ACTON • MICKELSON • van DAM, INC.
Consulting Scientists, Engineers, and Geologists

5090 Robert J. Mathews Parkway, #4
El Dorado Hills, California 95762

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October 12, 1993

Mr. Terrence A. Fox
Ultramar Inc.
525 West Third Street
Hanford, California 93230

19024.03

Subject: Work Plan to Install Additional Monitoring Wells
Beacon Station #604--1619 First Street, Livermore, California

Dear Mr. Fox:

Acton • Mickelson • van Dam, Inc. (AMV), has been authorized by Ultramar Inc. (Ultramar) to install additional ground water monitoring wells in the vicinity of the subject site. A total of three ground water monitoring wells and three vadose wells have been installed on and adjacent to the site by AMV (Figures 1 and 2). Installation of the additional ground water monitoring wells is intended to delineate the downgradient and crossgradient extent of petroleum constituents in ground water.

Background Information

Investigations by AMV have indicated the presence of ground water beneath the site at depths ranging from 36.18 to 39.07 feet below grade. The direction of ground water flow has been toward the northwest. Concentrations of dissolved benzene range from 19,000 micrograms per liter (μg/l) in monitoring well MW-2 to 8.2 μg/l in monitoring well MW-3.

Scope of Work

To assess the downgradient extent of dissolved petroleum constituents in ground water adjacent to the subject site, the following work is proposed:

- Prepare a site-specific health and safety plan.
- Acquire necessary encroachment permits to drill on the sidewalk or in the street.

- Drill three soil borings to approximately 55 feet below grade and convert the soil borings to ground water monitoring wells MW-4, MW-5, and MW-6.

- Collect soil samples at 5-foot intervals and/or at changes in lithology with a modified California sampler and classify recovered soil samples according to the Unified Soil Classification System (USCS).

- Screen the recovered soil samples in the field with a photoionization detector (PID) for the presence of organic vapors.

- Submit selected soil samples for chemical analysis based on field observations and PID readings. Soil samples will be analyzed for total petroleum hydrocarbons as gasoline (TPHg), and benzene, toluene, ethylbenzene, and xylenes (BTEX) by a state-certified laboratory.

- Survey the elevation of the newly constructed monitoring well risers to within 0.01 foot relative to the existing monitoring wells.

- Measure water levels in monitoring wells MW-1 through MW-6.

- Develop, purge, and sample the newly constructed monitoring wells (MW-4, MW-5, and MW-6).

- Submit a ground water sample from monitoring wells MW-4, MW-5, and MW-6 for analysis of TPHg and BTEX by a state-certified laboratory.

- Compile and review the collected data and prepare a report of the findings.

Soil Borings and Sampling

Soil borings of sufficient diameter to allow installation of 2-inch-diameter monitoring wells (MW-4, MW-5, and MW-6) will be advanced to a depth of approximately 55 feet below grade (or 10 feet below the water table). The soil borings will be advanced at or near the locations indicated on Figure 2 using hollow-stem auger drilling techniques. Soil samples will be collected as the borings are advanced at 5-foot intervals and/or at changes in lithology. The samples will be screened in the field for the presence of organic vapors with a PID. Soil cuttings will be stored on site on plastic (and covered with plastic) pending receipt of analytical results and characterization for disposal.

At least two soil samples collected above the water table from each boring will be submitted to a state-certified laboratory for analysis of BTEX and TPHg. All analyses will be done using established state and federal EPA methodology. Drilling and sampling protocols are described in Enclosure A.

Monitoring Well Construction, Depth to Water Measurements, and Ground Water Sampling

Proposed monitoring wells will be constructed with 15 feet of 2-inch-diameter polyvinyl chloride (PVC) well screen with 0.020-inch wide (#20) slots. Blank 2-inch-diameter PVC will extend from the top of the screen to the surface. The annular space opposite the screened portion of each well will be backfilled with #3 Monterey sand or equivalent which will extend 2 feet above the top of the screened interval. In the annular space above the sand, a 2-foot-thick bentonite seal will be installed. Above the bentonite seal, a cement grout with approximately 5 percent bentonite will be emplaced and will serve to inhibit movement of surface water downward through the well annulus. The well risers will be cut off below grade and flush-grade, watertight, well boxes will be installed at the surface. A watertight, locking, expansion well cap will be used to secure the well riser. A diagram of typical well construction specification is included as Figure 3.

