TRC

Customer-Focused Solutions

# AMENDED SITE ASSESSMENT WORKPLAN

March 10, 2003

Quik Stop No. 56
3132 Beaumont Ave
Oakland, California

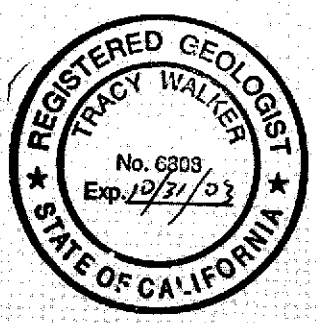
Prepared For:
Quik Stop Markets Inc.

Prepared by:

Tracy L. Walker
for Mark Trevor
Staff Geologist

Approved by:

Tracy L. Walker
Tracy L. Walker R.G.
Associate




TRC
Concord, California

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## 1.0 INTRODUCTION

On behalf of Quik Stop Market Incorporated (Quik Stop), TRC submits this Amended Site Assessment Workplan for Quik Stop Station No. 56 located at 3132 Beaumont Avenue, in Oakland, California (Figure 1). This workplan is an amendment to the *Site Assessment Workplan* prepared by TRC and dated February 25, 2002. The work cited in this document is being performed as requested in a letter dated November 26, 2002, from the Alameda County Health Care Services (ACHCS) to Quik Stop.

## 2.0 PROJECT OBJECTIVES AND SCOPE OF WORK

The objective of this investigation is to assess the lateral and vertical extent of the hydrocarbon plume on- and off-site. As indicated in the November 26, 2002 letter from the ACHCS, the distribution of a depth-discrete monitoring network should be determined by the results of soil borings. TRC proposes to complete borings at five downgradient locations; both on and off-site. The results of the proposed soil borings will be used to identify the locations of wells for a proposed groundwater monitoring network.

The scope of work for this assessment includes the following:

- Advancement of one on-site direct-push soil boring to 60 feet below grade (fbg).
- Advancement of four off-site direct-push soil borings to 60 fbg.
- Collection of groundwater samples from the first and second water-bearing zones for analysis at a state-certified laboratory.
- Collection of soil samples for analysis at a state-certified laboratory.
- Perform an Underground Conduit Survey.
- Summarize historic groundwater flow direction and gradient.
- Preparation of a final technical report documenting soil boring activities, groundwater sampling procedures, laboratory results, waste characterization and disposal.

## 3.0 SITE DESCRIPTION

The site is currently operated as a Quik Stop Market convenience store/gasoline service station (Figure 2). The site is surrounded by three city streets, Beaumont Avenue, 14$^{th}$ Avenue, and East 32$^{nd}$ Street (Figure 2). Most of the surrounding land use is residential, consisting of apartment and single-family buildings. Alameda County Medical Center is located approximately 300-feet to the southwest on Beaumont Avenue.

The site is at an elevation of approximately 140 feet above mean sea level. The topography generally slopes to the southwest. The site is located in the eastern part of the San Francisco Bay

area, and is underlain by Quaternary (Pleistocene) alluvium (ACFCD, 1993). This alluvium consists of coalescing alluvial fans, and estuarine and marine deposits. These deposits are heterogeneous inter-fingering layers of clayey gravel, sandy silty clay, and various clay-silt-sand mixtures, and have a maximum thickness of about 200 feet beneath the site. Soil types beneath the site consist of silty and sandy clays from the surface to a depth of approximately 13 fbg, silty sand or clayey silt from approximately 13 to 25 fbg, and silty clay from approximately 25 to 33 fbg.

The site is located in the East Bay Plain Groundwater Basin, Oakland Upland and Alluvial Plain Subarea (DWR, 1975; ACFCD, 1993). Regionally, shallow groundwater occurs in numerous small, discontinuous aquifers within the unconsolidated Quaternary alluvium (Godfrey, 1995), and generally flows to the southwest toward the San Francisco Bay (ACPWA, 1999). The local depth to shallow, confined groundwater is between 6 and 10 fbg. Groundwater beneath the site flows to the southwest with a hydraulic gradient of 0.116 ft/ft.

## 4.0 SITE BACKGROUND

### 4.1 Previous Investigations

**September 1998:** Two 10,000-gallon steel gasoline underground storage tanks (USTs) were excavated and removed from the site (Garlow, 1998). These tanks were replaced with two 12,000-gallon double-walled, fiberglass USTs. During the upgrade activities, approximately 792 cubic yards of soil were excavated to remove potentially impacted soil and accommodate the new orientation of the USTs. All excavated soil was transported under manifest to Forward Landfill in Manteca, California for disposal.

Soil samples collected during the removal of the USTs were below laboratory reporting limits for total petroleum hydrocarbons as gasoline (TPH-g), benzene, toluene, ethylbenzene, and total xylenes (BTEX), and methyl tert-butyl ether (MtBE), except for 0.53 milligrams per kilogram (mg/kg) MtBE detected in one sample at the south corner of the USTs (SW-1), and 240 mg/kg TPH-g, 0.85 mg/kg ethylbenzene, and 130 mg/kg total xylenes in soil sample SW-2. Grab water samples were also collected from the bottom of the excavation and analyzed.

**February 2000:** Three groundwater monitoring wells (MW-1, MW-2, and MW-3) were installed at the locations shown on Figure 2. Minor TPH-g was detected in a soil sample collected from MW-1 at 6.5 fbg (2.9 mg/kg), but was not detected in all other soil samples collected. Minor MtBE concentrations were detected in soil samples from MW-1 at depths ranging from 6.5 to 21.5 fbg, and MW-3 at 6 and 11 fbg. Detected MtBE concentrations in soil ranged from 0.0083 to 0.66 mg/kg. Benzene was detected at 0.038 mg/kg in one soil sample from MW-3 collected at 11 fbg. Toluene and ethylbenzene were not detected in any of the soil samples. Minor xylene concentrations were detected in MW-1 at 6.5 fbg (0.0097 mg/kg) and MW-3 at 11 fbg (0.019 mg/kg).

Groundwater monitoring has been conducted at the subject site beginning with the installation of monitoring wells and continuing to present. Groundwater has been analyzed for TPH-G, BTEX and MtBE. During this period, all three wells have consistently had non-detectable amounts of BTEX compounds. Monitoring well MW-1, located downgradient from the former UST's has been the only well with detectable concentrations of MtBE and TPH-G. The Fourth Quarter 2002 Progress Report (TRC, 2003) shows that MtBE and TPH-G concentrations were detected in MW-1 at 39,000 and 17,000 ug/L, respectively.

