Chevron

July 22, 1996

**Chevron ~~U.S.A.~~ Products Company**
~~2410 Camino Ramon~~
~~San Ramon, CA 94583~~
P.O. Box 5004
San Ramon, CA 94583-0804

**Marketing Department**
Phone 510 842 9500

Ms. Juliet Shin
Alameda County Health Care Services
Department of Environmental Health
1131 Harbor Bay Parkway, Suite 250
Alameda, CA 94502-6577

**Re: Former Chevron Service Station #9-1153**
**3126 Fernside Boulevard, Alameda, California**

Dear Ms. Shin:

Enclosed is a report prepared by NORCAL Geophysical Consultants, Inc. and titled Geophysical Investigation for Buried Underground Storage Tanks. Chevron contracted with Fluor Daniel GTI who subcontracted with NORCAL to evaluate the potential presence of buried underground storage tanks at the site. This decision was made due to the continuing presence of separate phase hydrocarbons occurring in monitoring well C-1 and why hydrocarbons were occurring at this location.

The area surveyed by NORCAL was a 10 by 70 foot section along the sidewalk, paralleling Gibbons Blvd. and a 10 by 15 foot area in the vicinity of monitoring well C-1. This surveyed area would be the logical location for any old underground storage tanks that could have been left at the site. Small underground storage tanks were installed in the sidewalk area in the 1930's/1940's to allow for easier delivery of product to the stations.

The conclusions presented in NORCAL's report dated June 26,1996, state that no buried underground storage tanks were identified in the area surveyed. No additional investigations for buried UST's are proposed.

If you have any questions or comments, call me at (510) 842-9136.

Sincerely,
CHEVRON PRODUCTS COMPANY

Philip R. Briggs
Site Assessment and Remediation Project Manager

Enclosure

cc. Ms. Bette Owen, Chevron

Mr. Larry Bolton, State Farm Insurance
2509 Santa Clara Avenue, Alameda, CA 94501

**FLUOR DANIEL GTI**

ENVIRONMENTAL PROTECTION
96 JUL 23 PM 2:53

July 8, 1996

Mr. Phil Briggs
Chevron U.S.A. Products Company
6001 Bollinger Canyon Road, Building L
San Ramon, CA 94583-0804

RE: *Geophysical Investigation for Buried Underground Storage Tanks*
Chevron Station 9-1153
3126 Fernside Boulevard
Alameda, California
FDGTI Job Number 020200124

Dear Mr. Briggs:

At your request, Fluor Daniel GTI contracted NORCAL Geophysical Consultants, Inc. (NORCAL) to perform a geophysical investigation at the subject site to evaluate the potential presence of buried underground storage tanks (USTs). The geophysical survey which included ground penetrating radar (GPR) and vertical magnetic gradiometer (VMG) was conducted on June 24, 1996. The survey area, as you requested, included approximately 70 feet by 10 feet along the sidewalk paralleling Gibbons Boulevard and approximately 15 feet by 10 feet in the immediate vicinity of monitoring well C-1. The conclusions presented by NORCAL in their report dated June 26, 1996 (report attached) state following their interpretation of the GPR and VMG data, no buried USTs were identified within the survey area.

We trust that this report provides you with the data you require. If you have any questions or comments, please do not hesitate to contact our Concord office at (510) 370-3990.

Sincerely,
**Fluor Daniel GTI, Inc.**

Michael A. Chamberlain
Project Manager

Attachment NORCAL Geophysical Consultants, Inc. Report, dated June 26, 1996

MWP452.doc

NORCAL GEOPHYSICAL CONSULTANTS INC.

NORCAL

June 26, 1996

95 JUL 23 PM 2:53
ENVIRONMENTAL PROTECTION

Mr. Michael Chamberlain
Fluor Daniel GTI
757 Arnold Drive, Suite D
Martinez, CA 94553

Dear Mr. Chamberlain:

This report presents the findings of a geophysical investigation performed by NORCAL Geophysical Consultants, Inc. at 3126 Fernside Blvd., Alameda, California. The field survey was conducted on June 24, 1996 by geophysicist Derrik Sandberg.

## SITE DESCRIPTION

The survey area is situated within the limits of a former Chevron service station along the north side of Gibbons Drive, west of the intersections of High St., Fernside Blvd., and Gibbons Blvd. The area of investigation is a 70 ft x 10 ft area along the sidewalk as well as an additional 15 ft x 10 ft area that extends into a residential driveway, as shown on the Site Location Map, Plate 1. The residence is situated northwest of the survey area. Within these areas are street light posts and signs, as well as surface utility box covers.

