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October 9, 2008
Project 2262EG

BY EMAIL & MAIL

Dr. Michael Moeller
c/o Ms. Pamela Silkwood
Horan, Lloyd Law Offices
P.O. Box 3350
Monterey, CA 93942-3350

SUBJECT: **Slope Stability Evaluation**
Proposed Alternative Septic System
192 San Remo Road
APN 243-181-005
Monterey County, California

Dear Dr. Moeller:

As requested, this letter provides you with the results of our slope stability evaluation, for submittal as required to the Regional Water Quality Control Board (RWQCB).

BACKGROUND

Your septic consultant (BioSphere Consulting, Inc.) has prepared the following plan for a proposed enhanced treatment system at the site:

- *Alternative Onsite Wastewater System Design for New Development of a Single Family Dwelling, Proposed Enhanced Treatment System Specifying Pressurized Dispersal to Subsurface Drip Tubing and Shallow Pressurized Rock-filled Dispersal Trenches*; prepared by BioSphere Consulting, rev. date September 25, 2008.

BioSphere has also provided us with various field test data sheets regarding percolation rates and pilot testing of infiltration rates using the proposed leach field system, and a summary letter (Results of Additional Soil Testing and Discussion of Potential Influence of Rainfall, dated September 25, 2008).

You have also provided us with copies of the following previous geotechnical and septic investigations, for use in the course of our evaluation: "*Geotechnical and Percolation Investigation*" by Soil Surveys, Inc. dated September 15, 1999; "*Additional Percolation Tests and Addendum to Geotechnical and Percolation Investigation Report...*" by Soil Surveys, Inc. dated November 2, 2001; "*Geotechnical Investigation for San Remo Road Properties...*, by Pacific Crest Engineering, Inc., dated April, 2003; and "*Soil Analysis...192 San Remo Road...*", by BioSphere Consulting, dated April 23, 2008.

Since this system would be sited on slopes that exceed 20%, the RWQCB has required a slope stability evaluation of this proposed approach.

SCOPE OF WORK

The scope of our services has included of the following:

1) Review of published and unpublishedgeologic maps, reports, and other pertinent information in our office files.
2) Geologic reconnaissance of the site and vicinity to evaluate geomorphic features that may be indicative of slope stability or instability, and to evaluate the site topographic base map used for BioSphere's septic plan for use in our slope stability evaluation.
3) Drilling, logging, and sampling of 2 exploratory drill holes in the immediate vicinity of the proposed leach field.
4) Preparation of a geologic cross section, integrating the subsurface materials encountered by our drill holes, materials reported by previous investigations, and our interpretation of their inter-relationships.
5) Laboratory testing of selected samples recovered from our drilling program to measure pertinent index and engineering properties.
6) Analysis of the above data and evaluation of the geologic and geotechnical suitability of the selected leach field site for the proposed plan from a slope stability standpoint.
7) Preparation of this report. We also prepared a status report letter dated September 26, 2008, in order to provide the RWQCB with an update on the progress of our investigation.

