RO341

March 10, 2005

CAMBRIA

Mr. Barney Chan
Hazardous Materials Specialist
Alameda County Health Care Services Agency (ACHCSA)
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502



Re: **Technical Letter and Surfactant Test Work Plan**
Former Chevron Service Station # 9-1153
3135 Gibbons Drive
Alameda, California
Cambria Project No. 31H-1642
ACHCSA No. RO0000341

Dear Mr. Chan:

Cambria Environmental Technology, Inc. (Cambria) is submitting this technical letter and surfactant test workplan on behalf of Chevron Environmental Management Company (ChevronTexaco) to inform you of our desire to utilize this technology at the site mentioned above. Presented below are a site description, history of previous investigations, and a description of the proposed surfactant test.

## Site History

The site is located on the corner of Gibbons Drive and Fernside Boulevard in Alameda, California (Figure 1). There are nine monitoring wells associated with this site. Figure 2 is a site plan showing the well locations. Depth to water at the site ranges from surface to approximately seven feet below grade (fbg). Soils beneath the site consist of interbedded sands, clayey sands, and clays to the total explored depth of 22 fbg. Wells C-1, C-3, and MW-4 through MW-9 are currently being monitored on a quarterly basis to evaluate groundwater conditions. Results indicate that residual hydrocarbons exist at the site, centered around well C-1, where SPH continues to be intermittently observed at thicknesses ranging from 0.01 to 1.23 feet.

***Chevron Service Station Operation 1956-1986:*** Chevron leased the referenced property and operated a service station there between 1956 and June 1986.

***UST Removal and Well Installation June 1986:*** Two used-oil underground storage tanks (USTs) (550-gallon and 750-gallon) and three gasoline USTs (3,000-gallon, 6,000-gallon, and 8,000-gallon) were removed from the site in 1986. An unknown volume of soil was excavated from the former UST pit and product line trenches. Soil excavated from beneath the tanks was aerated on-site and used as backfill. Wells C-1 through C-3 were installed onsite shortly after the removal of the USTs.

**Cambria Environmental Technology, Inc.**

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***Soil Vapor Sampling 1987 and 1989:*** Soil vapor surveys were conducted in June 1987 and again in May 1989. The vapor samples collected from the southeastern portion of the site indicated benzene concentrations of up to 2,200 ppmv. A vapor barrier was recommended for any new structures on the site, but no verification has been obtained that such a barrier was installed during construction of the existing residence.

***Redevelopment and Soil Borings 1989:*** A residence was constructed on the property in 1989. During the construction, C-2 was destroyed. On and offsite borings SB-1 through SB-8 were advanced in June 1989.

***Groundwater Extraction 1991 to 1994:*** A groundwater pump and treat system operated by extracting groundwater from a recovery trench through well RW-1. This system operated from 1991 to 1994. The system treated almost 100,000 gallons of water during that time, but only 54 lbs of hydrocarbon mass were removed.

***Well Installation May 1992:*** Offsite wells MW-4 through MW-6 were installed in May 1992.

***Well Installation November 1993:*** Well MW-7 was installed in November of 1993.

***Well Installation October 1995:*** Wells MW-8 through MW-10 were installed October 1995.

***Soil Borings and ORC Placement 1997:*** In September 1997, shallow soil samples S-1 through S-15 were collected along the north, west, and east property boundaries and analytical results indicated elevated lead concentrations. In 1997, oxygen releasing compound (ORC) and hydrogen peroxide were placed in three onsite wells to treat separate phase hydrocarbons (SPH).

***Groundwater Extraction 2001-2002:*** From August 2001 to January 2002, five groundwater extraction events occurred and an additional 2,350 gallons of groundwater were removed. These events were discontinued because of inconvenience to the resident. Currently, no active remediation is being conducted.

***Soil Vapor Sampling October 2002:*** In October 2002, seven borings (SV-1 through SV-7) were hand-augered along the edges of the current building. Soil-vapor samples were collected from each borings. These data were used to evaluate potential indoor air risks to onsite residents. The data indicated that any residual hydrocarbon impacts posed no unacceptable threat to human health.

**Surfactant Treatment Field Test Proposal**

ChevronTexaco and Cambria request the opportunity to conduct a pilot test to study the effectiveness of improving light, non-aqueous phase liquid (LNAPL) recovery around a well by applying a surfactant pre-treatment into the soil around an SPH-bearing well (C-1) prior to temporary mobile vacuum-enhanced fluid recovery. The goal of the pilot test is to determine if a surfactant pre-treatment application can improve mobilization of LNAPL near the well, and thereby improve the speed and cost effectiveness of recovering LNAPL in conjunction with standard vacuum truck fluid recovery technology.