After installation, the casing riser on each new well will be surveyed to the existing on-site monitoring wells. Depth to water in each well will then be measured, and monitoring wells MW-4, MW-5, and MW-6 will be developed, purged, and sampled as described in Appendix A and in accordance with Alameda County requirements. Purge water will be stored on site in approved 55-gallon drums pending disposal. The ground water samples will be submitted to a state-certified laboratory for analysis of BTEX and TPHg.

Results Report

After field activities are complete and after receipt of laboratory results, a report of the results will be prepared to document field activities, present the analytical results, and recommend additional work, if warranted. The report will include soil boring logs, soil sample analytical results, subsurface soil descriptions, depth to water measurements, and ground water sample analytical results.

Schedule

Fieldwork to advance and sample the proposed borings and install monitoring wells MW-4, MW-5, and MW-6 will commence within 10 working days of approval of this plan and receipt of encroachment and monitoring well permits. Permit applications to advance the soil borings will be submitted under separate cover to Alameda County.

We recommend that a copy of this plan be submitted to:

Ms. Eva Chu
Department of Environmental Health
Alameda County Health Care Services Agency
80 Swan Way, Room 200
Oakland, CA 94621

Mr. Peter Johnson
California Regional Water Quality Control
Board, San Francisco Bay Region
2101 Webster Street, Suite 500
Oakland, California 94612

If you have any questions regarding this work plan, please do not hesitate to contact me.

Sincerely,

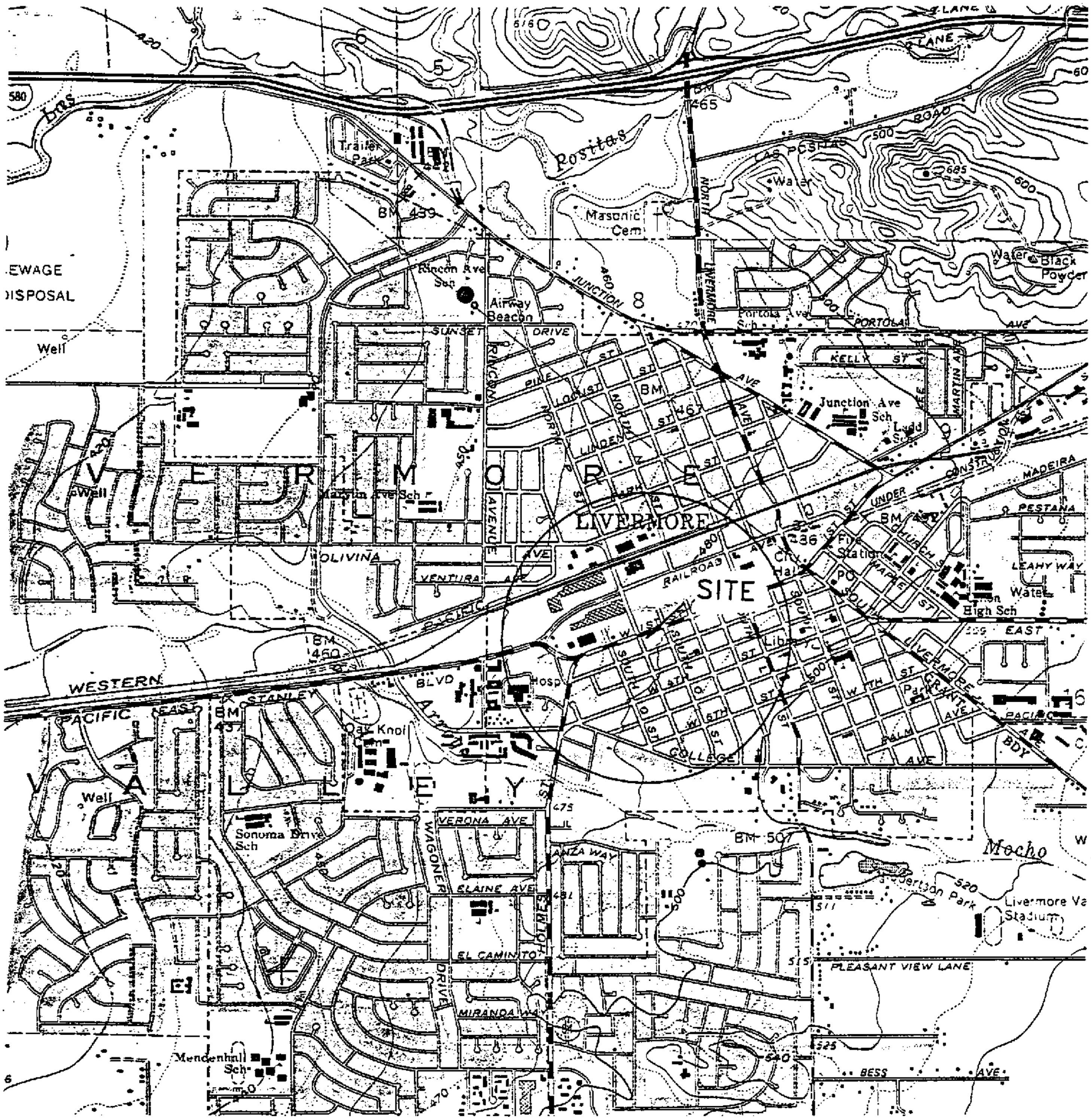
ACTON • MICKELSON • van DAM, INC.

