Approve workplan for 2 MWs

WELL INSTALLATION AND GROUNDWATER MONITORING WORKPLAN FOR FRIESMAN RANCH PROPERTY LIVERMORE, CALIFORNIA

Nov 1998

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A Report Prepared for:

Children's Hospital Foundation
747 52nd Street
Oakland, California 94609-1815

WELL INSTALLATION AND GROUNDWATER MONITORING WORKPLAN FOR FRIESMAN RANCH PROPERTY LIVERMORE, CALIFORNIA

Kleinfelder Job No. 10-3006-13/009

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WELL INSTALLATION AND
GROUNDWATER MONITORING WORKPLAN
FRIESMAN RANCH PROPERTY
LIVERMORE, CALIFORNIA

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

PLATES

TABLES

APPENDICES

1. INTRODUCTION

This workplan describes the purpose, objectives, tasks and methods for performing additional investigations at the Friesman Ranch Property, Livermore, California. The proposed work focuses on the installation of two additional groundwater monitoring wells and implementation of a regularly scheduled groundwater monitoring program at the site. This proposed work is based on our report entitled *Remedial Investigation, RBCA Tier 2 Evaluation and Remedial Action Plan, Friesman Ranch Property, Livermore, California* dated October 17, 1997 (our Report) and the Alameda County Health Care Services Agency, Environmental Health Services Division's (ACHCSA's) letter regarding *Additional Investigations at 1600 Friesman Road, Livermore, CA* dated July 29, 1998. Preparation of this Workplan is a key task of our proposal dated August 24, 1998 [Kleinfelder, Inc. (Kleinfelder), 1998].

This workplan generally follows the suggested format described in *A Suggested Method for Review of Workplans and Reports Submitted to Comply with Regional Board Staff Requests* [California Regional Water Quality Control Board - Central Valley Region (RWQCB), 1990]. In addition, the following regulatory agency standard guidance document was used to prepare this workplan.

- *Guidelines for Hydrogeologic Characterization at Hazardous Substances Release Sites, Volumes I (Field Investigation Manual) and II (Project Management Manual)*. California Environmental Protection Agency (Cal/EPA), September 1994.

1.1 PURPOSE, OBJECTIVES AND SCOPE OF WORK

The purpose of the additional investigations is to close data gaps identified in our Report.
The objectives of the additional investigations are to:

- Provide a monitoring point in the inferred downgradient direction (northwest) of groundwater flow; MW-8
- Provide a monitoring point in the suspected source area; MW-7 also to see if Creek has affect on GW flow direction
- Initiate and implement a regularly scheduled groundwater monitoring program for a period of one year to track spatial and temporal variations in groundwater conditions; and
- Re-evaluate and modify the groundwater monitoring program as appropriate after the one year of monitoring.

In order to meet these objectives, the following scope of work will be implemented:

- Installation of two groundwater monitoring wells;
- Implementation of a regularly scheduled groundwater monitoring program; and
- Preparation of quarterly groundwater monitoring reports.

2. SITE DESCRIPTION

2.1 LOCAL DESCRIPTION, SURROUNDING LAND USE AND CLIMATE

The Friesman Ranch Property is located at 1600 Freisman Road, Livermore, Alameda County, California (Plate 1). The property covers an area of approximately 55 acres and is used for agricultural and residential purposes. Although the majority of the site is undeveloped and was used for grazing purposes, the southwest central portion of the site is occupied by six single family residences, three detached garages, the former dairy building, seven barns and a stable.

Several aboveground storage tanks (ASTs) are present on the central portion of the site. All of these ASTs are located on concrete pads that appeared to have only minor oil staining. In addition, two 55-gallon drums containing hydraulic fluid are located on the southern section of the central portion of the developed area. Minor stains were observed on the concrete pad beneath these drums. Reportedly, no underground storage tanks (USTs) were or are located at the site.

Surrounding land use is mixed (agricultural, recreational and residential). The site is bordered to the south by scattered residential buildings, Las Positas Golf Course and undeveloped grazing land; to the north by Interstate 580; to the west by Tri-Valley Golf Center's driving range; and to the east by Las Positas Golf Course.

The climate of the area is characterized by wet mild winters and dry, hot summers. Rainfall occurs intermittently, but is concentrated between September and March. Between 1990 and 1994, annual rainfall ranged from 8.96 to 19.67 inches, with an average of 13.88 inches (National Weather Service, 1997).

2.2 LOCAL GEOLOGY AND HYDROLOGY

The site is located in the Livermore Basin portion of the Coast Range Geomorphic Province of California (Norris and Webb, 1990). The Livermore Basin, including the Friesman Ranch property, is underlain by non-marine, Pleistocene and Holocene deposits of fluvial and lacustrine origin. Most significant of these deposits is the Livermore Gravels, an approximately 4,000 foot thick sequence of gravels, sands, silts and clays, with scattered lake bed deposits. On the northern side of the basin, where the Friesman Ranch Property is located, these deposits are commonly buried by younger alluvium.

Site subsurface materials consist of silts and clays down to a depth of at least 28 feet below ground surface (bgs). Reported hydraulic conductivity values associated with these materials range from 10^{-5} to 1 gallon per day per square foot (gal/day/ft^2) (Freeze and Cherry, 1979). First groundwater was encountered at a depth of approximately 21 feet bgs and stabilized at depths ranging from 12 to 14.5 feet bgs. Groundwater appears to be under confined conditions and flows to the northwest (Kleinfelder, 1997b).

The Livermore valley is drained by a number of small streams that originate in the surrounding hills and flow into larger drainages that ultimately discharge into Alameda Creek, through Niles Canyon, and into San Francisco Bay. [redacted]d flows into Alamo Creek to the west.

2.3 SURFACE WATER AND GROUNDWATER USE

The Dublin-San Ramon Services District obtains its municipal and industrial water supplies from a combination of treated surface water and groundwater supply wells located in residential areas in and around the San Ramon, Livermore and Amador Valleys. T[redacted]

3. SITE HISTORY

3.1 OPERATIONAL HISTORY

The Friesman Ranch Property was undeveloped until the 1910s when the buildings (barns, outbuildings, residences) associated with the dairy operation were constructed. The property was used as a dairy until operations ceased in 1971. The equipment used in the dairy operations was powered by steam generated by two boilers located in the former dairy building. These boilers were reportedly fueled via a heating oil AST that was located in the metal shed located to the north of the dairy building. Open areas on the northern and southern portions of the property were and still are used as agricultural land and pastured for cattle and horses.

Currently, the site is occupied by six residences, the former main dairy and associated support buildings, several garages, seven barns and a stable. The property owner occupies the main residence while the remaining residences and several of the barns are leased to tenants. Debris (tires, old furniture, scrap metal and lumber) is scattered across the property.

3.2 PREVIOUS INVESTIGATIONS

3.2.1 Phase I Investigations

In July 1997, a Phase I Environmental Site Assessment (Phase I ESA) and limited soil and groundwater investigation was performed at the site (Kleinfelder, 1997a). During the site reconnaissance portion of the Phase I ESA, a number of ASTs, reportedly used for fueling of vehicles and equipment and two 55-gallon drums used to store hydraulic fluid, were observed around the central portion of the developed portion of the facility. A heating oil AST, that supplied fuel to the boilers in the former dairy building and that was reportedly removed from the facility several years earlier, previously occupied the metal shed (Plate 2). Each of the ASTs was mounted on towers above concrete pads. No evidence of piping, either above or below ground, were observed. Reportedly, no USTs were ever installed on the property.

