BLYMYER
ENGINEERS, INC.
1829 Clement Avenue
Alameda, California 94501-1396
(510) 521-3773 FAX: (510) 865-2594

LETTER OF TRANSMITTAL

DATE March 7, 1997	BEI Job No 97019
ATTENTION: Mr. Terry Caughell	
SUBJECT: Pyro Minerals	
Phase II Site Assessment	

Pyro Minerals
2510 Wood Street
Oakland, CA 94607 ✓

We are sending you
☐ Invoice ☐ Report ☐ Work Order ☐ Specifications
☐ Copy of letter ☐ Prints ☐ Change Order ☐ _____
☐ Plans

Copies	Date	Number	Description
2	2/26/97		Final copy; *Phase II Environmental Site Assessment*

These are transmitted as checked below:

☐ For signature
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☐ Approved as submitted
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☐ For review and comment
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☐ Resubmit___copies for approval
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REMARKS: I have included an extra copy of the report for Malcolm. As requested, the report has additionally been sent to the individuals and agencies listed below. Please call with comments or questions.

COPY TO: File
Ms. Jennifer Eberle, Alameda County Health Care Services Agency
Mr. Kevin Graves, San Francisco Bay Regional Water Quality Control Board

SIGNED: Mark Detterman

If enclosures are not as noted, kindly notify Blymyer Engineers, Inc. at once.

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BLYMYER
ENGINEERS, INC.

ENVIRONMENTAL PROTECTION
97 MAR 10 PM 4:45

February 26, 1997
BEI Job No. 97019

Mr. Terry Caughell
Pyro Minerals
2510 Wood Street
Oakland, CA 94607

Subject: **Phase II Environmental Site Assessment**
Pyro Minerals
2510 Wood Street 94607
Oakland, California

Dear Mr. Caughell:

Blymyer Engineers, Inc. has completed the scope of work outlined in our December 16, 1996, proposal for the subject property. This letter presents a report, including tables, figures, and discussions of analytical results, of the subsurface investigation. The investigation was performed to address the recommendations in the Phase I environmental site assessment (ESA) for a shallow soil and groundwater investigation, as discussed below.

1.0 Introduction

1.1 Background

Blymyer Engineers performed a Phase I ESA of the property in October 1996 (*Phase I Environmental Site Assessment*, October 23, 1996). Two findings were identified that prompted THE recommendation that a Phase II assessment be performed:

1. A gasoline underground storage tank (UST) was removed from the property in June 1986. Analysis of a soil sample collected during tank removal from beneath one end of the UST indicated no detectable gasoline contamination. However, no analysis was performed on samples of the backfill material and there was no indication as to the disposal of the backfill material. Blymyer Engineers recommended that a subsurface investigation be performed in order to determine whether contaminated backfill material was returned to the excavation.

2. Numerous unauthorized releases have been reported in close proximity to the property. Blymyer Engineers recommended that regulatory agency files for sites with leaking USTs within ¼ mile of the property and non-fuel releases within ½ mile of the property be reviewed to determine if the releases at these sites may impact the property. In lieu of an agency file review, Blymyer Engineers indicated that a subsurface investigation could be performed at the upgradient property line to determine if off-site releases have impacted the property.

1.2 Site Conditions

The property is located in the city of Oakland, Alameda County, California (Figure 1). To the west is the Oakland Army Terminal, across Southern Pacific and other rail tracks; to the north is the Interstate 80 and 580 interchange; and to the east and south lie commercial establishments and the location of the former Cypress Structure. The property is located approximately 3,000 feet southeast of San Francisco Bay. The site is predominately paved. More site specific descriptions may be obtained from the referenced Blymyer Engineers Phase I ESA report.

1.3 Scope of Work

The proposed scope of work for the subsurface investigation was as follows:

- Obtain required drilling permits and contact Underground Service Alert (USA) for utility clearance at least 48 hours prior to drilling.
- Prepare a site-specific health and safety plan for the project.
- Drill two soil bores using a Geoprobe® or other direct-push rig to a maximum depth of 20 feet below ground surface (bgs) in the area of the former gasoline UST and the assumed upgradient (east) property line.
- Collect continuous soil samples from each soil bore for lithologic description and field screening using a photoionization detector. Package two soil samples from the soil bore in the former gasoline UST area for laboratory analysis.
- Collect a grab groundwater sample from each soil bore for laboratory analysis.
- Backfill soil bores with concrete grout upon completion.
- Place excess soil samples and decontamination liquids in Department of Transportation-approved containers for later disposal by the client.
- Analyze the soil samples from the soil bore in the former gasoline UST area on a standard 1-week turnaround time for Total Petroleum Hydrocarbons (TPH) as gasoline by modified EPA Method 8015; benzene, toluene, ethylbenzene, and total xylenes (BTEX) and methyl-tert-butyl ether (MTBE) by EPA Method 8020; and total lead.

- Analyze the grab groundwater samples from both soil bores on a standard 1-week turnaround time for TPH as diesel, motor oil, and gasoline by modified EPA Method 8015; BTEX and MTBE by EPA Method 8020; and halogenated volatile organics (HVOs) by EPA Method 8010.

- Prepare a letter report of findings.

2.0 Environmental Setting

2.1 Regional Geology and Hydrogeology

The site is located in the gently sloping East Bay Plain of the San Francisco Bay Area, approximately 3,000 feet southeast of the informally designated "Emeryville Mudflats," at an approximate elevation of 6 feet National Geodetic Vertical Datum.

The San Francisco Bay Area is a region dominated by northwest trending topography, enclosed in the Coast Range Province of California. The topography of the region reflects activity of a major fault system that includes the San Andreas Fault Zone on the west side of San Francisco Bay and the Hayward Fault at the base of the Berkeley Hills on the east side of the Bay, which defines the base of the Berkeley Hills. Rock types in the region range from Jurassic age sedimentary, metamorphic, and plutonic basement to Quaternary alluvium (Norris and Webb, *Geology of California*, 1990).

Most of the property is located on an area of artificial fill. East of the property, the artificial fill is bordered by the Temescal Formation, and to the south of the property, by the Merritt Sand. The area of artificial fill was once tidal wetland. Radbruch (*Areal and Engineering Geology of the Oakland West Quadrangle, California*, 1957) reports borehole soil data for a location to the immediate southwest of the site. The bore indicates 10 feet of fill over lies native sediments. The Merritt Sand grades laterally with the Temescal Formation, which is alluvium derived from the Franciscan rocks of the nearby Berkeley and Oakland Hills. The Alameda Formation is found beneath all of these formations (Radbruch, op. cit., 1957).

The regional groundwater flow direction generally ranges from west to southwest, toward the San Francisco Bay, however, Radbruch (op. cit., 1957) notes several former estuary slough arms in the immediate vicinity of the site which appear to roughly parallel the former north-south shoreline, and groundwater may flow to either the north or to the south, along these former slough arms. Groundwater may be in part tidally influenced.

2.2 Climate

The East Bay Plain exhibits a Mediterranean-type climate with cool, wet winters and warmer, dry summers. Mean annual precipitation in Oakland is 25.42 inches. Mean monthly rainfall is 4.03 inches in January and 0.05 inches in August. Mean maximum temperatures are 54.5 degrees Fahrenheit (°F) in January and 70.6°F in July; mean minimum temperatures are 43.4°F in January and 56.8°F in July; average temperatures are 49°F in January and 63.7°F in July (National Oceanic and Atmospheric Administration, *Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1961-1990*, 1990).

3.0 Data Collection

3.1 Soil and Grab Groundwater Sample Collection

On February 10, 1997, two 1.75-inch-diameter soil bores, B1 and B2 (Figure 2), were advanced under the supervision of a Blymyer Engineers geologist by Gregg Drilling using Geoprobe® sampling equipment. A copy of the Zone 7 Water Agency drilling permit is enclosed as Attachment A. Soil samples were collected continuously, in 4-foot lengths, for field observation and one sample from each bore was collected for laboratory analysis. Groundwater was encountered in bores B1 and B2 at approximately 5 and 5½ feet bgs, respectively. The soil bores were advanced to 14 and 13 feet bgs, respectively, in order to obtain grab groundwater samples. Soil samples were field-screened for organic vapors using a photoionization detector (PID) and lithologically described using the Unified Soil Classification System. The soil descriptions and PID results are shown in the soil bore logs, which are included as Attachment B.

A temporary PVC well screen was placed in each soil bore in order to collect grab groundwater samples for laboratory analysis. Bore B1 did not readily yield groundwater on the day of drilling, and a hydropunch screen was utilized in another attempt to obtain groundwater. Because of the slow recharge of groundwater into bore B1, the grab groundwater sample was collected the following day. When obtained, the grab groundwater sample from each bore was noted as turbid. After collection of the groundwater samples all soil bores were grouted to grade surface with cement grout. The soil cuttings from the advancement of the soil bores were contained in a labeled, DOT-approved, 5-gallon pail. The pail was stored on-site behind the 500-gallon propane aboveground storage tank at the western property edge. Decontamination water was also contained in a labeled, DOT-approved, 5-gallon pail for later disposal.

All samples were collected in accordance with the enclosed Blymyer Engineers Standard Operating Procedure (SOP) No. 4, entitled *Soil and Grab Groundwater Sampling Using Hydraulically-Driven Sampling Equipment, Revision No. 1*, dated September 1, 1994 (Attachment C).

3.2 Soil and Grab Groundwater Sample Analytical Methods and Results

The soil and grab groundwater samples were analyzed by American Environmental Network, Inc. (AEN), a California-certified laboratory, on a standard 5-day turnaround time. Due to the relatively shallow depth of groundwater, only one soil sample was collected from bore B2, the soil bore in the former gasoline UST area. The soil sample was analyzed for TPH as gasoline by modified EPA Method 8015; BTEX and MTBE by EPA Method 8020; and total lead. The grab groundwater samples from both soil bores were analyzed for TPH as diesel, motor oil, and gasoline by modified EPA Method 8015; BTEX and MTBE by EPA Method 8020; and HVOs by EPA Method 8010.

Analytical results for the soil and grab groundwater samples are summarized in Tables I and II, respectively, and a copy of the laboratory report is included as Attachment D.