## PURPOSE AND METHODOLOGY

The purpose of the geophysical survey is to investigate for possible underground storage tanks (USTs) using ground penetrating radar (GPR) and vertical magnetic gradient (VMG) methods.

Ground Penetrating Radar

Ground penetrating radar is a method that provides a continuous, high resolution cross-section depicting variations in the electrical properties of the shallow subsurface. The method is particularly sensitive to variations in electrical conductivity and electrical permittivity (the ability of a material to hold a charge when an electrical field is applied).

The system operates by continuously radiating an electromagnetic pulse into the ground from a transducer (antenna) as it is moved along a traverse. Since most earth materials are transparent to electromagnetic energy, only a portion of the radar signal is reflected back to the surface from interfaces representing variations in electrical properties. When the signal encounters a metal object, however, all of the incident energy is reflected. The reflected signals are received by the same transducer and are printed in cross-section form on a graphical recorder. Depending upon depth and/or

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thickness the resulting records can provide information regarding the location of USTs, underground utilities, and variations in the shallow site materials. Generally, electrically conductive materials, such as saturated clay and significant amounts of rebar can reduce the penetration capability and limit radar performance.

For this investigation, we used a Geophysical Survey Systems, Inc. SIR-2 Subsurface Interface Radar System equipped with a 500 megahertz (MHz) antenna. This antenna is near the center of the available frequency range and is used to provide high resolution at depths of about one to four feet.

Vertical Magnetic Gradiometer

A magnetic gradiometer measures the vertical gradient of the earth's magnetic field. It consists of two total field magnetic sensors separated vertically by one-half meter. The magnetic field strength is measured simultaneously at both of these sensors. The difference in magnetic intensity between these measurements is proportional to the vertical gradient of the earth's magnetic field. Because the vertical gradient is constant with respect to time, the effect of diurnal variations is eliminated. A gradiometer is effected less by cultural features, and therefore it provides higher sensitivity and better resolution of near surface sources than total field magnetometers. Areas with significant amounts of buried metal typically produce anomalously steep magnetic gradients. Because the magnetometer is sensitive to ferrous metal sources both above and below ground, site and vicinity surface conditions can affect survey results. This can include items such as power lines and buried metal utilities that potentially interfere with magnetic effects from subsurface sources.

We used a Scintrex Envi-mag magnetometer to obtain the vertical magnetic gradient data. The instrument features a built-in memory that stores the vertical magnetic gradient data and survey grid information. All information can be down loaded to a computer for further processing.

## DATA ACQUISITION

We established a north-south and east-west grid system oriented parallel and perpendicular to the sidewalk along Gibbons Drive. Grid line 0N is located along the Gibbons Drive curb. Grid line 30E is located along the west side of the residential driveway entrance. The grid lines were measured using a fiberglass measuring tape and stations marked with chalk on the concrete surface.

GPR data were obtained along east-west and north-south trending traverses in a 5 ft x

5 ft grid pattern, as shown on the Site Location Map, Plate 1.

VMG data were collected on a 5 ft x 5 ft grid (stations) along east-west trending traverses. VMG data were not collected within 5 - 10 ft of above ground metal (i.e. street light posts) that typically causes magnetic interference. Therefore, the survey area consisted of two areas separated by 15 ft as shown on the Plates. The area to the east also has a 15 ft wide portion consisting of only one traverse of data stations.

## DATA ANALYSIS

### GPR Data Analysis

We examined the GPR records for hyperbolic reflection patterns characteristic of USTs, as well as changes in reflection character that may indicate variations in fill material associated with a UST excavation.

### VMG Data Computer Processing

The magnetic data were down loaded from the magnetometer to a computer. The computer processing included conversion of the data into a format that can be used in a contouring software routine. This contouring package was used to calculate an evenly spaced array of values (gridded) based on the observed field data. These gridded values were then contoured to produce the vertical magnetic gradient contour map.

### Contour Map Interpretation

Generally, where there are no metallic sources, magnetic values vary smoothly throughout a given region. Within culturally active areas, the ambient vertical magnetic gradient can be relatively large. In comparison, the magnetic effects produced by buried magnetic sources can be relatively small or subtle. Areas where magnetic variations are strong are defined by closely spaced contours and are typically considered anomalous. If the source of a particular anomaly is an isolated object or a group of closely spaced objects, the contours may form circular or elliptical closures. A large accumulation of buried objects may appear as a group of closely spaced anomalies or one large anomaly.

Magnetic anomalies can result from a wide variety of ferrous metallic objects. Typically, a small 500 gal. UST may produce a relatively circular magnetic anomaly of 200 to 500 gammas/meter (g/m) that can be up to 20 ft or more wide depending upon

specific site conditions. Actual anomaly magnitude and shape are dependent on the relative position and size of the buried objects with respect to the location of the data points. In general, anomaly magnitude will decrease and anomaly width will increase as distance (depth) to the source increases. Anomalies may or may not have paired high and low values creating what are known as magnetic dipoles.