Steven A. Liaty
Staff Geologist

Dale A. van Dam, R.G.
Project Manager

REGISTERED GEOLOGIST
DALE A. VAN DAM
NO. 4632
STATE OF CALIFORNIA

SAL:DAvD:mjd
Enclosures



General Notes

Base Map from U.S.G.S.
Livermore, California
7.5 Minute Topographic
Photorevised 1980

CALIF

QUADRANGLE LOCATION

N

0 2000

Scale
1" = 2000'

FIGURE 1

SITE LOCATION MAP
BEACON STATION #604
1619 WEST FIRST STREET
LIVERMORE, CALIFORNIA

Project No.	Drawn by:
19024.01	EAF
File No.	Prepared by:
19024015	HEH
Revision No.	Reviewed by:

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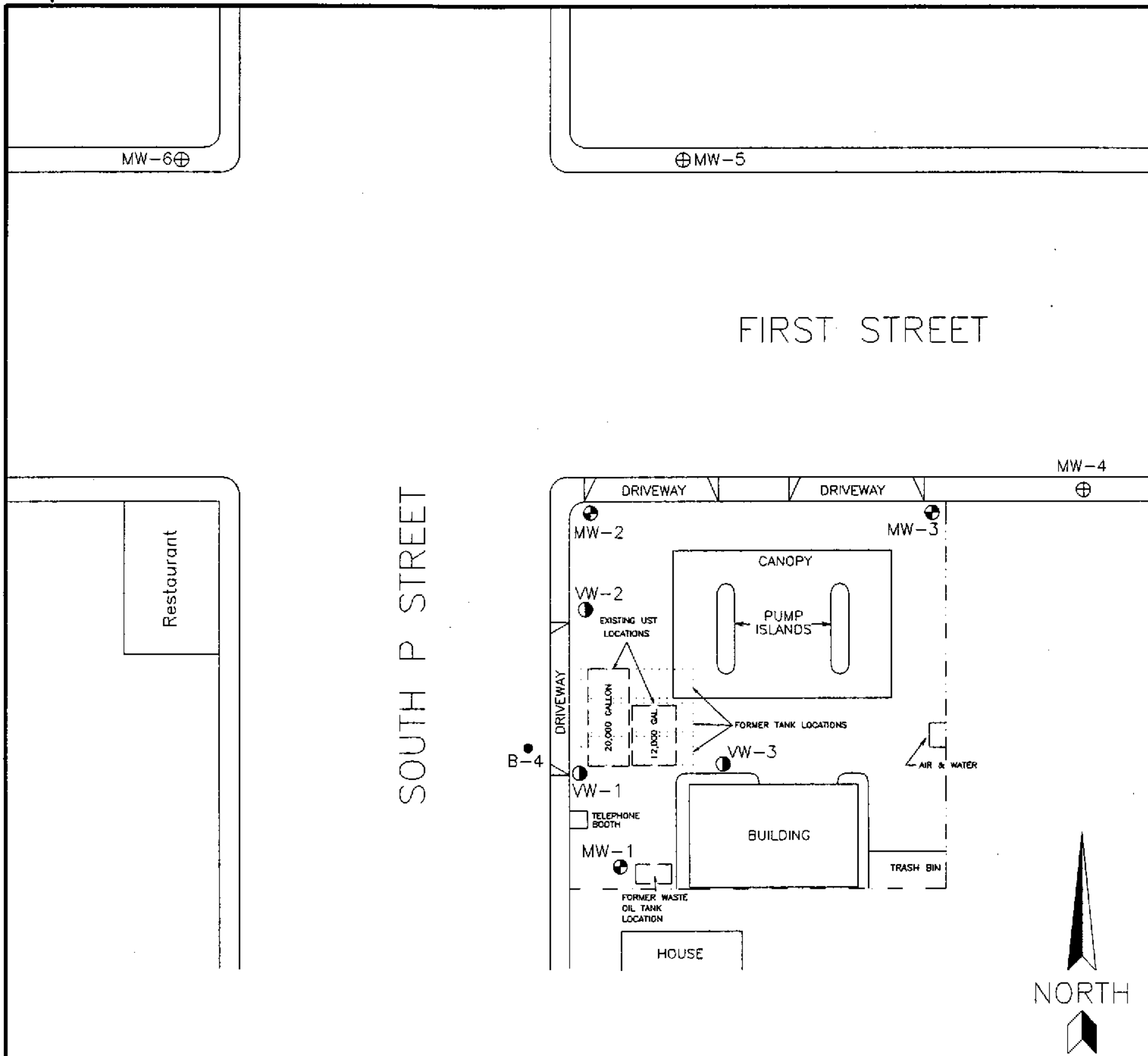