Cambria believes that this site is a good candidate for such a surfactant injection treatment field trial. Site attributes conducive to this technology include the fact that LNAPL has been detected in only one site well, the LNAPL footprint is limited, and the thickness of LNAPL is relatively small. Cambria proposes to collect soil data before and after the surfactant treatment to monitor the effectiveness of the process.

Surfactants (essentially soap or detergent) work by decreasing the interfacial surface tension between oil and water, creating a micro-emulsion of oil in water. This significantly increases the mobility of LNAPL during water extraction and can thereby significantly enhance LNAPL product recovery from a well. Ideally the soil volume around the well can be cleared of the majority of LNAPL volume, leaving a very low residual LNAPL saturation in soil pores which will not be mobile under natural conditions. Under such low residual conditions, separate-phase hydrocarbons should not re-enter the treated monitoring well.

A typical surfactant solution for remediation would consist of approximately 2 percent surfactant in water. The surfactants we plan to use for remediation are non-toxic and biodegradable. The material safety data sheet (MSDS) for the proposed surfactant is included as Attachment A. The general protocol for enhancing recovery of LNAPL around a single well is as follows.

Surfactant will be injected at low pressure or gravity fed into the nuisance LNAPL source zone area around the well in which the enhanced fluid vacuum recovery (EFVR) will be applied. The rate of application will be low so the surfactant does not mound significantly inside the monitoring well and to minimize outward displacement of LNAPL during the surfactant application step. The surfactant solution will then be allowed to equilibrate in the source area smear zone for a period of 24 hours to envelop and micro-emulsify the LNAPL in the impacted soil. This application will be followed by a 24 hour enhanced vacuum fluid recovery (EVFR) event, using a mobile vacuum truck, to remove the surfactant and emulsified LNAPL from the source area. In addition, the water removed will be periodically tested for surfactant concentration and for fraction of LNAPL in the recovered fluid over

time, to quantify removal of the surfactant and LNAPL from the pilot test site. The actual duration of the EFVR event will be dictated by the diminishing returns of LNAPL and surfactant concentrations in well effluent. Typically the volume withdrawn is at least three times the volume of injected surfactant solution. Pumping will be stopped when the recovery of surfactant and LNAPL becomes negligible.

The efficacy of the surfactant pre-treatment will be evaluated by comparing LNAPL recovery to the regular quarterly monitoring (without surfactant pre-treatment) results. The ultimate measure of success will be that LNAPL does not reappear in the well following treatment. We will monitor for post-treatment LNAPL rebound in the well on a weekly basis in the month following the pilot test, followed by monthly monitoring for approximately three months. We will compare pilot test rebound results with those observed after the temporary vacuum fluid extraction events in 2001-2002 to estimate the impact of surfactant pretreatment on vacuum extraction event results. Any changes in the dissolved plume will be monitored via the current quarterly groundwater monitoring program.

Potential advantages of surfactant treatment for recovering mobile and residual product include:

- LNAPL below the water table can be recovered.
- Recovery is not restricted by LNAPL volatility or composition, or the thickness of the smear zone.
- Recovery does not depend on dewatering the smear zone.
- It is potentially an efficient, low cost, method to improve the success of temporary vacuum-enhanced fluid recovery treatments in removing sufficient LNAPL to prevent re-entry of product into wells.

Sampling and analysis of LNAPL in C-1 has been performed and used to tailor the surfactant blend for application at this site in anticipation of ACEH approval of this approach.

## Work Schedule

Cambria will schedule this work after receiving written approval of this workplan by ACEH staff and after obtaining all necessary permits from the City of Alameda, and boring permits from the Alameda County Public Works Department. Cambria will submit our investigation report within 60 days after completion of the fieldwork.

**Closing**

Please call Robert Foss at (510)-420-3348 or Ian Robb at (510)-420-3352 if you have any questions regarding this work.