Other facilities that potentially could be associated with the handling, storage and disposal of hazardous materials/wastes include: a barn immediately east of the former dairy building at which numerous paint and thinner cans were stored; a barn located on the southwestern corner of the facility where numerous 55-gallon drums were noticed; and large quantities of debris (tires, old furniture, scrap metal and lumber) that were observed at various locations across the site.

In order to assess environmental impairment associated with these facilities, a limited soil and groundwater sampling program was implemented. Surface soil (KSF-6, KSF-7, KSF-8 and KSF-9), shallow soil (sample numbers KSH-3, KSH-4 and KSH-5), subsurface soil (sample numbers KB-2 and KB-1) and groundwater (sample number KB-2) samples were collected using a truck-mounted Geoprobe™ sampling system. The soil and groundwater samples collected from borings KB-1 and KB-2 and the shallow subsurface soil samples (KB-3, KB-4 and KB-5) were analyzed for total purgeable petroleum hydrocarbons (TPPH) and total extractable petroleum hydrocarbons (TEPH), and for aromatic hydrocarbons (benzene, toluene, ethylbenzene and total xylenes - BTEX). The four surface soil samples (KSF-6, KSF-7, KSF-8 and KSF-9) were composited and analyzed for purgeable halocarbons and total and extractable lead.

Table 1 summarizes analytical results from the Phase I ESA. TPPH, TEPH and BTEX were detected in the soil and groundwater samples collected from the areas where the boilers and former AST were located. The maximum concentrations of TPPH and TEPH detected in soil samples were 280 and 160 milligrams per kilogram (mg/kg), respectively. The aromatic hydrocarbons ethylbenzene (1.6 mg/kg), toluene (0.52 mg/kg) and total xylenes (1.2 mg/kg) were detected at the maximum concentrations specified (Table 1); however, benzene was not detected in any of the soil samples.

TPPH, TEPH and BTEX were detected in the one groundwater sample collected at concentrations of 3,100, 160,000, 7.3, 19, 11 and 22 micrograms per liter (µg/L), respectively. Benzene was present at a concentration that exceeded its State of California Maximum Contaminant Level (MCL), 1.0 µg/L (Title 22, California Code of Regulations [CCR], Section 64444.5).

[redacted]le analyzed for this suite of chemicals. This composite sample ([redacted]) did contain total lead at a concentration of 73 mg/kg, but did not contain extractable lead (Table 1).

3.2.2 Remedial Investigations and Risk Evaluation

In October 1997, a Remedial Investigation (RI) and Risk-Based Corrective Action (RBCA) Tier 2 Evaluation was implemented at the Friesman Ranch Property to assess potential adverse environmental impacts associated with the former heating oil AST located at the site. In addition, other potential environmental concerns, such as nitrate, organochlorine pesticide and polychlorinated biphenyl (PCB) impacts, were addressed by the RI. The purpose of the RI and RBCA Tier 2 Evaluation was to gather the information and data required to develop a Remedial Action Plan (RAP) for the site (Kleinfelder, 1997b).

RI activities performed consisted of utility surveys, wipe sample collection, surface soil sample collection, soil boring/sampling and reconnaissance groundwater collection, monitoring well installations, implementation of groundwater monitoring event and IDW-handling procedures.

Two wipe samples were collected from concrete beneath the 55-gallon drums that reportedly were used for the storage of hydraulic oil. These samples were analyzed for PCBs and found to be non-detect.
Six surface soil samples were collected from the pasture areas located along the northwestern and southwestern portions of the property. The objective of this activity was to assess the potential impact from historical agricultural activities. Nitrate was detected in the composite surface soil sample at a concentration of 17 milligrams per kilogram (mg/kg). This concentration is not

considered to be significant. Organochlorine pesticides were not detected in the composite surface soil sample and do not appear to have adversely impacted the property.

A soil boring/sampling program and reconnaissance groundwater sampling program were implemented to assess the potential lateral and vertical extent of hydrocarbon impacts to soil and the potential lateral extent of hydrocarbon impacts to groundwater.

A total of 20 soil borings were advanced to a maximum depth of 28 feet bgs with soil samples being collected as the boring was advanced. A total of 14 soil samples were collected for lithologic and laboratory analyses at 5 foot depth intervals from 7 soil borings. Samples collected were analyzed for at least one of the following constituents: total petroleum hydrocarbons as gasoline (TPH-g), total petroleum hydrocarbons as diesel (TPH-d), the aromatic hydrocarbons benzene, toluene, ethylbenzene and total xylenes (BTEX), methyl tertiary-butyl ether (MTBE) and polynuclear aromatic hydrocarbons (PAHs).

TPH-d was not detected in any of the subsurface soil samples. TPH-g was detected in 3 of the 14 samples at a concentration in excess of 10 mg/kg. The highest concentrations of TPH-g were detected in Samples KB-18 at depths of 15 (2,100 mg/kg) and 20 feet (4,000 mg/kg) feet bgs; however, these areas appear to be within the saturated zone and may represent residual groundwater smearing (Table 2).

BTEX was detected in the same three subsurface soil samples in which TPH-g was detected; however, the highest concentrations were associated with the lowest TPH-g concentration detected and conversely, the lowest concentrations of BTEX were associated with the highest concentrations of TPH-g (Table 2).

MTBE was detected in only one sample at a concentration of 0.065 mg/kg. PAHs were not detected in any of the samples (Table 2).

The lateral and vertical extent of TPH, BTEX and MTBE contamination in soil appears to be limited. With the exception of a few isolated locations, chemicals of concern were not detected at depths less than 10 feet bgs, being concentrated at the capillary fringe at a depth of 19 feet bgs. Reconnaissance groundwater samples were collected from all 20 soil borings (Table 3). TPH-g and TPH-d were detected at concentrations of thousands of milligrams per liter (μg/L) in at least one sample collected and analyzed. At least one sample contained concentrations of BTEX at or in excess of their respective MCLs. Although MTBE was detected, concentrations were not in excess of the compound's proposed cleanup level.

A total of six groundwater wells were installed on the central portion of the property (Plate 3) to act as monitoring points to assess temporal and spatial variations in groundwater depth, flow, free-product thickness and chemistry. Well locations were selected based on the results of the reconnaissance groundwater sampling program.

One groundwater monitoring event was performed to verify the analytical results obtained from the reconnaissance groundwater sampling program. Water levels and free-product thickness were measured and water quality samples were collected as part of this monitoring event. Only one groundwater monitoring well sample (KMW-g) contained petroleum hydrocarbon compounds. TPH-g was detected at 13,000 µg/L, TPH-d was detected at 3,200 µg/L, BTEX was detected at 1,314 µg/L and the PAH naphthalene was detected at 140 µg/L. MTBE was not detected in any of the groundwater monitoring well samples (Table 4).

Impacts of TPH and BTEX appear to be concentrated in the vicinity of soil borings KB-11 and KB-13. The maximum TPH-g and TPH-d concentrations and observed sheen suggest that free-product is floating on the piezometric surface. The center of mass of the groundwater plume was assumed to be in the vicinity of KB-13.