4.0 Data Interpretation

4.1 Site Geology and Hydrogeology

The site contains approximately 6.5 to 7 feet of fill. There were approximately three different fill materials encountered during advancement of the soil bores. In bore B1, fill soils placed around the railroad spur tracks consisted of an approximately 2½-foot-thick unit of well rounded cobbles, with a silt and clay matrix, and a soft silty fine-grained sand to approximately 7 feet bgs. In bore B2 the fill soil consisted of a dark gray-green silty medium-grained sand backfill with wood blocks and a likely concrete block to approximately 6½ feet bgs. Native sediments encountered below the fill in both bores consisted of black, highly plastic and organic silty clay to the depth of exploration. For detailed lithologic descriptions, please refer to the soil bore logs included as Attachment B. Field PID readings indicated that the soil from bore B2 was impacted by volatile organic compounds.

The near surface fill sediments were mostly damp to moist. Groundwater was encountered at approximately 5 feet bgs. Groundwater flow direction cannot be determined using the data acquired during this investigation.

4.2 Discussion of Soil Sample Analytical Results

Detectable concentrations of TPH as gasoline, BTEX, and total lead were detected in soil sample B2-5.5 (Table I). MTBE was not detected; however, due to the elevated concentrations of other detected analytes, the limit of detection for MTBE was 5,000 micrograms per kilogram (µg/kg).

4.3 Discussion of Grab Groundwater Sample Analytical Results

Detectable concentrations of TPH as diesel and toluene were present in the grab groundwater sample obtained from bore B1. Due to the low yield of groundwater from bore B1, insufficient sample volume was obtained to analyze TPH as motor oil from this bore (Table II). TPH as gasoline, benzene, ethylbenzene, total xylenes, and MTBE were not present in the grab groundwater sample obtained from bore B1.

TPH as diesel and MTBE were not present in the grab groundwater sample from bore B2; however, concentrations of TPH as motor oil and TPH as gasoline were present at concentrations of 77 milligrams per liter (mg/L) and 78 mg/L, respectively. The detection limit for MTBE was elevated due to the presence of other chemical compounds in the sample. Benzene, ethylbenzene, and total xylenes were detected at concentrations of 17,000, 7,800, and 8,300 µg/L, respectively.

Detectable concentrations of HVOs were not present in the grab groundwater samples from either bore (Table II).

5.0 Conclusions and Recommendations

Based upon the presence of detectable concentrations of TPH as gasoline, and most of the BTEX compounds, a reportable release of gasoline-range petroleum hydrocarbons has occurred at the site. The age of the release is roughly constrained to prior to 1986. MTBE was in use during that time period; however, due to the elevated detection limit of MTBE in grab groundwater sample B2W, it cannot yet be determined if the gasoline product included unleaded gasoline.

The detectable concentration of lead in soil is below the Total Threshold Limit Concentration (TTLC) and 10 times the Soluble Threshold Limit Concentration (STLC), and consequently is not considered to be hazardous.

The source of TPH as motor oil in grab groundwater sample B2W is currently unknown and may require additional investigation. The source of the relatively low concentrations of TPH as diesel and toluene in grab groundwater sample B1W is also unknown, but is not unexpected in an area of fill and an area of industrial use.

Blymyer Engineers recommends that the following actions be taken:

- The Porter-Cologne Water Quality Control Act of California requires notification of the San Francisco Regional Water Quality Control Board (RWQCB) as soon as knowledge of a discharge is available.

- A copy of this report should be sent to the following local regulatory agencies:

  Ms. Jennifer Eberle
  Alameda County Health Care Services Agency
  Department of Environmental Health
  1131 Harbor Bay Parkway, 2nd Floor
  Alameda, CA 94502

  Mr. Kevin Graves
  San Francisco Bay Regional Water Quality Control Board
  2101 Webster Street, 5th Floor
  Oakland, CA 94612

- Future work will likely be required to comply with regulatory requirements as a result of the detection of TPH as gasoline, TPH as motor oil, and BTEX at the site. Discussions with the appropriate regulatory agency should be initiated to determine future requirements.

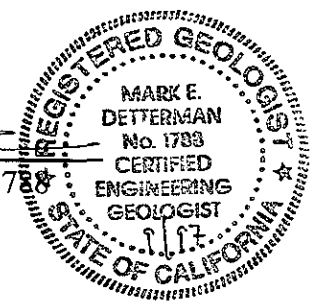
6.0 Limitations

Services performed by Blymyer Engineers, Inc. have been provided in accordance with generally accepted professional practices for the nature and conditions of the work completed in the same or similar localities, at the time the work was performed. The scope of work for the project was conducted within the limitations prescribed by the client. This report is not meant to represent a legal opinion. No other warranty, expressed or implied, is made. This report was prepared for the sole use of the client.

Blymyer Engineers appreciates this opportunity to provide you with environmental consulting services. Please call Mark Detterman at (510) 521-3773 with any questions or comments regarding this letter report.

Sincerely,

Blymyer Engineers, Inc.



By: _____
Mark E. Detterman, C.E.G. 1788
Senior Geologist

And: _____
Michael S. Lewis
Vice President, Technical Services

Enclosures:

Table I:	Summary of Soil Sample Analytical Results
Table II:	Summary of Groundwater Sample Analytical Results
Figure 1:	Site Location Map
Figure 2:	Site Plan
Attachment A:	Zone 7 Water Agency Drilling Permit
Attachment B:	Soil Bore Logs
Attachment C:	Blymyer Engineers Standard Operating Procedure No. 4, *Soil and Grab Groundwater Sampling Using Hydraulically-Driven Sampling Equipment, Revision No. 1*, dated September 1, 1994
Attachment D:	Analytical Report, American Environmental Network, Inc., dated February 21, 1997, and February 25, 1997

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Table I, Summary of Soil Sample Analytical Results
BEI Job No. 97019, Pyro Minerals
2510 Wood Street, Oakland, California

Sample I.D.	Sample Date	Modified EPA Method 8015	Modified EPA Method 8020					EPA Method 6010
		TPH as gasoline (mg/kg)	Benzene (µg/kg)	Toluene (µg/kg)	Ethylbenzene (µg/kg)	Total Xylenes (µg/kg)	MTBE (µg/kg)	Lead (mg/kg)
B2-5.5	2/10/97	150	1,800	600	4,600	1,200	<5,000	32
STLC (mg/L)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	5
TTLC (mg/kg)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	1,000

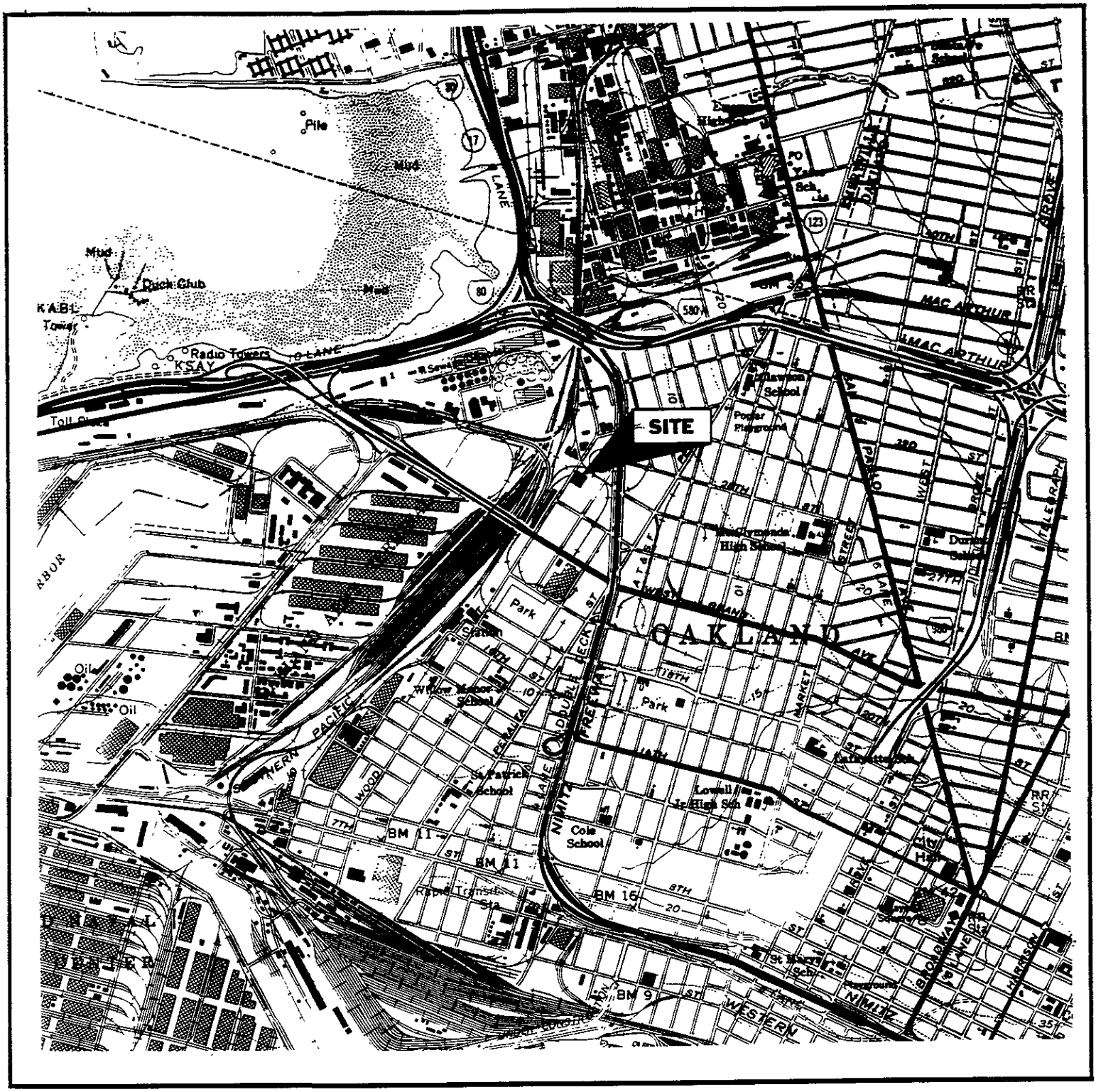
Notes:
EPA = Environmental Protection Agency
TPH = Total Petroleum Hydrocarbons
MTBE = methyl-tert-butyl ether
mg/kg = milligrams per kilogram (parts per million)
µg/kg = micrograms per kilogram (parts per billion)
<x = Not detected above the listed detection limit
B2-5.5 = Soil sample from bore 2 at a depth of 5.5 feet
STLC = Soluble Threshold Limit Concentration
TTLC = Total Threshold Limit Concentration
mg/L = milligrams per liter (parts per million)

