ENVIRONMENTAL ENGINEERING, INC
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# REVISED WORKPLAN TO CONDUCT AN ADDITIONAL SOIL AND GROUNDWATER INVESTIGATION

## WENTE WINERY

## 5565 Tesla Road

## Livermore, California

January 31, 2005

Project 2840

**Prepared for**

**Mr. Aris Krimetz**
**5565 Tesla Road**
**Livermore, California**

**Prepared by**

**SOMA Environmental Engineering, Inc.**
**2680 Bishop Drive, Suite 203**
**San Ramon, California**

## CERTIFICATION

This report has been prepared by SOMA Environmental Engineering, Inc. on behalf of Mr. Aris Kremetz, corporate engineer for Wente Winery, located at 5565 Tesla Road, Livermore, California. This workplan was prepared in response to the Alameda County Health Care Services – Environmental Health Services' letter, dated January 19, 2005.

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Principal Hydrogeologist

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Project Geologist

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## 1.0 INTRODUCTION

This workplan has been prepared by SOMA Environmental Engineering, Inc., (SOMA) on behalf of Mr. Aris Kremetz, corporate engineer for Wente Winery. As shown in Figure 1, the property is located at 5565 Tesla Road, between South Vasco Road and Mines Road, in Livermore, California (the "Site"). Currently, the Site is an operating winery that includes three aboveground fuel storage tanks with a total capacity of 4,000 gallons. Reportedly, the aboveground fuel storage tanks replaced two underground storage tanks (USTs) in 1987. The latest site investigation activities confirmed the presence of residual petroleum hydrocarbon concentrations in the subsurface at the vicinity of the former USTs.

In order to assess the impact of the present groundwater contamination to human health and the environment, this workplan is designed to provide additional data in order to characterize the extent of the groundwater contamination around the former USTs, and to define the beneficial use of the groundwater. This workplan will be implemented after receiving approval from the Alameda County Health Care Services (ACHCS).

### 1.1 Site Description

The developed portion of the Site consists of approximately thirty buildings constructed between the 1920s and 1980s, with an on-site septic system. West of the winery buildings is an enclosed maintenance and agricultural storage area with a former UST pit that contained one gasoline and one diesel UST. The USTs were replaced with three aboveground storage tanks (ASTs), with a total capacity of 4,000 gallons; the ASTs are reportedly located in the same area of the former USTs. Although California Water Service Company provides potable water to the Site, an on-site potable water supply well provides backup potable drinking water and process water for the winery facility. This water supply well is located south of and presumably upgradient from the former USTs area.

## 1.2 Previous Activities and Investigations

In 1987, two fuel USTs were removed from the Site without agency oversight. Without available records of the tank removal, there is no information regarding the condition of the tank or evidence of leakage.

In 1990, the ACHCS issued a notice of violation (NOV) for discharging waste sludge to an open ditch adjacent to a former steam-cleaning bay, which is at the south end of the steel storage and welding shed. The NOV required sampling of the ditch area and around a stained drum, along with remediation of the contaminated area(s). No available records reportedly exist to document the implementation of the required tasks.

Clayton Environmental Consultants (Clayton) conducted a Phase I Environmental Site Assessment of the maintenance and storage areas. In accordance with Comerica Bank guidelines, Clayton performed an ASTM D standard Phase I investigations to identify recognized environmental concerns (RECs). The Phase I study revealed the existence of the former USTs, former waste discharge area, and a number of agricultural storage areas. Agricultural chemicals and equipment are currently stored in the Agricultural Storeroom. However, documents indicate that these items were also previously stored in Building S and in a detached garage. Clayton concluded that the identified areas constituted RECs and recommended sampling of these areas for relevant constituents of concern.

In 2003, Clayton performed a subsurface investigation at the Site to implement the recommendations of the Phase I report. As shown in Figure 2, boreholes were advanced near the ASTs and near other RECs. Soil samples were analyzed for pesticides, herbicides, petroleum hydrocarbons, volatile organic compounds (VOCs), and heavy metals. Groundwater samples collected from beneath the former USTs and former steam cleaning areas were analyzed for petroleum hydrocarbons, VOCs, pesticides and herbicides. Appendix A presents the tabulated results of the soil and groundwater analyses, along with maps of sampling locations and groundwater analytical results. Clayton concluded that a fuel release in the former UST area impacted the groundwater at concentrations that significantly exceeded Risk Based Screening Levels (RBSLs). In the former steam-cleaning bay, which is located south/southwest of, and presumably upgradient from the former UST pit, no total petroleum hydrocarbon (TPH) or VOCs were detected in the soil. However, gasoline and motor oil-range petroleum hydrocarbons were detected in the groundwater at concentrations that were slightly above RBSLs. Other borehole samples contained constituents of concern below RBSLs. Figure 2 illustrates the locations of the soil borings drilled by Clayton.

Clayton recommended an additional site characterization to further characterize the Site before installing monitoring wells. Wente then retained SOMA to review the Clayton report and provide an alternate workplan. Upon reviewing the Clayton's report, SOMA proposed to install three groundwater monitoring wells to evaluate the groundwater contaminant plume and determine the groundwater flow direction. The ACHCS reviewed SOMA's workplan and requested a revised workplan that would present a vicinity well survey, a regional hydrogeologic study, and propose an additional site characterization. The requested site characterization items included sampling and evaluating the water quality of the on-site water supply well, installing temporary piezometers, additional lithologic characterization to better define the shallow/perched water-bearing zone, as well as vertical definition of the petroleum hydrocarbon contamination in the soil and groundwater beneath the USTs. Based on the ACHCS's request, the results of our regional hydrogeologic study and well survey data are presented in the following sections.