LEGEND

VW-3	VADOSE WELL LOCATION AND NUMBER
MW-3	MONITORING WELL LOCATION AND NUMBER
B-4	SOIL BORING LOCATION AND NUMBER
— · —	PROPERTY BOUNDARY
MW-6	PROPOSED MONITORING WELL AND NUMBER

0 40 80

Approximate Scale
(in feet)

FIGURE 2

SITE MAP
BEACON STATION #604
1619 WEST FIRST STREET
LIVERMORE, CALIFORNIA

Project No. 19024.03	Drawn DA
File No. SM	Prepared HEH
Revision	Reviewed

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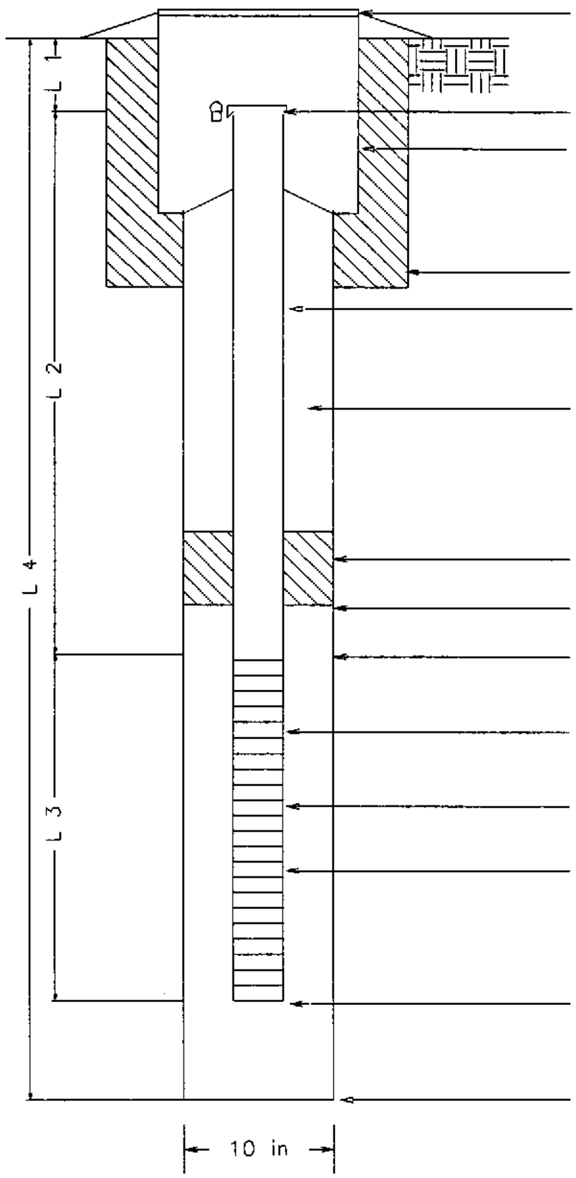
FIGURE 3
PROPOSED MONITORING WELL
CONSTRUCTION DETAILS