4. PROPOSED WORK

4.1 INTRODUCTION

The proposed work to be performed at the Friesman Ranch Property consists of the following tasks:

- Installation of two groundwater monitoring wells;
- Implementation of a regularly scheduled groundwater monitoring program; and
- Preparation of quarterly groundwater monitoring reports.

The project activities will be conducted under the supervision of a California Registered Geologist (RG) or a Professional Engineer (PE). Field activities will be documented in bound field notebooks and with photographs. This documentation will be incorporated into the groundwater monitoring reports.

4.2 TASK 1 - GROUNDWATER MONITORING WELL INSTALLATIONS

Kleinfelder will install two additional monitoring wells at the site. These wells will be used to close data gaps and provide monitoring points for the measurement of groundwater levels and free-product thickness and for sampling water quality. One of these wells will be located northwest of Well KMW-6 and the developed portion of the property to provide a monitoring point in the inferred downgradient direction of groundwater flow. The other well will be located between the metal shed that reportedly contained the former heating oil AST, the suspected source area, and boring KB-13.

4.2.1 Field Preparation Activities

Prior to the performance of any intrusive field procedures, the following tasks will be performed:

- Notification of Underground Services Alert (USA),
- an industry utility location service, of the intent to utilize intrusive investigative techniques at the site; and
- Procurement of a soil boring permit from the Alameda County Flood Control and Water Conservation District - Zone 7 (ACFCWCD) to perform the additional investigation.

4.2.2 Soil Boring Procedures

The testholes for the monitoring wells will be advanced using hollow stem auger (HSA) advancement techniques. The minimum outside diameter (OD) of the HSAs used to advance the testholes will be 10-inches.

No soil samples will be collected during the advancement of these testholes.

4.2.3 Monitoring Well Construction

Each monitoring well will be constructed of four-inch OD flush-joint Schedule 40 polyvinyl chloride (PVC) well screen and casing. The final depth of the boring and screened interval will be assessed in the field based upon the data collected at the time the well is drilled. It is anticipated that the maximum depth of each well will be approximately 25 feet bgs and will be completed with 15 to 20 feet of 0.020-inch factory-milled, well screen. The well screen will be positioned to straddle the water table with approximately 5 feet above and 10 to 15 feet below the top of the water table. The assembled well pipe will be installed through the augers and a quartzite sand, of a size compatible with the well screen slot size (Lonestar™ Number 2/12 sand or equivalent), will be backfilled through the annulus between the well pipe and the auger. The sand pack will extend at least one foot above the top of the well screen. Above the sand pack, bentonite pellets will be backfilled to form a two-foot thick seal. A neat cement grout (one 94-pound sack of Portland cement to 5-gallons of water) will be backfilled from the top of the bentonite seal to the ground surface. The PVC casing will be completed with a vented locking cap and covered by a flush-mounted steel protective curb box. The protective curb box will be grouted into place to limit disturbance to the PVC well pipe.

4.2.4 Well Development

After completion of the groundwater monitoring wells, the driller/well installer contractor will develop them by pumping or bailing. Removal of water will continue until a maximum of ten well volumes of water have been evacuated or the wells produces clear, sediment-free samples and pH, electrical conductivity and temperature stabilize. If field conditions preclude this, the well development method and field conditions will be reviewed to determine whether the achieved turbidity is acceptable. Equipment utilized in the development effort will be thoroughly cleaned prior to insertion into the wells and between wells to preclude the possibility of introducing contamination into an otherwise "clean" well.

4.2.5 Decontamination of Downhole Boring/Sampling Equipment

Prior to performing field activities, downhole boring equipment will be pre-cleaned with a steam cleaner. Boring sampling equipment will be decontaminated prior to use at each boring location. The decontamination procedures will include: (1) remove gross contamination by scraping, pulling or brushing (as necessary) followed by a tap water rinse; (2) Alconox™ or equivalent equipment wash; (3) tap water rinse; and (4) followed by two rinsings with deionized water.

4.2.6 Grouting of Soil Borings

Following completion of soil boring activities, any open cased boreholes will be sealed from bottom to top with neat cement grout (one 94-pound sack of Portland cement to 5-gallons of water).

4.2.7 Investigation Derived Waste Management

Investigation Derived Waste (IDW) will be placed in labeled, 55-gallon, United States Department of Transportation 17H drums or 5-gallon pails. These drums/pails will be placed in a designated IDW accumulation area until ultimate disposal by the Client.

4.3 TASK 2 - QUARTERLY GROUNDWATER MONITORING PROGRAM

After the new wells have been installed, quarterly groundwater monitoring will be initiated. Groundwater monitoring involves the measurement of water levels and free-product thickness (if any) and the collection of water quality samples from each of the wells. Initially a water level reading will be taken with a clean weighted measuring tape, hydrocarbon interface probe, or electric contact probe. The depth of the water and the thickness of any free-product will be measured from the top edge of the permanent PVC well casing. The reference point will be surveyed and an elevation determined relative to previously established top of well casing elevations on site. In this way, a water level elevation can be calculated. This data will be utilized in conjunction with direct measurements to prepare groundwater elevation contour map and estimate groundwater flow direction.

The eight monitoring wells will be sampled for each quarterly event. Initially, each well will be purged prior to sampling so that a representative sample of water in the aquifer near the well is collected. Each well will be purged until at least three or a maximum of five well volumes of water have been removed and allowed to recover to near static levels before sampling. In addition, water quality parameters (pH, electric conductivity and temperature) will be measured to evaluate whether the water in each well has stabilized prior to sampling.

Water samples from each well will be collected using either a Teflon™ or disposable PVC bailer. Groundwater monitoring well samples collected for chemical analysis will be placed in appropriate containers, labeled and placed in a Ziploc™ plastic bag. The samples will then be placed in an ice chest packed with loose water ice to 4 +/- 2 degrees Celsius for delivery to the laboratory.

4.3.1 Investigation Derived Waste Management

Investigation Derived Wastes (IDW) will be placed in labeled, 55-gallon, United States Department of Transportation 17H drums. These drums will be placed in a designated IDW accumulation area until ultimate disposal by the Client. Kleinfelder can identify disposal options for the Client; however, the Client is ultimately responsible for disposal for any IDW produced during the implementation of these investigation activities.

4.4 TASK 3 - ANALYTICAL LABORATORY SERVICES

4.4.1 Groundwater Samples

Groundwater monitoring well samples will be analyzed for the following constituents:

- TPH-g using Modified United States Environmental Protection Agency (EPA) Method 8015;
- TPH-d using Modified EPA Method 8015;
- BTEX using EPA Method 8020;
- MTBE using EPA Method 8020.

Should MTBE be detected in any of the groundwater monitoring well samples. The detection will be confirmed in the sample with the greatest MTBE concentration by re-analyzing using EPA Method 8260 (gas chromatography/mass spectrometry).

In addition to the above analyses, samples collected during the first monitoring event will also be analyzed for:

- Polynuclear aromatic hydrocarbons (PAHs) using EPA Method 8270; and
- Total soluble lead using EPA Method 6010/7000.