## 4.2 Conduit and Well Survey

A well survey using Department of Water Resources (DWR) well installation records was performed for this site as requested by the ACHCS. On March 3, 2003, TRC personnel conducted field reconnaissance to verify the existence of wells and to identify the locations of additional sensitive receptors such as utility conduits and surface water bodies.

Well Completion Reports obtained from the California Department of Water Resources (DWR) indicate that no municipal or domestic wells are located within 2,000 feet of the site (Figure 1). Field reconnaissance of the site vicinity also did not reveal the existence of any wells within 2,000-feet of the site.

During the site visit on March 3, 2003, two Pacific Gas and Electric Company (PG&E) vaults and five traffic signal vaults were identified adjacent to the site (Figure 3). The PG&E vaults serve as gas main access points, however, the direction of the gas line could not be determined from visual observations of the site. Five utility conduits were identified near the site: a sanitary sewer line, a storm sewer line, a water line, an electrical line and a phone line (Figure 3). The highest concentration of utility conduits is beneath Beaumont Avenue. Four storm drains were observed southwest of the site at the confluence of 14$^{th}$ Avenue, Beaumont Avenue and East 31$^{st}$ Street.

No natural surface water bodies exist in the immediate area. The nearest surface water body is Lake Merrit, located approximately 1 mile west of the site. No basements were observed within the immediate surroundings of the subject site.

## 4.3 Historical Gradient

As requested by the ACHCS, TRC evaluated groundwater monitoring data from the Second Quarter 2000 to present to determine the historical groundwater flow direction and gradient. Flow direction and gradient as determined by monitoring wells MW-1, MW-2 and MW-3 is predominantly in a southwesterly direction. This is consistent with local topography. The flow gradient ranges from 0.05 to 0.10, however it is most commonly 0.08. A rose diagram showing groundwater flow direction and gradient is presented in Figure 4. The data compiled to create the diagram is presented in Table 1.

## 5.0 SITE ASSESSMENT ACTIVITIES

### 5.1 Pre-Field Work Activities

Underground Services Alert (USA) will be notified at least two days prior to field activities to mark underground utilities near the boring locations. Boring permits will be obtained from the Alameda County Public Works Agency. Prior to drilling each boring, a pilot-hole will be hand augured to approximately 5 fbg 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 A. 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.

### 5.2 Soil Boring Activities

Borings will be advanced to a maximum depth of 60 fbg. If a second water-bearing zone is encountered, a second discrete grab groundwater sample will be collected for the purpose of characterizing the vertical extent of dissolved-phase hydrocarbons, including MTBE. If a second water-bearing zone is not encountered within 60 feet of the ground surface, the boring will be terminated.

The borings will be advanced using direct-push methods. The locations of the borings are shown on Figure 2. The proposed locations may be adjusted based on access and interfering utilities. Soil samples will be collected using a 4-foot-long continuous core barrel to total depth. This method will provide a detailed description of the subsurface lithology and hydrostratigraphy. Soil will be logged in accordance with the Unified Soil Classification System (ASTM D-2487). Samples will be collected for soil description, field hydrocarbon vapor testing, and analysis at a state-certified laboratory. General field procedures to be followed during this investigation are discussed in Appendix B.

### 5.3 Soil Sampling

Soil samples collected during direct-push activities will be screened in the field using a hand-held photo-ionization detector (PID). Two soils samples will be collected from each boring and held for laboratory analysis, if deemed necessary. The soils samples will be analyzed only if petroleum hydrocarbons are detected in the groundwater sample from the associated boring. If a second-water bearing zone is not encountered within 60 feet below surface grade, one soil sample will be collected from the maximum depth of the soil boring and submitted to a State-certified laboratory for analysis. The selected soil samples will be properly preserved and transported to the laboratory under appropriate chain-of-custody protocol.

Selected soil samples will be analyzed for the following:

- TPH-G by EPA Method 8015;
- BTEX, MTBE, Di-isopropyl ether (DIPE), Ethyl Tertiary Butyl Ether (ETBE), Tertiary Amyl Methyl Ether (TAME), and Tertiary Butyl Alcohol (TBA) using EPA Method 8260.

5.4 Hydropunch Groundwater Sampling

A grab groundwater sample will be collected from the first and second water-bearing zone using a Hydropunch® sampling device. The Hydropunch® consists of a stainless steel probe, which is advanced into the water-bearing zone, then withdrawn to expose an internal screen. Groundwater will be collected from inside the screen using a bailer, placed in appropriate sample bottles, and labeled with a unique identification number. The sample will be placed in an ice-chilled cooler and transported to a state-certified analytical laboratory under proper chain-of-custody protocol. The laboratory will analyze the groundwater sample for the following:

- TPH-G by EPA Method 8015;
- BTEX, MTBE, Di-isopropyl ether (DIPE), Ethyl Tertiary Butyl Ether (ETBE), Tertiary Amyl Methyl Ether (TAME), and Tertiary Butyl Alcohol (TBA) using EPA Method 8260.

After sampling is completed, the 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 grade level in one continuous pour.

5.4 Soil and Groundwater Disposal

Soil and wastewater generated during site assessment activities will be stored on-site in Department of Transportation (DOT) approved 55-gallon drums. The waste will remain on-site until the proper method for disposal is assessed. Waste manifests will be prepared for proper transport and disposal of the waste.

5.5 Technical 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 be submitted to the California Regional Water Quality Control Board and the ACHCS within six weeks of the completion of the field activities.

## 6.0 WORK SCHEDULE

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

- Agency approval of workplan 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.

## 7.0 REFERENCES

ACFCD, 1993. Geology Framework of the East Bay Plain Groundwater Basin, Alameda County, California; Alameda County Flood Control and Water Conservation District, August 1993.

ACPWA, 1999. Frank Codd, Alameda County Public Works Agency, Personal Communication via Facsimile (map of groundwater levels in the City of Oakland area); November 16.

DWR, 1975. Sea-Water Intrusion in California, Inventory of Coastal Ground Water Basins; California Department of Water Resources, Bulletin No. 63-5; October.

Godfrey, 1995. Andreas Godfrey, Alameda County Public Works-Water Resources Section, Personal Communication; May 22.

Gregg Drilling, 1999. Web Page, www.greggdrilling.com/water_table_n.html; November 10.