PROJECT NO: 19024.03

LOCATION: Beacon #604
1619 West First Street
Livermore, CA

MONITORING WELL NO.: MW-4, MW-5, and MW-6



Protective Casing	
Locking Water Tight Cap	
Flush Grade Well Construction	
Diameter and Mat'l	12-inch steel
Total length	12 inches
Length Above Ground	1/4 inch
Thickness and Type of Seal	2 feet, concrete
Diameter, Mat'l and Joint Type of Riser Pipe	2 inch, SCH 40 PVC, flush thread
Type of Backfill Around Riser	cement/ 5% bentonite grout
Thickness and Type of Seal	2 feet bentonite chips
Distance of Filter Sand Above Top of Screen	2 feet
Type of Filter Around Screen	#3 lonestar
Monitoring Well Mat'l	SCH 40 PVC
Screen Gauge/Slot Size	0.020 inch
Diameter and Length of Screen	2 inch, 15 feet
Depth to Bottom of Monitoring Well	55 feet
Depth to the Bottom of Filter Sand	55 feet

L1 = 0.25 feet
L2 = 39.75 feet
L3 = 15.00 feet
L4 = 55.00 feet

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ENCLOSURE A

SAMPLING TECHNIQUES

ENCLOSURE A

SAMPLING TECHNIQUES

Proper sampling techniques must be followed to assure that samples represent actual field conditions and that samples are labeled, preserved, and transported properly to retain sample integrity. This exhibit describes procedures to be followed by Acton • Mickelson • van Dam, Inc. (AMV), during collection of samples of subsurface soil and ground water. Sampling guidance documents from the American Society of Testing and Materials (ASTM), U.S. Environmental Protection Agency (EPA), and California Environmental Protection Agency (Cal-EPA) will be followed for all sampling procedures. Actual sampling procedures to be employed will be based on field conditions and may differ from those described here.

1.0 EXPLORATION BORING/SOIL SAMPLING PROCEDURES

Soil borings and soil sampling will be performed under the direction of an AMV geologist. The soil borings will be advanced using a truck-mounted, hollow-stem auger drill rig.

Soil samples will be collected at 5-foot vertical intervals. Soil sampling will be done in accordance with ASTM 1586-84. Using this procedure, three 2-inch-diameter, 6-inch-length, brass tubes are placed in a California-type split-barrel sampler. The sampler is driven into the soil by a 140-pound weight falling 30 inches. After an initial set of 6 inches, the number of blows required to drive the sampler an additional 12 inches is known as penetration resistance, or the "N" value. The "N" value is used as an empirical measure of the relative density of cohensionless soils and the consistency of cohesive soils.

Upon recovery of the split-barrel sampler, the brass tubes containing the soil will be removed. One of the three brass tubes will be sealed at the ends with Teflon tape and plastic end caps. The sample will be labeled with an identification number, time, date, location, and requested laboratory analysis. The sample will then be placed in a plastic bag and stored at approximately 4° Celsius (C) in an ice chest for transport to the laboratory. Sample custody procedures outlined in Section 5.0 of this exhibit will be followed. This will be performed for each sample collection.

Soil in one of the brass tubes will be extracted upon recovery, placed in a plastic bag, and sealed for later screening for organic vapors using a photoionization detector (PID) or a flame ionization detector (FID). The remaining portion of the soil sample will be examined and a complete log of soil conditions will be recorded on a soil boring log (Enclosure A) using the Unified Soil Classification System (Enclosure B). The soil will be examined for grain size, color, and moisture content.

The split-barrel sampler will be cleaned to prevent cross-contamination for each sampling interval using procedures described in Section 3.0.

Soil borings will normally be advanced with 8- or 10-inch-diameter, hollow-stem augers. The soil generated from the soil borings will be wrapped in plastic sheeting and stored on site until characterized for disposal.