Table II, Summary of Groundwater Sample Analytical Results
BEI Job No. 97019; Pyro Minerals
2510 Wood Street, Oakland, California

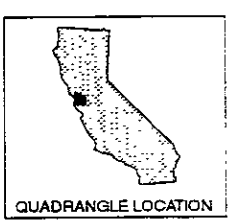
Sample I.D.	Sample Date	Petroleum Hydrocarbons								HVOs
		Modified EPA Method 8015			EPA Method 8020					EPA Method 8010
		TPH as gasoline (mg/L)	TPH as diesel (mg/L)	TPH as motor oil (mg/L)	Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Total Xylenes (µg/L)	MTBE (µg/L)	HVOs 8010 (µg/L)
B1W	2/11/97	<0.05	**0.66**	NA	<0.5	**0.8**	<0.5	<2	<5.0	ND
B2W	2/10/97	**78**	<2	**77**	**17,000**	<50	**7,800**	**8,300**	<500	ND
MCL[a]	N/A	N/A	N/A	N/A	1	150	700	1,750	35*	N/A

Notes:
EPA = Environmental Protection Agency
TPH = Total Petroleum Hydrocarbons
mg/L = milligrams per liter (parts per million)
NA = Not analyzed, insufficient sample volume
<x = Not detected above the listed detection limit
N/A = Not applicable
[a] = Information obtained from *Compilation of Federal and State Drinking Water Standards and Criteria*, July 1995, Quality Assurance Technical Document No. 3, State of California Department of Water Resources.
ND = Not detected above the detection limit, see laboratory sheet for individual compound detection limits
* = Preliminary MCL, not yet determined
MTBE = methyl-tert-butyl ether
HVOs = Halogenated Volatile Organic Compounds
µg/L = micrograms per liter (parts per billion)
MCL = Maximum Contaminant Level

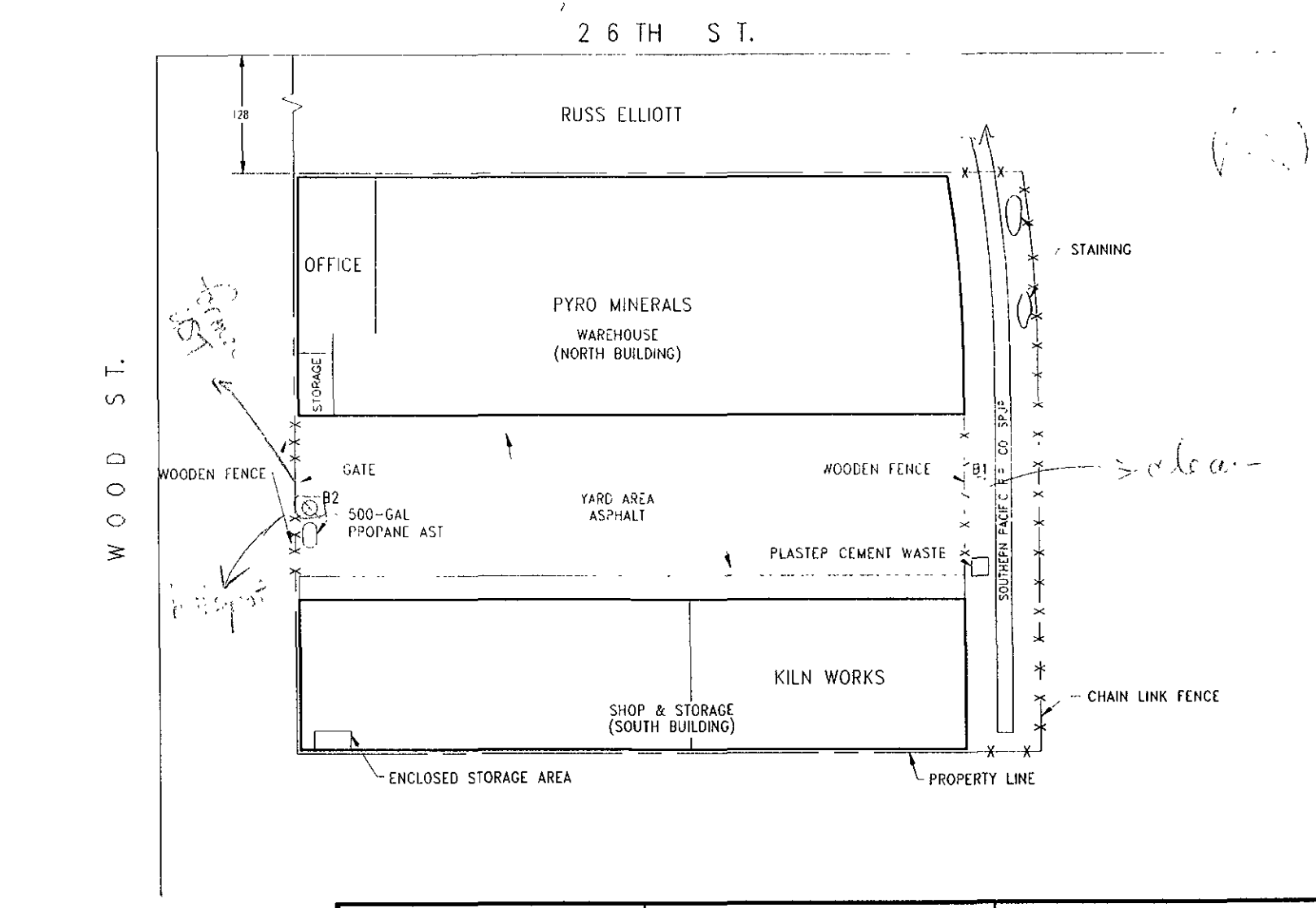
Bold results indicate concentrations over the listed method detection limit.
Shaded results indicate concentrations over the respective MCL



UNITED STATES GEOLOGICAL SURVEY 7 5' QUAD. "OAKLAND WEST, CA" PHOTOREVISED 1980



BLYMYER ENGINEERS, INC	0 1000 2000 SCALE IN FEET	N	**SITE LOCATION MAP** PYRO MINERALS 2510 WOOD STREET OAKLAND, CA	FIGURE 1
BEI JOB NO 97019	DATE 2/27/97			



0 10 20 40
SCALE IN FEET

BLYMYER ENGINEERS, INC.

BEI JOB NO.	DATE
97019	2-27-97

LEGEND
AST ABOVEGROUND STORAGE TANK
⊗ SOIL BORE LOCATION

SITE PLAN
PYRO MINERALS
2510 WOOD ST.
OAKLAND, CA

FIGURE 2

REVISED 2/27/97 H:\PUBLIC\ACADLW\970192

Attachment A

Zone 7 Water Agency Drilling Permit

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

5997 PARKSIDE DRIVE ♦ PLEASANTON, CALIFORNIA 94566 ♦ (415) 484-2600

GROUNDWATER PROTECTION ORDINANCE PERMIT APPLICATION

FOR APPLICANT TO COMPLETE

(1) LOCATION OF PROJECT Pyun Mwanda
2510 Wood ST
Oakland CA 94607

(2) CLIENT
Name Pyun Mwanda
Address [illegible] Phone 510/839-3900
City ____ Zip ____

(3) APPLICANT
Name Mark Detterman
Blymyer Engineers, Inc.
Address 1829 Clement Ave Phone 510/521-3773
City Alameda Zip 94501

(4) DESCRIPTION OF PROJECT
Water Well Construction ___ Geotechnical Investigation
Cathodic Protection ___ General X
Well Destruction ___ Contamination ___

(5) PROPOSED WATER WELL USE
Domestic ___ Industrial ___ Irrigation ___
Municipal ___ Monitoring ___ Other Grab Sampling

(6) PROPOSED CONSTRUCTION
Drilling Method:
Mud Rotary ___ Air Rotary ___ Auger ___
Cable ___ Other Geoprobe

DRILLER'S LICENSE NO. C-57 : 485165 (Expires)

WELL PROJECTS
Drill Hole Diameter 13/4 in. Maximum
Casing Diameter N/A in. Depth 20 ft.
Surface Seal Depth 20 ft. Number 2

GEOTECHNICAL PROJECTS
Number of Borings ___ Maximum
Hole Diameter ___ in. Depth ___ ft.

(7) ESTIMATED STARTING DATE 2/10/97
ESTIMATED COMPLETION DATE 2/10/97

(8) I hereby agree to comply with all requirements of this permit and Alameda County Ordinance No. 73-68.

APPLICANT'S SIGNATURE Mark Detterman Date 2/4/97

FOR OFFICE USE

PERMIT NUMBER 97081
LOCATION NUMBER ____

PERMIT CONDITIONS

Circled Permit Requirements Apply

A. GENERAL
(1.) A permit application should be submitted so as to arrive at the Zone 7 office five days prior to proposed starting date.
2. Submit to Zone 7 within 60 days after completion of permitted work the original Department of Water Resources Water Well Drillers Report or equivalent for well projects, or drilling logs and location sketch for geotechnical projects.
(3.) Permit is void if project not begun within 90 days of approval date.

B. WATER WELLS, INCLUDING PIEZOMETERS
1. Minimum surface seal thickness is two inches of cement grout placed by tremie.
2. Minimum seal depth is 50 feet for municipal and industrial wells or 20 feet for domestic, irrigation, and monitoring wells unless a lesser depth is specially approved.

(C.) GEOTECHNICAL. Backfill bore hole with compacted cuttings or heavy bentonite and upper two feet with compacted material. In areas of known or suspected contamination, tremied cement grout shall be used in place of compacted cuttings.