TRC, 2002. Quarterly Progress Report, Fourth Quarter, 2002, December 13, 2002.

FIGURES

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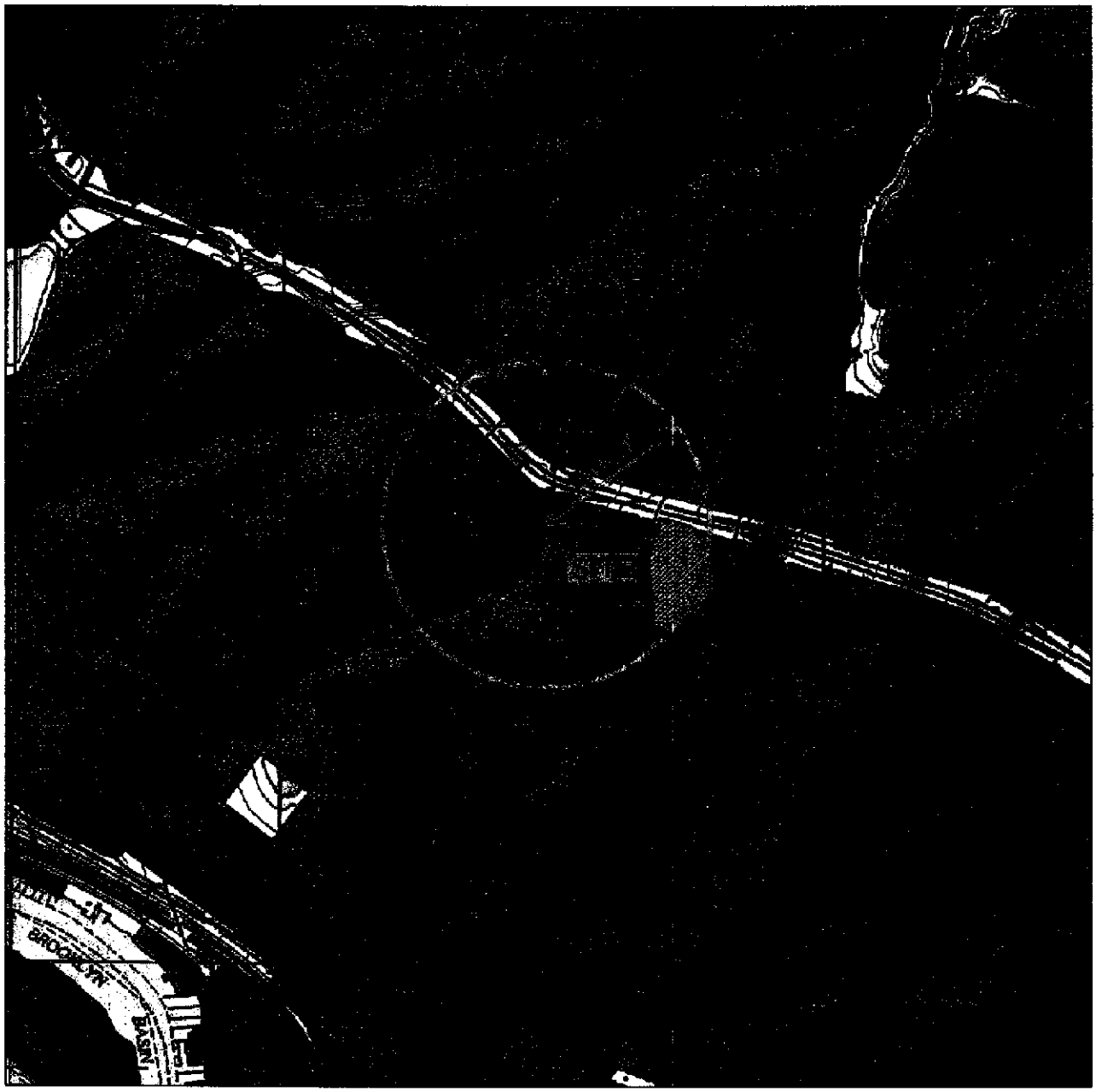



1 MILE 3/4 1/2 1/4 0 1 MILE

SCALE 1 : 24,000

N


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

**VICINITY MAP SHOWING 2,000-FT. RADIUS AROUND SITE**

Quik Stop No. 56
3132 Beaumont Avenue
Oakland, California

TRC | **FIGURE 1**

EAST 31st STREET

BEAUMONT AVENUE

EAST 32ND STREET

14TH AVENUE

PARKING LOT

PG&E GAS

QUIK STOP MARKET #56

SIDEWALK

PLANTER AREA

CONCRETE WALKWAY

STORAGE

PLANTER

MW-2

PARKING

A/C

DRIVEWAY

CONCRETE

DISPENSER ISLAND (UNDER CANOPY)

UST

MW-3

MW-1

LOGO/ PRICE SIGN

APPROXIMATE LIMITS OF EXCAVATION

APPROXIMATE LOCATION OF FORMER USTs

APPROXIMATE LOCATION OF MEDICAL BUILDING

ALAMEDA COUNTY MEDICAL CENTER

?

LEGEND

MW-1 Monitoring Well

Electric Line

Phone Line

Sanitary Sewer and Manhole

? Storm Sewer (Approximate)

Water Line

Storm Drain

Electrical Vault

N

APPROXIMATE SCALE (FEET)

