1R023

ADDENDUM TO THE WORK PLAN FOR SOIL AND GROUNDWATER INVESTIGATION

ABE PETROLEUM LLC
17715 Mission Boulevard
Hayward, California 94541

Prepared for
Mr. Paul Garg
ABE Petroleum

Prepared by
Sierra Environmental, Inc.

September 10, 2003
Project 03-103.06

September 10, 2003
Project 03-103.06

Mr. Paul Garg
ABE Petroleum LLC
33090 Mission Boulevard
Union City, CA 94587

Subject: Addendum to the Work Plan for Soil and Groundwater Investigation, 17715 Mission Boulevard, Hayward, California

Dear Mr. Garg:

Sierra Environmental, Inc. (Sierra) has prepared this addendum to our May 27, 2003 work plan in response to the comments presented by Mr. Scott Seery of the Alameda County Environmental Health Care Services Agency (ACHCS) in his August 12, 2003 letter. As requested by Mr. Seery, Sierra has extensively revised the original scope of work and included the following additional tasks in this addendum to the work plan.

OBJECTIVES

The May 27, 2003 work plan proposed the following objectives:

- Identify preferential migration pathways and conduits
- Identify potential sensitive receptors near the site
- Delineate the vertical and lateral extent of the gasoline constituents in groundwater

At Mr. Seery's request, the objectives of the project have been modified to include the followings:

- Define and quantify the full 3-dimensional extent of the gasoline constituents impacts in soil and groundwater

- Develop a refined Site Conceptual Model that depicts the behavior of the petroleum hydrocarbons in the subsurface environment and can be used to identify optimum locations for monitoring wells

The modified project objectives necessitate several changes in the approach and scope of work to be performed during the next phase of the investigation.

In particular, ACHCS is concerned that the high concentrations of gasoline oxygenates, especially MTBE, could lead to rapid spread of the contaminant plume. Therefore, ACHCS is requiring an expedited assessment of the plume's present extent to avoid delays in implementing some type of corrective action. Our original work plan had envisioned a more phased approach, involving smaller chunks of the overall investigation during each phase.

PROPOSED TASKS

In order to achieve the objectives developed by ACHCS, we have reviewed the site history again to determine what additional information is needed. From this review, we have developed a new list of work tasks:

Task 1. Identify the Prevailing Groundwater Flow Direction

ACHCS has recommended laying out a number of transects oriented parallel to and normal to the predominant groundwater flow direction, and drilling several borings along each transect to determine the extent of the hydrocarbon impact. We agree that this would yield a considerable volume of hydrogeologic data; however, at the present time, the predominant groundwater flow direction is poorly and inadequately known. In previous reports, we have inferred a generally northwestward flow direction, but this inference is based on only three data points (MW1 to MW3), which allows only the use of the somewhat crude method known as the "three-point method" to determine the flow direction. The three existing wells are too closely spaced to allow a reliable interpretation of the flow direction off site, and therefore it would be highly fortuitous if a grid of boring transects laid out with the present data were actually oriented parallel to and normal to flow direction. Therefore, prior to developing a boring plan (Task 2 below), we propose the following work.

Task 1a. Install three additional water-table monitoring wells off site

In our experience, the groundwater flow direction at most sites is quite variable over longer distances and it is usually necessary to install several monitoring wells and construct contour maps of the water table before the true flow direction can be determined with sufficient confidence to develop a Site Conceptual Model. Interpretations based on only three data points are often incorrect, and it would not be prudent to complete a multi-

boring drilling program based on the present limited information. Our original work plan proposed six new wells, and we firmly believe that three is the bare minimum that should be installed farther from the site to aid in the determination of the groundwater flow direction in the greater site area. Figure 1 shows the proposed locations of these three wells. The only change in the well installation procedures from our original work plan is that the borings will be sampled at 5-foot intervals, rather than continuous sampling.