D. CATHODIC. Fill hole above anode zone with concrete placed by tremie.

E. WELL DESTRUCTION. See attached.

Approved Wyman Hong Date 6 Feb 97
Wyman Hong

21989

Attachment B

Soil Bore Logs

KEY TO BORE/WELL CONSTRUCTION LOGS

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS				TYPICAL NAMES
COARSE GRAINED SOILS (MORE THAN HALF IS LARGER THAN NO. 200 SIEVE)	GRAVEL (MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO 4 SIEVE SIZE)	CLEAN GRAVEL WITH LESS THAN 5% FINES	GW	WELL GRADED GRAVEL, GRAVEL-SAND MIXTURES
			GP	POORLY GRADED GRAVEL, GRAVEL-SAND MIXTURES
		GRAVEL WITH OVER 12% FINES	GM	SILTY GRAVEL, GRAVEL-SAND-SILT MIXTURES
			GC	CLAYEY GRAVEL, GRAVEL-SAND-CLAY MIXTURES
	SAND (MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO 4 SIEVE SIZE)	CLEAN SAND WITH LESS THAN 5% FINES	SW	WELL GRADED SAND, GRAVELLY SAND
			SP	POORLY GRADED SAND, GRAVELLY SAND
		SAND WITH OVER 12% FINES	SM	SILTY SAND, SAND-SILT MIXTURES
			SC	CLAYEY SAND, SAND-CLAY MIXTURES
FINE GRAINED SOILS (MORE THAN HALF IS SMALLER THAN NO. 200 SIEVE)	SILT AND CLAY (LIQUID LIMIT LESS THAN 50)		ML	INORGANIC SILT, ROCK FLOUR, SANDY OR CLAYEY SILT OF LOW PLASTICITY
			CL	INORGANIC CLAY OF LOW TO MEDIUM PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAY (LEAN)
			OL	ORGANIC SILT AND ORGANIC SILTY CLAY OF LOW PLASTICITY
	SILT AND CLAY (LIQUID LIMIT GREATER THAN 50)		MH	INORGANIC SILT, MICACEOUS OR DIATOMACIOUS FINE SANDY OR SILTY SOIL, ELASTIC SILT
			CH	INORGANIC CLAY OF HIGH PLASTICITY, GRAVELLY, SANDY OR SILTY CLAY (FAT)
			OH	ORGANIC CLAY, ORGANIC SILT OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT AND OTHER HIGHLY ORGANIC SOILS

FILL MATERIALS

C		CONCRETE
F		FILL
A		ASPHALT

WELL CONSTRUCTION MATERIALS

CEMENT GROUT		
BENTONITE		
FILTER SAND		SEE ABOVE FOR CONCRETE SYMBOL

SOIL CONSISTENCY FROM DRIVE SAMPLER

NON-COHESIVE SOILS*		COHESIVE SOILS*		UNCONFINED COMPRESSIVE STRENGTH
SANDS & GRAVELS	BLOWS PER FOOT	SILTS AND CLAYS	BLOWS PER FOOT	STRENGTH TONS/SQ. FT.
VERY LOOSE	0 - 4	VERY SOFT	0 - 2	0 - 1/4
LOOSE	4 - 10	SOFT	2 - 4	1/4 - 1/2
MED. DENSE	10 - 30	MEDIUM STIFF	4 - 8	1/2 - 1
DENSE	30 - 50	STIFF	8 - 16	1 - 2
VERY DENSE	OVER 50	VERY STIFF	16 - 32	2 - 4
		HARD	OVER 32	OVER 4

* = STANDARD PENETRATION RESISTANCE IS THE NUMBER OF BLOWS REQUIRED TO DRIVE A 2-INCH O.D. (1-3/8-INCH I.D.) SPLIT BARREL SAMPLER 12 INCHES USING A 140-POUND HAMMER FALLING FREELY THROUGH 30 INCHES. THE SAMPLER IS DRIVEN 18 INCHES AND THE NUMBER OF BLOWS ARE RECORDED FOR EACH 6-INCH INTERVAL. THE SUMMATION OF THE FINAL TWO INTERVALS IS THE STANDARD PENETRATION RESISTANCE.

SAMPLE INTERVAL SYMBOLS

	CORED/RECOVERED		CORED/RECOVERED/SAMPLED/ANALYZED
	CORED/ NO RECOVERY	N/A	NON APPLICABLE/NOT AVAILABLE
	CORED/RECOVERED/SAMPLED		

SOIL BORE LOG: B1

BLYMYER
ENGINEERS, INC.

Job No.: 97019
Client: Pyro Minerals
Site: 2510 Wood Street
Oakland, California
Date Drilled: 2/10/97
Logged By: M. Detterman

Drilling Company: Gregg Drilling
Driller: Paul Rogers
Drilling Equipment: Geoprobe
Sample Method: Continuous Sleeve
Bore Diameter: 1.75 in.
Total Depth: 14 ft.

Initial Water Depth: ▽ 5 ft.
Stabilized Water Depth: ▼ 5 ft.

Depth (ft.)	Blows/6 in.	P.I.D. (ppm)	Sample Intervals	LITHOLOGIC DESCRIPTION	Unified Soil Classification	Graphic Log	Water Depth
0				FILL; Medium gray; Well rounded COBBLES; 2- to 3-inch diameter; 80%; silty clay with medium sand matrix; 20%; loose; moist	GP		
		0		Light brown; fine-grained SAND; silty; sand 80%; loose; moist; Fill?	SP		
5				Wet at 5 feet			▼ 5'
		0		Black; silty organic CLAY; very soft; wet	OH		
10							
15				Bore terminated at 14 ft.			
20							
25							
30							

BLYMYER
ENGINEERS, INC.

SOIL BORE LOG: B2

Job No.: 97019
Client: Pyro Minerals
Site: 2510 Wood Street
Oakland, California
Date Drilled: 2/10/97
Logged By: M. Detterman

Drilling Company: Gregg Drilling
Driller: Paul Rogers
Drilling Equipment: Geoprobe
Sample Method: Continuous Sleeve
Bore Diameter: 1.75 in.
Total Depth: 13 ft.

Initial Water Depth: ▽ 5.5 ft.
Stabilized Water Depth: ▼ 5.5 ft.

Depth (ft.)	Blows/6 in.	P.I.D. (ppm)	Sample Intervals	LITHOLOGIC DESCRIPTION	Unified Soil Classification	Graphic Log	Water Depth
0				FILL; Dark gray with medium green; silty medium-grained SAND; moist to wet; wood block at 5.75 to 8 ft.; hard object (concrete?) at 8 to 8.5 feet	SP		
5		211					▼ 5.5'
				Black; silty organic CLAY; 100%; very soft; wet	OH		
10		0.6					
				Bore terminated at 13 ft.			
15							
20							
25							
30							

Attachment C

Blymyer Engineers' Standard Operating Procedure No. 4

Soil and Grab Groundwater Sampling Using

Hydraulically-Driven Sampling Equipment, Revision No. 1

dated September 1, 1994

BLYMYER
ENGINEERS, INC.

Standard Operating Procedure No. 4

Soil and Grab Groundwater Sampling Using Hydraulically-Driven Sampling Equipment

Revision No. 1

Approved By:

Michael Lewis
Quality Assurance/Quality Control Officer
Blymyer Engineers, Inc.

9/1/94
Date

Table of Contents

Attachments:

Boring and Well Construction Log
Drum Inventory Sheet

1.0 Introduction and Summary

This Standard Operating Procedure (SOP) describes methods for drilling with the use of hydraulically-driven equipment, soil sampling with the use of split-spoon samplers, and grab groundwater sampling through an open borehole. Drilling activities covered by this SOP are conducted to obtain soil and grab groundwater samples. Soil samples may be obtained to log subsurface materials, to collect samples for chemical characterization, or to collect samples for physical parameter characterization.

The soil sampling techniques described in this SOP are generally suitable for chemical characterization and physical classification tests; because a driven split-spoon sampler is employed, the resulting soil samples should generally be considered "disturbed" with respect to physical structure and may not be suitable for measuring sensitive physical parameters, such as strength and compressibility. The techniques described in this SOP generally produce a borehole with a diameter corresponding to the outside diameter of the drill rods, a relatively small annulus of remolded soil surrounding the outside diameter of the drill rods, and limited capability for cross-contamination between subsurface strata as the leading drill rods pass from contaminated strata to uncontaminated underlying strata. However, should conditions require strict measures to help prevent cross-contamination or maintain the integrity of an aquitard, consideration should be given to augmenting the procedures of this SOP, for example, by using pre-drilled and grouted isolation casing.

The procedures for hydraulically-driven soil sampling generally consist of initial decontamination, advancement of the drill rods, driving and recovery of the split-spoon sampler, logging and packaging of the soil samples, decontamination of the split-spoon and continued driving and sampling until the total depth of the borehole is reached. Withdrawal of the drill rods upon reaching the total depth requires completion of the borehole by grouting or other measures.

2.0 Equipment and Materials

- Drill rods and drive-weight assembly (hydraulic hammer or vibrator) for driving the drill rods and split-spoon sampler.

- Split-spoon sampler should conform to ASTM D 1586-Standard Method for Penetration Test and Split-Barrel Sampling of Soils, except: (1) split-spoon should be fitted with liners for collection of chemical characterization samples, and (2) allowable split-spoon diameters include nominal 1.5-inch inside diameter by nominal 2-inch outside diameter (Standard Penetration Test split-spoon), nominal 2-inch inside diameter by nominal

2.5-inch outside diameter (California Modified split-spoon), or nominal 2-1/2-inch inside diameter by nominal 3-inch outside diameter (Dames & Moore split-spoon). The split-spoon type and length of the split barrel portion of the sampler should be noted on the Boring and Well Construction Log (copy attached), as should the use of a sample catcher if employed.

- Liners should be 3- to 6-inch length, fitted with plastic end caps, brass or stainless steel, with a nominal diameter corresponding to that of the inside diameter of the split-spoon sampler. The Boring and Well Construction Log should note whether brass or stainless steel liners were used.

- Teflon® sheets, approximate 6-mil thickness, precut to a diameter or width of the liner diameter plus approximately 1 inch.

- Plastic end caps.