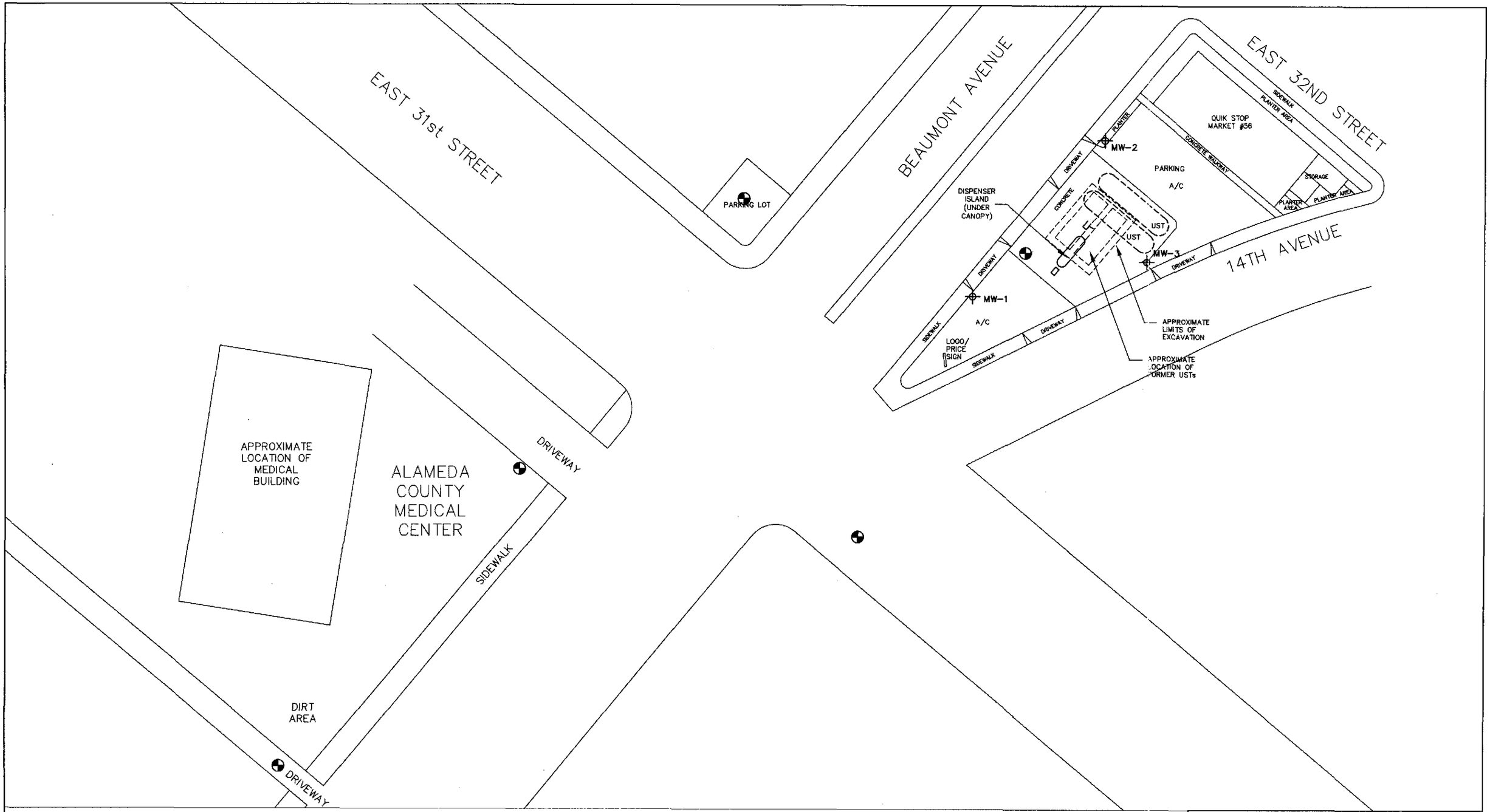
0 40 80

**SITE PLAN SHOWING UTILITY CONDUITS**

Quik Stop No. 56
3132 Beaumont Avenue
Oakland, California

TRC

**FIGURE 3**




LEGEND

MW-1 — Monitoring Well

Proposed Boring Location

N

APPROXIMATE SCALE (FEET)

0 40 80

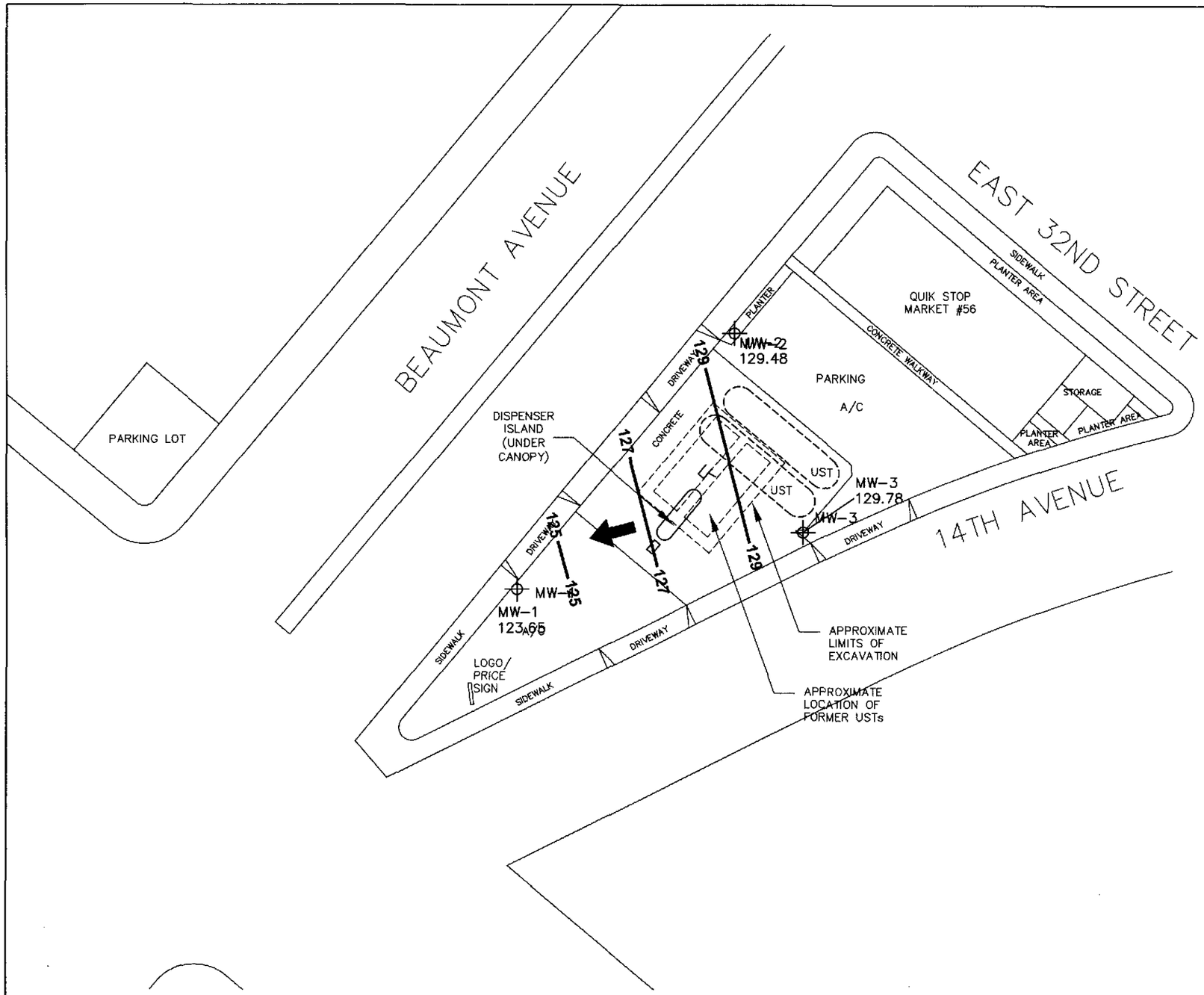
SOURCE: Client-provided drawings and Garlow, 1998. Site plan updated per 11/27/01 well survey by Doble Thomas Associates.