Task 1b. Collect and analyze soil and water samples from new wells

A minimum of three soil samples will be collected from each new well and analyzed for petroleum hydrocarbons as described in the work plan, using EPA methods 8015, 8020, and 8260. After developing the wells, Sierra will collect groundwater samples from all six monitoring wells and prepare contaminant isoconcentration maps as a preliminary tool to define the extent of groundwater impact.

Task 1c. Construct a groundwater elevation map

The depth to groundwater will be measured in all six wells and a contour map depicting the water table will be constructed to determine the existing groundwater flow direction. This map can then be used to modify, if necessary, the boring layout discussed in Task 2.

Task 2. Investigate the subsurface stratigraphy and geometry of the contaminant plume

As requested by ACHCS, we have designed a tentative grid of boring transects showing proposed locations for 18 exploratory borings (Figure 1). Because the groundwater flow direction is uncertain, Mission Boulevard is the principal feature governing the orientation of the grid, but the grid could be rotated by several degrees if necessary after Task 1 has been completed to more closely match the flow direction. The average spacing between borings is about 35 feet, except where the transects cross various streets. Several borings would be located on private properties, and it would be necessary to secure permission from the various property owners before drilling could be performed. It might be necessary to adjust some locations if property owners and/or access restrictions prevent the grid from being drilled as shown. The drilling program would encompass the following subtasks:

Task 2a. Identify and describe the vertical sequence of stratigraphic units

To date, three borings have been drilled at the site. Boring MW1 was drilled adjacent to three of the former underground storage tanks and was sampled at 5-foot intervals from the surface to a depth of 30 feet. In the upper 25 feet, the samples varied from silty clay to clayey silt to clayey silty sand, but bedding contacts could not be identified and these various lithologies were grouped into an upper fine-grained stratigraphic unit described as "dark brown clayey silt/clayey silty sand". Below 30 feet, the sediment consisted of fine-grained (silty) sand and was described as "green silty sandy clay". This unit was

saturated, and was recognized as the first aquifer beneath the site. Although not penetrated in any of the three borings that have been drilled, coarser-grained sediment, including gravel, is reportedly present at greater depths.

In all three existing borings, hydrocarbon odors were evident in the deepest soil samples (30 feet), implying that none of the borings reached the base of the zone of impacted soil. Therefore, it will be necessary, at least in the on-site borings, to drill deeper to define the vertical extent of contamination. It is unlikely that the soil is contaminated off site, except in the zone of contaminated groundwater, so off-site borings may not be drilled as deep as the on-site borings,

To better characterize the vertical stratigraphy, we propose to continuously sample 3 of the 18 proposed borings. One of these borings will be located on the site, another will be located in the vacant lot north of Mission Boulevard, and the third will be located at the most convenient location south of MW5 (Figure 1). If sufficient room is available, a cone-penetrometer rig will be used, but if access is limited, either a conventional hollow-stem auger rig or a Geoprobe- rig may be required. This will be determined in consultation with potential drilling subcontractors, after property owners have been contacted for permission to drill. The core samples will be preserved in labeled core boxes for later detailed description and photography by a registered geologist.

Task 2b. Identify and characterize lateral variations in stratigraphy

Samples from the other two existing borings (MW2 and MW3) are generally similar to those from MW1, but slight changes in grain size and color were observed in some units that could suggest that greater variations in the stratigraphic sequence are present off site. If so, the grid of borings should help to identify such changes and map any coarser-grained units that could serve as migration conduits. These borings will normally be sampled at roughly 5-foot intervals, but the exact sampling depths will be determined based on the results from Task 2a. The drilling equipment will again be dependent on accessibility; most borings will probably be drilled with conventional hollow-stem augers, although limited-access equipment may be needed on some of the private properties.