## RESULTS

The location of the geophysical investigation is presented on Plate 1 and the VMG Contour Map is on Plate 2.

Ground Penetrating Radar

GPR records display surficial reflection characteristics that can be indicative of relatively uniform materials. There are also localized areas on the records where the reflections are random or discontinuous that may indicate disturbed subsurface materials and small buried objects. The most significant disturbed zone indicating buried object(s) is located within the western portion of the survey area. Additionally, the GPR records show reflections typical of buried utilities. The locations of the disturbed zone and the buried utilities are shown on Plate 1. The GPR records do not display large hyperbolic reflections indicative of a UST.

Vertical Magnetic Gradiometer

The VMG contour map indicate magnetic variations that are most likely due to magnetic sources outside the survey area. This is characterized by the semi-circular contours on the VMG map with increasing magnetic values towards the survey borders. The sources causing the magnetic variations are most likely the street light posts and pillar lamps. The VMG map does not display magnetic variations indicative of a UST within the limits of the survey area.

## STANDARD CARE AND WARRANTY

The scope of NORCAL's services for this project consisted of using geophysical methods to characterize the shallow subsurface. The accuracy of our findings is subject to specific site conditions and limitations inherent to the techniques used. We performed our services in a manner consistent with the level of skill ordinarily exercised by members of the profession currently employing similar methods. No warranty, with respect to the performance of services or products delivered under this agreement, expressed or implied, is made by NORCAL.

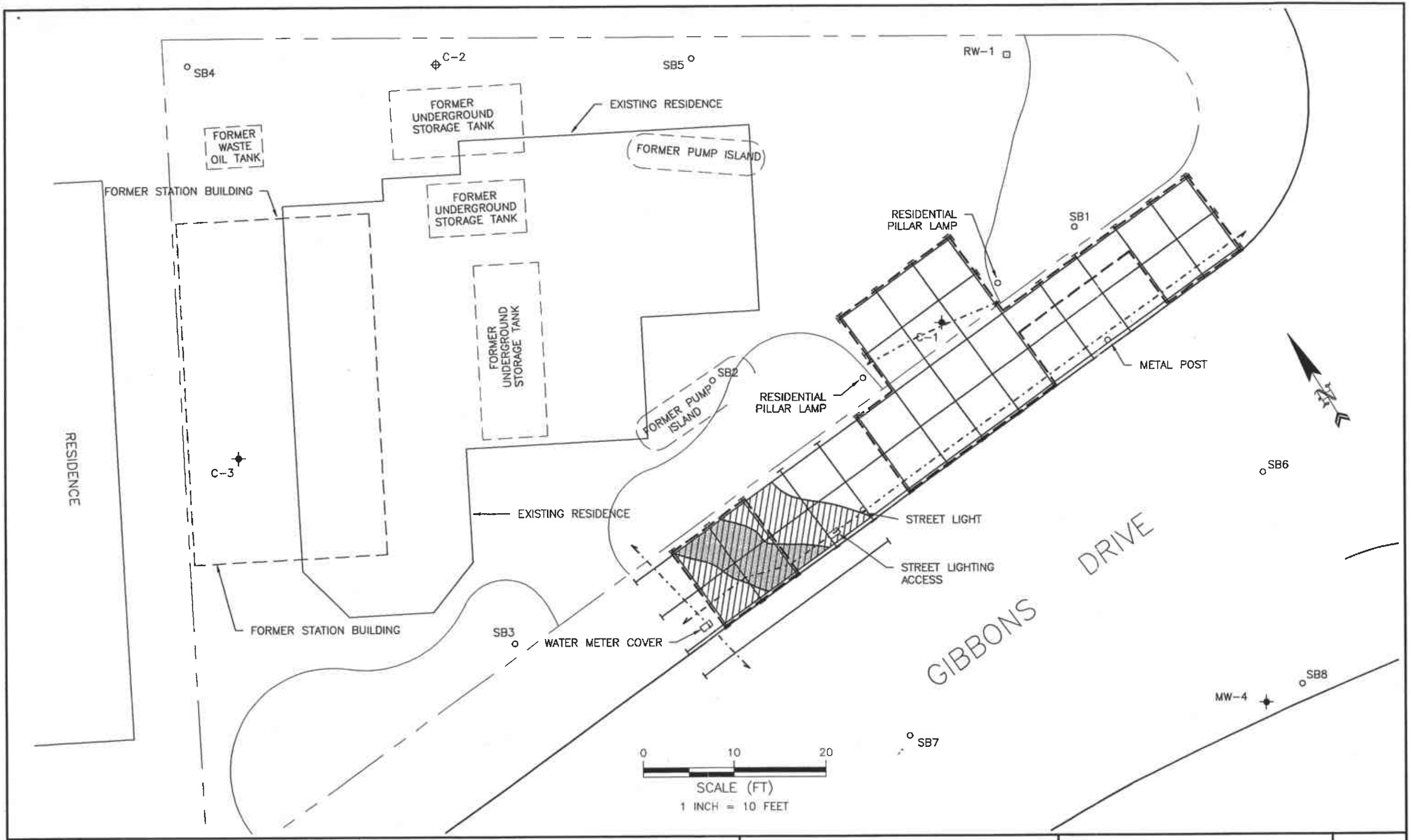
We appreciate having the opportunity to provide you with this information.