2.0 WATER LEVEL AND LIQUID-PHASE HYDROCARBON (LPH) THICKNESS MEASUREMENTS AND GROUND WATER SAMPLING

2.1 Water Level and LPH Thickness Measurements

The static water level and LPH thickness in each well will be measured prior to purging or sampling.

The depth to water/product will be measured using an electronic interface probe. The wire of the interface probe is marked at 0.01 foot intervals. One tone is emitted from the interface probe if LPH is encountered; another tone for water. The wire of the interface probe will be lowered slowly until LPH or water is encountered. At this point, the mark on the interface wire opposite the permanent reference point on the top of the well casing will be read to the nearest 0.01 foot and recorded. If the first encountered substance is LPH, the probe will be lowered until the tone corresponding to water is emitted. This depth will also be recorded. The difference between the two depths corresponds to the LPH thickness. The interface probe will be rinsed in a cleaning solution and deionized water between measurements in different wells.

A permanent reference point will be marked on the well casings. The permanent reference point on the well casings will be surveyed to a common reference point. All well casing riser elevations will be known to within 0.01 foot.

Prior to well development, a disposable bailer will be used to collect a sample of LPH, if present in a well, for subjective analysis. The sample will be collected by gently lowering the bailer approximately one-half the bailer length past the air/LPH interface. The appearance (color, opacity, "freshness") will be described and noted on field notes.

2.2 Well Evacuation

After the static water level in a well is determined and prior to collection of a ground water sample, stagnant water will be removed from the well casing and the surrounding gravel pack by bailing, pumping, or with a vacuum truck. At least three casing volumes of water will be removed from each well from which a sample was collected. The volume of water in the casing will be determined from the known elevation of the water surface, the well bottom elevation (as measured when the well is installed), and the well diameter.

If the well is bailed or pumped during purging, samples will be collected and field analyzed for pH, temperature, and specific conductance. The well will be considered stabilized when repeated readings of the following parameters are within the ranges indicated as follows:

- Specific conductance   ±10 percent of the reading range
- pH   ±0.1 pH unit
- Temperature   ±0.5° C.

After stabilization, and after at least three well volumes are evacuated, a sample will be collected for analysis. The field container used for well stabilization measurements, and the pH, temperature, and conductivity probes will be rinsed between wells with deionized water.

All purge water will be containerized and properly handled and documented for disposal. If the containers are stored on site, a label specifying the date of purging, source, and the known or suspected nature of the contents will be affixed to each container.

2.3 Sample Collection, Preservation, and Handling

After purging, a new polyethylene disposable bailer will be used to collect samples for analysis. The bailer is attached to a new disposable rope and lowered slowly into the water to avoid agitation of the collected sample. Containers for volatile organics analyses will be filled completely so that no airspace remains in the vial after sealing.

All sample containers will be prewashed and prepared at the analyzing laboratory in accordance with quality assurance/quality control protocols of the laboratory. Only sample containers appropriate for the intended analyses will be used.

3.0 DECONTAMINATION AND DISPOSAL PROCEDURES

3.1 Equipment Decontamination

All equipment that comes in contact with potentially contaminated soil, drilling fluid, air, or water will be decontaminated before each use. Decontamination will consist of steam-cleaning, a high-pressure, hot-water rinse, or trisodium phosphate (TSP) wash and freshwater rinse, as appropriate.

Drilling and sampling equipment will be decontaminated as follows:

1. Drill rig augers, drill rods, and drill bits will be steam-cleaned prior to use and between borings. Visible soil, grease, and other impurities will be removed.

2. Soil sampling equipment will be steam-cleaned prior to use and between each boring. Prior to individual sample collection, any sampling device will also be cleaned in a TSP solution and rinsed twice in clean water. Any visible soil residue will be removed.

3. It is anticipated that disposable equipment will be used to collect water samples. If disposable equipment is not used, water sampling equipment will be decontaminated using methods described in Item 2 above for soil sampling equipment.

4. Water sampling containers will be cleaned and prepared by the respective analytical laboratories.

5. Stainless steel or brass soil sampling tubes will be steam-cleaned or washed in TSP solution and rinsed with clean water.

6. Field monitoring equipment (pH, conductivity, or temperature probes) will be rinsed with clean water prior to use and between samples.