### 1.3 Regional Hydrogeologic Study

For conducting the regional hydrogeologic study, SOMA contacted the following agencies to obtain reports, documents and maps for this regional hydrogeologic study:

1. California Department of Water Resources (DWR);
2. California Division of Mines and Geology (CDMG);
3. Regional Water Quality Control Board – San Francisco Region (SFRWQCB);
4. Alameda County Health Care Services – Environmental Health Services (ACHCS-EHS); and
5. Zone 7 Water Agency (Zone 7).

The results of this study are presented below.

### *1.3.1 Regional Hydrogeologic Features*

The subject site is located in the Livermore Valley Groundwater Basin (LVGB). With a surface area of 109 square miles, the LVGB extends from the Pleasanton Ridge approximately 14 miles east to the Altamont Hills and from the Livermore Upland approximately 3 miles north to the Orinda Upland.

#### *Water-Bearing Formations*

The LVGB basin consists of a structural trough that is an important source of irrigation water for the Livermore Valley. The LVGB comprises water-bearing formations derived from alluvial fans, outwash plains and lakes that belong to the valley-fill, Livermore and Tassajara Formations. The valley-fill and Livermore Formations provide adequate and large quantities of good to excellent water to the Livermore Valley.

***Valley-Fill:*** The shallowest water-bearing formation is the Holocene age (less than 10,000 years old) valley-fill that ranges in thickness from several tens of feet to almost 400 feet. The valley-fill consists of unconsolidated sediments deposited as alluvium, stream-channel, alluvial fan, and terrace deposits. In the western part of the basin, up to 40 feet of clay, caps these water-bearing sediments. In the vicinity of the subject site, DWR maps the valley-fill with a thickness of approximately 20 to 30 feet and describes this water-bearing zone as a permeable unit consisting of sand and gravel in a clayey sand matrix. The DWR delineated the potentiometric surface of valley-fill groundwater near the Site at approximately 20 to 30 feet below ground surface (bgs).

***Livermore Formation:*** The next youngest water-bearing zone is the Plio-Pleistocene (approximately 10,000 to 5 million years old) Livermore Formation with a thickness of up to 4,000 feet. The Livermore Formation usually occurs at approximately 400 feet bgs. In the eastern half of the LVGB, deep wells produce adequate volumes of groundwater for irrigation, industrial, or municipal purposes. In the vicinity of the subject site, the DWR delineated the potentiometric groundwater surface at approximately 150 feet bgs within the Livermore Formation. The DWR describes this water-bearing unit as massive beds of rounded gravel cemented by an iron-rich sandy clay matrix.

***Tassajara Formation:*** The oldest water-bearing zone is the Pliocene-age (approximately 2 to 5 million years old) Tassajara Formation that occurs in the uplands north of the Livermore Valley at approximately 250 to 750 feet bgs. This formation consists of more consolidated deposits of sandstone, siltstone, shale, conglomerate and limestone. The Tassajara Formation only provides enough groundwater for domestic and livestock purposes. This unit has little hydrogeologic continuity with the Livermore Formation.

***Subbasins of the Livermore Valley Groundwater Basin***

The LVGB consists of twelve subbasins bounded by faults and non-water-bearing marine rocks: Bishop, Dublin, Castle, Bernal, Camp, Amador, Cayetano, May, Spring, Vasco, Altamont and the Mocho Subbasin. The subject site is located on the west side of the Mocho Subbasin, which is one of the three most important water-producing subbasins of the Livermore Valley.

The Mocho Subbasin is bounded on the east by the Tesla Fault, on the west by the central zone of the Livermore Fault, on the north by bedrocks of the Tassajara Formation, and on the south by non-water-bearing marine rocks. The DWR described groundwater flow within the Mocho Subbasin to the north or northwest with a gradient of 20 feet per mile (equivalent to 0.004 foot per foot).

This subbasin has been divided into the Mocho I (eastern) and Mocho II (western) subbasins. Separated by a nearly buried ridge of the underlying Livermore Formation, these subunits are described below.

***Mocho I Subbasin:*** In the shallow water-bearing valley-fill, there is an apparent lack of hydrogeologic continuity with the Mocho II Subbasin. The Arroyo Seco watercourse drains the Mocho I Subbasin.

***Mocho II Subbasin:*** The shallow valley-fill deposits of Mocho II occur along the watercourse of Arroyo Mocho that merge with gravelly fan deposits near Tesla Road. The DWR described these Arroyo Mocho deposits as no more than 30 feet thick. In the vicinity of the Site, the DWR mapped approximately 20 to 30 feet of the valley-fill unit overlying the Livermore Formation. Within the Livermore Formation, there is apparently little discontinuity with the Mocho I Subbasin or across the Mocho Fault. Sediments of the Livermore Formation have been down-warped into a structural trough – or syncline – and the Site is situated on the south limb of the syncline. Beds underlying the Site incline gently to the north at approximately 5 to 10 degrees.

### *1.3.2 Initial Site Conceptual Model*

Due to the lack of site-specific information in connection with the local hydrogeology and the extent of petroleum hydrocarbons in groundwater beneath the site, the site conceptual model (SCM) cannot be evaluated. This section will be discussed after implementation of the proposed fieldwork.