Based on the analytical results obtained during the first monitoring event, the analysis for these parameters may be extended through subsequent events for selected wells as appropriate.

Table 5 is a schedule correlating the wells with the analytical parameters during the first year of monitoring. Table 6 correlates the analytical parameter with required sample containers and preservatives.

4.5 TASK 4 - REPORTING

Kleinfelder proposes to prepare a series of reports during the first year of monitoring. These reports will be prepared under the direct supervision and signed by either a R.G. or P.E. The outline for a typical groundwater monitoring report is included in Appendix A.

4.5.1 Quarterly Monitoring Reports

A total of four quarterly groundwater monitoring reports will be prepared under this scope of work. These reports will be concise and will include the following:

- A description of surface water and groundwater monitoring procedures and protocols;
- A summary tabulation of all water-level and free-product thickness measurements;
- A summary tabulation of chemical analysis results for all monitoring wells;
- Appropriately scaled and labeled maps showing the locations of the surface water monitoring points and monitoring wells in relation to existing structures and facilities; and
- Semiannually, in the second and fourth quarter monitoring reports, updated water and piezometric surface and isoconcentration maps for key chemicals of concern for the affected aquifers.

5. FIELD QUALITY ASSURANCE/QUALITY CONTROL

Field quality assurance/quality control (QA/QC) will be documented by two indirect means: field documentation and QA/QC sample collection and analysis.

5.1 FIELD DOCUMENTATION

Four formats are used to document the implementation of field activities:

- Field log book;
- Field data sheets;
- Photodocumentation Record;
- Sample labels; and
- Chain-of-custody form.

5.1.1 Field Log Book

All field data will be recorded in a log book while in the field. Logged data will include soil boring specifications and sample-collection information including sample date and time, location and client, analytical methods, samplers' initials, and the name and address of the laboratory. In addition, any other pertinent information, such as conversations with concerned parties (site custodians, regulatory agency personnel) or descriptions of anomalous conditions, will be recorded.

5.1.2 Field Data Sheets

Field data sheets will be completed in the field to document field activities. The data sheets will include: daily field reports, daily trip reports, and geologic boring logs.

5.1.3 Photodocumentation Record

Photographs will be used to document all phases of the field activities. These photographs will be logged and placed into the RI Report, as appropriate.

5.1.4 Sample Labels

Samples labels will be completed in waterproof ink at the time of sample collection and before the sample is placed in the cooler. The following information will be included on the sample label: sample number, date and time, sample location and client, analysis and laboratory, preservative, samplers' initials, and project number.

5.1.5 Chain-of-Custody Records

A chain-of-custody record will be completed as soil and groundwater samples are collected, so that samples do not have to be removed from the cooler. The record will be checked for completeness at the end of each day samples are collected and signed. It will then be hand-delivered with the samples to the laboratory, or placed in a sealable plastic freezer bag and taped to the inside lid of a cooler for shipment. Information on the chain-of-custody record will include: sample date and time, sample ID and location, matrix, number of containers, required analyses, preservative, instructions for composite samples, turnaround time, project manager's name, project number, project name and location, client and laboratory names, and sampler signatures.

5.2 FIELD QUALITY ASSURANCE/QUALITY CONTROL SAMPLE COLLECTION AND ANALYSIS

QA/QC samples will be collected during field sampling activities. These QA/QC samples include random duplicates, trip blanks and equipment rinsate blanks.

One duplicate, one trip blank and one equipment rinsate blank will be collected during each groundwater monitoring event. These samples will be analyzed for TPH-g, TPH-d, BTEX and MTBE. In addition, for the first event the duplicate groundwater monitoring well sample will be analyzed for PAHs and lead.

6. LABORATORY QUALITY ASSURANCE/QUALITY CONTROL

All analytical testing will be performed by a Cal/EPA Environmental Laboratory Accreditation Program (ELAP)-accredited hazardous-waste fixed-base laboratory. The laboratories will be responsible for maintaining custody of the samples, and for maintaining all associated records documenting that custody. Upon receipt of the samples, the laboratories will check the original chain-of-custody documents and compare them with the labeled contents of each sample container for accuracy and traceability. The laboratories will check all sample containers for integrity, and will record any observations on the original chain-of-custody record; the chain-of-custody form will be signed and dated by the laboratories.

Each sample will be logged into the laboratory by assigning it a unique sample number. All samples received as part of the same shipment will receive the same work order. Each container of the sample is identified by appending sequential letters to the end of the sample number. The laboratory number and the sample ID number will be recorded on the laboratory report.

7. PROPOSED SCHEDULE

We estimate that implementation of the RI will take approximately eight weeks. Preparation of the Workplan, procurement of subcontractors and regulatory agency permits and other pre-field work activities will take approximately two weeks to complete. The soil and groundwater investigation is estimated to take approximately one week to complete, contingent on the availability of the drilling and mobile laboratory subcontractors.

Approximately one week will be required to install and sample the monitoring wells. Laboratory turnaround-time will take two weeks. Approximately four weeks from receipt of analytical results, the RI Report will be submitted. A description of project milestones and their scheduled implementation and/or completion dates is included below:

• Completion of Draft Workplan	November 20, 1998
• Completion of review of Workplan	November 30, 1998
• Approval of Workplan	December 4, 1998
• Site Walk with Notified Utility Companies (USA Locator)	December 9, 1998
• Well Installations	December 10-11, 1998
• Groundwater Monitoring Event	December 15-16, 1998
• Receipt of Final Certified Analytical Results	December 23, 1998
• First Quarterly Monitoring Report	January 30, 1999
• Second Quarterly Monitoring Event	March 1999
• Second Quarterly Monitoring Report	April 30, 1999
• Third Quarterly Monitoring Event	June 1999
• Third Quarterly Monitoring Report	July 30, 1999
• Fourth Quarterly Monitoring Event	September 1999
• Fourth Quarterly Monitoring Report	October 30, 1998

8. QUALIFICATIONS

Kleinfelder, Inc.(Kleinfelder) is a multidisciplinary consulting firm providing a broad range of environmental engineering, planning, and design services. For more than 35 years, Kleinfelder has concentrated on geotechnical, materials and environmental engineering and the environmental sciences, conducting projects throughout the United States and abroad. Clients include the U.S. Government, foreign governments, state and city governments, communities, special districts, industrial, commercial, institutional and other private interests. Kleinfelder currently has 42 offices throughout the western United States as well as numerous project and field offices. The total corporate staff includes over 800 engineers, scientists, and support personnel.

Kleinfelder has over 15 years of direct hazardous waste management experience and is a recognized leader in technology development and use in the areas of hazardous waste handling, treatment, and disposal. The Kleinfelder staff of geologists, hydrogeologists, chemists; environmental, civil, and chemical engineers; meteorologists, industrial hygienists, toxicologists, planners, ecologists, hazardous waste specialists, and other professional personnel are equipped to provide a full spectrum of services from site characterization, waste auditing, remedial investigations, feasibility studies, and remedial action planning to design and construction management.

Kleinfelder maintains all current licenses, certifications, and training required for hazardous waste operations in the State of California, including:

- State of California Contractors State License Board General Engineering Contractor (A) License; and
- Federal Occupational Safety and Health Administration (OSHA) 40-hour health and safety training for hazardous waste operations (29 CFR 1910.120) certifications for all site workers.

