FOR

BECHTEL CORPORATION

VERNON, CALIFORNIA

GEOPHYSICAL REPORT

ON

RANCHO SECO POWER PLANT SITE

217

BOYLES BROS. DRILLING COMPANY

AUBURN, CALIFORNIA

JULY, 1967

GEOPHYSICAL REPORT

RANCHO SECO POWER PLANT SITE

INTRODUCTION

A seismic refraction survey was conducted for Bechtel Corporation, Vernon, California on June 30-July 2 and July 10, 1967 at the proposed nuclear power plant site of the Sacramento Municipal Utility District. The survey was done at the request of Mr. Dave Campbell, Project Geologist with the assistance of Mr. Carl Bock, Mr. Sherman Mackay and Mr. Bob Fox all of the Bechtel Corporation.

The area of investigation is approximately 20 miles southeast of Sacramento, California in Section 29, T8E, R6N.

Purpose of the Geophysical exploration was to determine seismic velocities of foundation materials for earthquake data analysis, depth values to significant velocity layers and excavation characteristic.

THEORY

Seismic energy or shock wave created by a dynamite explosion will travel through the different earth materials with characteristic velocities. This shock wave is detected, amplified, and recorded

on an Electro Tech ER-75 portable refraction seismograph. The travel time of the seismic energy is usually recorded to an accuracy of +.001 seconds. Therefore, knowing the characteristic velocity and the geometry of the seismic spread in the field it is possible to interpret depth and structure of geologic features. Figure 1 shows a typical seismic record (c), seismic spread (b), and travel time curve (a). The shock wave or seismic energy shown as the refraction event in (c) travels along paths indicated by the arrows in (b) and is plotted as shown in (a).

For seismic calculations the velocities and critical distances obtained for these graphs are used in the formula:

$$D_1 + \frac{X_1}{2}\sqrt{\frac{V_2 - V_1}{V_2 + V_1}}$$

for two layer problem

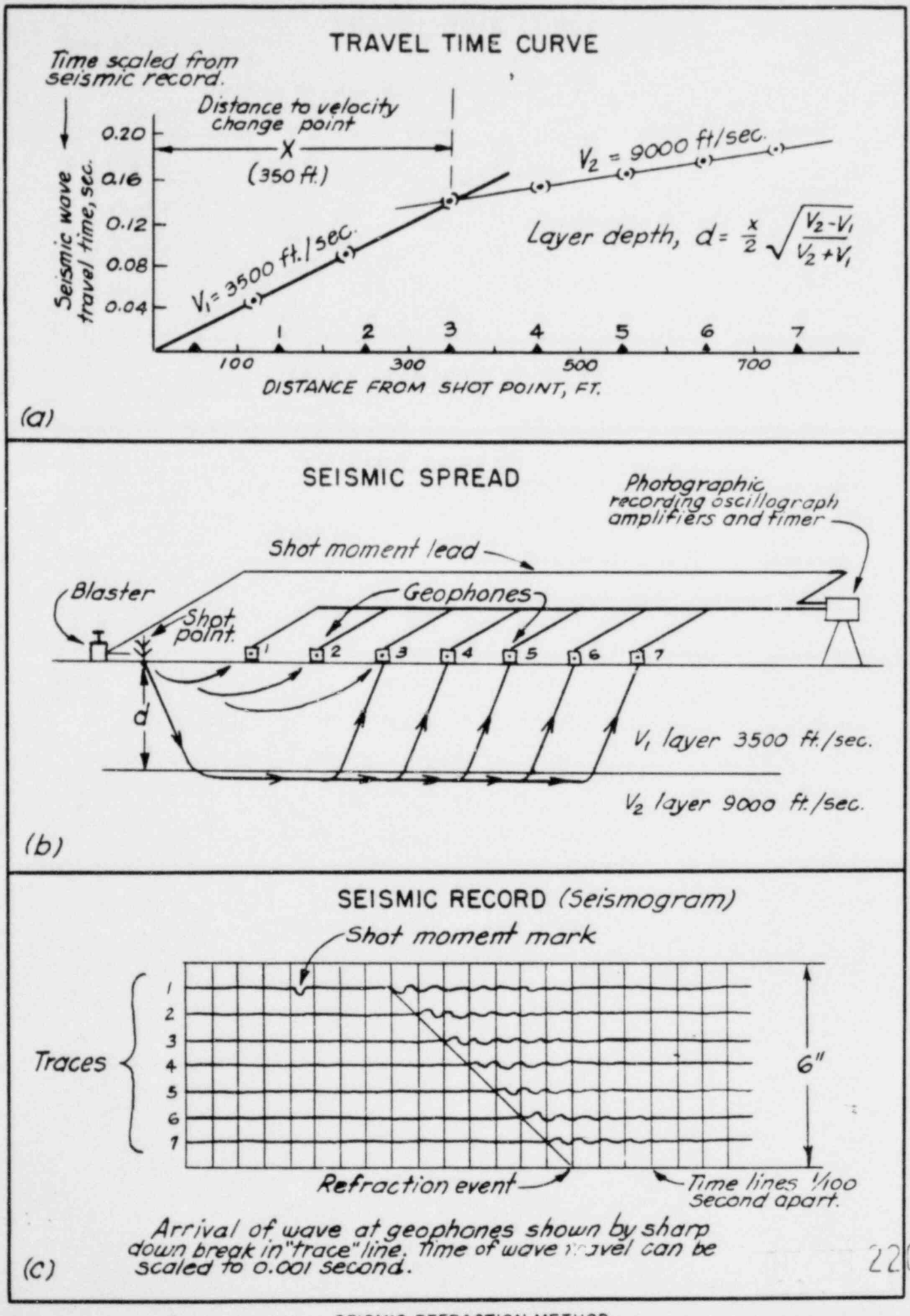
and

$$D_2 = \frac{X_2}{2}\sqrt{\frac{V_3 - V_2}{V_3 - V_1}} + D_1\frac{(\cos i - \cos \alpha)}{(\sin i - \cos \beta)}$$

for the three layer problem

case where:

D_1, D_2	depth to refraction layer usually directly below shot point in shallow refraction.
X_1, X_2	critical distances obtained from time distance plots of seismic spreads.
V_1, V_2, V_3	seismic velocities through different material.



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SEISMIC REFRACTION METHOD
(From Princ. of Eng. Geology and Geotechnics)

FIG. 1

FIELD PROCEDURE

During mid-June, 1967 a reconnaissance was made of the Rancho Seco site and it was learned that radio station KRAK had a 50,000 watt transmitter located in the southeast area of the site. State regulations forbid the use of electric blasting caps within one mile zone from a 50,000 watt transmitter which in this case included the entire plant site. For this reason it was decided to try a weight-drop technique as the energy source for the ER-75 portable seismograph. Working with our drilling personnel we made several tests to determine the best method. It was found that an arrangement of three steel drive hammers totaling 830 pounds dropped from a height of eight feet furnished enough energy to the ground to be recorded along the 550 foot geophone pattern. A special triggering switch also had to be obtained from the instrument manufacturer before field work could begin. Although the records were not as clear and sharp as those from a dynamite energy source, the quality of the record was acceptable in light of the safety regulation and time available for the survey. However, approximately one-third of the total seismic coverage was affected by the energy of the radio station transmitter and had to be reshot when the station was not transmitting and using dynamite. This could only be done when the station was off the air from 12:00 midnight, Sunday July 9, 1967 to 5:00 am Monday July 10, 1967. In spite of the conditions of darkness and the resulting slower field procedure, six of the seven spreads were completed before the station began operating again Monday morning.

Total coverage of this survey was 8800 feet along two lines (A & B) with 19 shot points. The seismic energy along each of the 550 feet cable spread was recorded with twelve 7.5 cps geophones at 50 foot intervals. Lines A & B were located over the gentle rolling topography at an angle of 90 degrees to each other. Line A had a northeast bearing and Line B a southeast bearing and they intersected at Shot Point 2 also drill hole DH-23. (Plate 1)

INTERPRETATION

The seismic velocities at this site appear to be delineated by three ranges representing a three layer geophysical problem. (Table 1 and Plate 2) The surface zone (V_1) varies from 12 to 35 feet and has velocities of 1200 to 2600 feet per second. This zone probably exists over the entire area but is apparently too thin at several points to be detected. An intermediate zone (V_2) in the 3000-4200 feet per second range appears in the western half of Line A and B. Higher velocities of the V_3 range were delineated at depths from the surface near SP 8, 9 to a maximum of 126 at SP-2. A single spread of geophones between SP-14 and 15 recorded an isolated velocity of 8500 feet per second which may be the effect of structural dip giving an apparent velocity higher than the V_3 average. Attempts to make meaningful correlations from this shot point are futile and those shown on Plate 2 are questionable. Velocity ranges vary and

SEISMIC VELOCITIES AND DEPTHS

Table 1

Line	Shot Point	V_1	V_2	V_3	D_1	D_2
A	7	1200	3600	5000	35	85
	8		3000	5600		87
	9	2200	4200	5500	15	100
	19	2800	3200	6500	26	100
	14	2400	3200	5000	35	120
	2	2000		4800		126
	1	2300		5400		116
	3	2000		4800		100
	4	2800		6000		110
	5	2700	3600	6000		122
	6	2700		8500		187
B	10	Not Shot				
	11			5000		Surface
	12	2200		5000		15
	13	2000		5000	12	100
	2	2000				
	14	2500		5000		110
	15	2600	3000	6000		100
	16		3000	6000		123
	17	2500		5000		100
	18	2500		5000		95

overlap along each profile. The sonic log of DH-23 also indicated varying vertical velocities. In viewing the drill hole log such velocity variation is to be expected as the material has many ranges of lithology and competency. Although it is difficult to extend the velocity from one point to another some general agreement exists at a depth to 126 feet in DH-23 between the surface seismic information and the sonic, gamma, density and induction logs of Schlumberger.

As far as excavation characteristics are concerned all the velocities are typical of materials that can be excavated with modern earthmoving equipment.

SUMMARY

It should be stated that seismic data represents interfaces which exist because of contrasts in the elastic properties of the different materials. Seismic values on occasions may not fit the geologic picture because of gradational contacts, horizontal changes in velocity of the overburden and bedrock. This situation can be improved by continued use of drilling data and other control data. As this control becomes available it will be possible to re-evaluate the results in light of new data and improve on the accuracy of the seismic data.