- Adhesiveless silicone tape.

- Disposable polyethylene bailer.

- Type I/Type II Portland cement.

- Groundwater sample containers (laboratory provided only).

- Kimwipes®, certified clean silica sand, or deionized water (for blank sample preparation).

- Sample labels, Boring and Well Construction Logs, chain-of-custody forms, drum labels, Drum Inventory Sheet (copy attached), and field notebook.

- Ziploc® plastic bags of size to accommodate a liner.

- Stainless steel spatula and knife.

- Cooler with ice or dry ice (do not use blue ice) and packing material.

- Field organic vapor monitor. The make, model, and calibration information for the field organic vapor monitor (including compound and concentration of calibration gas) should be noted in the field notebook.

- Pressure washer or steam cleaner.
- Large trough (such as a water tank for cattle), plastic-lined pit, or equivalent for decontamination of drill rod and end plug.
- Buckets and bristle brushes for decontamination of liners, split-spoon sampler, and other small gear.
- Low-residue, organic-free soap such as Liquinox® or Alconox®.
- Distilled water.
- Heavy plastic sheeting such as Visqueen.
- 55-gallon, open-top, DOT-approved, 17H drums
- 5-gallon open-top DOT-approved pails, if required.

As specified in the Site Safety Plan, additional safety and personnel decontamination equipment and materials may be needed.

3.0 Typical Procedures

The following typical procedures are intended to cover the majority of hydraulic drilling and sampling conditions. However, normal field practice requires re-evaluation of these procedures and implementation of alternate procedures upon encountering unusual or unexpected subsurface conditions. Deviations from the following typical procedures may be expected and should be noted on the Boring and Well Construction Log.

1. Investigate location of the proposed boreholes for buried utilities and obstructions. At least 48 hours before drilling, contact known or suspected utility services individually or through collective services such as "Underground Service Alert."

2. Decontaminate drill rods, split-spoon sampler, and other drilling equipment immediately prior to mobilization to the site.

3. Calibrate field organic vapor monitor equipment in accordance with the manufacturer's specifications. Note performance of the calibration in the geologist's field notebook.

4. Conduct "tail-gate" meeting and secure the work area in accordance with the Site Safety Plan.

5. Core concrete, if required.

6. Using hand-augering device, hand auger to a depth of 5 feet, if feasible, to clear underground utilities and structures not located by a utility service or on drawings. As appropriate, retain private buried utility location services or geophysical investigation services to search for buried utilities and obstructions. During initial advancement of each borehole, drill cautiously and have the driller pay particular attention to the "feel" of drilling conditions. The suspected presence of an obstruction, buried pipeline or cable, utility trench backfill, or similar may be cause for suspension of drilling, subject to further investigation.

7. Advance drill rods, or nested drill rods, to the desired sampling depth using hydraulic hammer or vibrator. Note depth interval, augering conditions, and driller's comments on Boring and Well Construction Log. Samples should be collected at intervals of 5 feet or less in homogeneous strata and at detectable changes of strata.

The sampling procedure varies depending on whether the drill rods are nesting-type. With nesting-type drill rods, the inner and outer drill rods are driven simultaneously. As they are driven, soil is forced into the lined inner drill rod. The outer drill rod is left in place and the inner drill rod is relined with sample sleeves and replaced for the next sampling segment. Where nesting-type drill rods are not used, a split-spoon sampler is used. The following sampling procedures cover sampling with a split-spoon sampler:

8. Remove drill rod and note presence of water mark on drill rod, if any. Also, monitor the top of hollow drill rods using field organic vapor monitor, as appropriate.

9. Decontaminate split-spoon sampler, liners, spatulas and knives, and other equipment that may directly contact the chemical characterization sample. Fit the split-spoon sampler with liners and attach to drill rod.

10. Lower split-spoon sampler until sampler is resting on soil. If more than 6 inches of slough exists inside the borehole, consider the conditions unsuitable and re-advance the drill rods and sampler to a new sampling depth.

11. Drive and recover split-spoon sampler. Record depth interval and sample recovery on Boring and Well Construction Log. Monitor the recovered split-spoon sampler with the field organic vapor monitor, as appropriate.

12. Remove either bottom-most or second-from-bottom liner (or both) from split-spoon sampler for purposes of chemical characterization and physical parameter testing. Observe soil at each end of liner(s) for purposes of completing sample description. Place Teflon® sheet at each end of liner, cover with plastic caps, and tape plastic caps with adhesiveless silicone tape (do not use electrical or duct tape) to further minimize potential loss of moisture or volatile compounds. Label liner(s) and place in Ziploc® bag on ice or dry ice inside cooler.

13. Extrude soil from remaining liner(s) and subsample representative 1-inch cube (approximate dimensions). Place subsample in Ziploc® bag and seal. Allow bag to equilibrate at ambient conditions for approximately 5 minutes and screen for organic vapors by inserting the probe of the field organic vapor monitor into the bag. Record depth interval, observed sample reading, and ambient (background) reading on the Boring and Well Construction Log. Discard bag and sample after use in the solid waste stockpile.

14. Classify soil sample in approximate accordance with ASTM D 2488-Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) and in accordance with the Unified Soil Classification System (USCS). Description should include moisture content, color, textural information, group symbol, group name, and odor. Optional descriptions, especially if classification is performed with protective gloves, include particle angularity and shape, clast composition, plasticity, dilatancy, dry strength, toughness, and reaction with HCl. Add notes on geologic structure of sample, as appropriate. Record depth interval, field organic vapor monitor reading, USCS classification, and other notes on the Boring and Well Construction Log.

15. Repeat steps 7 through 14 until total depth of borehole is reached.

16. If a grab groundwater sample is to be collected, slowly lower bailer through the open borehole to minimize agitation and aeration of the sampled water. Transfer the grab groundwater sample into sample container(s). Label sample container(s), place packing materials around containers, and place on ice inside cooler.

17. After drill rods are removed, complete borehole according to the requirements specified elsewhere or by abandonment in accordance with section 8.0.

18. Decontaminate drill rods between boreholes and after finishing last borehole prior to drill rig leaving site.

19. Change decontamination solutions and clean decontamination trough, buckets, and brushes between boreholes.

20. Containerize decontamination liquids in 17H steel drums. Affix completed "Caution - Analysis Pending" labels to the drums.

21. Store any excess soil sample on and cover with heavy plastic sheeting. If required by local regulations or due to site constraints, store excess soil sample in 5-gallon pails. Affix completed "Caution - Analysis Pending" labels to drums.

22. Complete Drum Inventory Sheet.

23. Complete pertinent portion of the chain-of-custody form and enter descriptions of field work performed in the field notebook.

4.0 Quality Assurance and Quality Control (QA/QC)

Optional quality control sampling consists of sequential replicates, collected at an approximate frequency of one sequential replicate for every 10 collected soil samples. Sequential replicates are collected by packaging two adjacent liners of soil from a selected split-spoon drive. Each sample is labeled according to normal requirements. The replicate samples obtained in such a manner are suitable for assessing the reproducibility of both chemical and physical parameters. Interpretations of data reproducibility should recognize the potential for significant changes in soil type, even over 6-inch intervals. Accordingly, sequential replicates do not supply the same information as normally encountered in duplicate or split samples. Duplicate or split samples are better represented by the laboratory performing replicate analyses on adjacent subsamples of soil from the same liner.

Optional quality control samples may be collected to check for cross-contamination using field blanks. Field blanks may be prepared by (1) wipe sampling decontaminated liners and split-spoon with Kimwipes®, (2) pouring clean silica sand into a decontaminated split-spoon sampler that has been fitted with liners, or (3) pouring deionized water over the decontaminated liners and split-spoon sampler and collecting the water that contacts the sampling implements for aqueous analysis. Field blanks may be prepared at the discretion of the field staff given reasonable doubt regarding the efficacy of the decontamination procedures.

The comparability of the field soil classification may be checked by conducting laboratory classification tests. Requests for laboratory testing verification of the field classification should be left to the discretion of the field staff.

Field decisions that may also affect the quality of collected data include the frequency of sampling and the thoroughness of documentation. Subject to reasonable limitations of budget and schedule, the completeness, comparability, and representativeness of data obtained using this SOP will be enhanced by decreasing the sampling interval (including collecting continuous samples with depth) and increasing the level of detail for sample classification and description of drilling conditions. More frequent sampling and more detailed documentation may be appropriate in zones of chemical concentration or in areas of critical geology (for example, zones of changing strata or cross-correlation of confining strata).

As required, rinse or wipe samples may be collected from the sampling equipment before the initial sampling is conducted to establish a baseline level of contamination present on the sampling equipment. Rinse or wipe samples may also be collected at intervals of decontamination wash and rinse events or after the final decontamination wash and rinse event.

5.0 Documentation

Observations, measurements, and other documentation of the drilling and soil sampling effort should be recorded on the following:

- Sample label
- Boring and Well Construction Log
- Field notebook
- Chain-of-custody form
- Drum Inventory Sheet

Documentation should include any deviations from this SOP, notations of unusual or unexpected conditions, and documentation of the containerization and disposal of investigation-derived waste. Information to be documented on the sample label and Boring and Well Construction Log is listed below.

5.1 Sample Label

- Project name and project number
- Borehole number
- Sample depth interval (feet below ground surface), record the depth interval using notation similar to "19.2-19.7;" generally do not record just one depth "19.2" because of uncertainty regarding the location such depth corresponds to (midpoint, top, etc.)
- Sample date and sample time
- Name of on-site geologist
- Optional designation of orientation of sample within the subsurface, for example, an arrow with "up" or "top" designated

5.2 Boring Log

- Project name, project number, and name of on-site geologist
- Borehole number
- Description of borehole location, including taped or paced measurements to noticeable topographic features (a location sketch should be considered)
- Date and time drilling started and completed
- Name of drilling company and name of drilling supervisor, optional names and responsibilities of driller's helpers
- Name of manufacturer and model number of sampling rig
- Type and size of sampler, optional description of the size of drill rod
- USCS classification
- Sampling interval and total depth of borehole

- Depth at which groundwater was first encountered with the notation "initial" and any other noted changes in groundwater movement or stabilized water level
- Field organic vapor monitor readings
- Method of boring completion
- Other notations and recordings described previously in section 2.0, Equipment and Materials, and section 3.0, Typical Procedures

6.0 Decontamination

Prior to entering the site, the sampling rig and appurtenant items (drill rods, split-spoon sampler, shovels, troughs and buckets, driller's stand, etc.) should be decontaminated by steam cleaning or pressure washing. Between each borehole, appurtenant items that contacted downhole soil (essentially all appurtenant items including drill rod, split-spoon sampler, shovels, troughs, and buckets, etc.) should be decontaminated by steam cleaning or pressure washing. The sampling rig should be steam cleaned or pressured washed as a final decontamination event. On-site decontamination should be conducted within the confines of a trough or lined pit to temporarily contain the wastewater. Between each borehole and prior to demobilization, the trough or lined pit should be decontaminated by steam cleaning or pressure washing. If a rack or other support is used to suspend appurtenant items over the trough or lined pit during decontamination, only the rack or other support needs to be decontaminated between boreholes.