The geophysical contractor responsible for the utility clearance survey will have a California Registered Geophysicist (R.Gp.) supervise its portion of the work.

The drilling/well installation contractor selected by Kleinfelder will have the following certifications and training:

- Class C-57 Contractor's License for the State of California; and
- Federal OSHA 40-hour health and safety training for hazardous waste operations (20 CFR 1910.120) certifications for all site workers.

The laboratory contractors (mobile and fixed) selected by Kleinfelder will have the following certification:

- Current Cal/EPA ELAP accreditation for all of the analytical methods used.

The surveying contractor selected by Kleinfelder will have the following certification:

- Registered California Land Surveyor

9. HEALTH AND SAFETY

The Federal OSHA and California Department of Safety and Health (DOSH) require that a site-specific Health and Safety Plan (HASP) be prepared prior to field activities (29 CFR Part 1910.120[j]; Title 8, CCR). In addition, Kleinfelder safety policy dictates that a HASP be generated for use by the Kleinfelder field team because the potential for exposure to hazardous materials exists. All Kleinfelder field personnel and subcontractors working directly in the field will be enrolled in a medical monitoring surveillance program.

The site-specific HASP provides general guidelines for decision points in site safety planning, and will establish personnel protection standards and mandatory safety practices and procedures. In general, the HASP covers the following subjects:

- Emergency contracts to be used in the event of an accident or exposure;
- Description of site hazards, both physical and chemical;
- On-site monitoring and personnel protection;
- Project team organization and responsibilities;
- Site control measures;
- Decontamination procedures; and
- Training and medical monitoring requirements for personnel.

The provisions of the HASP will be mandatory for all on-site personnel; all Kleinfelder subcontractors shall conform to this plan at a minimum.

10. REFERENCES

California Environmental Protection Agency, 1994, Guidelines for Hydrogeologic Characterization at Hazardous Substances Release Sites, Volumes I (Field Investigation Manual) and II (Project Management Manual), Interim Final. September.

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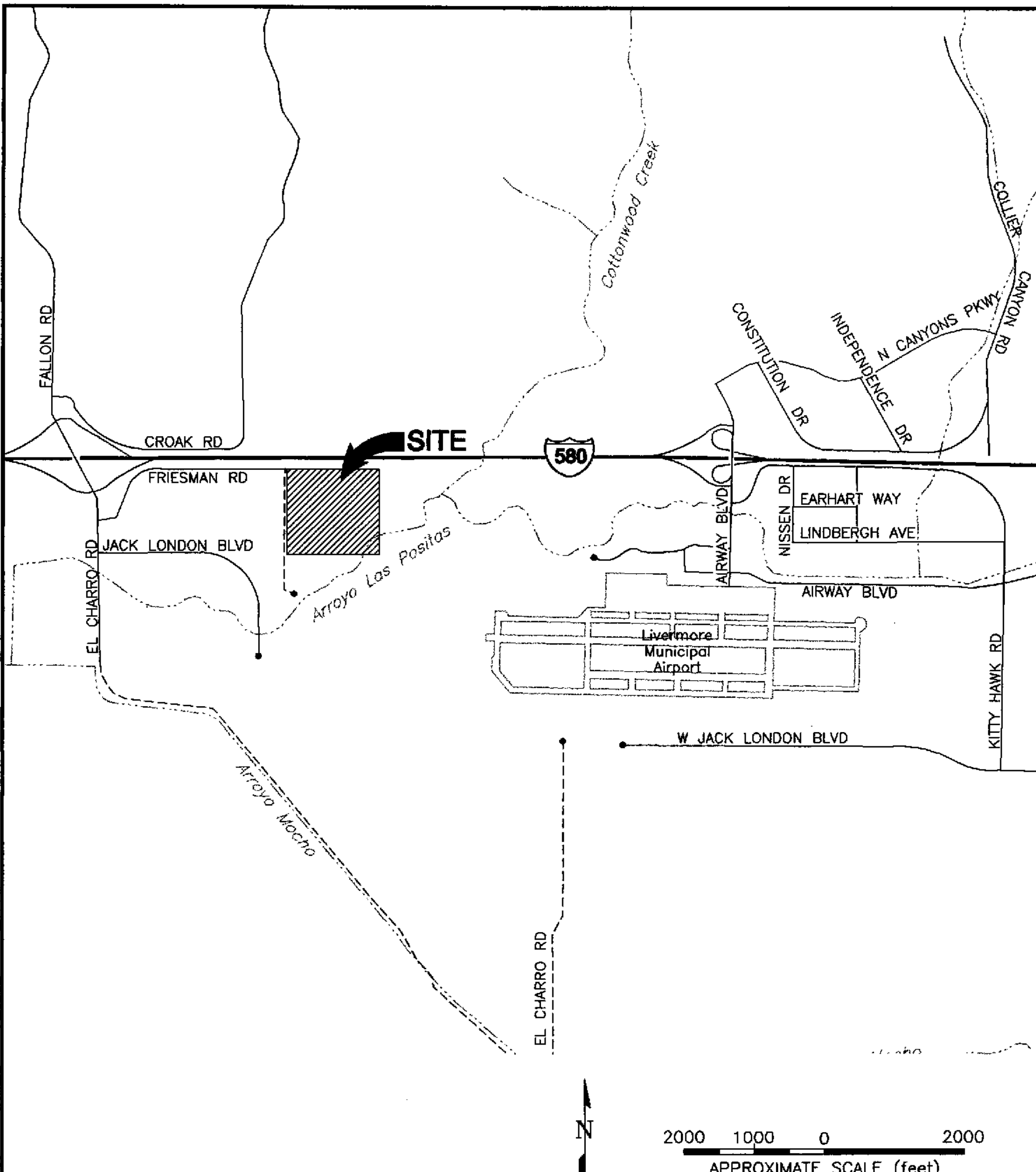
PLATES



