8"	14
Carbon arc welding	14

Gas Welding

Hoses shall be inspected frequently for cracks, abrasions, and loose connections, and shall be replaced if found defective.

Fuel gas and oxygen hoses shall be readily distinguishable from each other, and shall not be interchangeable

When parallel runs of oxygen and fuel gas hose are taped together, not more than 4 out of every 12 inches shall be covered by tape.

Hoses that have been contaminated by oil, grease or other petroleum products shall not be used.

Before lighting the torch for the first use each working shift, hoses shall be purged individually.

Hoses extended over the ground or shop floor shall be kept free of kinks or loops.

Matches, lighters or hot metal shall not be used in place of proper friction lighters to light torches.

Defective torches shall not be used, and shall be inspected at the beginning of each working shift for leaking shut off valves, hose couplings and tip connections.

Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills or other devices designed for such purposes.

Torch valves shall be closed and the gas supply valves will be shut off whenever work is suspended.

No cutting or welding on or near any container that contains or may have contained any flammable or explosive material.

Cutting or welding shall not be done directly on concrete.

When cutting any container with a closed bottom, the welder's face shall be kept to one side.

Cutting or welding shall not be performed in hazardous locations.

Cutting or welding shall not be performed near flammable vapors, liquids, dust, or loose combustible material.

When possible, all combustibles shall be moved at least 30 to 40 feet from the cutting/ welding area.

Welder shall not be in such a position as to allow cutoffs to fall on feet, legs or other body parts.

When finished welding or cutting, material shall be marked "HOT" with soapstone.

When welding or cutting in the field, fire extinguishers shall be readily available, and a spotter will be used to watch sparks and slag.

Woodward Drilling Co., Inc

INDUSTRIAL INJURY REPORT

PLEASE PRINT CLEARLY AND CMPLETE EVERY BLANK

INJURED EMPLOYEE _____ RIG # _____

EMPLOYEES JOB TITLE _____ SUPERVISOR _____

LOCATION OF ACCIDENT _____ DRILL/CREW CHIEF _____

CREW MEMBERS _____

_____ _____ _____
(CITY) (COUNTY)

DATE OF INJURY _____ _____ AM PM

WITNESSES _____ _____

_____ _____

_____ _____
(NAME) (ADDRESS)

DISCRIPTION OF EMPLOYEES ACTIVITIES AT THE TIME OF THE INJURY. _____

_____

_____

_____

_____

_____

HOW DID THE INJURY/ACCIDENT OCCUR? _____

_____

_____

_____

_____

_____

DESCRIBE IN DETAIL THE INURY. (Be specific, right or left, upper or lower, front or back.) _____

_____

_____

_____

_____

_____

_____

IS THIS A LOST TIME INJURY? YES NO

WAS INJURED EMPLOYEE SENT TO DOCTOR? YES NO

IF YES, WHO TOOK INJURED EMPLOYEE? _____

NAME OF DOCTOR OR HOSPITAL _____

WAS SUPERVISOR PRESENT? YES NO

SIGNATURE OF SUPERVISOR _____

DATE OF REPORT _____

(USE REVERSE SIDE FOR COMMENTS, IF NECESSAARY)

APPENDIX D

GENERAL FIELD PROCEDURES

GENERAL FIELD PROCEDURES

A description of the general field procedures used during site investigation and monitoring activities is presented below. For an overview of protocol, refer to the appropriate section(s).

DRILLING AND SOIL SAMPLING

Soil borings are drilled using continuous-flight, hollow-stem augers. Borings that are not completed as monitoring wells are grouted to within 5 feet of the ground surface with a cement/bentonite slurry. The remaining 5 feet is filled with concrete.

Soil samples are obtained for soil description, field hydrocarbon vapor screening, and possible laboratory analysis. Soil samples are retrieved from the borings by one of two methods: 1) continuously, using a 5-foot-long, continuous-core barrel sampler advanced into the soil with the lead auger; sample tubes are driven into the core with a mallet, or 2) at 2.5- or 5-foot intervals, using a standard split-spoon sampler lined with four 1.5-inch-diameter stainless steel or brass sample inserts. The split-spoon sampler is driven approximately 18 inches beyond the lead auger with a 140-pound hammer dropped from a height of 30 inches.

For hand auger borings and hand-held, power-driven auger borings, soil samples are retrieved using a hand-driven slide hammer lined with a 1.5-inch-diameter stainless steel sample tube.