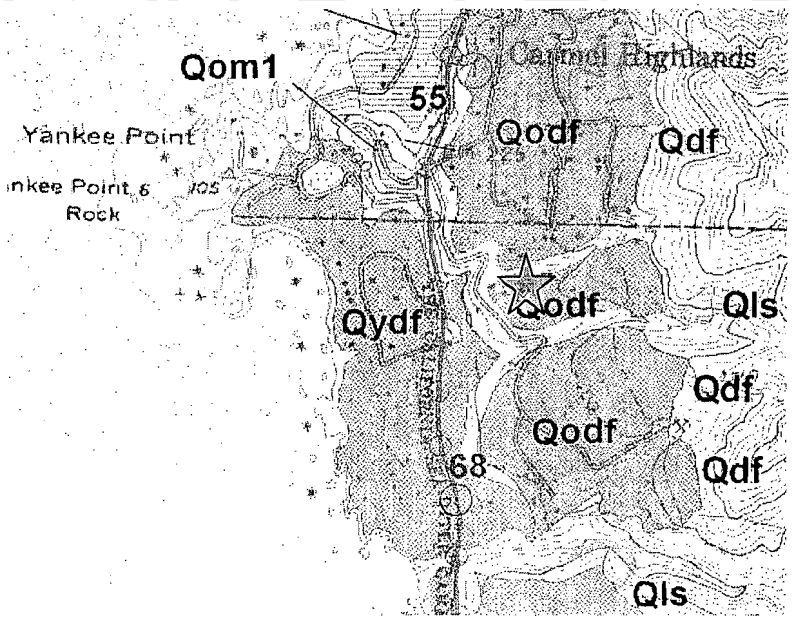
REGIONAL GEOLOGIC SETTING AND REPORTS BY OTHERS

Recent detailed geologic and landslide mapping by the California Geological Survey (Wills and others, 2005) maps the site as being underlain by "older debris fans." No landslides are mapped at the site; mapped landsliding is confined to the steeper ground several hundred feet east of the site, and within steep-walled drainages incised into crystalline bedrock terrain still further east. Geomorphically, the site is located within a series of marine terraces into which the modern drainages (such as the swale just north of the site) are cut.

Site Location (star) and Geologic Index Map

<u>Geologic units:</u> Qls (landslide); Qdf (youngest, active debris fans); Qodf (older debris fans); Qydf (young debris fans); uncolored (crystalline bedrock).

Excerpted from Wills and others (2001)



Previous geotechnical investigations in the site vicinity have included Soil Surveys, Inc. (September 15, 1999) and Pacific Crest Engineering (April 30, 2003). We refer the reader to these reports for a fuller treatment of geotechnical aspects of the site, and focus herein on aspects of the site geology pertinent to slope stability at the proposed septic leach field location.

Soil Surveys, Inc. (1999) performed an investigation that included drilling of 9 drill holes, and 6 percolation tests. Subsurface conditions across the site vicinity are fairly consistent, with looser surficial soils texturally classified as sandy silt and silty fine sand to 2 feet; underlain by relatively harder/denser cemented silty decomposed granitic sand and silty sand yielding high blow counts.

More recently, Pacific Crest Engineering (2003) performed a geotechnical engineering investigation targeted at the current project. Their investigation included drilling of 6 drill holes on April 7, 2003. Subsurface conditions are fairly consistent across the site, and are consistent with findings reported by the earlier Soil Surveys, Inc. investigation.

Investigation by your septic design consultant (BioSphere Consulting, Inc.) in this last year (2008) included evaluation of percolation and infiltration rates at various exploration points. From a geologic, slope stability standpoint, key findings by their investigations included measurement of percolation rates that well exceed the application rates proposed. BioSphere Consulting Inc. also considered historic rainfall patterns as an indication of just how much water site soils would be asked to absorb under conditions of septic loading during wet weather.

FINDINGS

Topographic Setting

Regionally, the site is located on rolling terrain that drains westward toward the coast, with local small east-west-trending drainages fluting this topography. The proposed home site and septic leach field are located on this rolling terrain. An unnamed drainage passes north of the site, draining westward. The proposed septic leach field is set back several tens of feet from the break-in-slope associated with this drainage.

Figure 1 (Site Exploration Plan) shows the topography in the vicinity of the project. As shown on that base map, elevations above sea level range from approximately 177 feet near the northwestern corner of the property to approximately 253 feet near the southwestern corner. There is approximately 24 feet of relief across the proposed septic leach field area. Slopes in the vicinity of the septic leach field range from approximately 10 degrees up to approximately 25 degrees.

Site Geologic Setting

We performed geologic reconnaissance of the property and vicinity to evaluate geologic conditions as reported by previous investigations, and to develop our own observations. We were fortunate to be able to observe fresh cuts through native soil and subsoil along the perimeter of the house under construction at the adjacent 194 San Remo Road; these cuts provide valuable context for site-specific data on 192 San Remo Road. The depth and character of the soils exposed in these cuts is consistent with the depth and character of the soils reported by previous investigations.

Geomorphically, the site is on a marine terrace cut into deeply decomposed crystalline (granitic) rocks, and blanketed by older debris fans that were shed off the steeper ground that lies well east of the site. The unnamed drainage that passes north of the site is incised into/through

these debris fans. Response of the creekbank (through raveling, soil creep, and shallow sloughing) to downcutting by the creek appears to be limited to the immediate vicinity of the creek, and we did not observe any evidence of landsliding in the vicinity of the proposed septic field.

Findings of Subsurface Investigation and Laboratory Testing

Our subsurface exploration program for this investigation included drilling of two exploratory holes (DH-1 and DH-2). The drill holes were located in the field by referencing to existing site features and pacing; therefore, their locations are approximate. The approximate locations of our drill holes are shown on the Exploration Site Plan, Figure 1.