## 1.4 Well Survey

SOMA contacted Zone 7 and the DWR to obtain well data for this survey. As shown in the well location map presented in Appendix A, there is one on-site well (3S/2E 23C1) and five wells in the properties immediately west of and presumably downgradient from the Site: 3S/2E 23C2, 3S/2E 23D1, 3S/2E 23D2, 3S/2E 23D3, and 3S/2E 23D4. North/northeast of and presumably up/cross gradient from the subject site there are seven wells within 2,000 feet of the investigation area: 3S/2E 14P2, 3S/2E 14Q1, 3S/2E 14Q2, 3S/2E 14Q3, 3S/2E 14Q5, 3S/2E 14Q6, and 3S/2E 14Q7. Approximately 1,800 feet south of the Site there is another water supply well, 3S/2E F1.

### *1.4.1 Well Construction Findings*

***On-Site***

Table in Appendix A shows that the Wente Brothers' well (23C1) is 102 feet deep with a casing diameter of 10 inches. The State DWR Water Well Drillers Report indicates this well is screened from 11 to 66 feet and at 77 to 93 feet bgs.

***Off-Site***

With the exception of 3S/2E 23C2, the five wells west of and adjacent to the Site have similar well depths ranging from 108 to 140 feet bgs. Well 23D3 is located at 5143 Tesla Road and has a relatively shallow depth of 29 feet with a casing diameter of 9 inches. Zone 7 records indicate that this well is used for domestic purposes and that well 23C2 is used as a drinking water well. Well 23C2 is located on the property immediately adjacent to the Site at 5443 Tesla Road. In response to SOMA's request for a well search within 2,000 feet of the Site, the DWR provided no Water Well Drillers Reports for three of these five wells located west of and adjacent to the Site.

Available records indicate that seven wells are located north/northeast of and within 2,000 feet of the Site. Zone 7 records indicate that these wells are 80 to 308 feet deep with casing diameters ranging from 6.6 to 10 inches. Wells 3S/2E P2, 3S/2E Q1, 3S/2E Q2, 3S/2E Q3, 3S/2E Q5, and 3S/2E Q6 are reportedly used as drinking water wells. State DWR Reports indicate that well Q6 is perforated from 80 to 140 feet bgs and that well Q7 is perforated from 100 to 210 feet bgs. The DWR provided no Water Well Drillers Reports for the other five wells and construction details for most of these wells are unknown.

Based on data received from Zone 7, well 3S/2E 23F1 is located almost 2,000 feet south and presumably up/cross gradient from the Site. Because the DWR provided no Water Well Drillers Report for this well, the construction details for well 23F1 are unknown.

### *1.4.2 Well Evaluation*

Based on the regional hydrogeologic study, groundwater flow in the valley-fill and underlying Livermore Formations is to the northwest/north. The nearby water supply wells west of and presumably downgradient from the Site are potentially exposed to the on-site contaminant plume. At least two of these wells, 3S/2S 23C2 at 5443 Tesla Road and 3S/2S 23D3 at 5143 Tesla Road, should be sampled in addition to the on-site well. If the findings of the investigation indicate that the plume has migrated beyond the western property line, the other five wells should also be sampled.

## 2.0 SCOPE OF WORK

Based on the results of the most recent site investigation conducted by Clayton, SOMA's research described above, and the ACHCS-EHS letter of workplan request, SOMA proposes to perform the following scope of work in two phases:

**Phase I: Preliminary Characterization**

**Task 1: Sampling On-Site and Two Off-Site Water Supply Wells**

| | |
|---|---|
| **Task 2:** | **Field Preparation: Permit Acquisition, Site Health and Safety Plan Preparation, and Utility Clearance** |
| **Task 3:** | **Installation and Sampling of Peizometers** |
| **Task 4:** | **Developing and Surveying Peizometers** |
| **Task 5:** | **Laboratory Analysis** |
| **Task 6:** | **Preliminary Evaluation of Groundwater Contaminant Plume** |

| | |
|---|---|
| **Phase II:** | **Site Characterization Using CPT/MIP** |
| **Task 1:** | **CPT/MIP Study** |
| **Task 2:** | **Groundwater Sampling Boreholes** |
| **Task 3:** | **Laboratory Analysis** |
| **Task 4:** | **Installation of Groundwater Monitoring Wells** |
| **Task 5:** | **Report Preparation** |

The following is a brief description of the above two phases and associated tasks.

### Phase I: Preliminary Characterization

Phase I of the Additional Soil and Groundwater Investigation will consist of the installation, development and surveying of three peizometers, sampling the on- and off-site water supply wells, laboratory analysis, and a preliminary evaluation of the groundwater contaminant plume. These tasks are described as follows.

### Task 1: Sampling On-Site and Off-Site Water Supply Wells

To obtain representative groundwater samples, the on-site and two off-site water supply wells located at 5143 and 5443 Tesla Road will be sampled during or immediately after active pumping. SOMA personnel will sample groundwater from the wells into one liter amber bottles and 40-milliliter (mL) volatile organic analysis (VOA) vials. SOMA field personnel will visually verify that no air bubbles were entrained in the VOA vials. The groundwater sample will then be analyzed for the following constituents of concern, as identified by the ACHCS:

- Total petroleum hydrocarbons as diesel (TPH-d) using EPA Method 8015M,
- Total petroleum hydrocarbons as gasoline (TPH-g) and as motor oil (TPH-mo) using EPA Method 8015M,
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) and Methyl tertiary Butyl Ether (MtBE) using EPA Method 8260B.

**Task 2: Determining Local Groundwater Flow Direction**

To determine the local groundwater flow direction, SOMA is planning to install three peizometers.