ADDITIONAL SEISMIC EXPLORATION

RANCHO SECO

Line C

Following the initial seismic refraction work of Lines A and B at Rancho Seco in July additional exploration, a survey along Line C, was made in the early morning of August 21, 1967. This consisted of 2750 lineal feet approximately parallel to and north of Line A and included shot points 20-25. Line C as with parts of the previous work was conducted while the nearby 50,000 watt transmitter was off the air to comply with safety regulations. The five spreads of Line C plus the spread between SP 10-11 were completed from 12 midnight to 5 a.m., August 21, 1967.

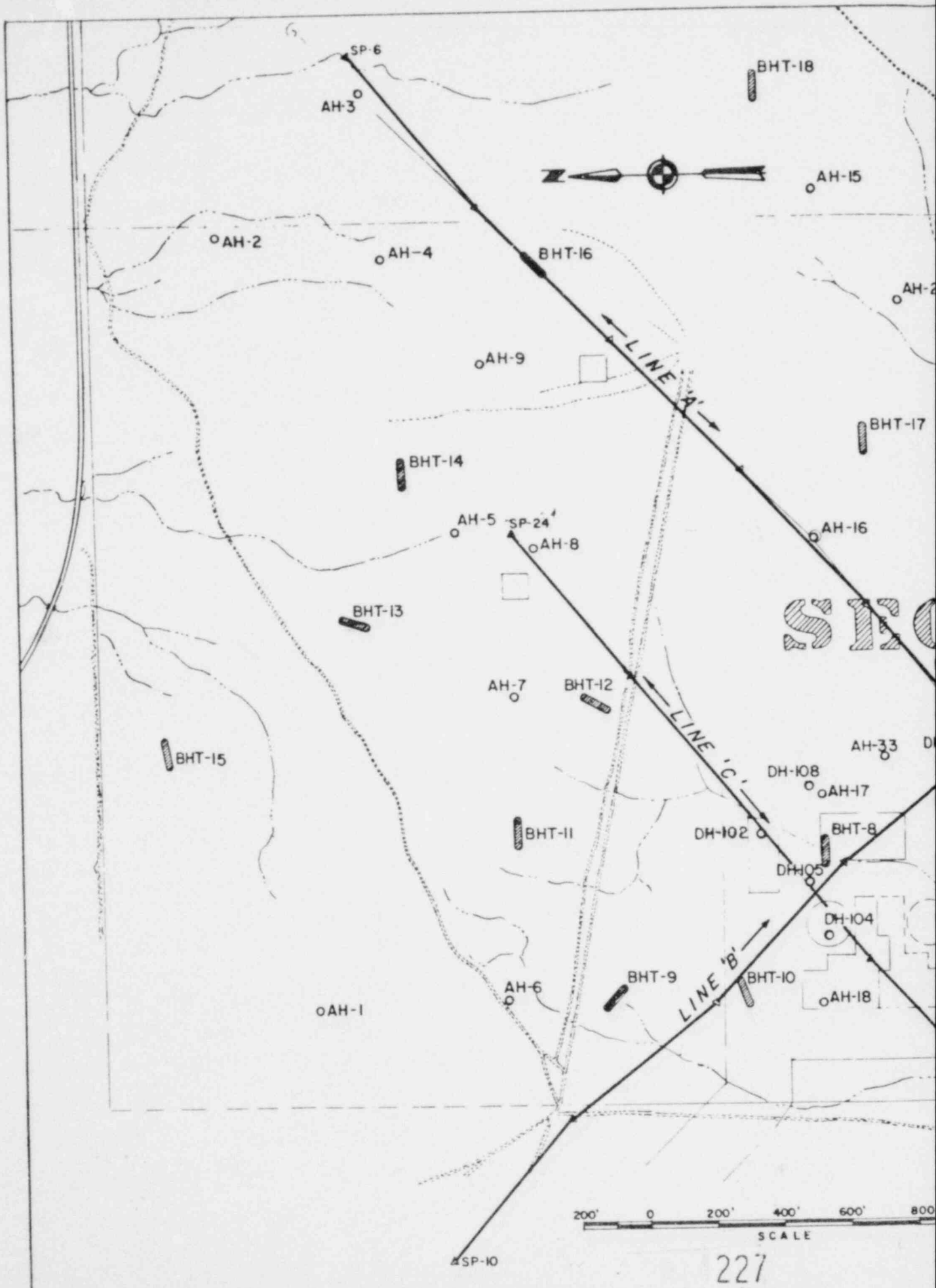
The seismic depth values and velocity ranges are similar to the data from the two previous lines. Quality of seismic records are fair with first arrivals of seismic energy showing sharp breaks at the near geophones and attenuating to rather poor breaks at the far end of the 550 foot seismic lines.

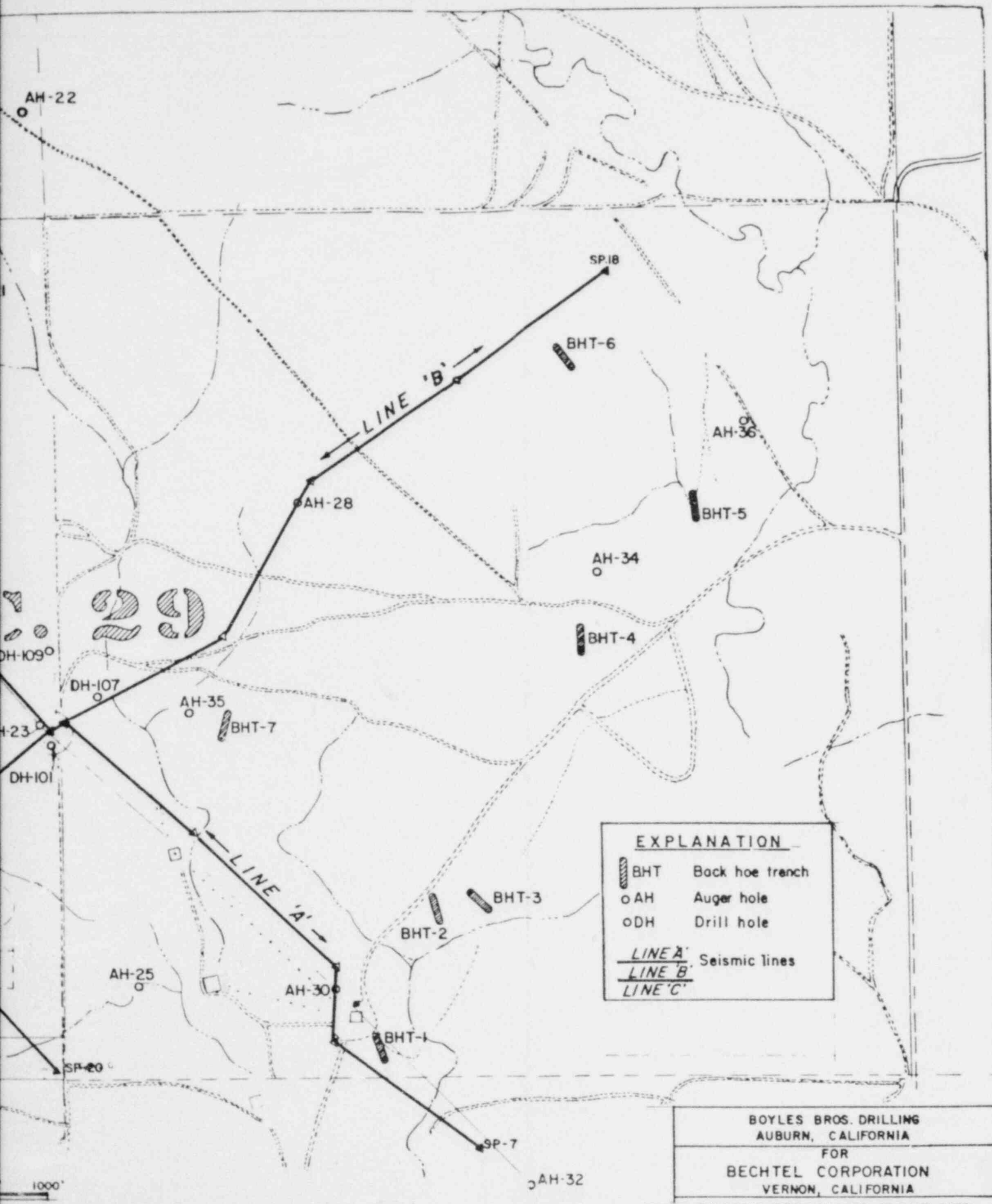
Very low velocities, V_1, appear only at mid-line between SP 22-24. The V_2 layer of 2800 to 3600 feet/second and the V_3 of 4000-5000 predominate along the remainder of the line (Plate 3). Depth to the highest velocity refractor, V_3, is from 52-115 feet and averaging near 100 feet.

The records for the remaining lines between SP 10-11, omitted on Line B on the first survey appear to be a continuation of the material with 5000 feet/second velocity shown between SP 11-12.

TABLE 2

Line	SP	V_1	V_2	V_3	D_1	D_2
C	20		2800	4000		52
	21		3000	5000		100
	22	1500	2800	5000	17	115
	23		3600	5000	40	91
	24	2500	3500	4500	22	79
	25	2000	3000	4200	32	90
B	10			5000	surface	
	11			5000	surface	


SP-6
AH-3
BHT-18
AH-15
AH-2
AH-4
BHT-16
AH-9
LINE 'A'
BHT-17
BHT-14
AH-5
SP-24
AH-8
AH-16
BHT-13
AH-7
BHT-12
LINE 'C'
BHT-15
AH-33
DH-108
AH-17
BHT-11
DH-102
BHT-8
DH-105
DH-104
LINE 'B'
AH-6
BHT-9
BHT-10
AH-18
AH-1
SP-10
200' 0 200' 400' 600' 800'
SCALE