Sincerely,
**Cambria Environmental Technology, Inc.**

Ian Robb
Project Geologist

Robert Foss, P.G. #7445
Associate Geologist

REGISTERED GEOLOGIST
ROBERT C. FOSS
exp 08/06
No. 7445
STATE OF CALIFORNIA

Figures: 1 – Site Vicinity Map
2 – Site Plan w/ Well Locations

Attachments: A – Surfactant MSDS

cc: Mr. Mark Inglis, Chevron Environmental Management Company, P.O. Box 6012, San Ramon, CA 94583
Mr. and Mrs. Thompson, 3135 Gibbons Dr., Alameda, CA 94501

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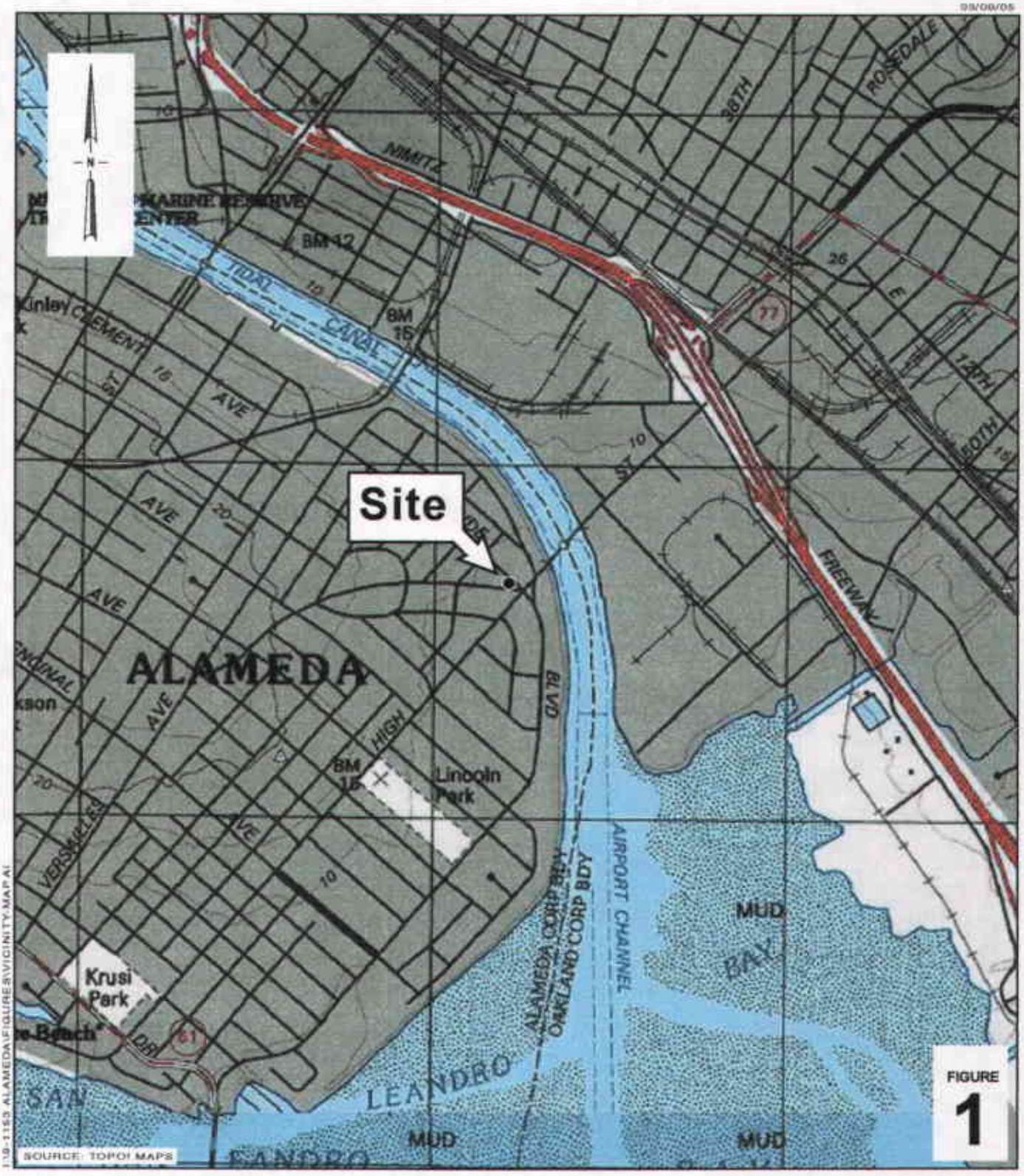