4.0 FIELD MEASUREMENTS

Field data will be collected during various sampling and monitoring activities; this section describes routine procedures to be followed by personnel performing field measurements. The methods presented below are intended to ensure that field measurements are consistent and reproducible when performed by various individuals.

4.1 Buried Utility Locations

Prior to commencement of work on site, AMV will contact appropriate utility companies to have underground utility lines located. All work associated with the borings will be preceded by hand augering to a minimum depth of 5 feet below grade to avoid contact with underground utilities.

4.2 Lithologic Logging

A log of soil conditions encountered during the drilling and sample collection (Enclosure A) will be maintained using the Unified Soil Classification System (Enclosure B) by an AMV geologist. All boring logs will be reviewed by a California registered geologist.

The collected soil samples will be examined and the following information recorded: boring location, sample interval and depth, blow counts, color, soil type, moisture content (qualitative), and depth at which ground water (if present) is first encountered. Also recorded on the soil boring logs will be the field screening results derived from the use of a portable PID or FID.

4.3 Disposal Procedures

Soils and fluids that are produced and/or used during the installation and sampling of borings, and that are known or suspected to contain potentially hazardous materials, will be contained during the above operations. These substances will be retained on site until chemical testing has been completed to determine the proper means of disposal. Handling and disposal of substances known or suspected to contain potentially hazardous materials will comply with the applicable regulations of Cal-EPA, the California Department of Water Resources, and any other applicable regulations. Soils and fluids produced and/or used during the above-described operations that appear to contain potentially hazardous materials will be disposed of appropriately.

Residual substances generated during cleaning procedures that are known or suspected to pose a threat to human health or the environment will be placed in appropriate containers until chemical testing has been completed to determine the proper means for their disposal.

4.4 Conductivity, Temperature, and pH

Specific conductance, water temperature, and pH measurements will be made when a water sample is collected. Regardless of the sample collection method, a representative water sample will be placed in a transfer bottle used solely for field parameter determinations. A conventional pH meter with a combination electrode or equivalent will be used for field-specific conductance measurements. Temperature measurements will be performed using standard thermometers or equivalent temperature meters. Combination instruments capable of measuring two or all three of the parameters may also be used.

All instruments will be calibrated in accordance with manufacturer methods. The values for conductivity standards and pH buffers used in calibration will be recorded daily in a field notebook. All probes will be thoroughly cleaned and rinsed with fresh water prior to any measurements, in accordance with Section 3.1.

5.0 SAMPLE CUSTODY

This section describes standard operating procedures for sample custody and custody documentation. Sample custody procedures will be followed through sample collection, transfer, analysis, and ultimate disposal. The purpose of these procedures is to assure that (1) the integrity of samples is maintained during their collection, transportation, and storage prior to analysis and (2) post-analysis sample material is properly disposed of. Sample custody is divided into field procedures and laboratory procedures, as described below.

5.1 Field Custody Procedures

Sample quantities, types, and locations will be determined before the actual fieldwork commences. As few people as possible will handle samples. The field sampler is personally responsible for the care and custody of the collected samples until they are properly transferred.

5.1.1 Field Documentation

Each sample will be labeled and sealed properly immediately after collection. Sample identification documents will be carefully prepared so that identification and chain-of-custody records can be maintained and sample disposition can be controlled. Forms will be filled out with waterproof ink. The following sample identification documents will be utilized.

- Sample labels
- Field notebook
- Chain-of-custody forms

5.1.2 Sample Labels

Sample labels provide identification of samples. Preprinted sample labels will be provided. Where necessary, the label will be protected from water and solvents with clean label-protection tape. Each label will contain the following information:

- Name of collector
- Date and time of collection
- Place of collection
- AMV project number
- Sample number
- Preservative (if any)

5.1.3 Field Notebook

Information pertinent to a field survey, measurements, and/or sampling must be recorded in a bound notebook. Entries in the notebook should include the following:

- Name and title of author, date and time of entry, and physical/environmental conditions during field activity.
- Location of sampling or measurement activity.
- Name(s) and title(s) of field crew.
- Type of sampled or measured media (e.g., soil, ground water, air, etc.)
- Sample collection or measurement method(s).
- Number and volume of sample(s) taken.
- Description of sampling point(s).
- Description of measuring reference points.
- Date and time of collection or measurement.
- Sample identification number(s).
- Sample preservative (if any).
- Sample distribution (e.g., laboratory).
- Field observations/comments.
- Field measurements data (pH, etc.).