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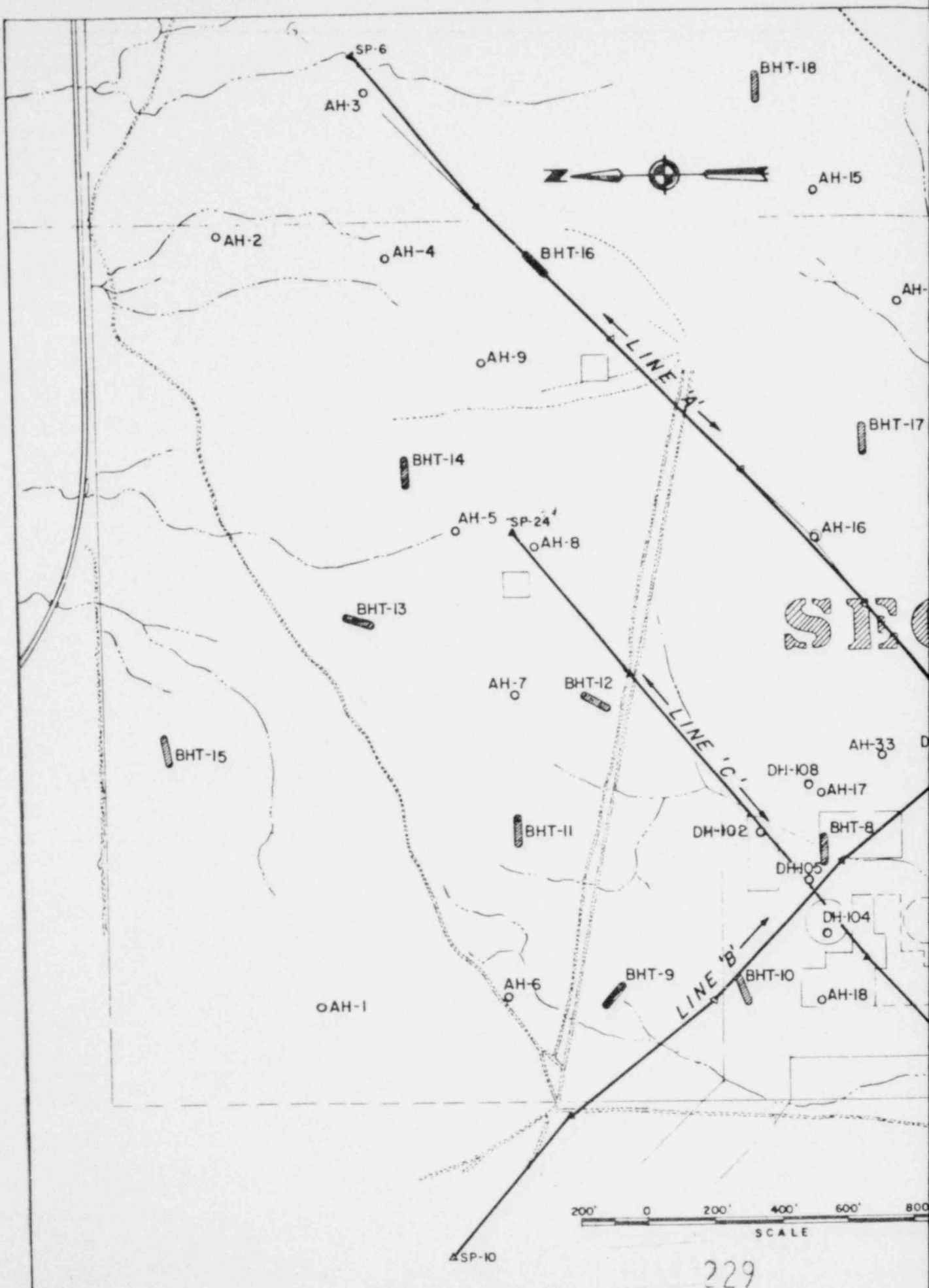
AUBURN, CALIFORNIA

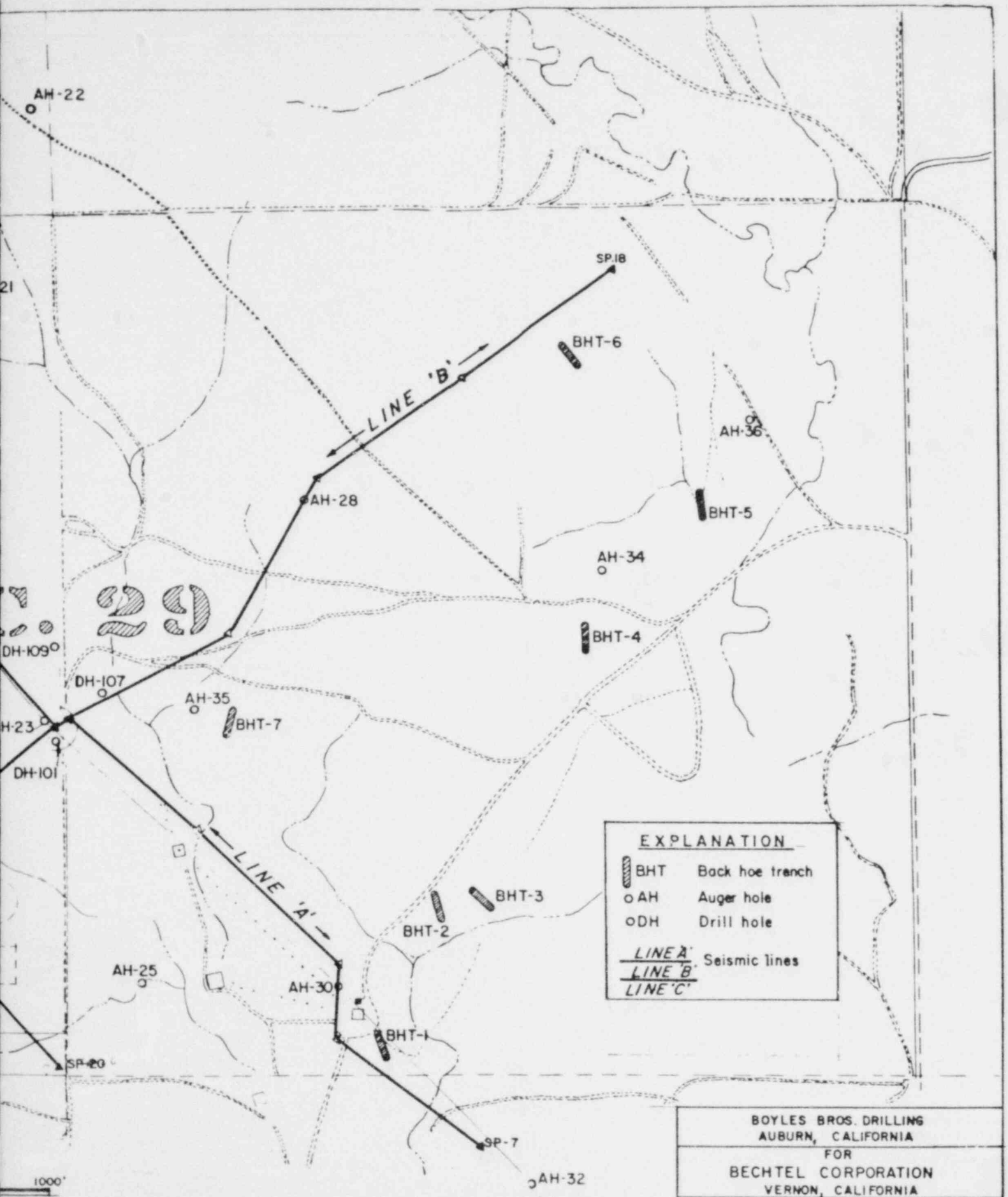
FOR

BECHTEL CORPORATION
VERNON, CALIFORNIA

RANCHO SECO POWER PLANT SITE
SEISMIC LINES 'A' & 'B'

DATE	DRAWN	PLATE 1


SP-6
AH-3
BHT-18
AH-15
AH-2
AH-4
BHT-16
AH-
LINE 'A'
AH-9
BHT-17
BHT-14
AH-5
SP-24
AH-8
AH-16
BHT-13
AH-7
BHT-12
LINE 'C'
AH-33
BHT-15
DH-108
AH-17
BHT-11
DH-102
BHT-8
DH-105
DH-104
LINE 'B'
BHT-9
BHT-10
AH-6
AH-18
AH-1
SP-10
200' 0 200' 400' 600' 800
SCALE