Drill holes DH-1 and DH-2 were advanced on September 29, 2008, using a portable drill rig equipped with 3.5-inch-diameter solid-stem augers to depths of approximately 10 feet below the existing ground surface (bgs). In the field, our personnel visually classified the materials encountered and maintained a log of each drill hole. Samples were obtained from the drill holes by driving a 2.5-inch inside diameter split spoon or a 2-inch outside diameter (1⅜ inch inside diameter) Standard Penetration Test (SPT) sampler up to a depth of 18 inches into the earth material using a 140-pound hammer falling 30 inches. The 140-pound hammer was raised with a cathead pulley system. The number of blows required to drive the samplers was recorded for each 6-inch penetration interval. The number of blows required to drive the sampler the last 12 inches, or the penetration interval indicated on the log where harder material was encountered, is shown as blows per foot on the drill hole logs. Continuous sampling was employed without drilling between samples and thus the blow counts recorded on repeated drives of the same sampler size do not correlate to true standard penetration blow counts. Collected soil samples were transported to our laboratory for further evaluation and testing.

Visual classification of soils encountered in our exploratory drill holes was made in general accordance with the Unified Soil Classification System (ASTM D 2487-06 and D 2488-06). The results of our laboratory tests were used to refine our field classifications. Keys to Soil Classification, one for fine grained soils and one for coarse grained soils, and Rock Classification are included in the appendix together with the logs of the drill holes.

We did not encounter groundwater in either drill hole, and the oxidized colors of the materials encountered are consistent with all of the materials observed lying above the local groundwater table.

Soil samples were sealed in the field and returned to our laboratory for additional examination, and for testing of selected soil samples. These tests included water content, dry density, unconfined compressive strength, and percent passing No. 200 sieve. The results of these tests are presented at the corresponding sample locations on the Drill Hole Logs appended herein.

In DH-1 and DH-2, we encountered between 1 and 1-½ feet of loose, dry and porous surficial colluvial soil with abundant roots and rootlets. A significant increase in hardness/density occurs at the bottom of this layer. This relatively thin surficial soil layer is underlain by moist, medium dense to very dense, cemented, decomposed granite that has been highly weathered to the consistency of silty sand and clayey sand to a depth of between 8 and 8-½ feet. Below this layer to the bottom of the holes at 10 feet, the soil consisted of decomposed granite with a clayey matrix.

CONCLUSIONS

The proposed design (see Figure 1) indicates the location of the leach field is to be upslope of the house, set back from the unnamed drainage north of the site, and set back from the top-of-

bank. Based on our observations of dense soil and bedrock material within our drill holes, relatively high blow counts obtained in our borings, blow counts obtained in borings on the site by previous investigation, and our laboratory tests on selected soil samples, we conclude that the site slopes in the vicinity of the proposed leachfield are geologically suitable from a slope stability standpoint. In our judgment, there is low probability that the proposed septic system, if properly designed, constructed, and operated, will induce slope instability.

If you have any questions, please contact us.