Prior to collection of each sample, the split-spoon sampler, liners, sample catcher, spatulas and knives, and other equipment or materials that may directly contact the sample should be decontaminated. Decontamination for these items should consist of a soap wash (Alconox®, Liquinox®, or other organic-free, low-residue soap), followed by a clean water rinse. If testing for metals, a final rinse of deionized water should be conducted. Wastewater should be temporarily contained.

Between each borehole, buckets and brushes should be decontaminated by steam cleaning or pressure washing. Before installation of each borehole is begun, fresh decontamination solutions should be prepared. Decontaminated equipment should be kept off of the ground surface. Cleaned equipment should be placed on top of plastic sheeting, which is replaced after completion of each borehole, or on storage racks.

More rigorous decontamination procedures may be employed if necessary to meet sampling or QA/QC requirements.

7.0 Investigation-Derived Waste

Wastes resulting from the activities of this SOP may include excess soil samples, decontamination liquids, and miscellaneous waste (paper, plastic, gloves, bags, etc.).

Solid waste from each borehole should be placed on and covered with heavy plastic sheeting or containerized in DOT-approved 5-gallon pails. Solids from multiple boreholes may be combined within a single stockpile if field observations (presence or absence of chemical staining and field organic vapor monitoring) indicate the solids are similarly uncontaminated or similarly contaminated. Given sufficient space and reasonable doubt, separate stockpiles should be used for solid waste from each borehole.

Decontamination liquids for each borehole should be placed in individual 17H steel drums with completed "Caution - Analysis Pending" labels affixed. Liquids from multiple boreholes may be combined, subject to the same limitations as solids.

8.0 Borehole Abandonment

Each borehole should be completely filled with neat cement (5.5 gallons of water in proportion to one 94-pound bag of Type I/Type II Portland cement, ASTM C-150) from the bottom of the bore to grade surface. Water used to hydrate cement should be free of contaminants and organic material. Bentonite may be added to reduce shrinkage and improve fluidity. Add 3 to 5 pounds of bentonite with 6.5 gallons of water and one 94-pound bag of Type I/Type II Portland cement. The water and bentonite should be mixed first before adding the cement. The borehole should be filled from the bottom first to grade surface. A tremie pipe should be used in small diameter boreholes or in formations prone to bridging or collapse. The tremie pipe should be lifted as the cement grout is poured, but should never be lifted above the surface of the neat cement. In boreholes deeper than 50 feet, the neat cement may need to be applied with pressure.

9.0 References

Aller, L., Bennett T.W., Hackett G., Petty R.J., Lehr J.H., Sedoris H., and Nielson D.M., 1989. Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells. National Water Well Association, Dublin, OH, 1989.

American Society for Testing and Materials. 1992. ASTM Standards On Ground Water and Vadose Zone Investigations. ASTM, Philadelphia, PA, 1992.

Driscoll, F.G., 1986. Groundwater and Wells. Johnson Filtration Systems Inc., St. Paul, MN, 1986.

Neilson, D.M., 1991. Practical Handbook of Ground-Water Monitoring. Lewis Publishers, Chelsea, MI, 1991.

United States Environmental Protection Agency, 1992. RCRA Ground-Water Monitoring: Draft Guidance Document. U.S. EPA, 1992.

BLYMYER ENGINEERS, INC.

BORE/WELL CONSTRUCTION LOG

BORE/WELL NO.:

Bore Location	Client:	Drilling Company:
	Project Site Address	
	BEI Job No:	Driller:
	Logged By:	License No.:
	Sampling Method:	Drilling Method:
	Started Time:	Date:
Scale: Elevation (msl):	Completed Time:	Date:

Total Bore Depth/Diameter:	Water Depth:	Initial: (▽):		Stabilized: (▽):
Total Well Depth/Diameter:	Time:			
Surface Seal Type/Completion:	Date:			

Annular Seal Type/Interval:

Seal Type/Interval:

Sand Type/Interval:

Blank Casing Type/Diameter/Interval:

Screened Casing Type/Diameter/Interval:

LITHOLOGIC DESCRIPTION	U.S. Classification/ Contact Type	Depth (ft.)	Sample Intervals (symbols)	Sample Number	Blows/6 in	Inches Driven	Inches Recovered	PID Readings (ppm)	Screened/Blank Casing Intervals	Sand/Seal Intervals
		1								
		2								
		3								
		4								
		5								
		6								
		7								
		8								
		9								
		10								
		11								
		12								
		13								
		14								
		15								

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BLYMYER ENGINEERS DRUM INVENTORY FORM

Number of Drums	Date Generated	Person on-site when generated	Soil or Groundwater	Contents (Cuttings, Purge Water, Development Water, Decon Water, PPE)	% Full	Bore or Monitoring Well ID	Do Lab Results Exist for Contents?

[illegible]

Date Client Informed? _____ All drums labeled? _____

Attachment D

Analytical Report

American Environmental Network, Inc.

dated February 21, 1997, and February 25, 1997

American Environmental Network

Certificate of Analysis

CDOHS Certification: 1172

AIHA Accreditation: 11134

BLYMYER ENGINEERS, INC.
1829 CLEMENT AVENUE
ALAMEDA, CA 94501

ATTN: MARK DETTERMAN
CLIENT PROJ. ID: 97019
CLIENT PROJ. NAME: PYRO MINERALS

REPORT DATE: 02/21/97

DATE(S) SAMPLED: 02/11/97

DATE RECEIVED: 02/11/97

AEN WORK ORDER: 9702109

PROJECT SUMMARY:

On February 11, 1997, this laboratory received 1 water sample(s).

Client requested sample(s) be analyzed for chemical parameters. Results of analysis are summarized on the following page(s). Please see quality control report for a summary of QC data pertaining to this project.

Samples will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Samples may be archived by prior arrangement.

If you have any questions, please contact Client Services at (510) 930-9090.

Larry Klein
Laboratory Director

BLYMYER ENGINEERS. INC.

SAMPLE ID: B1W
AEN LAB NO: 9702109-01
AEN WORK ORDER: 9702109
CLIENT PROJ. ID: 97019

DATE SAMPLED: 02/11/97
DATE RECEIVED: 02/11/97
REPORT DATE: 02/21/97

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	ND	0.5	ug/L	02/13/97
Toluene	108-88-3	0.8 *	0.5	ug/L	02/13/97
Ethylbenzene	100-41-4	ND	0.5	ug/L	02/13/97
Xylenes, Total	1330-20-7	ND	2	ug/L	02/13/97
Purgeable HCs as Gasoline	5030/GCFID	ND	0.05	mg/L	02/13/97
Methyl t-Butyl Ether	1634-04-4	ND	5	ug/L	02/13/97
#Extraction for TPH	EPA 3510	-		Extrn Date	02/13/97
TPH as Diesel	GC-FID	0.66 *	0.3	mg/L	02/16/97
EPA 8010 - Water matrix	EPA 8010				
Bromodichloromethane	75-27-4	ND	0.5	ug/L	02/18/97
Bromoform	75-25-2	ND	0.5	ug/L	02/18/97
Bromomethane	74-83-9	ND	2	ug/L	02/18/97
Carbon Tetrachloride	56-23-5	ND	0.5	ug/L	02/18/97
Chlorobenzene	108-90-7	ND	0.5	ug/L	02/18/97
Chloroethane	75-00-3	ND	2	ug/L	02/18/97
2-Chloroethyl Vinyl Ether	110-75-8	ND	0.5	ug/L	02/18/97
Chloroform	67-66-3	ND	0.5	ug/L	02/18/97
Chloromethane	74-87-3	ND	2	ug/L	02/18/97
Dibromochloromethane	124-48-1	ND	0.5	ug/L	02/18/97
1,2-Dichlorobenzene	95-50-1	ND	0.5	ug/L	02/18/97
1,3-Dichlorobenzene	541-73-1	ND	0.5	ug/L	02/18/97
1,4-Dichlorobenzene	106-46-7	ND	0.5	ug/L	02/18/97
Dichlorodifluoromethane	75-71-8	ND	2	ug/L	02/18/97
1,1-Dichloroethane	75-34-3	ND	0.5	ug/L	02/18/97
1,2-Dichloroethane	107-06-2	ND	0.5	ug/L	02/18/97
1,1-Dichloroethene	75-35-4	ND	0.5	ug/L	02/18/97
cis-1,2-Dichloroethene	156-59-2	ND	0.5	ug/L	02/18/97
trans-1,2-Dichloroethene	156-60-5	ND	0.5	ug/L	02/18/97
1,2-Dichloropropane	78-87-5	ND	0.5	ug/L	02/18/97
cis-1,3-Dichloropropene	10061-01-5	ND	0.5	ug/L	02/18/97
trans-1,3-Dichloropropene	10061-02-6	ND	0.5	ug/L	02/18/97
Methylene Chloride	75-09-2	ND	2	ug/L	02/18/97
1,1,2,2-Tetrachloroethane	79-34-5	ND	0.5	ug/L	02/18/97
Tetrachloroethene	127-18-4	ND	0.5	ug/L	02/18/97
1,1,1-Trichloroethane	71-55-6	ND	0.5	ug/L	02/18/97
1,1,2-Trichloroethane	79-00-5	ND	0.5	ug/L	02/18/97
Trichloroethene	79-01-6	ND	0.5	ug/L	02/18/97
Trichlorofluoromethane	75-69-4	ND	2	ug/L	02/18/97

BLYMYER ENGINEERS, INC.