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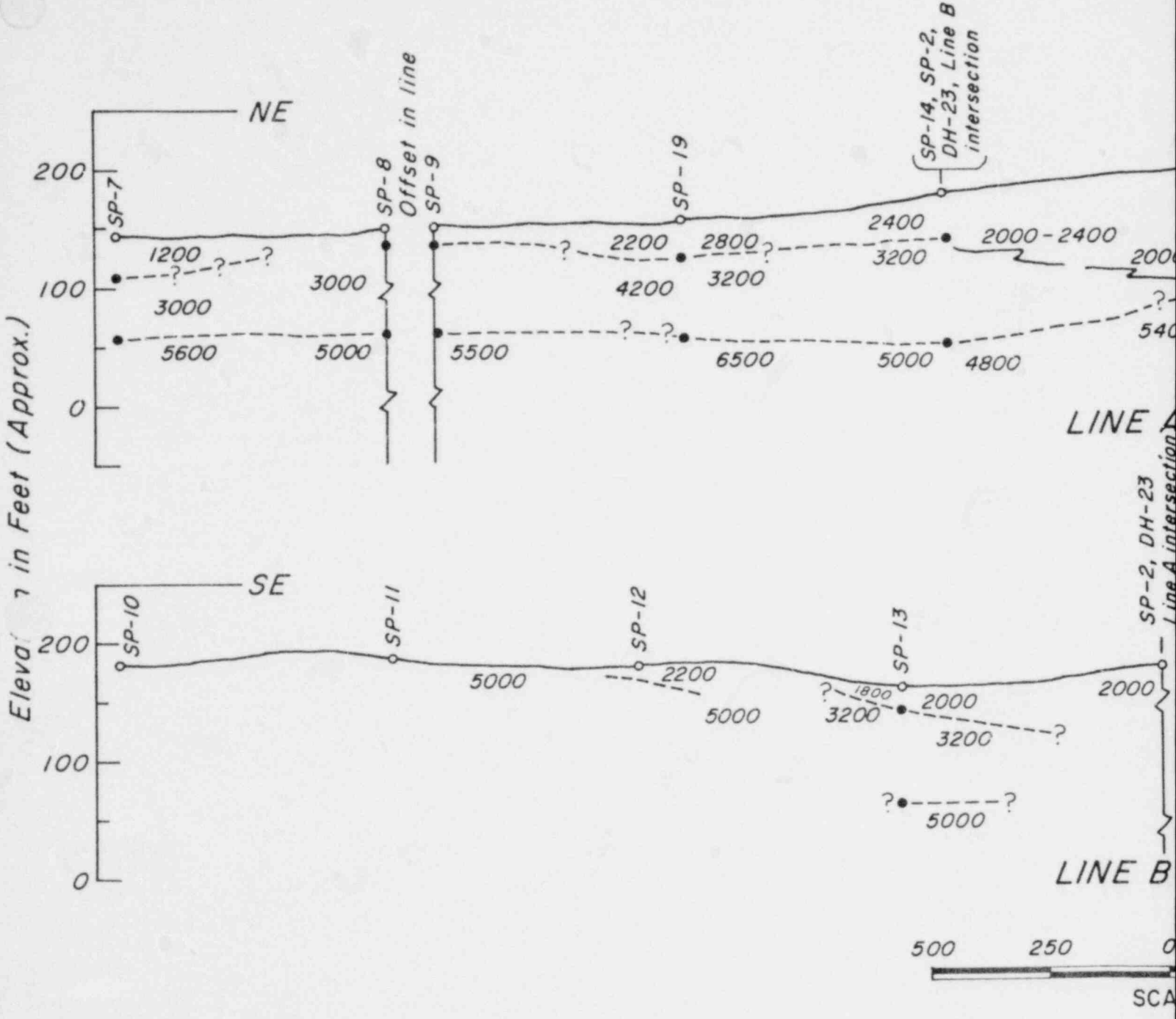
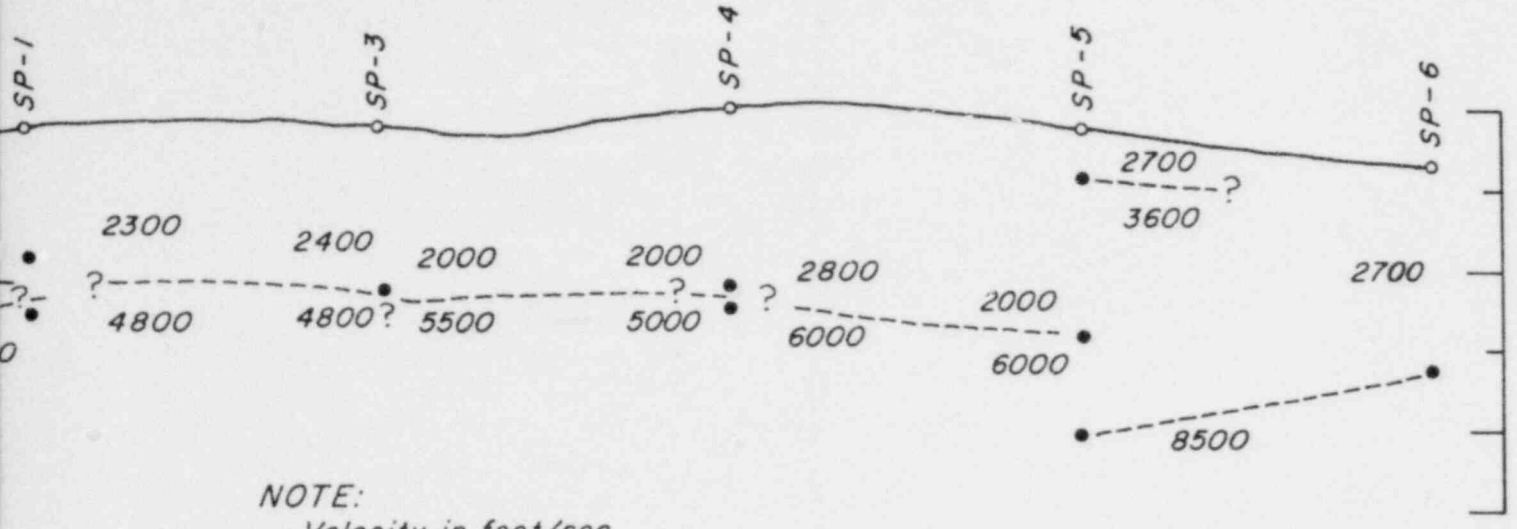
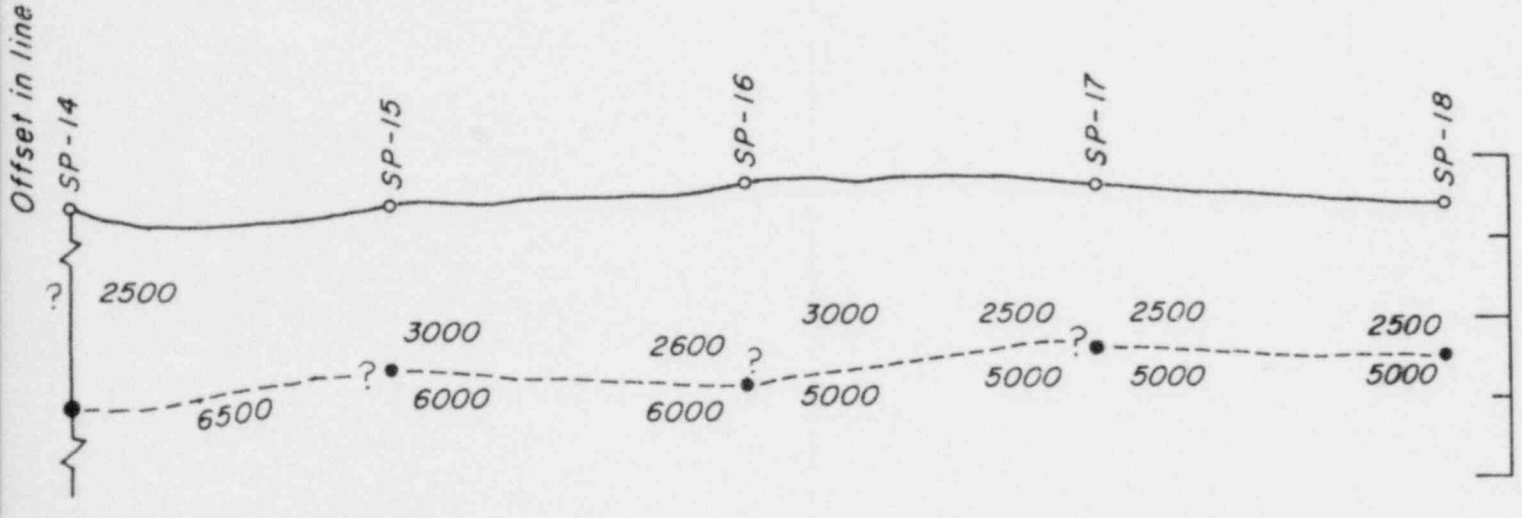
FOR BECHTEL CORPORATION VERNON, CALIFORNIA
RANCHO SECO POWER PLANT SITE SEISMIC LINES 'A' & 'B'
DATE DRAWN PLATE 1


NE
SE
SP-7
SP-8
Offset in line
SP-9
SP-19
SP-14, SP-2, DH-23, Line B intersection
SP-10
SP-11
SP-12
SP-13
SP-2, DH-23
Line A intersection
LINE A
LINE B
Elevation in Feet (Approx.)
200
100
0
1200
3000
5600
5000
5500
2200
2800
4200
3200
2400
3200
2000-2400
6500
5000
4800
5000
2200
5000
1800
3200
2000
3200
2000
5000
500
250
SCA



NOTE:
Velocity in feet/sec.