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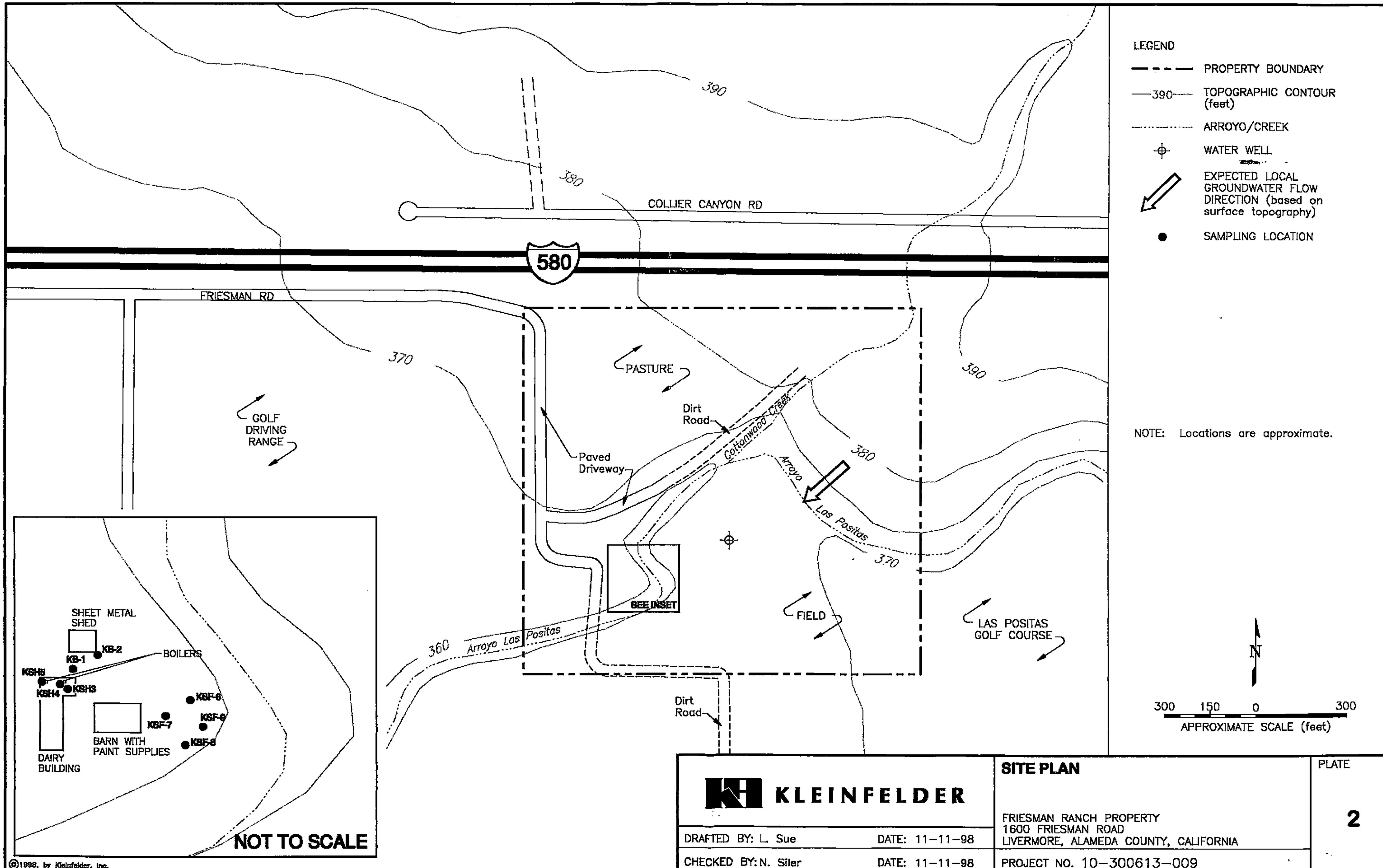
KLEINFELDER

DRAFTED BY: L. Sue	DATE: 11-11-98	**SITE VICINITY MAP** FRIESMAN RANCH PROPERTY 1600 FRIESMAN ROAD LIVERMORE, ALAMEDA COUNTY, CALIFORNIA	PLATE 1
CHECKED BY: N. Siler	DATE: 11-11-98	PROJECT NO. 10-300613-009	



CAD FILE: C:_PROJECTS\10300613\009\SITEPLAN.dwg

KLEINFELDER

DRAFTED BY: L. Sue DATE: 11-11-98

CHECKED BY: N. Siler DATE: 11-11-98

SITE PLAN

FRIESMAN RANCH PROPERTY
1600 FRIESMAN ROAD
LIVERMORE, ALAMEDA COUNTY, CALIFORNIA

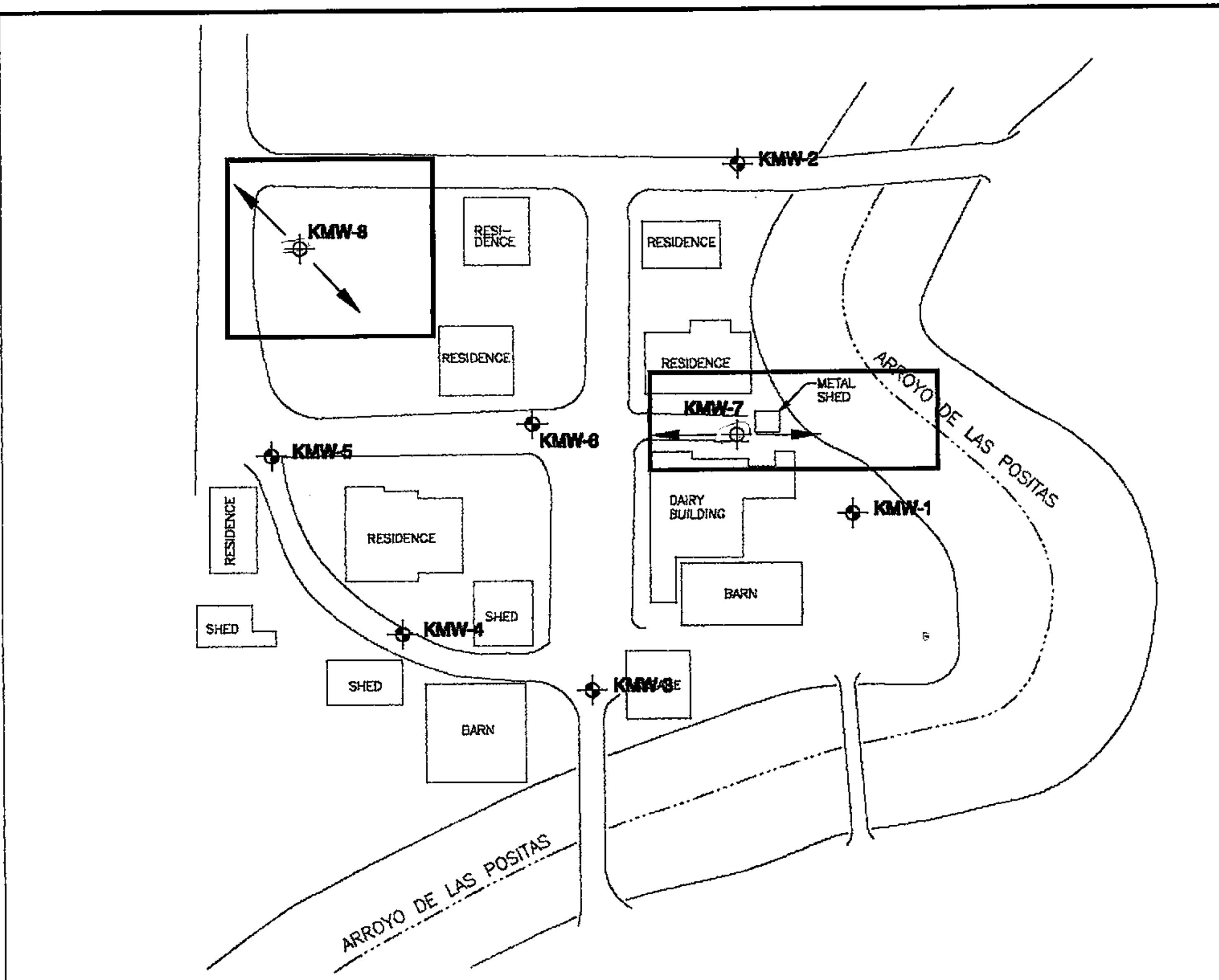
PROJECT NO. 10-300613-009

PLATE

2

EXISTING GROUNDWATER MONITORING WELL

PROPOSED GROUNDWATER MONITORING WELL



NOTES:

1. Locations are approximate.

N

80 0 80

APPROXIMATE SCALE (feet)

KLEINFELDER

DRAFTED BY: L. Sue DATE: 11-11-98

CHECKED BY: N. Siler DATE: 11-11-98

GROUNDWATER MONITORING WELL LOCATIONS

FRIESMAN RANCH PROPERTY
1600 FRIESMAN ROAD
LIVERMORE, ALAMEDA COUNTY, CALIFORNIA

PROJECT NO. 10-300613-009

PLATE

3

CAD FILE: C:_PROJECTS\10300613\009\GMW_LOCS.dwg

TABLES

TABLE 1
SUMMARY OF ANALYTICAL RESULTS FROM KLEINFELDER'S ESA REPORT
FRIESMAN RANCH PROPERTY
LIVERMORE, CALIFORNIA

Sample Number	Matrix	TPPH	TEPH	Benzene	Toluene	Ethyl-benzene	Xylenes	VOCs (µg/kg)	Total Lead	Soluble Lead (mg/L)
KB-1-19	soil	280,j	100,d,b	<0.01	0.52	1.6	1.2	NA	NA	NA
KB-2-19	soil	34,j,b	25,d	<0.005	0.036	0.083	0.13	NA	NA	NA
KB-2-W1	water	3,100, j,h,i	160,000, d,h,i	7.3	19	11	22	NA	NA	NA
KSH-3-1.5	soil	<1.0	<1.0	<0.005	<0.005	<0.005	<0.005	NA	NA	NA
KSH-4-2	soil	<1.0	160,c	<0.005	<0.005	<0.005	<0.005	NA	NA	NA
KSH-5-3	soil	<1.0	5.2,g	<0.005	0.016	<0.005	<0.005	NA	NA	NA
KSF6-9	soil	NA	NA	NA	NA	NA	NA	ND	73	<0.2
PRG	soil	NE	NE	0.63	790	230	320		130	--
TTLC	soil	--	--	--	--	--	--	--	1,000	--
MCL	water	--	--	1.0	1,000	680	1750	--	50	--
STLC	soil	--	--	--	--	--	--	--	--	5

Notes:
Soil results in mg/kg = milligrams per kilogram
Groundwater results in µg/L = micrograms per liter
Soluble analysis results in mg/L = milligrams per liter
ND = Compound not detected above laboratory reporting limit
NA = Not analyzed
NE = Not established
PRG = US Region IX Preliminary Remediation Goal for Industrial Sites, August, 1996 for residential soils/Values in mg/kg
TTLC = Total Threshold Limit Concentrations/Values in mg/kg
MCL = Cal-EPA Maximum Contaminant Levels/Values in ug/L
STLC = Soluble Threshold Limit Concentrations/Values in mg/L
TPPH = Total Purgeable Petroleum Hydrocarbons (quantified as gasoline)
TEPH = Total Extractable Petroleum Hydrocarbons (quantified as diesel)
b = heavier gasoline range compounds are significant
c = aged diesel (?) is significant
d = gasoline range compounds are significant
j = no recognizable pattern
g = oil range compounds are significant
h = lighter than water immiscible sheen is present
i= liquid sample contains greater than ~ 5 vol. % sediment

TABLE 2
SUBSURFACE SOIL SAMPLE ANALYTICAL RESULTS
FRIESMAN RANCH PROPERTY
LIVERMORE, CALIFORNIA

BOREHOLE NUMBER	SAMPLE COLLECTION DATE	TPH-D (mg/kg)	TPH-G (mg/kg)	BENZENE (mg/kg)	TOLUENE (mg/kg)	ETHYL BENZENE (mg/kg)	TOTAL XYLENES (mg/kg)	MTBE (mg/kg)	PAHs (mg/kg)
KB-1 at 10 ft.	8/28/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	NR
KB-1 at 15 ft.	8/28/97	<10	28	0.056	0.0025	0.043	0.071	0.065	<330
KB-3 at 10 ft.	8/28/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	NR
KB-3 at 15 ft.	8/28/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	<330
KB-9 at 15 ft.	8/29/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	NR
KB-9 at 20 ft.	8/29/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	<330
KB-14 at 10 ft.	8/29/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	NR
KB-14 at 15 ft.	8/29/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	<330
KB-15 at 10 ft.	8/29/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	NR
KB-15 at 15 ft.	8/29/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	<330
KB-17 at 5 ft.	8/29/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	NR	NR
KB-17 at 15 ft.	8/29/97	<10	<1.0	<0.005	<0.005	<0.005	<0.005	<0.005	<330
KB-18 at 15 ft.	8/29/97	<10	2,100	<0.005	<0.005	0.006	0.006	NR	NR
KB-18 at 20 ft.	8/29/97	<10	4,000	<0.005	<0.005	0.007	0.02	<0.005	<330

Notes:

TPH-D	Total Petroleum Hydrocarbons as Diesel	PAHs	Polynuclear Aromatic Hydrocarbons
TPH-G	Total Petroleum Hydrocarbons as Gasoline	mg/kg	Milligrams per Kilogram (approximately equal to parts per million)
MTBE	Methyl t-Butyl Ether	NR	Not Requested
		<0.005	Not detected at or above the laboratory method reporting limit

TABLE 3
RECONNAISSANCE GROUNDWATER SAMPLE ANALYTICAL RESULTS
FRIESMAN RANCH PROPERTY
LIVERMORE, CALIFORNIA

BOREHOLE NUMBER	SAMPLE COLLECTION DATE	TPH-D (µg/L)	TPH-G (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL BENZENE (µg/L)	TOTAL XYLENES (µg/L)	MTBE (µg/L)	PAHs (µg/L)
KB-1	8/28/97	120	<50	<0.5	<0.5	<0.5	<0.5	NR	<10
KB-2	8/28/97	180	850	7.9	1.7	10	3.4	NR	NR
KB-3	8/28/97	320	<50	<0.5	<0.5	<0.5	<0.5	NR	NR
KB-4	8/28/97	74	91	<0.5	<0.5	0.63	<0.5	NR	NR
KB-5	8/28/97	250	<50	<0.5	<0.5	<0.5	<0.5	NR	NR
KB-6	8/28/97	210	<50	<0.5	<0.5	<0.5	<0.5	NR	NR
KB-7	8/28/97	190	<50	<0.5	<0.5	<0.5	<0.5	NR	NR
KB-8	8/28/97	<50	<50	<0.5	<0.5	<0.5	<0.5	NR	NR
KB-9	8/29/97	113	<50	<0.5	<0.5	<0.5	<0.5	5.1	<10
KB-10	8/29/97	1,500	7,100	41	26	17	16	27	NR
KB-10D	8/29/97	2,700	10,000	53	38	21	29	33	NR
KB-11	8/29/97	6,700	9,900	160	22	380	530	NR	NR
KB-12	8/29/97	97	<50	<0.5	<0.5	<0.5	<0.5	NR	NR
KB-13	8/29/97	13,000	38,000	390	120	890	4,200	NR	NR
KB-14	8/29/97	NA	57	<0.5	<0.5	<0.5	<0.5	6.5	NR
KB-15	8/29/97	NA	<50	<0.5	<0.5	<0.5	<0.5	NR	NR
KB-16	8/29/97	91	<50	0.6	1.0	<0.5	1.1	NR	<10
KB-17	8/29/97	90	<50	<0.5	<0.5	<0.5	0.6	4.5	NR
KB-18	8/29/97	490	320	<0.5	<0.5	1.0	2.2	NR	NR
KB-19	8/29/97	<50	<50	<0.5	0.7	<0.5	0.9	NR	NR
KB-20	8/29/97	<50	<50	0.7	0.8	0.7	2.1	NR	NR
MCL	--	--	--	1.0	1000	680	1,750	--	--