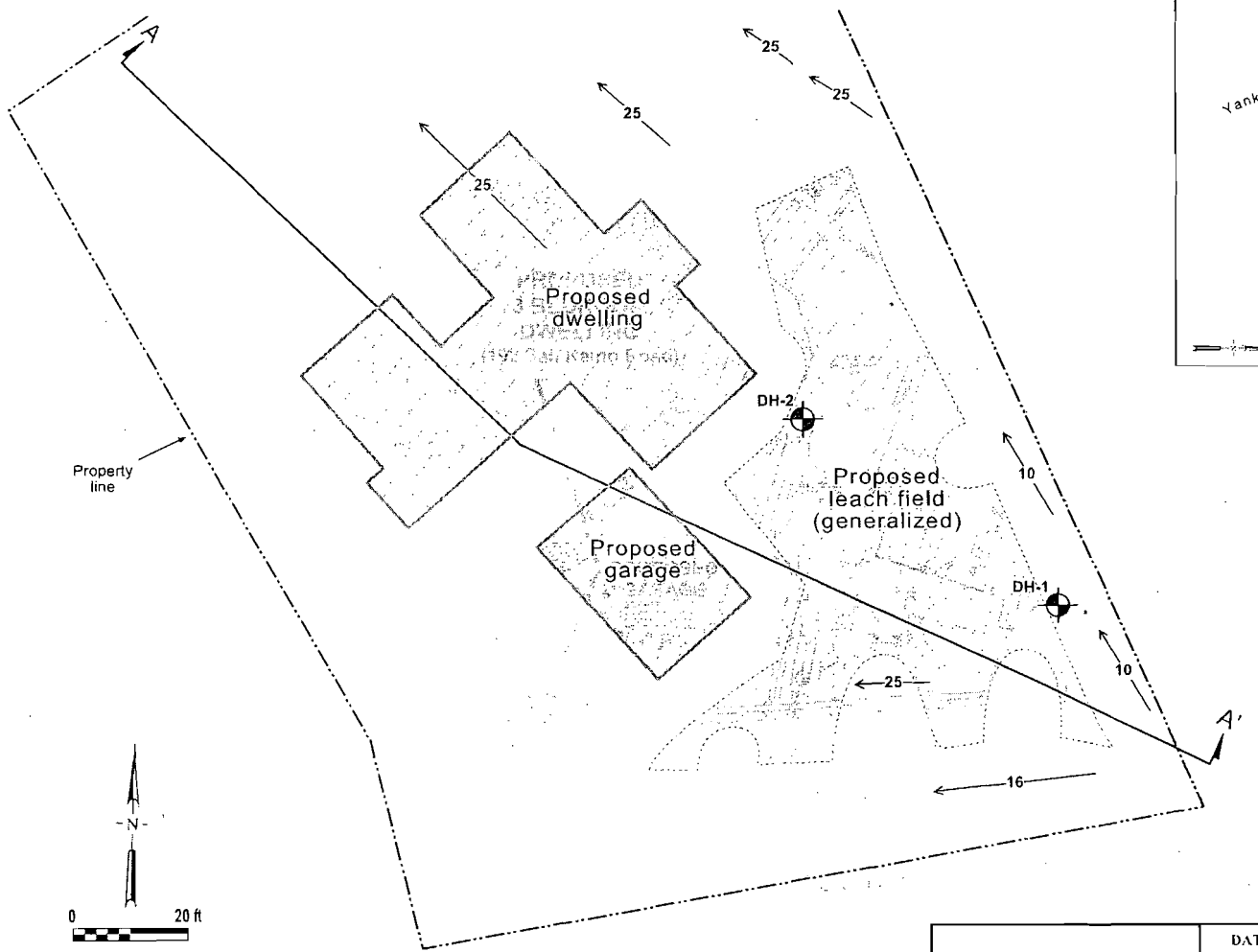
Sincerely,

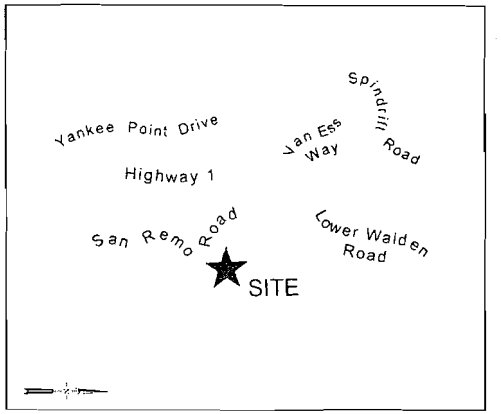
PACIFIC GEOTECHNICAL ENGINEERING

G. Reid Fisher, Ph.D.
CEG 1858

Daniel J. Peluso
GE 2367

Att: Figure 1 - Site Exploration Plan
Figure 2 - Geologic Cross-Section A-A'
Drill Hole Logs DH-1 and DH-2





VICINITY MAP - no scale

BASE: Alternative onsite wastewater system design for new development of a single family dwelling, Sheet 1 of 2, APN 243-181-005, 192 San Remo Road, Carmel Highlands, CA. Prepared by Biosphere Consulting, rev. 09/25/08.