500 FEET

LE

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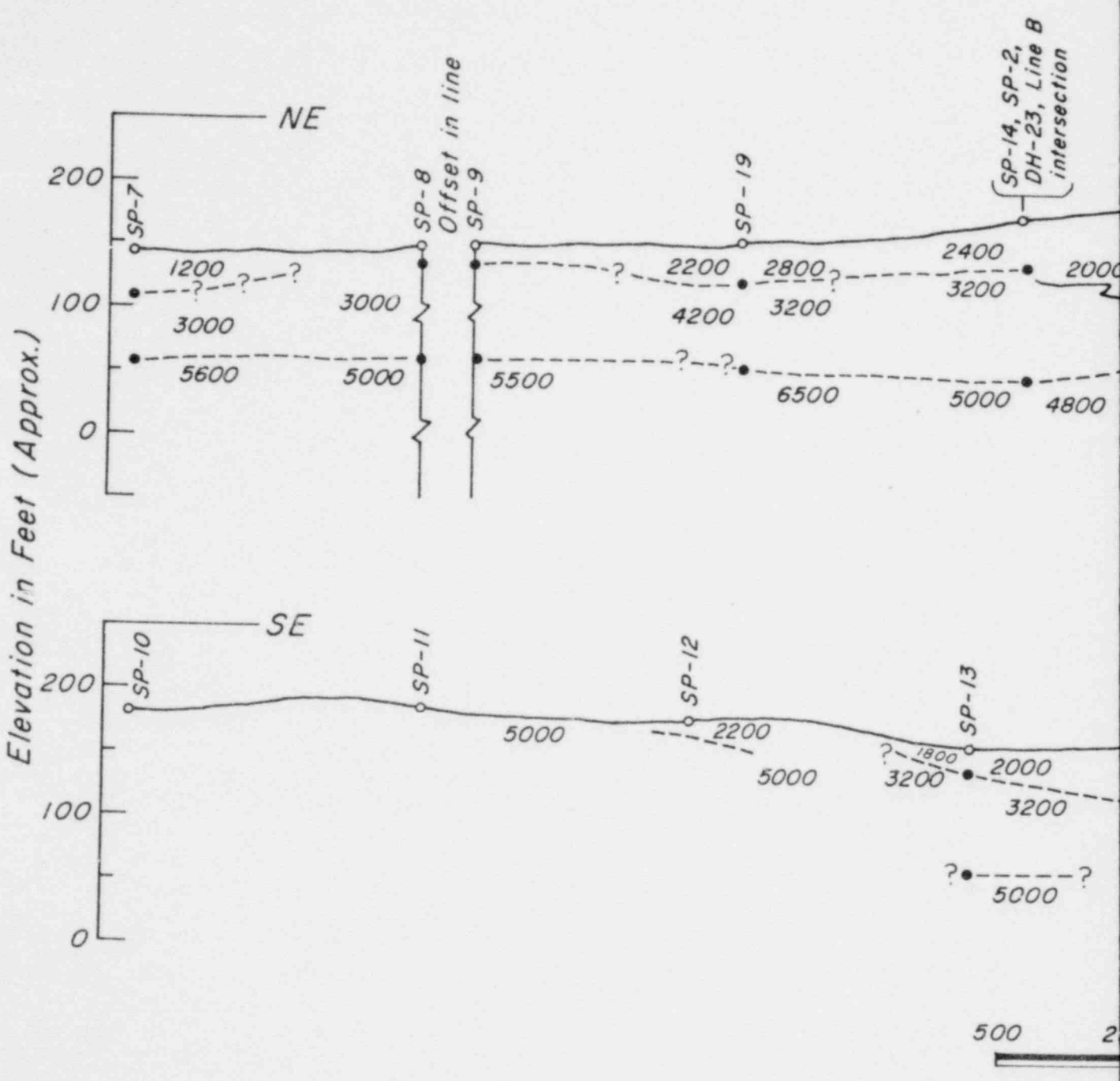
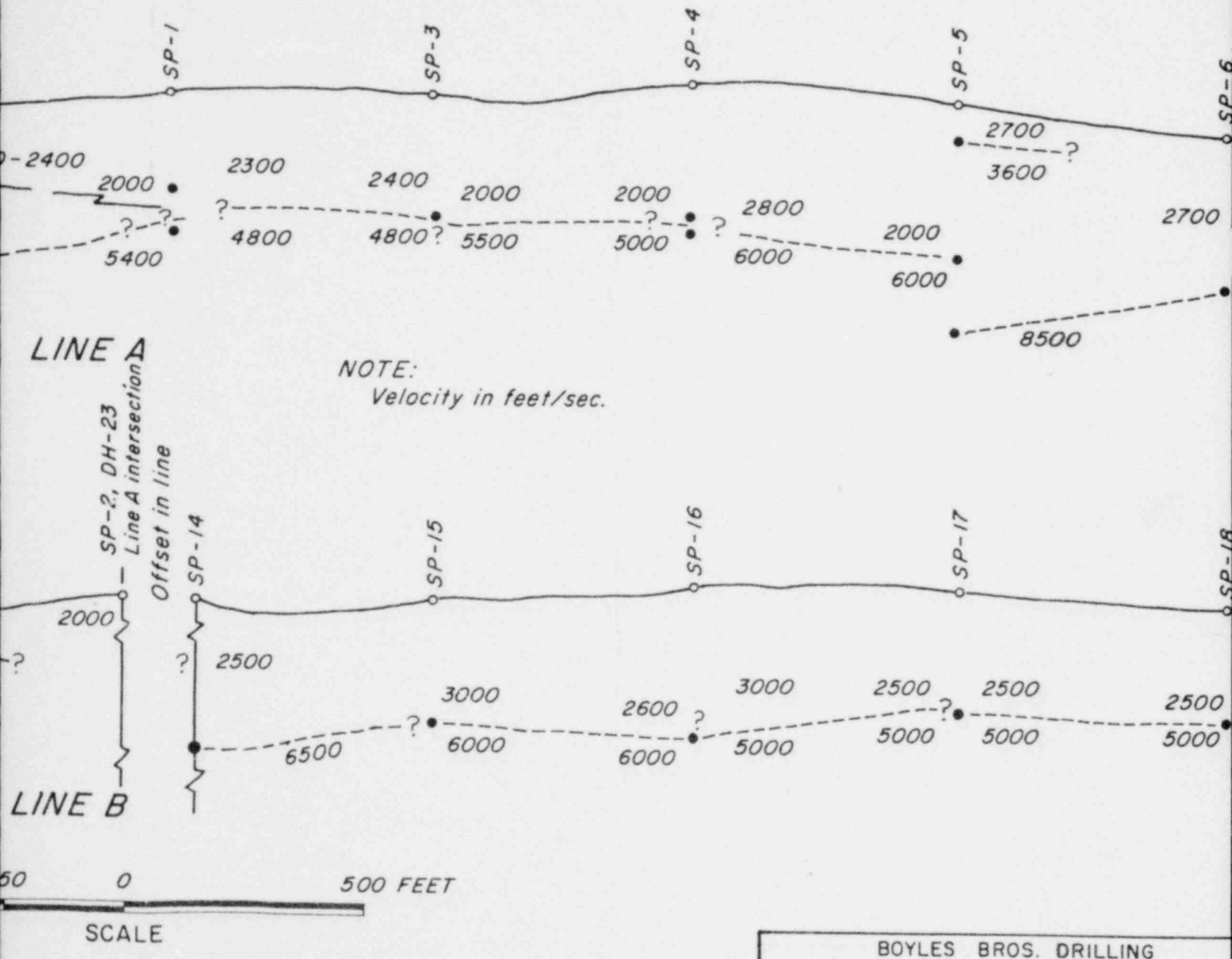
RANCHO SECO POWER PLANT SITE SEISMIC LINES A & B
DATE: 7/31/67 DRAWN: J.S.N. PLATE 2


NE
SE
Elevation in Feet (Approx.)
200
100
0
SP-7
SP-8
Offset in line
SP-9
SP-19
SP-14, SP-2, DH-23, Line B intersection
SP-10
SP-11
SP-12
SP-13
1200
3000
5600
5000
5500
2200
4200
2800
3200
6500
2400
3200
5000
4800
2000
3200
5000
1800
3200
2000
3200
5000
500



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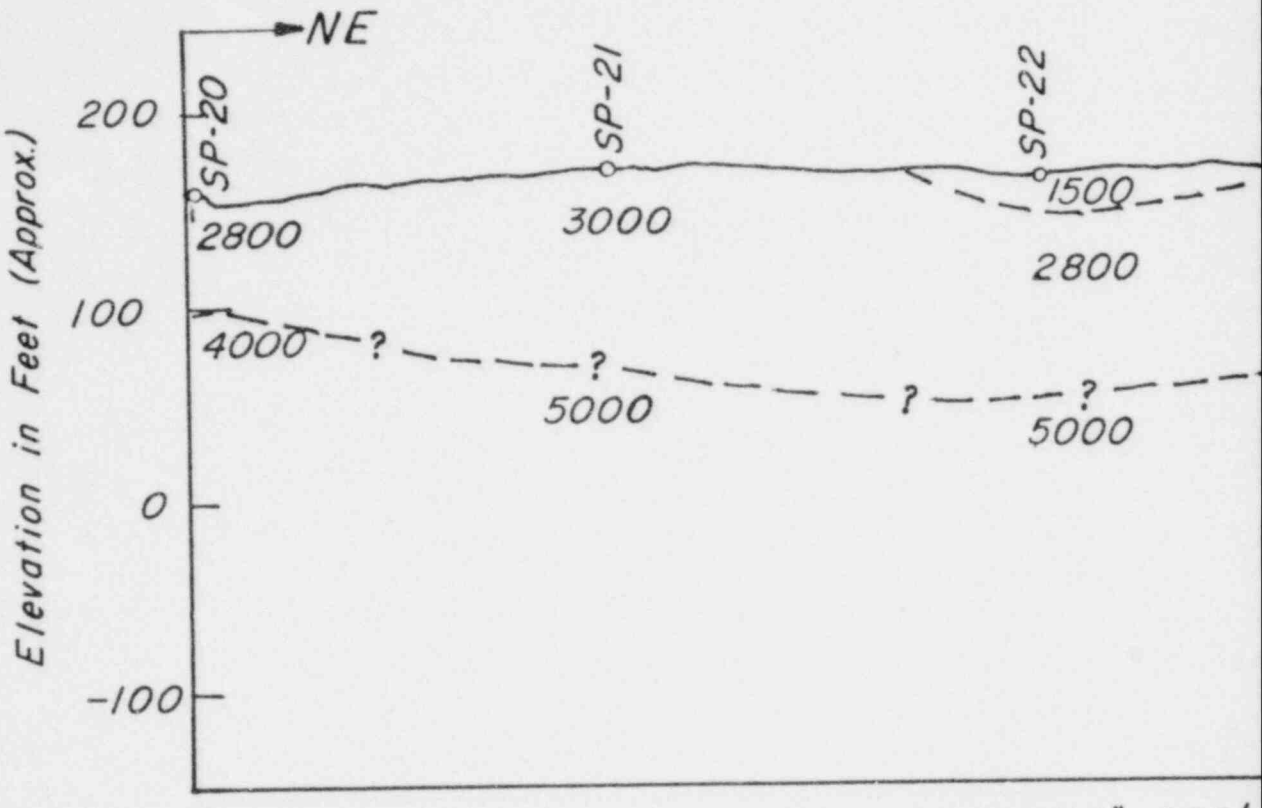
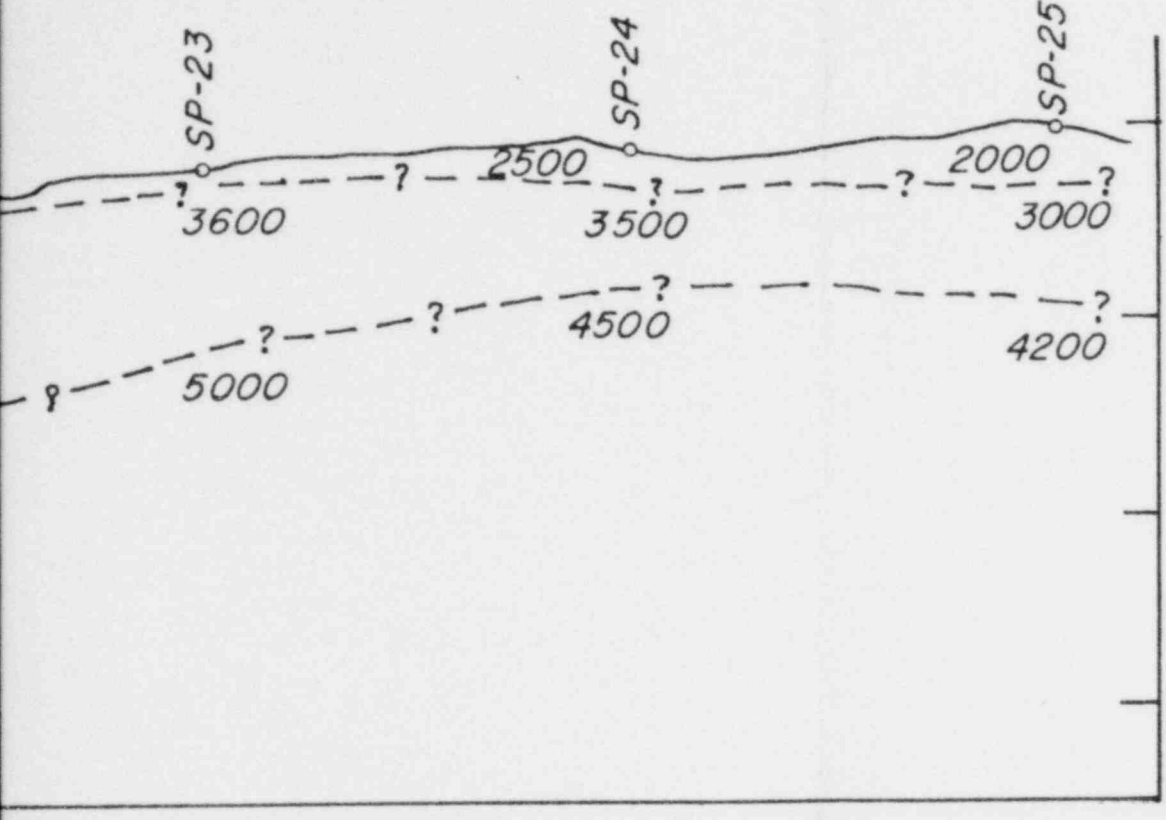
RANCHO SECO POWER PLANT SITE SEISMIC LINES A & B
DATE: 7/31/67 DRAWN: J.S.N. PLATE