SAMPLE ID: B1W
AEN LAB NO: 9702109-01
AEN WORK ORDER: 9702109
CLIENT PROJ. ID: 97019

DATE SAMPLED: 02/11/97
DATE RECEIVED: 02/11/97
REPORT DATE: 02/21/97

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
1,1,2Trichlorotrifluoroethane	76-13-1	ND	0.5	ug/L	02/18/97
Vinyl Chloride	75-01-4	ND	2	ug/L	02/18/97

Reporting limit elevated for diesel due to insufficient sample amount.

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9702109

CLIENT PROJECT ID: 97019

Quality Control Summary

All laboratory quality control parameters were found to be within established limits.

Definitions

Laboratory Control Sample (LCS)/Method Spike(s): Control samples of known composition. LCS and Method Spike data are used to validate batch analytical results.

Matrix Spike(s): Aliquot of a sample (aqueous or solid) with added quantities of specific compounds and subjected to the entire analytical procedure. Matrix spike and matrix spike duplicate QC data are advisory.

Method Blank: An analytical control consisting of all reagents, internal standards, and surrogate standards carried through the entire analytical process. Used to monitor laboratory background and reagent contamination.

Not Detected (ND): Not detected at or above the reporting limit.

Relative Percent Difference (RPD): An indication of method precision based on duplicate analysis.

Reporting Limit (RL): The lowest concentration routinely determined during laboratory operations. The RL is generally 1 to 10 times the Method Detection Limit (MDL). Reporting limits are matrix, method, and analyte dependent and take into account any dilutions performed as part of the analysis.

Surrogates: Organic compounds which are similar to analytes of interest in chemical behavior, but are not found in environmental samples. Surrogates are added to all blanks, calibration and check standards, samples, and spiked samples. Surrogate recovery is monitored as an indication of acceptable sample preparation and instrumental performance.

D: Surrogates diluted out.

#: Indicates result outside of established laboratory QC limits.

QUALITY CONTROL DATA

METHOD: EPA 8010

AEN JOB NO: 9702109
INSTRUMENT: I
MATRIX: WATER

Surrogate Standard Recovery Summary

Date Analyzed	Client Id.	Lab Id.	Percent Recovery: Bromochloro-methane	Percent Recovery: 1-Bromo-3-chloro-propane
02/18/97	B1W	01	99	99
QC Limits:			70-130	70-130

DATE ANALYZED: 02/18/97
SAMPLE SPIKED: LCS
INSTRUMENT: I

Laboratory Control Sample Recovery

Analyte	Spike Added (ug/L)	Percent Recovery	RPD	QC Limits: Percent Recovery	QC Limits: RPD
1,1-Dichloroethene	50	95	2	37-156	20
Trichloroethene	50	98	<1	54-122	20
Chlorobenzene	50	82	3	54-141	20

Daily method blanks for all associated analytical runs showed no contamination at or above the reporting limit.

QUALITY CONTROL DATA

METHOD: EPA 3510 GCFID

AEN JOB NO: 9702109
DATE EXTRACTED: 02/13/97
INSTRUMENT: C
MATRIX: WATER

Surrogate Standard Recovery Summary

Date Analyzed	Client Id.	Lab Id.	Percent Recovery n-Pentacosane
02/16/97	B1W	01	83
QC Limits:			65-125

DATE EXTRACTED: 02/13/97
DATE ANALYZED: 02/15/97
SAMPLE SPIKED: 9701218-02
INSTRUMENT: C

Matrix Spike Recovery Summary

Analyte	Spike Added (mg/L)	Percent Recovery	RPD	QC Limits Percent Recovery	QC Limits RPD
Diesel	4.00	83	6	60-110	15

Daily method blanks for all associated analytical runs showed no contamination at or above the reporting limit.

QUALITY CONTROL DATA

METHOD: EPA 8020, 5030 GCFID

AEN JOB NO: 9702109
INSTRUMENT: F
MATRIX: WATER

Surrogate Standard Recovery Summary

Date Analyzed	Client Id.	Lab Id.	Percent Recovery Fluorobenzene
02/13/97	B1W	01	101
QC Limits:			70-130

DATE ANALYZED: 02/13/97
SAMPLE SPIKED: 9702109-01
INSTRUMENT: F

Matrix Spike Recovery Summary

Analyte	Spike Added (ug/L)	Percent Recovery	RPD	QC Limits Percent Recovery	QC Limits RPD
Benzene	18.4	101	1	85-109	17
Toluene	64.4	100	<1	87-111	16
Hydrocarbons as Gasoline	500	86	12	66-117	19

Daily method blanks for all associated analytical runs showed no contamination at or above the reporting limit.

*** END OF REPORT ***

BLYMYER ENGINEERS, INC.

1829 Clement Avenue
Alameda, CA 94501 (510) 521-3773 FAX (510) 865-2594

E351
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9702.109

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

JOB #	PROJECT NAME/LOCATION
97019	Pyro Mineola

SAMPLERS (SIGNATURE): Mark Dotterman

DATE	TIME	COMP	GRAB	SAMPLE NAME/LOCATION	# OF CONTAINERS	TPH AS GASOLINE + BTXE + MTBE (MOD EPA 8015/8020)	TPH AS DIESEL (MOD EPA 8015)	VOC (EPA 624/8240)	SEMI-VOC (EPA 625/8270)	TRPH (EPA 418.1)	BTXE (EPA 8020/602)	8010					HOLD
2/11/97	900		X	B1W	6 VOA Amber	X	*					X						

TURNAROUND TIME: Standard DAY(S)

REMARKS:
01A-G
* Liter is not full analyze if possible.

REQUESTED BY: Mark Dotterman

RESULTS AND INVOICE TO: Mark D. @ Blymyer Eng.

RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)
Mark Dotter	2/11/97 4:11:15	
RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)
		Lynn Gillespie

RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)
	2/11/97 4:15	
DATE / TIME	REMARKS:	
2/11/97 1215		

WHITE: Accompany Sample YELLOW: BEI, After Lab Signs PINK: Original Sampler

American Environmental Network

Certificate of Analysis

CDHS Certification: 1172 AIHA Accreditation: 11134

BLYMYER ENGINEERS, INC.
1829 CLEMENT AVENUE
ALAMEDA, CA 94501

REPORT DATE: 02/25/97
DATE(S) SAMPLED: 02/10/97
DATE RECEIVED: 02/11/97
AEN WORK ORDER: 9702110

ATTN: MARK DETTERMAN
CLIENT PROJ. ID: 97019
CLIENT PROJ. NAME: PYRO MINERALS

PROJECT SUMMARY:

On February 11, 1997, this laboratory received 2 (1 soil & 1 water) sample(s).

Client requested sample(s) be analyzed for chemical parameters. Results of analysis are summarized on the following page(s). Please see quality control report for a summary of QC data pertaining to this project.

Samples will be stored for 30 days after completion of analysis, then disposed of in accordance with State and Federal regulations. Samples may be archived by prior arrangement.

If you have any questions, please contact Client Services at (510) 930-9090.

Larry Klein
Laboratory Director

BLYMYER ENGINEERS. INC.

SAMPLE ID: B2-5.5
AEN LAB NO: 9702110-01
AEN WORK ORDER: 9702110
CLIENT PROJ. ID: 97019

DATE SAMPLED: 02/10/97
DATE RECEIVED: 02/11/97
REPORT DATE: 02/25/97

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	**EPA 8020**				
Benzene	71-43-2	1,800 *	500	ug/kg	02/14/97
Toluene	108-88-3	600 *	500	ug/kg	02/14/97
Ethylbenzene	100-41-4	4,600 *	500	ug/kg	02/14/97
Xylenes, Total	1330-20-7	1,200 *	500	ug/kg	02/14/97
Purgeable HCs as Gasoline	5030/GCFID	150 *	20	mg/kg	02/14/97
Methyl t-Butyl Ether	1634-04-4	ND	5000	ug/kg	02/14/97
#Digestion, Metals AA/ICP	**EPA 3050**	-		Prep Date	02/14/97
Lead	**EPA 6010**	32 *	1	mg/kg	02/18/97

RLs elevated for gas/BTEX due to high levels of target compounds. Sample run at dilution.

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

BLYMYER ENGINEERS, INC.