FIGURE 1

**Former Chevron Station 9-1153**

3135 Gibbons Drive (3126 Fernside Blvd)

Alameda, California

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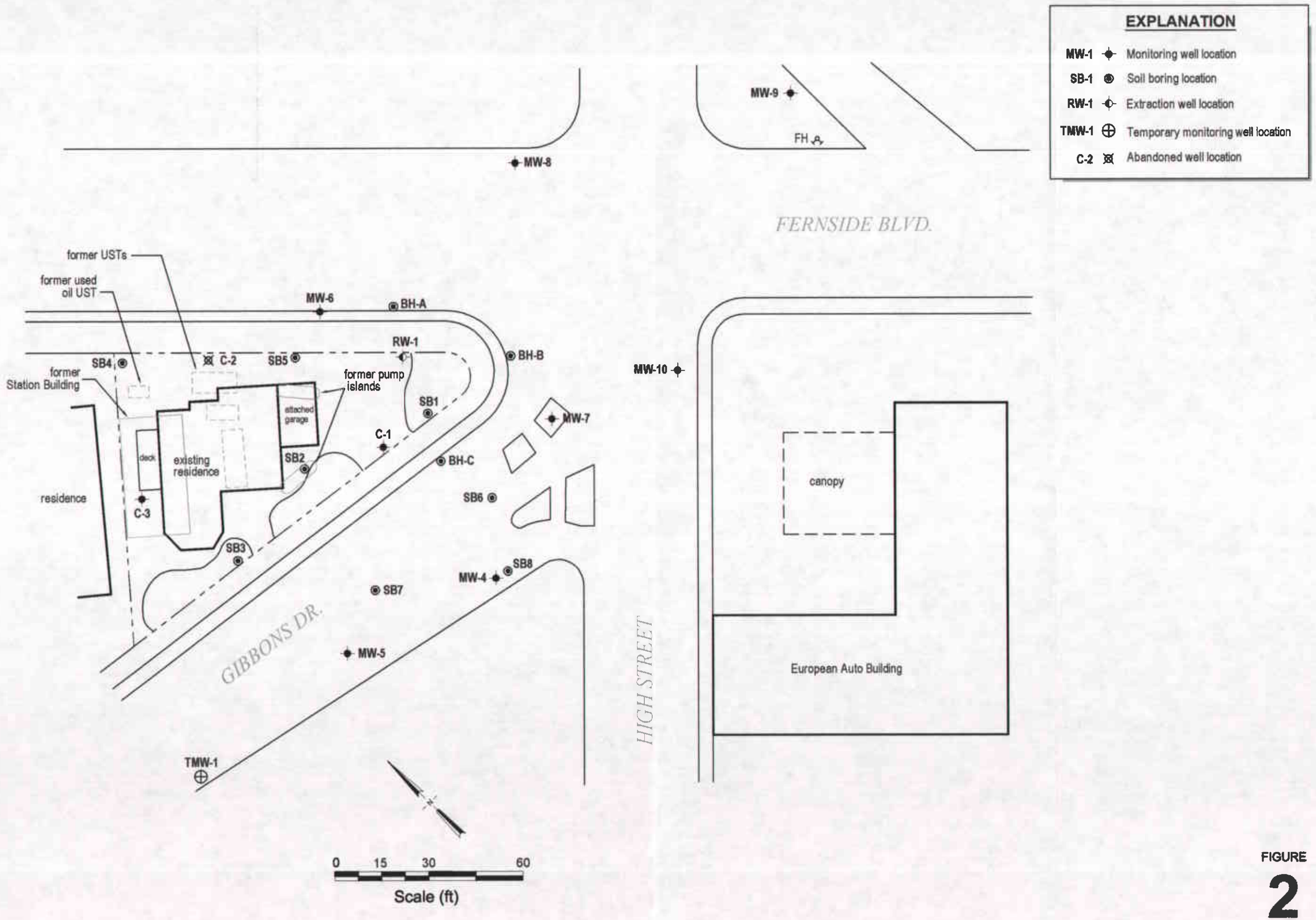
**Vicinity Map**




Siteplan

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**Former Chevron Station 9-1153**
3135 Gibbons Drive (3126 Fernside Blvd)
Alameda, California

FIGURE
**2**

19-1153 ALAMEDA\2\RESITEPLAN.DWG

# Attachment A

# Surfactant MSDS

International Chemical Systems, Inc.