Notes:

TPH-D	Total Petroleum Hydrocarbons as Diesel	µg/L	Micrograms per Liter (approx. equal to parts per billion)
TPH-G	Total Petroleum Hydrocarbons as Gasoline	NA	Not Analyzed
MTBE	Methyl t-Butyl Ether	NR	Not Requested
PAHs	Polynuclear Aromatic Hydrocarbons	<0.5	Not detected at or above the laboratory method reporting limit
		MCL	Maximum Contaminant Level

TABLE 4
GROUNDWATER MONITORING WELL SAMPLES ANALYTICAL RESULTS
FRIESMAN RANCH PROPERTY
LIVERMORE, CALIFORNIA

WELL NUMBER	SAMPLE COLLECTION DATE	TPH-D (µg/L)	TPH-G (µg/L)	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL BENZENE (µg/L)	TOTAL XYLENES (µg/L)	MTBE (µg/L)	PAHs (µg/L)
KMW-1	9/8/97	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	<10
KMW-2	9/8/97	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	<10
KMW-3	9/8/97	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	<10
KMW-4	9/8/97	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	<10
KMW-5	9/8/97	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	<10
KMW-5D	9/8/97	<50	<50	<0.5	<0.5	<0.5	<0.5	<5.0	<10
KMW-6	9/8/97	3,200, d	13,000, a	250	14	560	490	<150**	140*
MCL	9/8/97	--	--	1.0	1000	680	1,750	--	--

Notes:

TPH-D	Total Petroleum Hydrocarbons as Diesel
TPH-G	Total Petroleum Hydrocarbons as Gasoline
MTBE	Methyl t-Butyl Ether
PAHs	Polynuclear Aromatic Hydrocarbons
MCL	Cal EPA Maximum Contaminant Level
µg/L	Micrograms per Liter (approx. equal to parts per billion)
<0.5	Not detected at or above the laboratory method reporting limit
a	Unmodified or weakly modified gasoline is significant
d	Gasoline range compounds having broad chromatographic peaks are significant; biologically altered gasoline ?
*	Naphthalene only, all other chemicals were <20 µg/L
**	Reporting limit raised due to high presence of TPH-g

TABLE 5
SAMPLE LOCATIONS AND ANALYTICAL PARAMETERS
FRIESMAN RANCH PROPERTY
LIVERMORE, CALIFORNIA

SAMPLE LOCATION	MATRIX	ANALYTICAL PARAMETERS						
		TPH-g	TPH-d	BTEX	MTBE	MTBE Confirmation	PAHs	Lead
KMW-1	Groundwater	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998	December 1998
KMW-2	Groundwater	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998	December 1998
KMW-3	Groundwater	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998	December 1998
KMW-4	Groundwater	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998	December 1998
KMW-5	Groundwater	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998	December 1998
KMW-6	Groundwater	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998	December 1998
KMW-7	Groundwater	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998	December 1998
KMW-8	Groundwater	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998 March 1999 June 1999 September 1999	December 1998	December 1998

Notes:
TPH-g = Total Petroleum Hydrocarbons as Gasoline (Modified EPA Method 8015)
TPH-d = Total Petroleum Hydrocarbons as Diesel (Modified EPA Method 8015)
BTE = Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene and Total ylenes (EPA Method 8020)
MTBE = Methyl-Tertiary Butyl Ether (EPA Method 8020)
PAHs = Polynuclear Aromatic Hydrocarbons (EPA Method 8270)
Title 26 Metals = Antimony, Arsenic, Barium, Beryllium, Cadmium, total Chromium, Cobalt, Copper, Mercury, Lead, Manganese, Molybdenum, Nickel, Selenium, Thallium, Vanadium and Zinc (EPA Methods 6010/7000 Series)

[1] = EPA Method 8010

[2] = EPA Method 8260

TABLE 6
SAMPLE METHODS, PARAMETERS, CONTAINERS, PRESERVATIVES AND HOLDING TIMES
FRIESMAN RANCH PROPERTY
LIVERMORE, CALIFORNIA

ANALYTICAL METHOD	ANALYTICAL PARAMETERS	MATRIX	Sample Container	Preservatives	Holding Times
Modified EPA Method 8015	TPH-g, TPH-d	Groundwater	2 x 40-ml VOAs, 2 One-L Amber	Cool to 4°C	14 Days
EPA Method 8020	BTEX, MTBE	Groundwater	2 x 40-ml VOAs	Cool to 4°C, pH < 2 (HCl)	14 Days
EPA Method 8260	MTBE Confirmation	Groundwater	2 x 40-ml VOAs	Cool to 4°C, pH < 2 (HCl)	14 Days
EPA Method 8270	PAHs	Groundwater	2 One-L Amber	Cool to 4°C	14 Days
EPA Method 6010/7000	Lead	Groundwater	One 500-ml Plastic/Glass	Cool to 4°C, pH < 2 (HNO_3)	6 Months

Notes:
TPH-g = Total Petroleum Hydrocarbons as Gasoline (Modified EPA Method 8015)
TPH-d = Total Petroleum Hydrocarbons as Diesel (Modified EPA Method 8015)
BTEX = Aromatic Hydrocarbons (Benzene, Toluene, Ethylbenzene and Total Xylenes (EPA Method 8020)
MTBE = Methyl-Tertiary Butyl Ether (EPA Method 8020)
VOCs = Volatile Organic Compounds (EPA Method 8010 or 8260)
SVOCs = Semi-Volatile Organic Compounds (EPA Method 8270)
PAHs = Polynuclear Aromatic Hydrocarbons (EPA Method 8270)
VOA = Volatile Organic Analysis Vial
C = Celsius
HCl = Hydrochloric Acid
HNO3 = Nitric Acid
ml = Milliliter
L = Liter

APPENDIX A - GROUNDWATER MONITORING REPORT OUTLINE

PROPOSED OUTLINE
FOR
QUARTERLY GROUNDWATER MONITORING REPORTS
FRIESMAN RANCH PROPERTY, LIVERMORE, CALIFORNIA

APPENDIX A **PHOTODOCUMENTATION**

APPENDIX B **SOIL BORING/WELL PERMIT DOCUMENTATION (FIRST REPORT ONLY)**

APPENDIX C **SOIL BORING LOGS AND WELL CONSTRUCTION SUMMARIES (FIRST REPORT ONLY)**

APPENDIX D **FIELD MONITORING NOTES**

Well Development and Sampling Logs

Record of Water Level Measurements

APPENDIX E **CHAIN-OF-CUSTODY RECORDS AND CERTIFIED ANALYTICAL LABORATORY REPORTS**

LIST OF PLATES

LIST OF TABLES