SAMPLE ID: B2W
AEN LAB NO: 9702110-02
AEN WORK ORDER: 9702110
CLIENT PROJ. ID: 97019

DATE SAMPLED: 02/10/97
DATE RECEIVED: 02/11/97
REPORT DATE: 02/25/97

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
BTEX & Gasoline HCs	EPA 8020				
Benzene	71-43-2	17,000 *	50	ug/L	02/13/97
Toluene	108-88-3	ND	50	ug/L	02/13/97
Ethylbenzene	100-41-4	7,800 *	50	ug/L	02/13/97
Xylenes, Total	1330-20-7	8,300 *	200	ug/L	02/13/97
Purgeable HCs as Gasoline	5030/GCFID	78 *	5	mg/L	02/13/97
Methyl t-Butyl Ether	1634-04-4	ND	500	ug/L	02/13/97
#Extraction for TPH	EPA 3510	-		Extrn Date	02/12/97
TPH as Diesel	GC-FID	ND	2	mg/L	02/15/97
TPH as Oil	GC-FID	77 *	10	mg/L	02/15/97
EPA 8010 - Water matrix	EPA 8010				
Bromodichloromethane	75-27-4	ND	0.5	ug/L	02/18/97
Bromoform	75-25-2	ND	0.5	ug/L	02/18/97
Bromomethane	74-83-9	ND	2	ug/L	02/18/97
Carbon Tetrachloride	56-23-5	ND	0.5	ug/L	02/18/97
Chlorobenzene	108-90-7	ND	0.5	ug/L	02/18/97
Chloroethane	75-00-3	ND	2	ug/L	02/18/97
2-Chloroethyl Vinyl Ether	110-75-8	ND	0.5	ug/L	02/18/97
Chloroform	67-66-3	ND	0.5	ug/L	02/18/97
Chloromethane	74-87-3	ND	2	ug/L	02/18/97
Dibromochloromethane	124-48-1	ND	0.5	ug/L	02/18/97
1,2-Dichlorobenzene	95-50-1	ND	0.5	ug/L	02/18/97
1,3-Dichlorobenzene	541-73-1	ND	0.5	ug/L	02/18/97
1,4-Dichlorobenzene	106-46-7	ND	0.5	ug/L	02/18/97
Dichlorodifluoromethane	75-71-8	ND	2	ug/L	02/18/97
1,1-Dichloroethane	75-34-3	ND	0.5	ug/L	02/18/97
1,2-Dichloroethane	107-06-2	ND	0.5	ug/L	02/18/97
1,1-Dichloroethene	75-35-4	ND	0.5	ug/L	02/18/97
cis-1,2-Dichloroethene	156-59-2	ND	0.5	ug/L	02/18/97
trans-1,2-Dichloroethene	156-60-5	ND	0.5	ug/L	02/18/97
1,2-Dichloropropane	78-87-5	ND	0.5	ug/L	02/18/97
cis-1,3-Dichloropropene	10061-01-5	ND	0.5	ug/L	02/18/97
trans-1,3-Dichloropropene	10061-02-6	ND	0.5	ug/L	02/18/97
Methylene Chloride	75-09-2	ND	2	ug/L	02/18/97
1,1,2,2-Tetrachloroethane	79-34-5	ND	0.5	ug/L	02/18/97
Tetrachloroethene	127-18-4	ND	0.5	ug/L	02/18/97
1,1,1-Trichloroethane	71-55-6	ND	0.5	ug/L	02/18/97
1,1,2-Trichloroethane	79-00-5	ND	0.5	ug/L	02/18/97

BLYMYER ENGINEERS, INC.

SAMPLE ID: B2W
AEN LAB NO: 9702110-02
AEN WORK ORDER: 9702110
CLIENT PROJ. ID: 97019

DATE SAMPLED: 02/10/97
DATE RECEIVED: 02/11/97
REPORT DATE: 02/25/97

ANALYTE	METHOD/ CAS#	RESULT	REPORTING LIMIT	UNITS	DATE ANALYZED
Trichloroethene	79-01-6	ND	0.5	ug/L	02/18/97
Trichlorofluoromethane	75-69-4	ND	2	ug/L	02/18/97
1,1,2Trichlorotrifluoroethane	76-13-1	ND	0.5	ug/L	02/18/97
Vinyl Chloride	75-01-4	ND	2	ug/L	02/18/97

RLs elevated for gas/BTEX due to high levels of target compounds: RL elevated for diesel due to high levels of non-target compounds. Sample run at dilution.

ND = Not detected at or above the reporting limit
* = Value at or above reporting limit

AEN (CALIFORNIA)
QUALITY CONTROL REPORT

AEN JOB NUMBER: 9702110

CLIENT PROJECT ID: 97019

Quality Control and Project Summary

All laboratory quality control parameters were found to be within established limits.

Definitions

Laboratory Control Sample (LCS)/Method Spike(s): Control samples of known composition. LCS and Method Spike data are used to validate batch analytical results.

Matrix Spike(s): Aliquot of a sample (aqueous or solid) with added quantities of specific compounds and subjected to the entire analytical procedure. Matrix spike and matrix spike duplicate QC data are advisory.

Method Blank: An analytical control consisting of all reagents, internal standards, and surrogate standards carried through the entire analytical process. Used to monitor laboratory background and reagent contamination.

Not Detected (ND): Not detected at or above the reporting limit.

Relative Percent Difference (RPD): An indication of method precision based on duplicate analysis.

Reporting Limit (RL): The lowest concentration routinely determined during laboratory operations. The RL is generally 1 to 10 times the Method Detection Limit (MDL). Reporting limits are matrix, method, and analyte dependent and take into account any dilutions performed as part of the analysis.

Surrogates: Organic compounds which are similar to analytes of interest in chemical behavior, but are not found in environmental samples. Surrogates are added to all blanks, calibration and check standards, samples, and spiked samples. Surrogate recovery is monitored as an indication of acceptable sample preparation and instrumental performance.

D: Surrogates diluted out.

#: Indicates result outside of established laboratory QC limits.

QUALITY CONTROL DATA

METHOD: EPA 3510 GCFID

AEN JOB NO: 9702110
DATE EXTRACTED: 02/12/97
INSTRUMENT: A
MATRIX: WATER

Surrogate Standard Recovery Summary

Date Analyzed	Client Id.	Lab Id.	Percent Recovery n-Pentacosane
02/15/97	B2W	02	D
QC Limits:			65-125

D: Surrogate diluted out.

DATE EXTRACTED: 02/12/97
DATE ANALYZED: 02/14/97
SAMPLE SPIKED: 9701218-03
INSTRUMENT: C

Matrix Spike Recovery Summary

Analyte	Spike Added (mg/L)	Percent Recovery	RPD	QC Limits Percent Recovery	QC Limits RPD
Diesel	4.00	81	1	60-110	15

Daily method blanks for all associated analytical runs showed no contamination at or above the reporting limit.

QUALITY CONTROL DATA

METHOD: EPA 8010

AEN JOB NO: 9702110
INSTRUMENT: I
MATRIX: WATER

Surrogate Standard Recovery Summary

Date Analyzed	Client Id.	Lab Id.	Percent Recovery Bromochloro-methane	Percent Recovery 1-Bromo-3-chloro-propane
02/18/97	B2W	02	93	92
QC Limits:			70-130	70-130

DATE ANALYZED: 02/18/97
SAMPLE SPIKED: LCS
INSTRUMENT: I

Laboratory Control Sample Recovery

Analyte	Spike Added (ug/L)	Percent Recovery	RPD	QC Limits Percent Recovery	QC Limits RPD
1,1-Dichloroethene	20	95	2	37-156	20
Trichloroethene	20	98	<1	54-122	20
Chlorobenzene	20	82	3	54-141	20

Daily method blanks for all associated analytical runs showed no contamination at or above the reporting limit.

QUALITY CONTROL DATA

METHOD: EPA 8020. 5030 GCFID

AEN JOB NO: 9702110
INSTRUMENT: F
MATRIX: WATER

Surrogate Standard Recovery Summary

Date Analyzed	Client Id.	Lab Id.	Percent Recovery Fluorobenzene
02/13/97	B2W	02	98
QC Limits:			70-130

DATE ANALYZED: 02/13/97
SAMPLE SPIKED: 9702109-01
INSTRUMENT: F

Matrix Spike Recovery Summary

Analyte	Spike Added (ug/L)	Percent Recovery	RPD	QC Limits Percent Recovery	QC Limits RPD
Benzene	18.4	101	1	85-109	17
Toluene	64.4	100	<1	87-111	16
Hydrocarbons as Gasoline	500	86	12	66-117	19

Daily method blanks for all associated analytical runs showed no contamination at or above the reporting limit.

QUALITY CONTROL DATA

METHOD: EPA 8020. 5030 GCFID

AEN JOB NO: 9702110
INSTRUMENT: H
MATRIX: SOIL

Surrogate Standard Recovery Summary

Date Analyzed	Client Id.	Lab Id.	Percent Recovery Fluorobenzene
02/14/97	B2-5.5	01	91
QC Limits:			70-130

DATE ANALYZED: 02/07/97
SAMPLE SPIKED: 9702091-10
INSTRUMENT: H

Matrix Spike Recovery Summary

Analyte	Spike Added (ug/kg)	Percent Recovery	RPD	QC Limits Percent Recovery	QC Limits RPD
Benzene	21.9	102	2	79-113	20
Toluene	74.2	101	1	84-110	20
Hydrocarbons as Gasoline	500	107	2	60-126	20

Daily method blanks for all associated analytical runs showed no contamination at or above the reporting limit.

QUALITY CONTROL DATA

AEN JOB NO: 9702110
SAMPLE SPIKED: SAND
DATE(S) ANALYZED: 02/18/97
MATRIX: SOIL

Method Blank and Spike Recovery Summary

Analyte	Inst./ Method	Blank Result (mg/kg)	Spike Added (mg/kg)	Percent Recovery	RPD	QC Limits Percent Recovery	QC Limits RPD
Pb. Lead	ICP/6010	ND	50.0	103	1	90-120	10

*** END OF REPORT ***

RTSK
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9702-110

BLYMYER ENGINEERS, INC.
1829 Clement Avenue
Alameda, CA 94501 (510) 521-3773 FAX (510) 865-2594

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

JOB # 97019 | PROJECT NAME/LOCATION: Pyro Minerals

SAMPLERS (SIGNATURE): Mark E. Detert

TURNAROUND TIME: 5 / Normal DAY(S)

REMARKS:

	DATE	TIME	COMP	GRAB	SAMPLE NAME/LOCATION	# OF CONTAINERS	TPH AS GASOLINE + BTXE (MOD EPA 8015/8020) + MTBE	TPH AS DIESEL (MOD EPA 8015)	VOC (EPA 624/8240)	SEMI-VOC (EPA 625/8270)	TRPH (EPA 418.1)	BTXE (EPA 8020/602)	Total Pb	HVO's (EPA 8010)			HOLD	
	2/10/97	8351		X	SB1-5.5	Soil Sleeve												Held @ Blymyer Engs.
D1A	↓	930		X	B2-5.5	↓	X						X					
	↓	940		X	B2-12.5	↓												Held @ Blymyer Engs.
D2A-H	2/10/97	1000		X	B2W	2 Liter 6 VOA	X	X						X				

REQUESTED BY: M. Detert

RESULTS AND INVOICE TO: Mark Detert

RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)	RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED BY: (SIGNATURE)
Mark Detert	2/11/97 1115			2-11-97 13:15	
RELINQUISHED BY: (SIGNATURE)	DATE / TIME	RECEIVED FOR LABORATORY BY. (SIGNATURE)	DATE / TIME	REMARKS:	
		Jami Gillespie	2/11/97 1215		

WHITE: Accompany Sample YELLOW: BEI, After Lab Signs PINK: Original Sampler