Respectfully,

NORCAL Geophysical Consultants, Inc.

Derrik M. Sandberg
Geophysicist

Enclosures: Plates 1 and 2




LEGEND:

- UTILITY ALIGNMENT
- GPR TRAVERSE
- LIMITS OF VERTICAL MAGNETIC GRADIENT SURVEY
- POSSIBLE BURIED OBJECTS
- DISTURBED SUBSURFACE MATERIALS

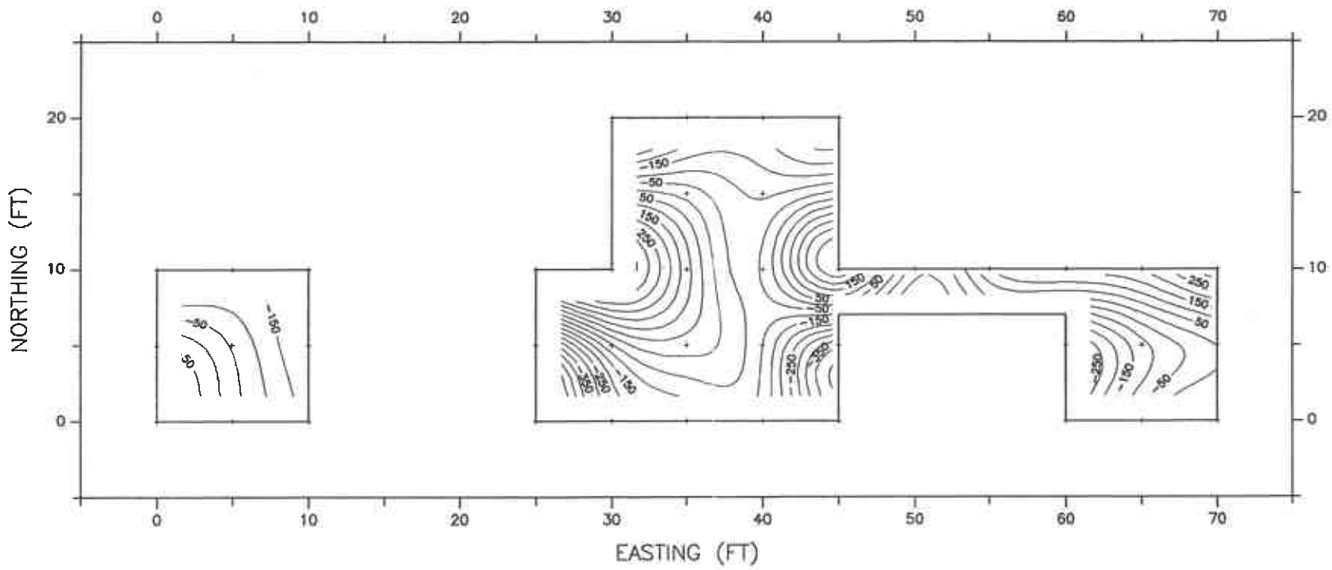
NORCAL GEOPHYSICAL CONSULTANTS INC.

JOB: 96-422.01 | APPR: | DATE: 6/96

# SITE LOCATION MAP

FORMER CHEVRON STATION
ALAMEDA, CALIFORNIA

PLATE 1





0 10 20

SCALE (FT)

1 INCH = 10 FEET

## LEGEND

VERTICAL MAGNETIC GRADIENT CONTOUR
CONTOUR INTERVAL = 50 g/m

VERTICAL MAGNETIC GRADIENT
DATA COLLECTION POINT

NORCAL GEOPHYSICAL CONSULTANTS INC.

| JOB: 96-422.01 | APPR: | DATE: 6/96 |
|---|---|---|

**VERTICAL MAGNETIC GRADIENT CONTOUR MAP**

FORMER CHEVRON STATION
ALAMEDA, CALIFORNIA

**PLATE 2**