**SITE PLAN SHOWING PROPOSED BORING LOCATIONS**

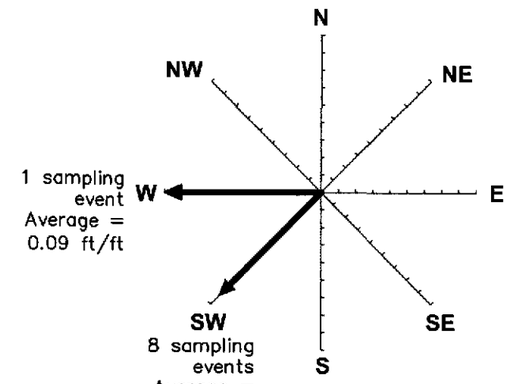
Quik Stop No. 56
3132 Beaumont Avenue
Oakland, California

TRC

**FIGURE 2**




**HISTORICAL GROUNDWATER FLOW DIRECTIONS:**
**4th Quarter 2000 - 4th Quarter 2002**
NOTE: Gradients are average magnitudes for each direction. Each tick = 0.01 ft/ft.




LEGEND

| | |
|---|---|
| MW-1 ⊕ | Monitoring Well |
| 123.65 | Groundwater Elevation in Feet Above Mean Sea Level |
| 129 ——— | Groundwater Elevation *Contour Line* |
| ◀ | General Direction of Groundwater Gradient |

NOTES:
Contour lines are interpretive based on *fluid level measurements taken on October 21, 2002.*
Contour interval = 2 feet.
SOURCE: Client-provided drawings and Garlow, 1998. Site plan updated per 11/27/01 well survey by Doble Thomas Associates.

APPROXIMATE SCALE (FEET)
0 30 60

N

**GROUNDWATER ELEVATION CONTOUR MAP**
**October 21, 2002**
Quik Stop No. 56
3132 Beaumont Avenue
Oakland, California

TRC | **FIGURE 4**

TABLES

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**Historic Groundwater Flow Direction and Gradient**
Quik Stop 56
Oakland, CA

| Quarterly Report (TRC) | Flow Direction | Gradient |
|---|---|---|
| Fourth Quarter, 2002 | southwest | 0.08 |
| Third Quarter, 2002 | southwest | 0.08 |
| Second Quarter, 2002 | southwest | 0.08 |
| First Quarter, 2003 | southwest | 0.10 |
| Fourth Quarter, 2002 | southwest | 0.09 |
| Third Quarter, 2002 | southwest | 0.05 |
| Second Quarter, 2002 | southwest | 0.10 |
| First Quarter, 2003 | southwest | 0.09 |
| Fourth Quarter, 2000 | west | 0.09 |

TABLE 1

APPENDIX A

HEALTH AND SAFETY PLAN

TRC

# SITE HEALTH AND SAFETY PLAN

For
Well Installation Activities
Quik Stop Market # 56
3132 Beaumont Avenue, Oakland, CA

## 1.0 PLAN SUMMARY

This Site Health and Safety Plan (SHSP) establishes responsibilities, requirements, and procedures for the protection of personnel while performing activities at the above-referenced site. This site-specific plan conforms with the Alton Geoscience 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 Cal/OSHA regulations shall be required. Site-specific conditions may necessitate modification of the SHSP; however, except in emergency situations no deviations from the plan may be implemented without the prior notification and approval of the Site Safety Officer (SSO).

## 2.0 SITE INFORMATION

This SHSP considers the physical, chemical, and environmental hazards that may be encountered during work activities at the site. Operations associated with this SHSP will be conducted in accordance with an approved workplan. 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.

| | |
|---|---|
| Workplan dated: | March, 2003 |
| Principal activities: | Groundwater Monitoring Well Installation |
| Site description (see Attachment A for site map): | Active service station and convenience store site |
| Expected depth to groundwater: | Estimated to be 6 to 12 fbg |
| Contaminants of concern (see Attachment B): | BTEX, constituents of gasoline |

## 3.0 SITE SAFETY AUTHORITY

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

| Role | Name | Company | Telephone |
|---|---|---|---|
| Site Safety Officer | Mark Trevor | TRC Alton Geoscience | (925) 260-6389 |
| Project Manager | Tracey Walker | TRC Alton Geoscience | (925) 260-3952 cell |
| Local IIPP Coordinator | Steve Kemnitz | TRC Alton Geoscience | (800) 260-6157 cell |
| Client Contact | Mike Karvelot | Quik Stop Markets, Inc | (510) 657-8500 |

**Site Safety Officer**: The SSO is responsible for briefing site personnel on potential physical and chemical hazards prior to work start-up, during operations, and whenever other health and safety matters need to be addressed. The SSO will be in charge of conducting the daily Tailgate Safety Meetings. The SSO will see that this SHSP is available onsite and is understood and signed by personnel entering the site. The SSO is also responsible for implementing emergency response procedures when necessary. In the event the SSO is unable to perform these duties, the Alternate SSO will be responsible.

**Project Manager**: The Project Manager (PM), in coordination with the SSO, is responsible for implementing health and safety requirements, including seeing that the SHSP is prepared and available onsite. The PM is the central point of contact for the SSO, Client, and Field Personnel, and has overall responsibility for site operations.

**Field Personnel**: Field Personnel are responsible for understanding and complying with this SHSP. Field Personnel include both Alton employees and Subcontractors hired by Alton Geoscience. Field Personnel are required to participate in briefings prior to commencement of site work; attend daily Tailgate Safety Meetings; and acknowledge receipt and understanding of the SHSP by signing the Compliance Log at the end of this plan.