Before drilling and installation of the piezometers, SOMA will obtain the necessary permits from the Zone 7 Water Agency. Prior to the commencement of field activities, a site-specific health and safety plan (HASP) will be prepared by SOMA. The HASP is designed to address safety provisions during field activities. It provides procedures to protect the field crew from physical and chemical hazards resulting from drilling, well installation, and groundwater monitoring and sampling. The HASP establishes personnel responsibilities, general safe work practices, field procedures, personal protective equipment standards, decontamination procedures, and emergency action plans. To protect the field crew from underground utility hazards, SOMA will notify Underground Service Alert (USA) and interface with the utility companies to clear the proposed drilling locations. In addition, a private utility locator will survey and mark subsurface utilities in the vicinity of the proposed peizometer borehole locations.

At the direction of the ACHCS, SOMA planned to install and develop temporary well casings to determine the groundwater flow direction. However, the drilling contractors contacted by SOMA indicated that developing temporary wells is not practicable because the surging motion would destabilize the temporary casing. Without installing a sand pack, bentonite, and grout seals, the wells cannot be properly developed and will not yield reliable groundwater flow direction data. Therefore, SOMA will install piezometers as described below.

Using a hollow stem auger (HSA) or a direct-push technology (DPT) rig, well boreholes will be drilled in the locations shown in Figure 3. The boreholes will be continuously sampled to approximately 20 feet commencing at approximately five feet above the anticipated first encountered groundwater. Except for obtaining one sample from the vadose zone, the sampler will be unlined to allow for the examination of continuous soil cores. After completing the boreholes, the drilling crew will install a one or two-inch diameter well casing fitted with a 0.01" slotted screen that will span the observed saturated zone. A sand pack will be emplaced to at least one-foot above the top of the screen and seal the sand pack with at least one-foot of hydrated bentonite. After allowing the bentonite seal to hydrate for at least one-half hour, the drilling crew will grout the well to approximately one-foot below surface grade with a grout mixture containing approximately 3% bentonite. At surface grade, a traffic-rated well vault will then be installed into a concrete foundation.

SOMA field personnel will develop the peizometers by bailing to remove sediment-laden water before commencing surging and pumping. After bailing the peizometers to remove sediment-laden water, they will be surged and pumped until groundwater clarity noticeably improves and groundwater quality parameters indicate groundwater stabilization.

After developing the piezometers, a California registered surveyor will survey them. SOMA will use the survey results to determine the groundwater flow direction and will sample groundwater in order to evaluate the extent of the groundwater contamination.

**Task 3: Preliminary Evaluation of Groundwater Contaminant Plume**

SOMA field personnel will sample the wells for agency-identified constituents of concern. Based on the groundwater analytical results, SOMA will conduct a preliminary evaluation of the groundwater plume. SOMA will discuss the first-phase investigative results with the ACHCS before proceeding with the tasks in Phase II.

If the results of the initial investigative phase indicate that the plume(s) of groundwater contaminant(s) are limited to the immediate vicinity of the former USTs, and the chemical plume(s) has not migrated beyond the property's boundary, conducting the Phase II investigation may not be necessary.

**Phase II: Conduct CPT and MIP Study**

Phase II of the investigation will consist of the field preparation as described in Phase I, advancing CPT/MIP boreholes, advancing and sampling groundwater sampling boreholes, laboratory analysis, installation of additional groundwater monitoring wells and report preparation. These tasks are described in the following sections.

**Task 1: CPT and MIP Study**

Typical soil and groundwater investigations are conducted with hollow stem auger drilling rigs with soil samples collected at 5-foot depth intervals, leaving lithologic gaps of almost 4 feet between each sampling location. Consultants often rely on cuttings to interpolate between these sampling intervals. However, the mixture of in-situ sediments with other borehole cuttings does not provide a reliable means of continuous logging. Clay layers and water-bearing stringers can easily be overlooked by this sampling methodology.

To evaluate the vertical extent of the chemical plume(s), SOMA proposes to continuously log the subsurface lithology and stratigraphy with a cone penetrometer test (CPT) study at the Site. CPT is a process whereby subsurface soil characteristics are determined when a cone penetrometer attached to a data acquisition system is pushed into the subsurface using a hydraulic ram. The CPT provides a rapid, reliable and economical means of determining soil stratigraphy, relative density, strength and hydrogeologic information using direct push methodology.

In addition to CPT, SOMA is proposing to utilize a membrane interface probe (MIP) to evaluate the vertical extent of the petroleum hydrocarbons. The actual depth of the borehole will be dependent upon the extent of the petroleum hydrocarbons as indicated by the MIP study. By calibrating the MIP device, residual levels of petroleum hydrocarbons that may exist at different depth intervals can also be identified.

Data gathered by CPT study will be used to construct accurate geologic cross sections in order to address the Site's conceptual hydrogeologic model. SOMA has extensive experience in conducting CPT and MIP studies at various sites to evaluate and understand the site's conceptual model.

In order to calibrate the CPT readings, SOMA proposes drilling a stratigraphy borehole using a hollow stemmed auger (HSA) adjacent to one of the CPT boreholes in the cleanest and least contaminated portion of the investigation area. SOMA will base the location of the HSA borehole on the MIP data. This borehole will be continuously sampled and logged throughout the entire depth of the hole by SOMA's geologist and compared with the CPT readings for calibration purposes. The geological information gathered in conducting this task will be used to identify different water-bearing zones and aquitards, as well as different lenses of clay layers beneath the Site at the locations of the other CPTs. The actual locations of the CPTs, MIPs and HSA boreholes will be determined after the completion of the tasks in the Phase I investigation.