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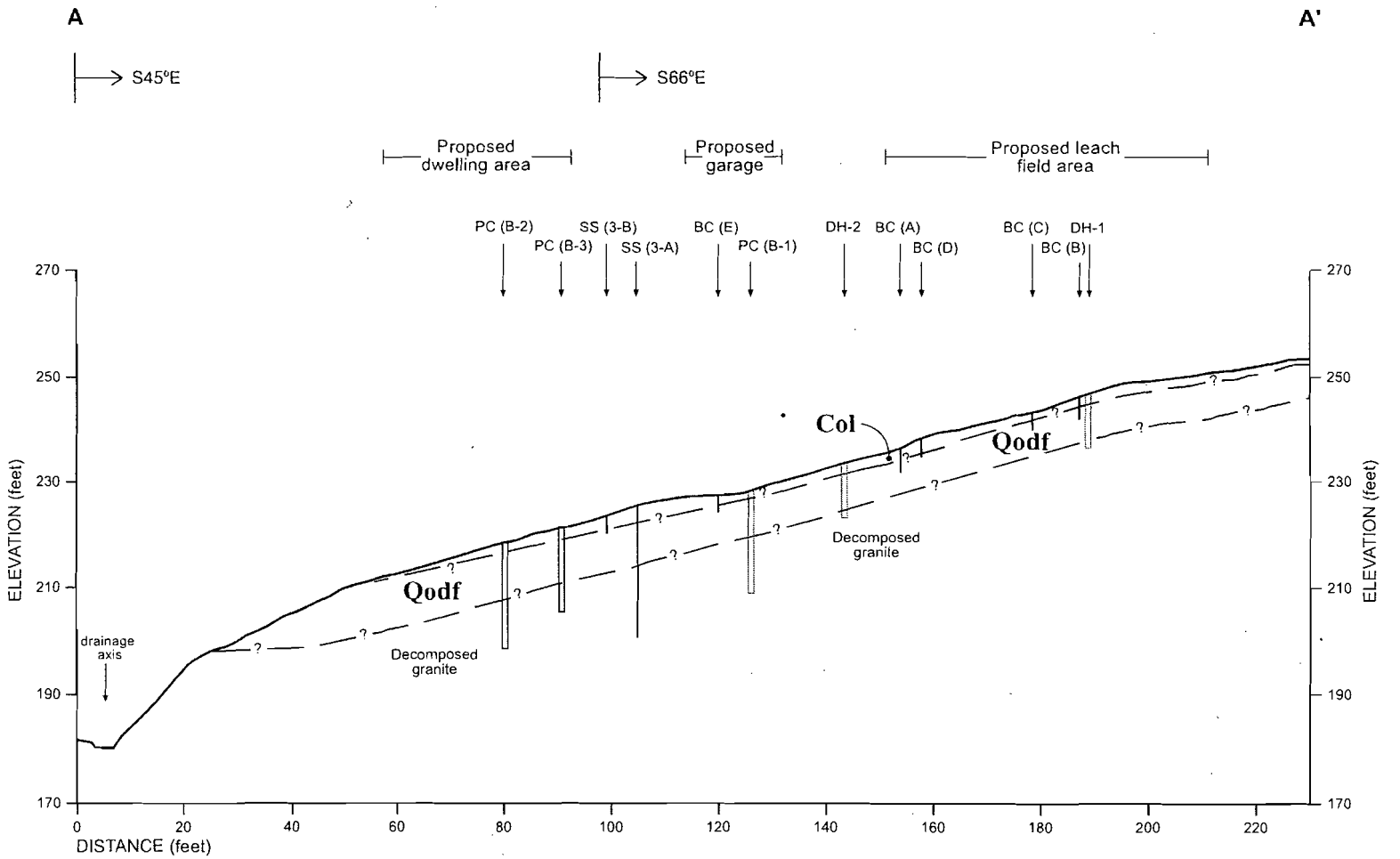
DATE	SITE EXPLORATION PLAN	FIGURE
OCTOBER 2008	SEPTIC SYSTEM SLOPE STABILITY EVALUATION 192 SAN REMO ROAD CARMEL HIGHLANDS MONTEREY COUNTY, CALIFORNIA	1
		PROJECT 2262EG



NOTE: See text for discussion of geologic units: Decomposed Granite (bedrock); Qodf (older debris fans); Col (colluvium). Previous exploration: PC (B-3) are borings for Pacific Crest Engineering (2003); SS (3-B) are borings for Soil Surveys, Inc. (1999); BC (E) are borings by Biosphere Consulting (2008).