Scale: Vertical 1" = 100'
Horizontal 1" = 250'

LINE C



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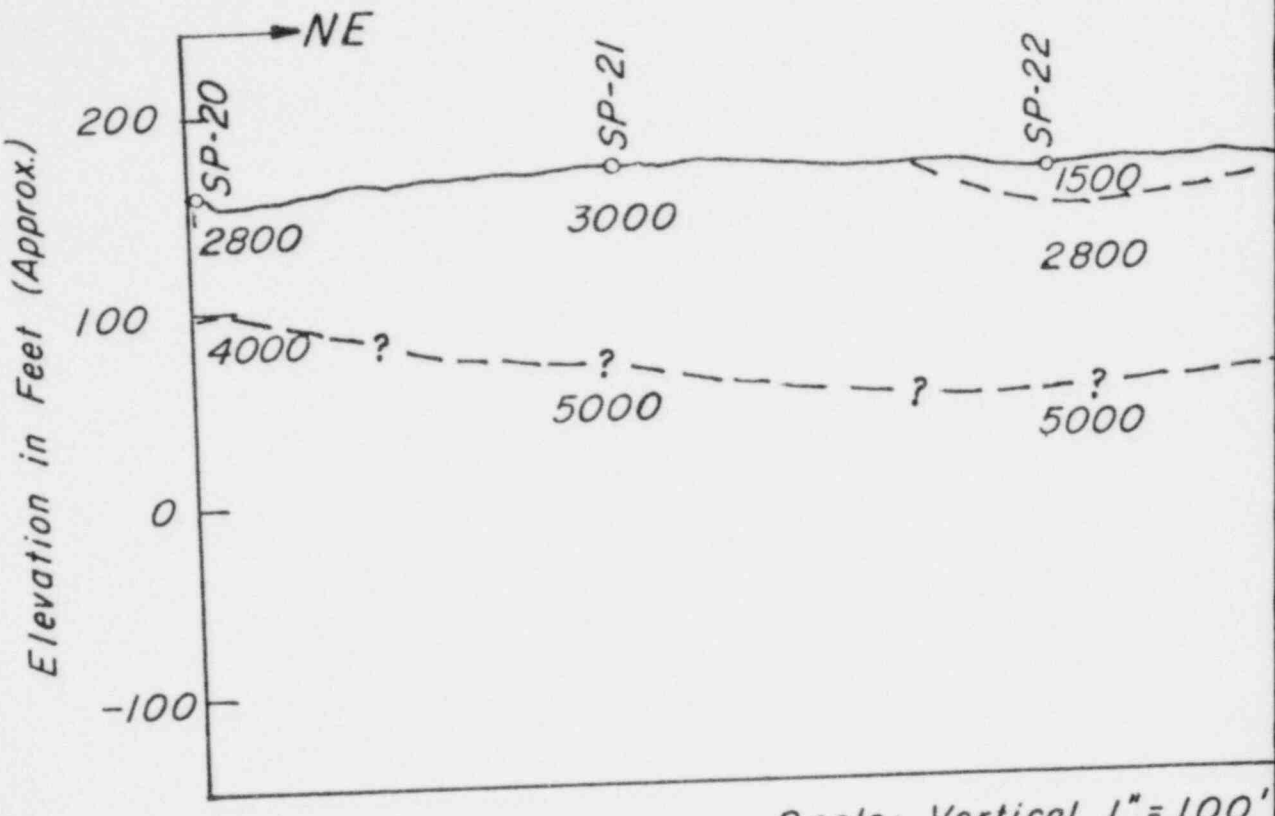
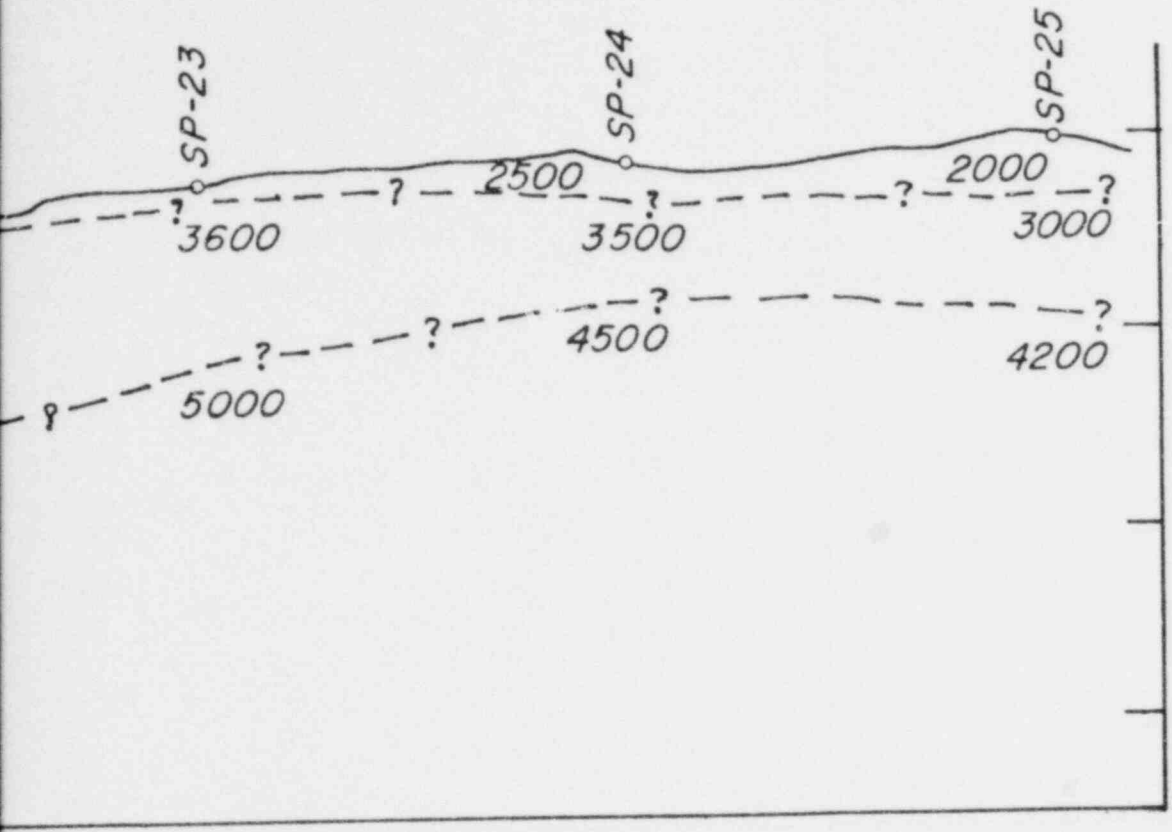
RANCHO SECO POWER PLANT SITE
SEISMIC LINE C

DATE: 9-9-67 DRAWN: JSN PLATE 3



Scale: Vertical 1" = 100'
Horizontal 1" = 250'

LINE C



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AUBURN, CALIFORNIA
FOR
BECHTEL CORPORATION
VERNON, CALIFORNIA

RANCHO SECO POWER PLANT SITE
SEISMIC LINE C

DATE: 9·9·67 DRAWN: JSN PLATE 3

BECHTEL CORPORATION

SHEET 1 OF 16

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH 23

PROJECT RANCHO SECO NUCLEAR STATION ANGLE FROM HORIZ 90° BEARING

LOCATION N247,750 E 2,253,130 BEGUN 6-28-67 COMPLETED 7-28-67

OVERBURDEN 3.0' DEPTH DRILLED INTO ROCK 599.0' TOTAL DEPTH OF HOLE 602'

ELEV. WATER TABLE +34.5' NO. CORE BOXES 21 NO. SAMPLES TAKEN 23

CORE RECOVERY (%) 78 FEET 188.2 MODEL & MAKE OF DRILL JOY 22

GROUND ELEV. +177.4' HOLE LOGGED BY MACKAY, FOX, ELSTON DRILLER BOYLES BROTHERS

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Fresh water used for circulation 0-10 ft Set 8 in. I.D. casing to 4.8 ft Set 6 in. I.D. casing to 5.0 ft (Retrieved) Set 4 in. I.D. casing to 5.1 ft Commence using drilling mud at 10 ft (Quick-Gel + fresh water) Easier drilling @ 13 ft Where no core recovery, lithologic descriptions derived from ditch samples Lowered 4 in. I.D. casing to 18.5 ft (Retrieved) Mud viscosity = 70 sec/1000 cc Inner barrel not properly latched	0		8 1/4 IN. ROCK BIT			175	0		0-3.0' GRAVEL: (GM-GW) Dark red brown, sandy, silty, clayey, cobbles to 8"
	0		NC DIA. CORE BIT				5		3.0'-19.2' SAND AND SILT: (SM-SP) Red brown to brown, very fine to fine-grained sands, with abundant variegated gravel
	0		NC DIA. CORE BIT			170	10		
	0		NC DIA. CORE BIT			165	15		Gravel decreases below 13 ft
	14		NXWL DIA CORE BIT			160	20		19.2'-19.7' GRAVEL: (GM-GW)
	0	REFUSAL	2" I.D. SPLIT SPOON	140	30	155			19.7'-30.0' SILTSTONE (ML) Red brown, scattered sand and gravel, firm, friable
	20		NXWL DIA. C. BIT				25		Below 28', material is (ML) Red brown, clayey, scattered sand grains, firm, slightly to moderately friable, locally indurated
	0		NXWL DIA. CB			150			
	50		NXWL TUNG. CARB. C. BIT				30		30.0'-33.7' SANDSTONE: (SM-SP) Red brown, silty, abundant pea gravel, soft-firm
	57		NXWL TUNG CARB. CORE BIT			145			33.7'-40.0' SILTSTONE: (ML) Red brown, scattered sand grains
	0		NXWL TUNG.C. BIT				35		