**Supervisor/Offsite Coordinator**: The Supervisor/Offsite Coordinator, typically the Alton branch manager, should be contacted when mobilization of support from an Alton office is needed, and in case of an emergency requiring offsite assistance.

## 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 as described in **Section 7.0.**

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 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 SHSP. 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 coworkers 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 all right. 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** | Heavy equipment<br>Overhead lines and underground utilities<br>Explosion and fire<br>Traffic - vehicular and pedestrian<br>Tripping, slipping, and falling<br>Head, foot, eye, and back injuries<br>Falling objects<br>Sharp objects<br>Electrical equipment<br>Welding hazards<br>Excavation and trenching |
| **Chemical Hazards** | Gasoline / benzene, toluene, ethylbenzene, xylenes (BTEX)<br>Environmental samples, soil cuttings, decontamination water, dust (nuisance, silica) |
| **Environmental Hazards** | Noise exposure<br>Weather - heat, cold, rain, fog<br>Biological - plants, animals/insects, pathogens |
| **Confined Spaces** | Hazardous atmospheres (Oxygen content; flammable, explosive, or toxic gases)<br>Engulfment potential<br>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 crewmember 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.

## 6.1 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 crewmembers 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 (such as cranes or drill rigs) near overhead power lines, care will be taken to ensure that the crane boom and rigging maintain a distance of ***at least 10 feet*** from the power lines. A USA utility mark-out is required and will be performed prior to drilling, construction, or excavation to mark/clear underground utilities. In addition, the first 5 feet of soil borings will be excavated using an air-knife or hand auger.

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 man-lifts). 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 will be trained in and 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

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.

## 6.2 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.**

## 6.3 ENVIRONMENTAL HAZARDS AND CONTROLS

### Noise Exposure

Hearing protection (ear plugs or ear muffs) will be worn when project personnel enter high-noise areas. The SSO should see that extra 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.

### 6.4 CONFINED SPACE HAZARDS

Confined space entry is NOT ANTICIPATED during the course of these operations. However, if such a situation is encountered, workers are prohibited from entering confined spaces until the company plan dealing with confined spaces 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/drill rig is in operation***

Gloves: chemical-resistant
***when handling soil cuttings or soil/water samples***

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

Respirators: half-face, air-purifying with organic vapor cartridges
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 Modified Level D (Level D plus respirator).

### 7.2 RESPIRATOR SELECTION

For operations that require the use of a respirator, the SSO 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.

Air monitoring will be performed to assess airborne contaminant levels onsite, and to evaluate suitable respiratory protection. Workers will be required to wear half-face, air-purifying respirators with organic vapor cartridges under the following circumstances, as indicated by onsite air monitoring:

> 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 protection 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

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 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.

### 8.1 HYDROCARBON ANALYZER

A hand-held hydrocarbon analyzer 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 PPE 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

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. Personnel are required to acknowledge their understanding and willingness to comply with this SHSP before admission to the site by signing the Compliance Log at the end of the SHSP.

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 spaces, 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

Alton Geoscience 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 will 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

The SSO 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 ACCIDENT REPORTING

In case of an accident, the SSO (or Alternate) will immediately notify the Supervisor/Offsite Coordinator at the nearest Alton office and later provide a report to the PM describing the following:

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 Alton's IIPP. The Supervisor's Report of Accident is to be completed and submitted to the Human Resources department within 24 hours following any accident or injury.

## SITE HEALTH AND SAFETY PLAN
## COMPLIANCE LOG

I have reviewed this Site Health and Safety Plan and understand the contents of the plan. I hereby agree to comply with all safety requirements outlined herein.

Signature: _____ Date:

**Site Safety Officer, TRC Alton Geoscience, Inc.**

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
(Continued)

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:

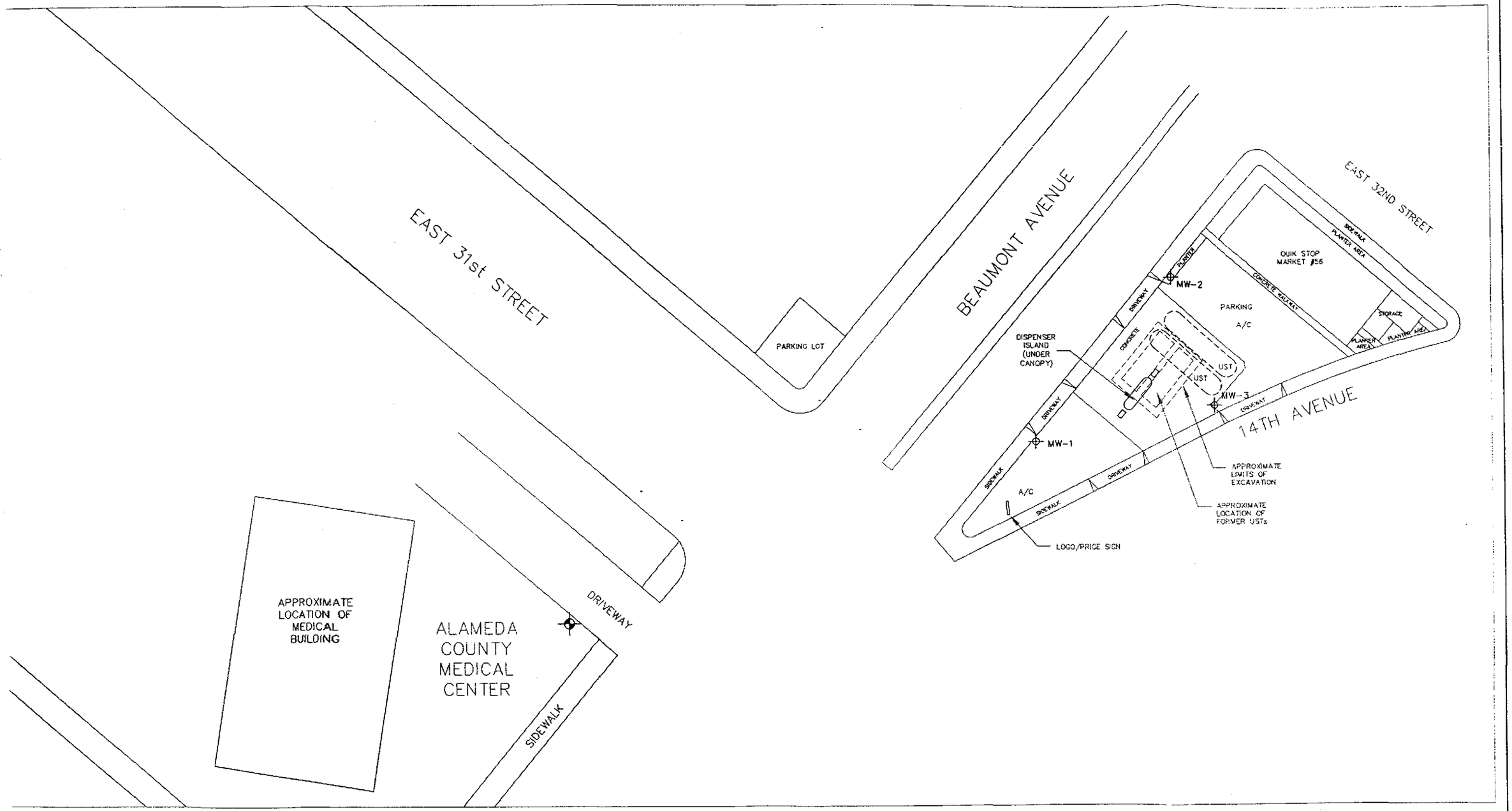
Signature: _____ Date: _____Print Name: _____Company:

Signature: _____ Date: _____Print Name: _____Company:

Signature: _____ Date: _____Print Name: _____Company:

## ATTACHMENT A

## SITE PLAN




LEGEND

MW-1 Monitoring Well

Proposed Monitoring Well

N

APPROXIMATE SCALE (FEET)

0 40 80

RCE: Client-provided drawings and Garlow, 1998. Site plan updated per 11/27/01 well survey by e Thomas Associates.

**SITE PLAN SHOWING PROPOSED MONITORING WELL**

Quik Stop No. 56
3132 Beaumont Avenue
Oakland, California

TRC

**FIGURE 2**

# ATTACHMENT B

# OCCUPATIONAL HEALTH GUIDELINES AND TOXICOLOGICAL INFORMATION

## DEFINITIONS

**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.

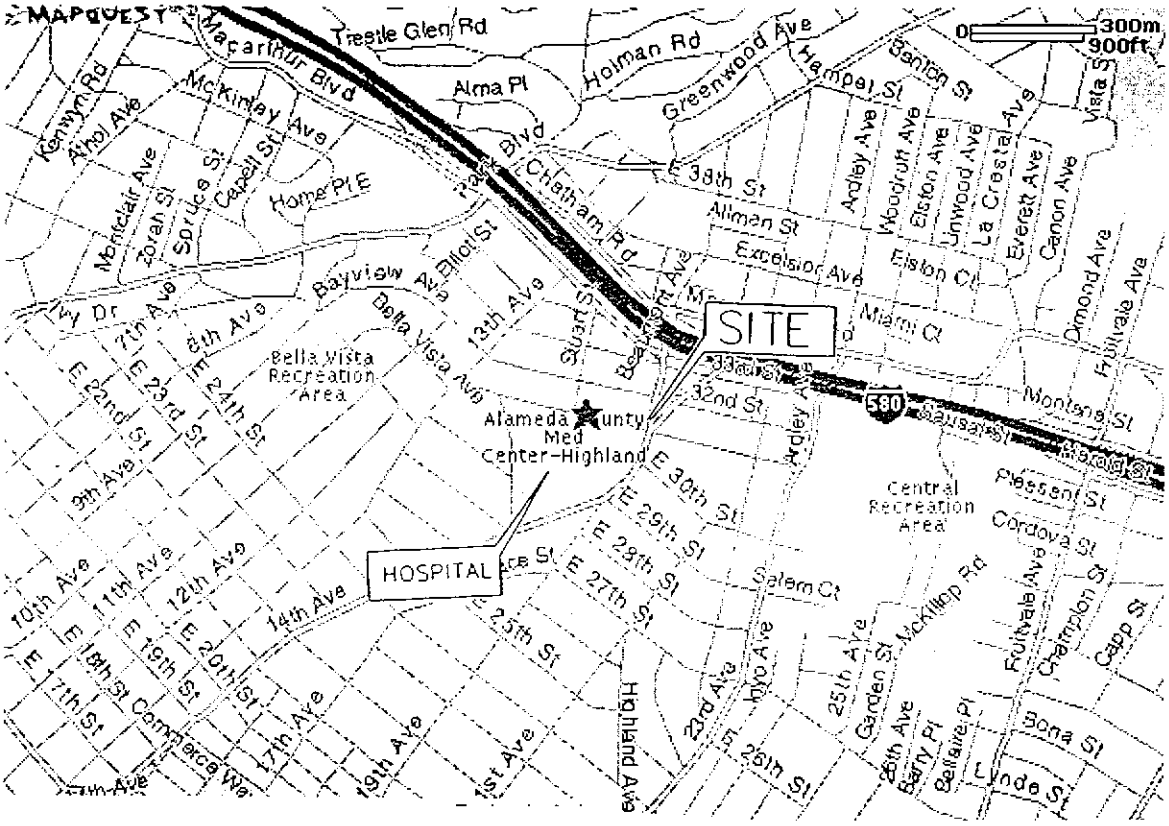
**Permissible Exposure Limit:** Permissible exposure limits (PELs) are TWA concentrations that must not be exceeded during any 8-hour work shift of a 40-hour workweek. PELs are established by OSHA (29 CFR 1910.1000).