PACIFIC GEOTECHNICAL ENGINEERING	DATE OCTOBER 2008	GEOLOGIC CROSS SECTION A-A' SEPTIC SYSTEM SLOPE STABILITY EVALUATION 192 SAN REMO ROAD CARMEL HIGHLANDS MONTEREY COUNTY, CALIFORNIA	FIGURE 2 PROJECT 2262EG

DATE: 9/29/2008	LOG OF EXPLORATORY DRILL HOLE	DH- 1
PROJECT NAME: Moeller Property		PROJECT NUMBER: 2262 EG
DRILL RIG: Minute man portable; 140lb hammer, cathead pully, and tripod		LOGGED BY: JL
HOLE DIAMETER: 3" samplers only		HOLE ELEVATION: ≈ 246'
SAMPLER: D = 3" OD, 2½" ID Split-spoon X = 2½" OD, 2" ID Split-spoon I = Standard Penetrometer (2" OD SPT) S = Slough in sample	GROUND WATER DEPTH: Initial: --- Final: ---	

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
COLLUVIUM: SILTY SAND: Dark grayish brown (10YR 4/2), dry, loose; fine sand; abundant roots and rootlets; porous	SM	1	S									
			D	65				5		102		
OLDER DEBRIS FAN DEPOSITS: SILTY SAND: Dark yellowish brown (10YR 4/4), dry, dense; fine to coarse subangular sand; iron oxide staining onserved in samples; at 2.0 feet- very severely weathered granite, fine to	SM	2	D					6		121	4	*5656
			D	72/6"								
		3	I	67		27		6				
		4	I									
SILTY SAND: Yellowish brown (10YR 5/4), dry to moist, dense to very dense; fine to coarse subrounded to subangular sand; 15-25% silty fines	SM	5	I	86								
		6	I									
CLAYEY SAND: Olive brown (2.5YR 4/4), moist, dense to very dense; fine to coarse subrounded to subangular sand; clay seams very dark brown (2.5Y 3/2)	SC	7	I	50								
		8	I	76								
BEDROCK: DECOMPOSED GRANITE: CLAYEY SAND: Dark grayish brown (2.5Y 4/2) clay with very slight to slightly weathered granite, moist, very dense; clayey matrix is dark grayish brown; granite shows varing degrees of weathering, fine to coarse sand in places where conpletely weathered; biotite abundant; salt and pepper granite portions contain euhedral grain shape	SC	9	I	60								
		10										
		11										
		12										
		13										
		14										
BOTTOM OF HOLE = 10 Feet No Groundwater Encountered		15										
		16										
		17										
		18										
		19										
		20										

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DATE: 9/29/2008	LOG OF EXPLORATORY DRILL HOLE	DH- 2
PROJECT NAME: Moeller Property		PROJECT NUMBER: 2262 EG
DRILL RIG: Minute man portable; 140lb hammer, cathead pully, and tripod		LOGGED BY: JL
HOLE DIAMETER: 3" samplers only		HOLE ELEVATION: ≈ 236'
SAMPLER: D = 3" OD, 2½" ID Split-spoon X = 2½" OD, 2" ID Split-spoon I = Standard Penetrometer (2" OD SPT) S = Slough in sample	GROUND WATER DEPTH: Initial: --- Final: ---	

DESCRIPTION OF EARTH MATERIALS	SOIL TYPE	DEPTH (ft)	SAMPLE	BLOWS PER FOOT	POCKET PEN (tsf)	% PASSING #200 SIEVE	LIQUID LIMIT	WATER CONTENT	PLASTICITY INDEX	DRY DENSITY (pcf)	FAILURE STRAIN (%)	UNCONFINED COMPRESSIVE STRENGTH (psf)
COLLUVIUM: SILTY SAND: Dark grayish brown (10YR 4/2), dry, loose; fine sand; abundant roots and rootlets; porous	SM	1	S									
OLDER DEBRIS FAN DEPOSITS: SILTY SAND: Dark yellowish brown (10YR 4/4), dry, medium dense; fine to coarse subangular sand; porous; abundant rootlets	SM	2	D	30		24		5		107	3	*3083
		3	D	87/12"				10		114		
	SM	4	I	106/9.5"								
SILTY SAND: Light yellowish brown (2.5Y 6/3), dry, very dense; fine to coarse subrounded to subangular sand		5	I									
CLAYEY SAND: Dark yellowish brown (10YR 4/6), moist, very dense; fine to coarse subrounded to subangular sand; minor fine subrounded gravel size crystalline rock	SC	6	I	68								
		7	I	84		26		8				
		8	I									
BEDROCK: DECOMPOSED GRANITE: CLAYEY SAND: Dark grayish brown (2.5Y 4/2) clay, moist, very dense; medium to coarse sand	SC	9	I	71								
		10	I									
BOTTOM OF HOLE = 10 Feet No Groundwater Encountered		11										
		12										
		13										
		14										
		15										
		16										
		17										
		18										
		19										
		20										

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