Task 2c. Collect and analyze soil and water samples from the borings

Soil samples will be collected from each new boring and analyzed for petroleum hydrocarbons as described in the work plan. In the on-site borings, we anticipate analyzing five or more samples. In off-site borings, samples will be examined and screened with a photo ionization detector (PID) for evidence of hydrocarbons to determine whether they will be preserved for laboratory analysis. In the continuously sampled borings, the core will be screened and samples will be collected as needed to characterize the vertical extent of contaminants.

One water sample will be collected from each boring when the first aquifer is penetrated. This sample will be collected by lowering a clean bailer to the water table. In several (perhaps most) borings, drilling will continue to the second aquifer. To avoid cross-contamination from the first aquifer, special sampling equipment will be used to collect a discrete water sample from the second zone. In hollow-stem auger borings, a Simulprobe-sampling device will be used. In Geoprobe- borings, a Miniprobe- device will be used. In CPT borings, the sample will be collected with a Hydropunch- sampler. The samples will be analyzed using the same methods as in Task 1b.

Task 2d. Obtain preliminary estimates of aquifer parameters

On average, three samples from each principal stratigraphic unit will be submitted to a testing laboratory to determine hydraulic conductivity and porosity. These parameters will be useful in characterizing preferential pathways, designing any aquifer testing program that may be needed in the future, and in assessing the potential for natural attenuation or other remediation methods for the site. In total, we estimate that ten to twelve samples will be analyzed.

Task 2e. Develop a 3-dimensional interpretation of site stratigraphy

The data collected in Tasks 1a, 2a, 2b, and 2d will be integrated in a series of cross sections and maps to develop a three-dimensional picture of the site's geology. Cross sections will be drawn along each transect line, and it may be possible to link these together in a fence diagram to yield a perspective view of the site. We also anticipate constructing at least one isopach map of the most important stratigraphic unit (migration pathway).

Task 2f. Map the vertical and lateral extent of hydrocarbon plumes

Isoconcentration maps for MTBE, TPH-g, and other analytes will be constructed from the soil and groundwater data to define the shape and extent of hydrocarbons in the saturated and unsaturated zones. A map showing the inferred extent of dissolved-phase hydrocarbons will be constructed for both the first and second aquifers. In addition, concentration data will be superimposed on one or more of the cross sections constructed in Task 2e to create an isocontour cross section that illustrates the vertical extent of contamination.

Task 3. Identify optimum locations for monitoring wells

After Tasks 1 and 2 have been completed, we will prepare a work plan for installation of additional monitoring wells. The work plan will be part of the report of this investigation, and will include a map showing the locations of proposed wells and well construction diagrams showing the intended screen intervals. Final selections will be made in consultation with ACHCS.

Task 4. Report and Site Conceptual Model

Upon completion of this investigation, we will prepare a written report. The report will include a preliminary conceptual model, but the model will be incomplete because a few important aspects of such models will be absent. Among these will be the results of an aquifer pumping test. However, the report will include recommendations for additional investigations, which could include an aquifer test, additional wells, or remediation pilot tests.

Please feel welcome to call us if you have questions.

Very Truly Yours,

Sierra Environmental, Inc.