**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

# LOCAL AREA MAP
## with route to hospital



## EMERGENCY SERVICES

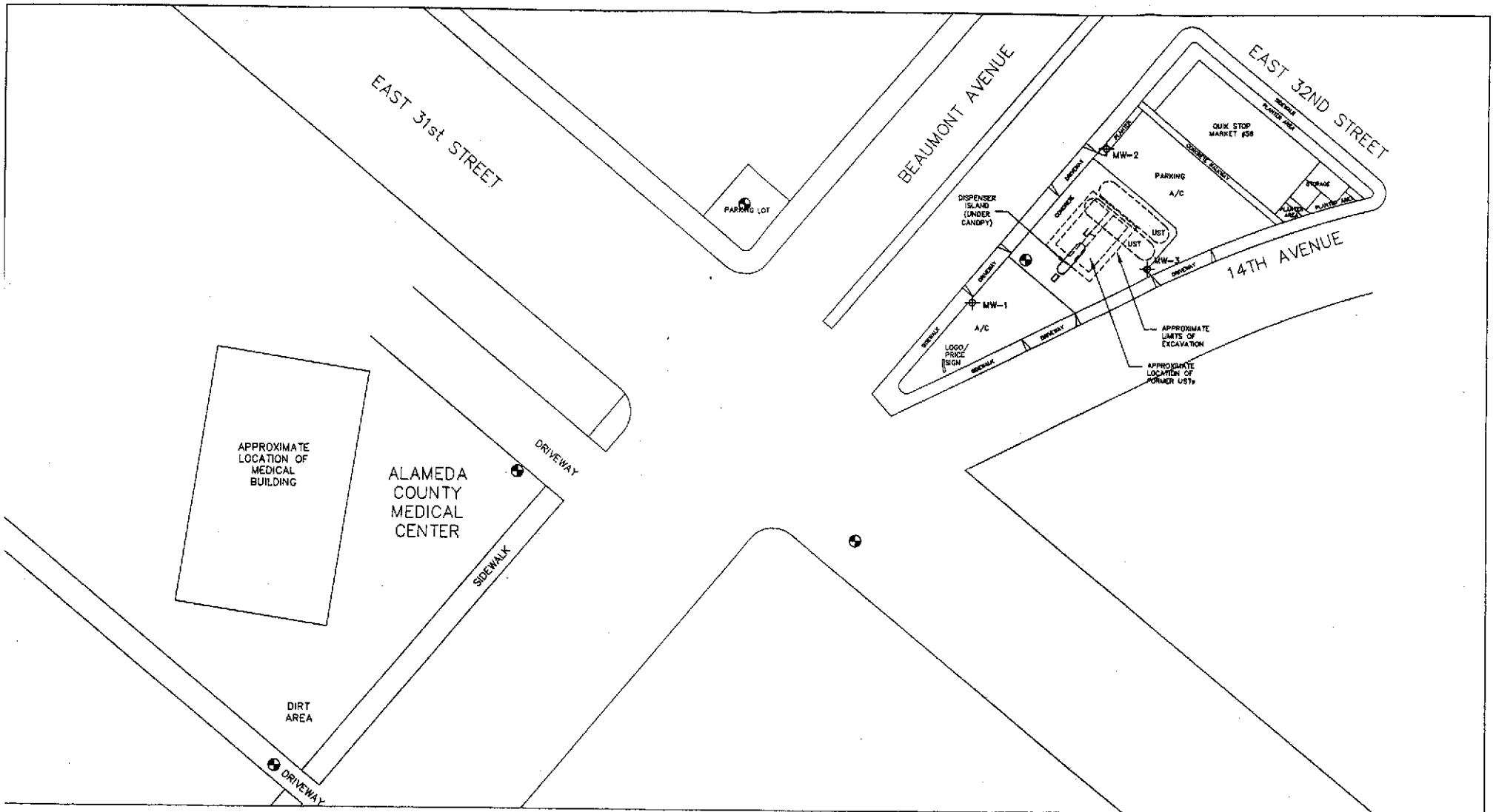
| FACILITY / LOCATION | TELEPHONE |
|---|---|
| **Emergency Situation** | **911** |

Medical Facility #1 *(with Emergency Room)*

Alameda County Medical Center (510) 534-8055
Highland Hospital Campus
1411 East 31st St.
Oakland, Ca

From the site, go southwest (left) on Beaumont to the next street. Turn right onto East 31st. The Emergency Room Entrance is on the left hand side. Follow the signs to the Emergency Room.

| | |
|---|---|
| Oakland Fire Department | 911 or (510) 444-3322 |
| Oakland Police Department | 911 or (510) 238-3481 |
| Poison Control Center | 1-800-662-9886 |
| Office of Emergency Services | (510) 286-0895 |
| Alameda County Department of Health | (510) 567-6761 |




SOURCE: Client-provided drawings and Gorlow, 1998. Site plan updated per 11/27/01 well survey by Doble Thomas Associates.

**SITE PLAN SHOWING PROPOSED BORING LOCATIONS**

Quik Stop No. 56
3132 Beaumont Avenue
Oakland, California

FIGURE 2

## TAILGATE SAFETY MEETING CHECKLIST

**Topics Covered**
(Check off as discussed)

____ **Personnel training/qualifications:** Check cards for OSHA HAZWOPER 40-hour certification/8-hour-refresher training (other if appropriate).

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

____ **Emergency services:** Discuss location of nearest telephone and directions to hospital. Map, directions, phone numbers provided at end of SHSP (Attachment C).

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

____ **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); and environmental hazards (heat stress, etc.).

____ **Air monitoring:** Necessary equipment is onsite and calibrated. Circle: CGI PID

____ **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 _____).

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

____ **Traffic control** (vehicular and pedestrian): Work area is properly delineated and cordoned off from traffic.

____ **Compliance log:** SHSP has been reviewed and signed by site personnel.

## Table B-1

## OCCUPATIONAL HEALTH GUIDELINES AND TOXICOLOGICAL INFORMATION
### Gasoline Constituents

| Contaminant | ACGIH TLV-TWA (ppm) | NIOSH REL (ppm) | STEL (ppm) | OSHA PEL (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 | 250-500 (NIOSH ceiling) | 500 | 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 | 500 (ACGIH) | n/a | 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 (NIOSH) | 1 | 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 | 150 (NIOSH) | 200 | 500 | Inhalation, Absorption, Ingestion, Contact | No | Irritation to eyes, nose; fatigue, weakness, confusion, euphoria, dizziness, headache, dilated pupils, tears, nervousness, muscle fatigue, insomnia, dermatitis |
| Ethylbenzene | 100 | 100 | 125 (NIOSH& ACGIH) | 100 | 800 | Inhalation, Ingestion, Contact | No | Irritation to eyes, skin, mucous membranes; headache, dermatitis, narcosis, coma |
| Xylenes | 100 | 100 | 150 (NIOSH& | 100 | 900 | Inhalation, Absorption, | No | Irritation to eyes, skin, nose, throat; dizziness, excitement, drowsiness, |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| (o,m,p,) | | | ACGIH) | | | Ingestion, Contact | | 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 |

## TABLE KEY

| | |
|---|---|
| ACGIH TLV-TWA | American Conference of Governmental Industrial Hygienists, Threshold Limit ValueTime 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) |

# APPENDIX B
# GENERAL FIELD PROCEDURES

TRC

# 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 4-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 bench mark.

## 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 Liqui-nox 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 Liqui-nox solution followed by two tap water rinses.