# ENVIRONMENTAL CHEMICAL SOLUTIONS

*"Delivering Solutions to the Customer"*

**MATERIAL SAFETY DATA SHEET**
**HYDROCARBON REMEDIATION AGENT**

# ACCELERATE +

**GOLD CREW REM-E002**

Emergency: 1-877-253-2665

## SECTION I - GENERAL INFORMATION

| | |
|---|---|
| Name: | Accelerate+ Gold Crew REM-E002,Hydrocarbon Remediation Agent |
| Manufacturer | Environmental Chemical Solutions<br>P.O. Box 2029<br>Gig Harbor, WA 98335<br>Tel: (877) 253-2665 Fax: (253) 853-1340<br>www.ecschem.com |
| Generic Description | Water Based, Biodegradable, Wetting Agents & Surfactants |
| HMIS Code | Health 0, Fire 0, Reactivity 0 |
| HMIS Key | 4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Insignificant |
| D.O.T. Class | Not regulated; not hazardous |
| Formula: | Proprietary |



## SECTION II - HAZARDOUS INGREDIENTS

This product does not contain any hazardous ingredients as defined by CERCLA and California's Prop. 65

## SECTION III - PHYSICAL & CHEMICAL CHARACTERISTICS

| | | | |
|---|---|---|---|
| Flash Point: | None | Melting Point: | 32F |
| Specific Gravity: | 1.03 ±.01 | Vapor Pressuremm/Hg: | NA |
| Pounds Per Gallon | 8.6 | Vapor Density Air 1: | NA |
| Solubility in Water | Complete | Reactivity with Water: | No |
| Viscosity | 15 Centipoise | Surface Tension @ 5%: | 27.7 Dyne/cm at 25°C |
| Evaporation Rate: | >1 as compared to Water | pH: | 10.0 ±.5 |
| Appearance: | Clear Liquid Unless Dyed | Fire Extinguisher Media: | NA |
| Odor: | Light Fragrance | Fire Fighting Procedures: | NA |

## SECTION IV - Fire and Explosion Data

| | | | |
|---|---|---|---|
| Special Fire Fighting Procedures | NA | Percent Volatile by Volume | NA |
| Unusual Fire and Explosion Hazards | None | Flammable Limit | NA |
| Solvent for Clean-Up | Water | Auto Ignite Temperature | NA |
| Flash Point | NA | Fire Extinguisher Media | NA |

## SECTION V - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be taken in Handling and Storage: Use good normal hygiene.
Precautions to be taken in case of Spill or Leak -
Small spills. Soak up with absorbent materials.
Large spills: dike and contain. Remove with vacuum truck or pump to storage/salvage vessel. Soak up residue with absorbent materials.

Waste Disposal Procedures: Dispose in an approved disposal area or in a manner that complies with all local, state, and federal regulations.

## SECTION VI - HEALTH HAZARDS

Threshold Limit Values: NA

Signs and Symptoms of Over Exposure-

Acute: Moderate eye irritation. Skin: Causes redness, edema, drying of skin.
Chronic: Pre-existing skin and eye disorders may be aggravated by contact with this product.

Medical Conditions Generally Aggravated by Exposure: Unknown

Carcinogen: No

**Emergency First Aid Procedures -**

Eyes: Flush thoroughly with water for 15 minutes. Get medical attention.
Skin: Remove contaminated clothing. Wash exposed areas with soap and water. Wash clothing before reuse. Get attention if irritation develops.
Ingestion: Get medical attention.
Inhalation: None considered necessary.

## SECTION VII - SPECIAL PROTECTION INFORMATION

| | | | |
|---|---|---|---|
| Respiratory Protection: | Not necessary | Ventilation Required: | Normal |
| Local Exhaust Required: | No | Protective Clothing: | Gloves, safety glasses, wash clothing before reuse. |

## SECTION VIII - PHYSICAL HAZARDS

| | | | |
|---|---|---|---|
| Stability: | Stable | Incompatible Substances: | None known |
| Polymerization: | No | Hazardous Decomposition Products: | NA |

## SECTION IX - TRANSPORT & STORAGE

| | | | |
|---|---|---|---|
| DOT Class | : Not Regulated/Non Hazardous | Freeze Temperature | : 28°F |
| Storage | : 35°F-120°F | Freeze Harm | : None |
| Shelf Life | : Approximately one year unopened | | |

## SECTION X - REGULATORY INFORMATION

The Information on this Material Safety Data Sheet reflects the latest information and data that we have on hazards, properties, and handling of this product under the recommended conditions of use. Any use of this product or method of application, which is not described on the Product label or in this Material Safety Data Sheet is the sole responsibility of the user. This Materia l Safety Data Sheet was prepared to comply with the OSHA Hazardous Communication Regulation.

All information appearing herein is based upon data obtained by the manufacturer and technical sources. Judgments as to the suitability of information herein for the purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of this information, ICS, ECS or Gold Crew, or its distributors extends no warrantees, makes no representations and assumes no responsibility as to the suitability of such information for application to purchasers intended purposes or for consequences of its use.

 