Hollow stem auger drilling can cross-contaminate shallow and deeper water-bearing zones. To verify that the HSA borehole will not cross-contaminate shallow and deeper zones, SOMA will locate the calibration borehole in the "cleanest" portion of the investigation area. Based on the analytical findings from the three piezometers and from the MIP screening data, SOMA will locate the CPT-calibration borehole.

### Task 2: Collect Soil and Groundwater Samples

Once the Site's stratigraphy is determined and the approximate location of the groundwater plume is defined, groundwater sampling will be performed adjacent to each of the future CPT/MIP boreholes. In the groundwater sampling boreholes, soil samples will be collected from the depths where MIP data indicated elevated concentrations of the contaminants of concern. Using direct push technology (DPT), a sampling rod lined with plastic sleeves will be hydraulically advanced into the CPT-identified soil layers. SOMA field personnel will seal the ends of the sample with Teflon foil and plastic end caps and then label the soil-filled sleeve. The sample will then be placed into a chilled cooler with the appropriate chain of custody documentation.

To collect groundwater samples at different depth intervals in the same borehole, the designated drilling crew will advance a Geoprobe™ Dual Tube DT-21 or SP-15 groundwater profiler and soil sampler. The DT-21 sampling system is ideal for water-bearing zones with low hydraulic head because the sampling chamber can be decontaminated downhole. The CPT data will reveal whether or not the water-bearing zone is under low/high hydraulic head. However, water-bearing zones with high hydraulic head will flood the sampling chamber and cross-contaminate subsequent samples and water–bearing zones. Decontaminating the DT-21 profiler under these conditions is awkward, time consuming, and inefficient. For water-bearing zones under elevated hydraulic pressure, the Geoprobe™ SP-15 groundwater sampling system would be more feasible. The SP-15 sampler can conveniently be withdrawn with the groundwater samples and, after decontamination, replaced inside the same borehole.

The groundwater analytical results will define the vertical and horizontal extent of the groundwater contamination. Per SOMA's experience, groundwater sampling from several water-bearing zones can be accomplished within one borehole. Because the lead cone and rods are the same diameter, the sampling system does not create an annulus to allow for aquifer cross-contamination. With this sampling system, soil and contaminant residuum from overlying soil units is easily squeezed off the smooth outside probe surface by lateral confining pressures. The groundwater sampling chamber will also be over-purged, the entire probe will be retrieved, and the sampling chamber will be decontaminated. After groundwater sampling, the boreholes will be tremie grouted from the bottom up, to further reduce the potential for cross-contaminating different water-bearing zones, if any.

In order to define the horizontal extent of the chemical plumes, if any, the location of the groundwater sampling will be around the USTs and in the downgradient direction. Since the groundwater flow direction is unknown, the exact locations of the CPT and MIPs will be decided upon completion of the Phase I investigation.

**Task 3: Laboratory Analysis**

Soil and groundwater samples will be analyzed for:

- Total petroleum hydrocarbons as diesel (TPH-d) using EPA Method 8015M
- Total petroleum hydrocarbons as gasoline (TPH-g) and as motor oil (TPH-mo) using EPA Method 8015M
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) and MtBE using EPA Method 8260B.

**Task 4: Installation of Groundwater Monitoring Wells**

The results of the CPT investigation will reveal the depths and thickness of water-bearing zones(s) beneath the Site. Using the information provided by the CPT study and groundwater investigation tasks, groundwater monitoring wells will be installed for future groundwater monitoring purposes. The depth and locations of the groundwater monitoring wells will decided upon completion of the CPT and groundwater investigation tasks.

### Task 5: Report Preparation

Upon completion of the above-mentioned tasks, SOMA will prepare a written report containing a detailed description of the procedures, present the results of the field investigation, and discuss our recommendations for further studies, including the installation of additional groundwater monitoring wells, as well as extraction wells, if warranted. The report will include tables and figures to help explain the results of the current investigation.

## 3.0 References

Department of Water Resources, June 1974. "Evaluation of Ground Water Resources: Livermore and Sunol Valleys," Bulletin 118-2.

Department of Water Resources, October 1, 2003. "San Francisco Hydrologic Region Livermore Valley Groundwater Basin," Update to Bulletin 118-2.

Lawrence Livermore National Laboratory, 1995. "Environmental Report of 1995."

Zone 7 Water Agency, August 3, 2004. " Well Location Map – 5565 Tesla Road" and Table of Well Owners.

# FIGURES


Figure 1: Site vicinity map.