5.1.4 Chain-of-Custody Record

A chain-of-custody record will be filled out for and will accompany every sample and every shipment of samples to the analytical laboratories in order to establish the documentation necessary to trace sample possession from the time of collection. The record will contain the following information:

- Sample or station number or sample I.D.
- Signature of collector, sampler, or recorder.
- Date and time of collection.
- Place of collection.
- Sample type.
- Signatures of persons involved in the chain of possession.
- Inclusive dates of possession.

The laboratory portion of the form should be completed by laboratory personnel and will contain the following information:

- Name of person receiving the sample.
- Laboratory sample number.
- Date and time of sample receipt.
- Analyses requested.
- Sample condition and temperature.

5.1.5 Sample Transfer and Shipment

Samples will always be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving the samples will sign, date, and note the time on the chain-of-custody record. Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis. The chain-of-custody record will accompany each shipment. The method of shipment, courier name(s), and other pertinent information will be entered in the chain-of-custody record.

5.2 Laboratory Custody Procedures

A designated sample custodian will accept custody of the shipped samples and verify that the information on the sample label matches that on the chain-of-custody record. Information regarding method of delivery and sample conditions will also be checked on the chain-of-custody record. The custodian will then enter the appropriate data into the laboratory sample tracking system. The laboratory custodian may use the sample number on the sample label or may assign a unique laboratory number to each sample. The custodian will then transfer the sample(s) to the proper analyst(s) or store the sample(s) in the appropriate secure area.

Laboratory personnel are responsible for the care and custody of samples from the time they are received until the sample is exhausted. Once at the laboratory, the samples are handled in accordance with U.S. Environmental Protection Agency SW-846, Test Methods for Evaluating Solid Waste Physical/Chemical Methods, Third Edition, for the intended analyses. All data sheets, chromatographs, and laboratory records will be filed as part of the permanent documentation.

5.3 Corrections to Documentation

Original data recorded in field notebooks, chain-of-custody records, and other forms should be written in ink. These documents should not be altered, destroyed, or discarded, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made or found on a document, the individual making the corrections will do so by crossing a single line through the error, entering the correct information, and initialing and dating the change. The erroneous information will be obliterated. Any subsequent error(s) discovered on a document will be corrected. All corrections will be initialed and dated.

5.4 Sample Storage and Disposal

Samples and extracts should be retained by the analytical laboratory for 60 days after a written report is issued by the laboratory. Unless notified by the program manager, excess or unused samples should be disposed of by the laboratory in an appropriate manner consistent with applicable government regulations.

ENCLOSURE B

UNIFIED SOIL CLASSIFICATION SYSTEM CHART

Major Divisions			Group Symbols	Typical Names
Coarse-Grained Soils More than 50% retained on No. 200 sieve*	Gravels 50% or more of coarse fraction retained on No. 4 sieve	Clean Gravels	GW	Well-graded gravels and gravel-sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel-sand mixtures, little or no fines
		Gravels With Fines	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sands More than 50% of coarse fraction passes No. 4 sieve	Clean Sands	SW	Well-graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		Sands With Fines	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine-Grained Soils 50% or more passes No. 200 sieve*	Silts and Clays Liquid limit 50% or less		ML	Inorganic silts, very fine sands, rock flour, silty or clayey fine sands
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	Silts and Clays Liquid limit greater than 50%		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity
Highly Organic Soils			PT	Peat, muck and other highly organic soils

*Based on the material passing the 3-in. (75-mm) sieve.

ENCLOSURE A

Acton • Mickelson • van Dam, Inc. Consulting Scientists, Engineers, and Geologists Log of Soil Boring Coordinates: Surface Elevation: Casing Elevation: Reference Elevation: Reference Desc: Completion Depth:	Project No. / Location: Drilling Company: Driller: Drilling and Sampling Methods: OVM/OVA

Drilling	Time	Date
Start		
Finish		
Water Depth	Initial	Completion

Logged by:

Checked by:

Depth (feet)	Sample Int.	Description	Graphic Log	Boring/Well Detail	Blows/6 in	Inches Driven	Inches Recov'd	Comments	Sample #	Field OVM/OVA Reading (ppm)
0										
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
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