Hole Size NC, NX, 6-1/4

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 15

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Hole drift angle 1° from vertical @ 50'						140	35		
	0		NXWL TUNG. CARB. C. BIT				40		40.0'-52.0' SANDSTONE (SM-SP) Red brown, very fine to medium, variegated grains, predominantly quartz, silty, firm, friable
	67		NXWL TUNG. CARB. CORE BIT			135	45		
Pull 4" & 6" I.D. casing, ream hole with 6-1/4" rock bit to 52 Ft.						130	50		
	0		NXWL TUNG. CARB. C. BIT						
Gradational contact	100		5½" OD TUNG. CARB. C. BIT			125	55		52.0'-54.0' CLAYEY SILTSTONE: (ML) Red brown, scattered fine to coarse sand grains, soft-firm, massive, locally plastic, trace anhydrous opal root replacements
	100		5½" OD TUNG. CARB. C. BIT			120	60		54.0'-81.7' SILTSTONE (ML) Red brown, locally gray, scattered coarse sand and pea gravel, firm, massive, local vertical irregular fractures, scattered uneven horizontal silicic bands 1/32" to 1/16" thick, grades to slightly clayey silt at 75.3'
	100		5½" OD TUNG. CARB. C. BIT			115			
	100		5½" OD T.C. C. BIT				65		
	100		5½" OD TUNG. CARB. C. BIT			110	70		
	100		5½" OD TUNG. CARB. C. BIT			105			
	77		5½" OD T.C.C.B.				75		

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Hole Size NX, 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Lithology based on drill characteristics and cuttings 77'-87'	100		5 1/2" OD T.C.C.B				75			
	0		5 1/2" OD TUNG. CARB CORE BIT			100	80			
	0		5 1/2" OD T.C.C.B.				95			81.7'-89.8' SILTY, SANDY, CLAYEY GRAVEL: (GM) gray, some brown, gravel to 1-1/2", sub-angular to round
	0		5 1/2" OD DIA CORE BIT				85			89.8'-94.5' SILTY SANDSTONE: (SM) Red brown to brown, fine to medium-grained, massive, firm, uneven silicic bands (to 1/2") and replacement fillings, local vugs to 1/8"
	56		2" I.D. SPLIT SPOON				90			
	100		5 1/2" OD DIA. C.B.				90			94.5'-98.2' SANDY SILTSTONE: (ML) Brown, scattered medium-grained sand, local vugs, silicic root replacements, friable, very firm, 1/2" silicic band at 98.2'
Gradational contact	100		5 1/2" OD DIA. CORE BIT				85			
	100		5 1/2" OD DIA. CORE BIT				95		10	98.2'-100.3' SILTY SANDSTONE: (SM) Brown, very fine-grained, scattered silicic streaks and pockets, local vugs
Drift angle 2-1/4° from vertical @100'							80		11	
	100		5 1/2" OD DIA CORE BIT				100			100.3'-109.8' SANDSTONE: (SP) Gray, very fine-grained, poorly graded, clean, scattered vugs, manganese-stained massive, unconsolidated to firm, trace anhydrous opal, 1' black, fine-grained, quartzitic sandstone at 104.4'; flat-lying fractures 1/4" to 3/4" apart below 105.4', micaceous
	100		5 1/2" OD DIA. CORE BIT				75			
							105		12	
Flat lying contact-Flat lying fracture	100		5 1/2" OD DIA. CORE BIT				70			109.8'-110.6' CLAYEY SILTSTONE: (ML) Gray, massive, firm, 1 flat lying fracture
Bedding dips 6° from horizontal core axis							110			110.6'-119.4' SANDSTONE: (SP) Gray to dark gray, very fine to fine-grained, uncemented to local moderate induration some bed planes, micaceous
							65			
							115			

Hole Size 5 1/2", 6 1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	94		5½" OD DIA. CORE BIT			60	115 120			119.4'-125.8' SILTSTONE:(ML-SM) Brown, massive, firm; below 120.5', scattered coarse sand, gravelly, unconsolidated to slightly firm, trace clay Grades to: (SM) Tan, trace fine grained sand, light weight, unconsolidated to moderately firm
	100		5½" OD DIA. CORE BIT			55	125			125.8'-127.5' SAND AND GRAVEL: (GP-SP) Tan, gray, light gray fine to v.coarse sand white to light gray gravel and siliceous nodules to 1/2"
Base of Laguna Fm. ——?——?——? Top of Mehrten Fm.										
Bedding dips 17° from horizontal core axis	90		5½" OD DIA. CORE BIT			50	130			127.5'-131.6' SANDSTONE:(SP) Tan to gray, very fine to fine-grained, poorly graded, well bedded uncemented to moderately indurated grades very coarse grains at 131.6
Contact dips 22° from horizontal core axis	100		5½" OD DIA. CORE BIT			45	135			131.6'-140.7' SILTSTONE:(ML) Brown, massive, firm, vugs, manganese-stained in part, scattered sand grains
Gradational contact	100		5½" OD DIA. CORE BIT			40	140			140.7'-141.3' SANDSTONE: (SP) Brownish black, fine-grained subround, friable to firm, poorly graded, abundant quartz, trace mica, bedded
Irregular contact Water Table @ 143'	100		5½" OD DIA. CORE BIT			35	145			141.3'-142.0' SANDY SILTSTONE: (ML) Brown, firm, trace mica, abundant manganese staining
Drift angle 3-1/4° from vertical @150'	100		5½" OD DIA. CORE BIT			30	150			142.0'-145.0' CLAYEY SILTSTONE: (ML) Red brown, unconsolidated to moderately firm, massive, slightly plastic, becoming sandy at 145'
	100		5½" OD DIA. CORE BIT			25	155			145.0'-161.3' SILTSTONE:(ML) Brown to red brown, locally sandy and clayey, firm, massive

Hole Size 5-1/2", 6-1/4"

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Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 5 OF 7

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100		5½" OD DIA. CORE BIT			20	155			161.3'-165.1' SANDSTONE: (SP) Blackish brown, very fine to fine-grained, poorly graded, clean, massive, abundant quartz, trace anhydrous opal root replacements, friable, slight to moderately cemented
	100		5½" OD DIA. CORE BIT				160			
	100		5½" OD DIA. CORE BIT			15			13	165.1'-166.0' SILTSTONE: (ML) Red brown, massive, firm
							165		14	166.0'-168.3' SANDSTONE: (SP-GP) Dark gray, v. fine to fine-grained at top with scattered medium to v.coarse, pea gravel; grades to pea gravel at base.
Bedding dips 15° from horizontal core axis	100		5½" OD DIA. CORE BIT			10				
							170			168.3'-175.8' SILTSTONE: (ML) Red brown, (Top foot is interlaced with white silicic streaks and banks) Firm, locally friable, manganese stained, scattered vugs
	100		5½" OD DIA. CORE BIT			5				
							175			175.8'-181.0' CLAYSTONE: (CL) Dark red brown, silty, unconsolidated to slightly firm, massive, grades to clayey silt at 181.0'
Sea Level	100		5½" OD DIA. CORE BIT			0				
							180			181.0'-190.8' SILTSTONE: (ML) Red brown, grading to gray brown at 182.5', grading to gray through light gray with local iron staining at 188.5' clayey, poorly to moderately indurated, massive, manganese streaks
	100		5½" OD DIA. CORE BIT			-5				
							185		15	
	100		5½" OD DIA. CORE BIT			-10				190.8'196.3' SANDSTONE WITH SILTSTONE INTERBEDS: (SP-SM-ML) Dark brown to black sandstone, light gray siltstone; grades to medium grains at 196.3', poor to indistinct bed planes, manganese-stained friable-moderately indurated
							190		16	
Joint dips 30° from horizontal core axis	100		5½" OD DIA. CORE BIT			-15				
							195			

Hole Size 5-1/2", 6-1/4"

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Hole No DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 6 OF 16

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drift angle 4-1/4° from vertical @200'	60		5 1/2" OD DIA. CORE BIT			-20	195		17	196.3'-231.0' SANDY SILTSTONE: (ML) Light brown, slightly clayey, trace bed planes at top, trace iron oxide stains, trace manganese
Hole reamed to 6-1/4" from 4.8 ft to 201.0 ft									18	
From 201 ft to 250 ft, lithology determined from drill returns, drill characteristics and geophysical logs			6 1/4" OD ROCK BIT TO 250'			-25	200			
205 to 218 drilled easy						-30	205			Gray to black, fine to scattered medium sand grains from 205.0' to 218.0'
						-35	210			
						-40	215			
218' to 224' - no discernible cuttings returned to surface, slow drilling						-45	220			
224' to 232' drilled easy						-50	225			
						-55	230			231.0'-243.0' SANDY CONGLOMERATE (GP) Gray to black, abundant coarse sand grains
232 to 240 considerable rig vibration, bounce, and chatter							235			

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Hole Size 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
240' to 250' drilled relatively easy						-60	235			
						-65	240			
										243.0'-257.7' SANDSTONE (SP) Gray, very fine to fine-grained, locally silty, massive, hard
Drift angle 3-1/2° from vertical @250'						-70	245			
	100		5½" OD DIA. CORE BIT			-75	250		19 20	
							255		21 22 23	
Bedding dips 5° from horizontal core axis	72		5½" OD DIA. CORE BIT			-80				
From 260 ft. to 310 ft. lithology determined from drill returns, drill characteristics and geophysical logs			6¼" OD ROCK BIT TO 310'			-85	260			257.7'-310.0' SILTSTONE: (ML-SM-SP) Light gray, massive, firm, locally sandy and interbedded with light gray, very fine to fine-grained, scattered medium, poorly graded, moderately hard sandstone
						-90	265			
							270			
						-95	275			

245

Hole Size 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 8 OF 16

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drift angle 2-1/4° from vertical @300'						-100 -105 -110 -115 -120 -125 -130 -135	275 280 285 290 295 300 305 310 315			
Bedding dips 3° from horizontal core axis	100		5 1/2" OD DIA. CORE BIT						1 2	310.0'-345.5' SANDSTONE (SP) Light gray, very fine to fine grained, scattered medium, poorly graded, moderately hard

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Hole Size 5 1/2", 6 1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 9 OF 16

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
From 315 ft. to 365 ft., lithology determined by drill returns, drill characteristics and geophysical logs			6 1/4" OD ROCK BIT TO 368'			-140 -145 -150 -155 -160 -165 -170 -175	315 320 325 330 335 340 345 350 355			
Drift angle 1-1/2° from vertical @350'										247
										345.5'-350.0' CONGLOMERATE (GP)
Base of Mehrten Form ——?——?——? Top of Valley Springs										350.0'-354.0' CLAYSTONE? (CL)