SOMA
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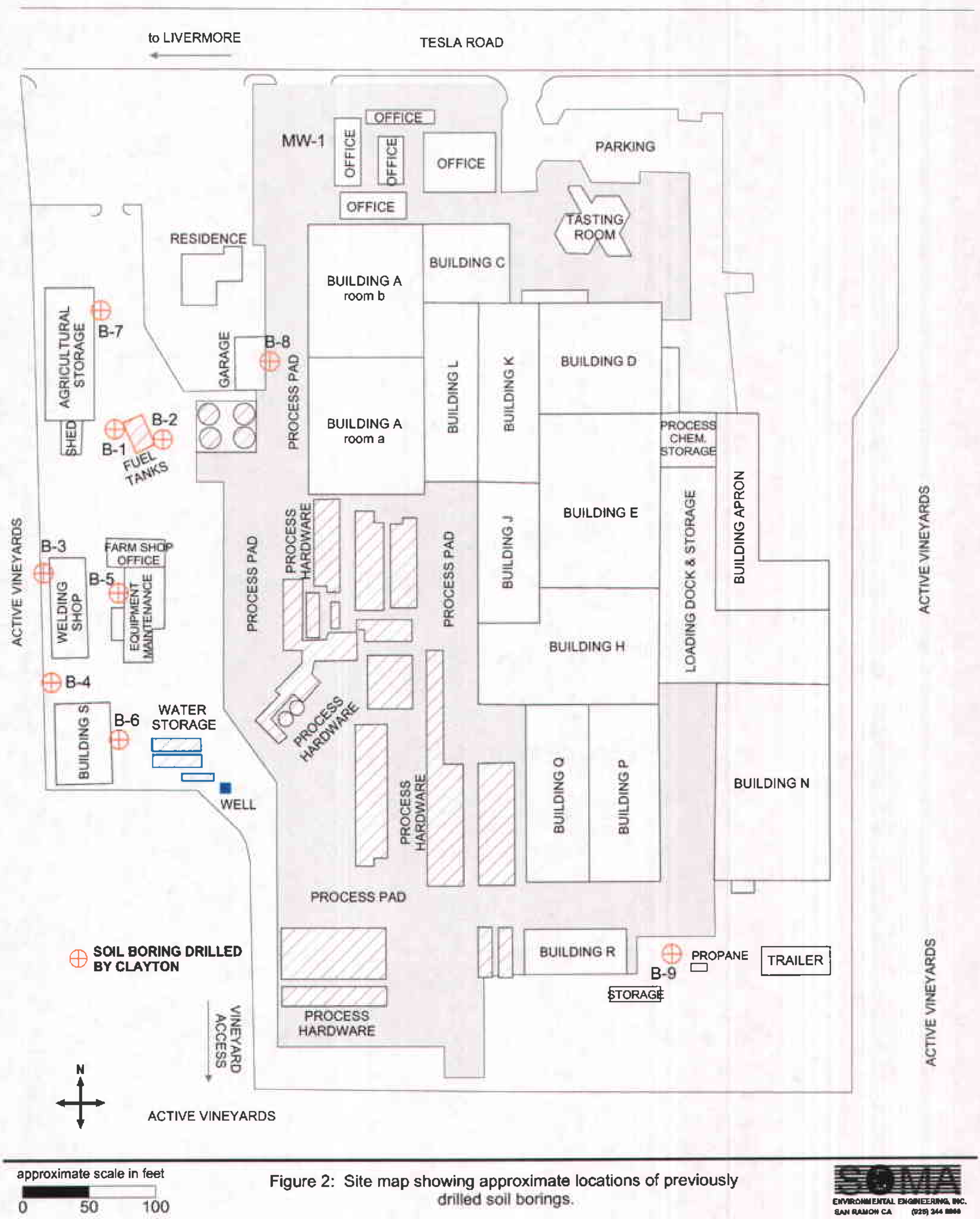


Figure 2: Site map showing approximate locations of previously drilled soil borings.