Reza Baradaran, PE, GE
Senior Geotechnical Engineer

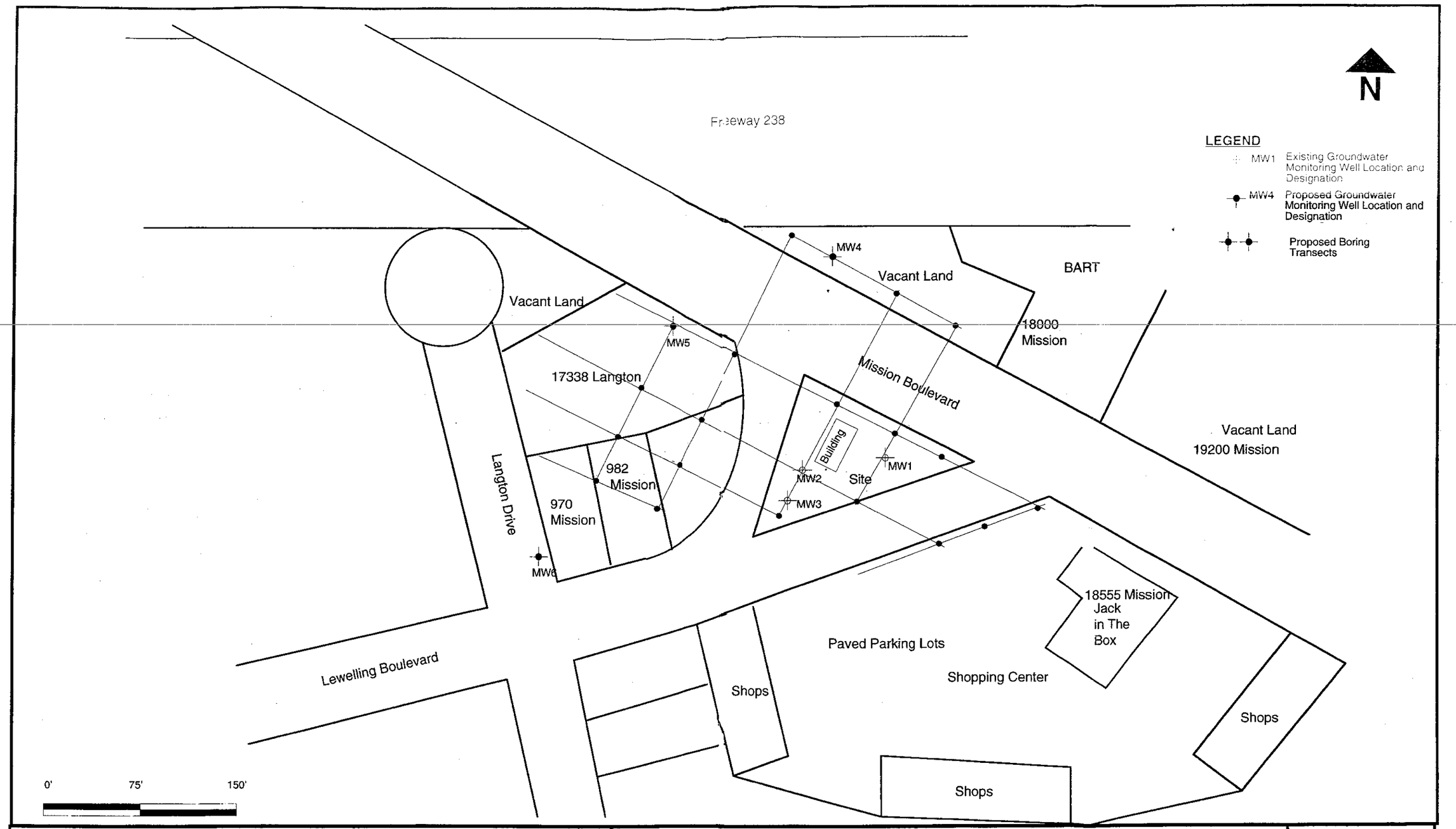
Victor Cherven, Ph.D., RG
Senior Geologist

Mitch Hajiaghai, REA II, CAC
Project Manager

Attachments: Figure 1 - Expanded Site Plan

cc: Scott O. Seery, ACHCS (1 Copy)
Shari Knieriem, SWRCB UST Fund

AW03-103.06\SWI\VC09102003



SIERRA ENVIRONMENTAL, INC.
Environmental Consultants
980 W. Taylor Street, San Jose, CA 95126
Phone [408]971-6758 • Fax [408]971-6759

Expanded Sit Plan

Soil and Groundwater Investigation
ABE Petroleum LLC

17715 Mission Boulevard • Hayward • California

FIGURE
1
September 12, 2003
Project 03-103.08