During drilling activities, soil adjacent to the laboratory sample is screened for combustible vapors using a combustible gas indicator (CGI) or equivalent field instrument. For each hydrocarbon vapor-screening event, a 6-inch-long by 2.5-inch-diameter sample insert is filled approximately 1/3 full with the soil sample, capped at both ends, and shaken. The probe is then inserted through a small opening in the cap, and a reading is taken after approximately 15 seconds and recorded on the boring log. The remaining soil recovered is removed from the sample insert or sampler, and described in accordance with the Unified Soil Classification System. For each sampling interval, field estimates of soil type, density/consistency, moisture, color, and grading are recorded on the boring logs.

SOIL SAMPLE HANDLING

Upon retrieval, soil samples are immediately removed from the sampler, sealed with Teflon sheeting and polyurethane caps, and wrapped with tape. Each sample is labeled with the project number, boring/well number, sample depth, geologist's initials, and date of collection. After the samples have been labeled and documented in the chain of custody record, they are placed in a cooler with ice at approximately 4 degrees Celsius (°C) prior to and during transport to a state-certified laboratory for analysis. Samples not selected for immediate analysis may be transported in a cooler with ice and archived in a frostless refrigerator at approximately 4°C for possible future testing.

MONITORING WELL INSTALLATION

Monitoring wells are constructed of 2-inch-diameter, flush-threaded Schedule 40 PVC blank and screened (0.020-inch slot size) casing. Where possible, the screened interval will extend at least 10 feet above, and 10 to 20 feet below, the top of the groundwater table. The annular space surrounding the screened casing is backfilled with No. 3 Monterey sand (filter pack) to approximately 2 feet above the top of the screened section.

During well construction, the filter pack is completed by surging with a rig-mounted surge block. A 3-foot-thick bentonite annular seal is placed above the filter pack. The remaining annular space is grouted with Portland cement and/or bentonite grout to the surface. Utility access boxes are installed slightly above grade. Locking, watertight caps are installed to prevent unauthorized access to the well, and limit infiltration of surface fluids.

FLUID LEVEL MONITORING

Fluid levels are monitored in the wells using an electronic interface probe with conductance sensors. The presence of liquid-phase hydrocarbons is verified using a hydrocarbon-reactive paste. The depth to liquid-phase hydrocarbons and water is measured relative to the well box top or top of casing. Well boxes or casing elevations are surveyed to within 0.02 foot relative to a county or city benchmark.

GROUNDWATER PURGING AND SAMPLING

Groundwater monitoring wells are purged and sampled in accordance with standard regulatory protocol. Typically, monitoring wells that contain no liquid-phase hydrocarbons are purged of groundwater prior to sampling so that fluids sampled are representative of fluids within the formation. Temperature, pH, and specific conductance are typically measured after each well casing volume has been removed. Purging is considered complete when these parameters vary less than 10% from the previous readings, or when four casing volumes of fluid have been removed. Samples are collected without further purging if the well does not recharge within 2 hours to 80% of its volume before purging.

The purged water is either pumped directly into a licensed vacuum truck or temporarily stored in labeled drums prior to transport to an appropriate treatment or recycling facility. If an automatic recovery system (ARS) is operating at the site, purged water may be pumped into the ARS for treatment.

Groundwater samples are collected by lowering a 1.5-inch-diameter, bottom-fill, disposable polyethylene bailer just below the static water level in the well. The samples are carefully transferred from the check-valve-equipped bailer to 1-liter and 40-milliliter glass containers. The sample containers are filled to zero headspace and fitted with Teflon-sealed caps. Each sample is labeled with the project number, well number, sample date, and sampler's initials. Samples remain chilled at approximately 4°C prior to analysis by a state-certified laboratory.

CHAIN OF CUSTODY PROTOCOL

Chain of custody protocol is followed for all soil and groundwater samples selected for laboratory analysis. The chain of custody form(s) accompanies the samples from the sampling locality to the laboratory, providing a continuous record of possession prior to analysis.

DECONTAMINATION

Drilling and Soil Sampling

Drilling equipment is decontaminated by steam cleaning before being brought onsite. The augers are also steam cleaned before each new boring is commenced. Prior to use, the sampler and sampling tubes are brush-scrubbed in a Liquinox and potable water solution and rinsed twice in clean potable water. Sampling equipment and tubes are also decontaminated before each sample is collected to avoid cross-contamination between borings.

Groundwater Sampling

Purging and sampling equipment that could contact well fluids is either dedicated to a particular well or cleaned prior to each use in a Liquinox solution followed by two tap water rinses, prior to analysis.