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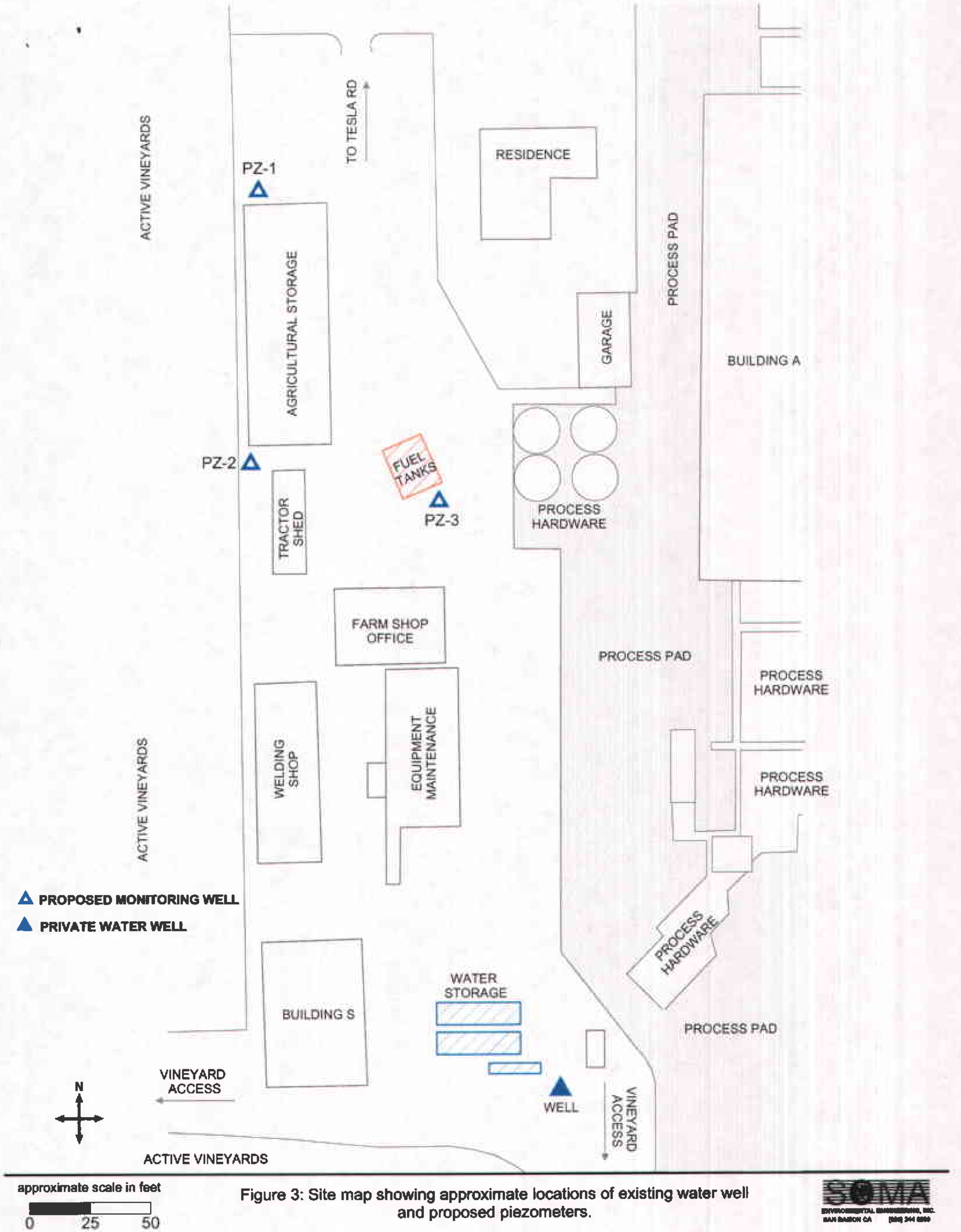
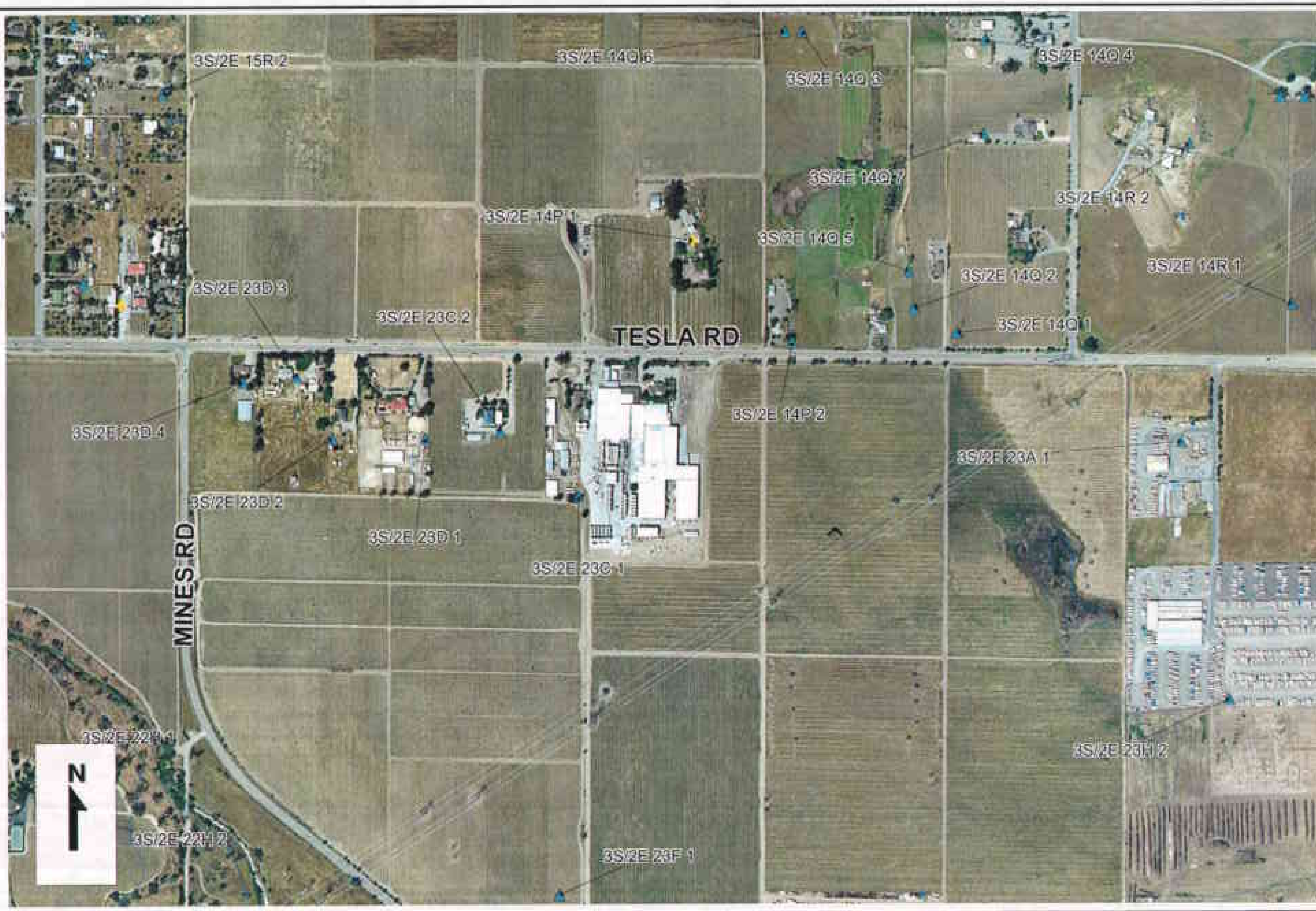



Figure 3: Site map showing approximate locations of existing water well and proposed piezometers.

# APPENDIX A

## Results of Well Survey




| | | |
|---|---|---|
| **ZONE 7 WATER AGENCY**<br>**5997 PARKSIDE DRIVE**<br>**PLEASANTON, CA 94588** | **WELL LOCATION MAP** | **SCALE: 1"= 600 ft**<br>**DATE: 8/30/04**<br>**5565 TESLA RD** |

## Roger Papler

**From:** Hong, Wyman [WHong@zone7water.com]

**Sent:** Thursday, September 02, 2004 11:25 AM

**To:** rpapler@somaenv.com

**Subject:** Owner's List

Roger,

Here's a list of the wells near 5565 Tesla Road in Livermore with their respective addresses and owners. Be aware that the owners may have changed since the well was first constructed or field located.

| WELL_# | DEPTH | DIAM | USE | RP | ADDRESS | CITY | OWNER |
|---|---|---|---|---|---|---|---|
| 3S/2E 13M 1 | 200.0 | 8.0 | pot | 660.00 | S VASCO ROAD | LIVERMORE | RON BAKER |
| 3S/2E 14J 5 | 0.0 | 0.0 | dom | 0.00 | 2700 S. VASCO RD | LIVERMORE | W.C. MALONEY |
| 3S/2E 14P 1 | 740.0 | 10.0 | sup | 611.00 | 5600 TESLA RD | LIVERMORE | ROBERT DETJENS |
| 3S/2E 14P 2 | 120.0 | 6.6 | pot | 615.00 | 5600 TESLA RD. | LIVERMORE | ROBERT DETJENS |
| 3S/2E 14Q 1 | 114.0 | 10.0 | mon | 622.50 | 2915 S. VASCO RD | LIVERMORE | DR. JENSEN |
| 3S/2E 14Q 2 | 80.0 | 8.0 | sup | 619.40 | 5878 TESLA RD | LIVERMORE | JUAN |
| 3S/2E 14Q 3 | 308.0 | 7.0 | pot | 620.00 | 2657 S. VASCO RD. | LIVERMORE | K. M. VOLKMAN |
| 3S/2E 14Q 4 | 294.0 | 0.0 | pot | 610.00 | 2693 S. VASCO RD. | LIVERMORE | KENNETH WALTERS |
| 3S/2E 14Q 5 | 158.0 | 6.0 | pot | 625.00 | 5898 TESLA RD. | LIVERMORE | LEROY IRWIN |
| 3S/2E 14Q 6 | 140.0 | 6.6 | pot | 620.00 | 2657 S. VASCO RD. | LIVERMORE | KEN VOLKMAN |
| 3S/2E 14Q 7 | 210.0 | 6.0 | dom | 625.00 | 2903 S. VASCO RD | LIVERMORE | MERV FRYDENDAL |
| 3S/2E 14R 1 | 152.0 | 8.0 | dom | 700.00 | 6500 TESLA RD | LIVERMORE | MAX RIOS |
| 3S/2E 14R 2 | 175.0 | 6.7 | dom | 665.00 | 2720 S. VASCO RD | LIVERMORE | EVERETT FARMS |
| 3S/2E 15J 6 | 0.0 | 8.0 | sup | 0.00 | 2262 BUENA VISTA AV | LIVERMORE | JAY DAVIS |
| 3S/2E 15J 7 | 140.0 | 5.0 | irr | 0.00 | 2262 BUENA VISTA AVE | LIVERMORE | JAY DAVIS |
| 3S/2E 15R 1 | 250.0 | 10.0 | sup | 596.80 | 2552 BUENA VISTA | LIVERMORE | SMITH |
| 3S/2E 15R 2 | 0.0 | 8.0 | dom | 0.00 | 2368 BUENA VISTA | LIVERMORE | W. RAYMOND |
| 3S/2E 15R 8 | 133.0 | 8.0 | irr | 600.00 | 4948 TESLA RD | LIVERMORE | STONY RIDGE WINERY |
| 3S/2E 22H 1 | 184.0 | 12.0 | sup | 603.20 | DEVINE RANCH AT WENTE FORD | LIVERMORE | WENTE BROS. |
| 3S/2E 22H 2 | 141.0 | 10.0 | dom | 609.60 | DEVINE RANCH AT WENTE FORD | LIVERMORE | WENTE BROS. |
| 3S/2E 23A 1 | 200.0 | 4.5 | pot | 0.00 | 5767 TESLA RD | LIVERMORE | WENTE BROS. |
| 3S/2E 23C 1 | 102.0 | 10.0 | irr | 0.00 | TESLA RD & MINES RD | LIVERMORE | WENTE BROS. |
| 3S/2E 23C 2 | 108.0 | 10.0 | pot | 0.00 | 5443 TESLA RD | LIVERMORE | DALMAZZO |
| 3S/2E 23D 1 | 140.0 | 8.0 | dom | 609.10 | 5255 TESLA RD | LIVERMORE | PELLERIN |
| 3S/2E 23D 2 | 116.0 | 0.0 | dom | 0.00 | 5167 TESLA RD | LIVERMORE | GAVENS |

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|---|---|---|---|---|---|---|
| 3S/2E 23D 3 | 29.1 | 9.0 dom | 0.00 | 5143 TESLA RD | LIVERMORE | JUDY DUDNEY |
| 3S/2E 23D 4 | 0.0 | 0.0 sup | 0.00 | 5053 TESLA RD | LIVERMORE | STAMBAUGH |
| 3S/2E 23F 1 | 690.0 | 12.0 sup | 635.00 | 5565 TESLA RD | LIVERMORE | WENTE BROS. |
| 3S/2E 23H 2 | 0.0 | 0.0 sup | 0.00 | 6271 TESLA RD | LIVERMORE | J. MIGLIORE |

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