Hole Size 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 10 OF 16

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
From 370 Ft. to 405 Ft., lithology determined by drill returns, drill characteristics, and geophysical logs	100		5½" OD DIA. CORE BIT			-180 -185 -190 -195 -200 -205 -210 -215	355 360 365 370 375 380 385 390 395		3	354.0'-365.0' SILTSTONE? (ML) 365.0'-367.6' CLAYSTONE: (CL) Light brown to light gray, highly fractured vertically and horizontally, firm 367.6'-394.0' SILTSTONE: (ML) Light green, firm to moderately hard, inclusions of angular fragments of similar material, slightly harder
			6¼" OD ROCK BIT TO 405'							

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Hole Size 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 11 OF 16

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drift angle 1-3/4° from vertical @400'						220	395			394.0'-406.5' CLAYSTONE: (CH) Blue green, highly plastic, fatty, high dry strength
						225	400			
							405			
	100		5 1/2" OD DIA. CORE BIT			230				406.5'-428.0' SILTSTONE: (ML) Blue green, firm to hard, interlaced with silicic veinlets to 1" thick
From 410 ft to 460 ft lithology determined by drill returns, drill characteristics and geophysical logs			6 1/4" OD ROCK BIT TO 460'			235	410			(ML-SM) Locally sandy below 410 Ft: very fine to fine grained, predominantly quartz
						240	415			
						245	420			
						250	425			
						255	430			428.0'-439.0' CLAYSTONE? (CL-CH)
							435			

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Hole Size 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 12 OF 16

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drift angle 1-1/2° from vertical @450'						-260	435			
							440			439.0'-513.0' CLAYSTONE AND SILTSTONE (CL-ML)
						-265				
							445			
						-270				
							450			
						-275				
							455			
						-280				
	100		5½" OD DIA. CORE BIT				460		4	Green, interbedded, firm to hard, with rounded inclusions of like material (ML-CL)
						-285			5	
From 465 ft to 515 ft lithology determined from drill returns, drill characteristics and geophysical logs			6¼" OD ROCK BIT TO				465			
						-290				
							470			
						-295				
							475			

250

Hole Size 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 13 OF 16

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drift angle 3/4° from vertical @500'						-300 -305 -310 -315 -320 -325 -330 -335	475 480 485 490 495 500 505 510 515		Claystone and siltstone as above (ML-CL) 513.0'-524.0' SANDY SILTSTONE: (ML) White to light gray, scattered 1/2" pebbles, clayey, hard when dry, trace anauxite?

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Hole Size 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 14 OF 16

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
From 520.2 ft. to 565.3 ft., lithology determined from drill returns, drill characteristics and geophysical logs	100		5½" OD DIA. CORE BIT			-340	515		6	
									7	
			6¼" OD ROCK BIT TO 565.3'			-345	520			
						-350	525			524.0'-565.0' SILTSTONE AND CLAYSTONE (ML-CL) Locally sandy
						-355	530			
						-360	535			
						-365	540			
						-370	545			
Drift angle 3/4° from vertical @550'						-375	550			
							555			

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Hole Size 5-1/2", 6-1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

HOLE NO. DH 23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
							555			
						-380				
							560			
						-385				
							565			
	100		5 7/8" OD DIA. CORE BIT			-390			8 9	565.0'-569.5' SANDSTONE (SP) Light olive green, very fine-grained, poorly graded, very firm to moderately hard, massive
From 570.3 ft. to 597 ft., lithology determined from drill returns, drill characteristics and geophysical logs			6 1/4" OD ROCK BIT TO 597'				570			569.5'-593.0' SILTSTONE AND CLAYSTONE (ML-CL)
						-395				
							575			
						-400				
							580			
						-405				
							585			
						-410				
							590			
						-415				593.0'-602.0' CLAYSTONE (CL) Olive green, scattered sand grains, firm
							595			

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Hole Size 5 1/2", 6 1/4"

Hole No. DH 23

Site RANCHO SECO

PROJECT RANCHO SECO

HOLE NO. DH-23

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drift angle 1/2° from vertical @600'	100		5 1/2" DIA. CORE BIT			420	595 600		Bottom of hole 602 ft

NOTE 1. GEOPHYSICAL LOGS:

Induction - Electric Log
SNP Neutron Log
Sonic Log (With Hole Caliper)
Formation Density Log
Directional Survey

NOTE 2. PUMP TEST:

Water Table: 143 ft
Set 4 inch ID casing at 318 ft
Produced 48 gpm (av.) during 24 hr test with 10 ft (av.) Drawdown

NOTE 3. PIEZOMETER INSTALLATION:

Installed 180 ft of 1-1/8 in. ID P.V.C. pipe with .95 ft stickup above cover plate. The bottom 13 ft was perforated. Static water level, upon completion of piezometer installation, was 145.39 ft below the cover plate.

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Hole Size 5-1/2", 6-1/4"

Hole No. DH-23

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-1

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING —

LOCATION N249, 730. E2,252, 325 BEGUN 7-6-67 COMPLETED 7-6-67

OVERBURDEN 1.5 Ft DEPTH DRILLED INTO ROCK 68.5 Ft TOTAL DEPTH OF HOLE 70 Ft

ELEV. WATER TABLE None NO. CORE BOXES None NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) — FEET — MODEL & MAKE OF DRILL Earthdrill Model 45

GROUND ELEV. +187.8 FT HOLE LOGGED BY Mackay, Fox DRILLER Myhren Drlg. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			185	0		0'-1.5' SILTY SANDY GRAVEL: (GM) Red brown, gravel to 3", subround to round, loose, dry
							5		1.5'-7.7' SANDY GRAVEL: (GW) Brown, well-graded, slightly loose to firm, dry Clay seam: 1/8-1/4 inch red brown, plastic
						180			7.7'-16.3' SILTY SANDSTONE: (SM) Red brown, v.fine-fine-grained, rare scattered gravels, moderately friable, massive, damp
							10		16.3'-21.0' SANDY GRAVEL: (GW) Red brown, v. fine to coarse-grained sand, well-graded gravel to 2", slightly silty, firm to locally uncemented, damp.
						175			
							15		21.0'-22.3' SANDSTONE: (SP-SM) Red brown-gray, fine-medium-grained, silty, clayey, massive, firm-slightly friable, damp, scattered gravel
Contact: Horizontal, uneven						170			
							20		22.3'-27.0' CLAYEY SILTSTONE (ML) Red brown, rare scattered sand and gravel, massive, firm, damp
Contact: Horizontal, uneven						165			
							25		27.0'-29.7' SILTY SANDSTONE: (SM) Gray, v.fine to fine-grained, scattered medium, slightly clayey above 27.9' manganese flecks, damp; below 27.9', less clayey, friable, slightly damp
Contact: Gradational						160			
							30		29.7'-30.7' SILTSTONE: (ML) Light red brown, slightly clayey, rare scattered sand and pea gravel, firm, damp
Contact: Gradational									30.7'-34.0' CLAYEY SILTSTONE: (ML) Red brown, firm, massive, rare scattered sand and pea gravel, black flecks, damp
						155	35		

Hole Size 24"

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Hole No. AH-1

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-1

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						150	40			34.0'-36.5' SANDY SILTSTONE-SILTY SANDSTONE: (SM) Red brown, firm, damp, mica
										36.5'-39.2' SANDSTONE: (SP) Dark gray, v.fine to medium scattered coarse grains, rare scattered gravel, massive, v. friable, micaceous, damp
						145	45			39.2'-45.0' CLAYEY SILTSTONE: (ML) Light red brown to slightly gray, with scattered pea gravel, massive, firm, damp, scattered black manganese
Contact: Gradational										
						140	50			45.0'-46.0' SANDY SILTSTONE: (SM) Red brown, massive, firm, damp
Contact: Gradational										46.0'-49.1' SILTY SAND: (SM) Red brown to slightly gray, v. fine to medium, scattered coarse grains, scattered pea gravel, massive, firm to slightly friable, damp, micaceous
						135	55			49.1'-70.0' CLAYEY SILTSTONE: (ML) Light red brown, rare scattered sand grains, massive, firm, damp, trace black manganese
						130	60			
						125	65			256
										Sandy between 65.5 and 65.9'
						120	70			Bottom of hole 70 ft
						115				

Hole Size 24"

Hole No. AH-1

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 1

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-2

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 250,010 E 2,254,625 BEGUN 10 JULY 67 COMPLETED 10 JULY 67

OVERBURDEN 4.6 FT DEPTH DRILLED INTO ROCK 6.9 FT TOTAL DEPTH OF HOLE 11.5 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 4

CORE RECOVERY (%) 100% FEET 3 MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. + 155.9 HOLE LOGGED BY FOX, TRANTHAM DRILLER MYHREN DRLG. CO

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Bag sample			24 IN. BUCKET AUGER			155	0		1	0'-4.6' CLAYEY SILT: (ML) Brown, roots & root hairs to 0.5 ft (no gravel)
Hammer not free-falling							5			
Bottle sample	100	NG 16 20	STD. PEN	140	30	150			2	4.6'-11.5' SILTSTONE: (ML) Brown, sandy, very fine to fine-grained, poorly graded, compact, damp
Bag sample			24 IN. BUCKET AUGER						3	
Bottle sample	100	14 29 30	STD. PEN	140	30	145	10		4	
										Bottom of hole 11.5 ft

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Hole Size 24", 2"

Hole No. AH-2

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-3

PROJECT RANCHO SECO — ANGLE FROM HORIZ 90° — BEARING

LOCATION N 249,570 E 2,255,050 — BEGUN 17 JULY 67 — COMPLETED 17 JULY 67

OVERBURDEN 1.3 FT — DEPTH DRILLED INTO ROCK 68.7 FT — TOTAL DEPTH OF HOLE 70 FT

ELEV. WATER TABLE NONE — NO. CORE BOXES NONE — NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) — FEET — MODEL & MAKE OF DRILL EARTHDRILL MODEL 36

GROUND ELEV. + 165.1 — HOLE LOGGED BY FOX — DRILLER MYHREN DRLG CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Distinct contacts			24 IN. BUCKET AUGER TO TOTAL DEPTH			165	0		0'-0.8' SILT: (ML) Brown, scattered rounded gravel to 1", dry
									0.8'-1.3' SILTY CLAY: (CL) Dark brown, moderately stiff
						160	5		1.3'-7.0' SANDY SILTSTONE: (ML) Tan-brown, dry to 2.3', damp below
Gradational contact									7.0'-14.7' SILTSTONE: (ML) Brown, softer than above
						155	10		
Gradational contact									From 12.5'-14.7' Dark tan, light weight
Gradational contact						150	15		14.7'-21.1' SILTSTONE: (ML) Brown, firm, damp
						145	20		21.1'-21.7' CLAY: (CL)
									21.7'-22.2' SILTSTONE: (ML) As above
									22.2'-22.7' CLAY: (CL)
									22.7'-27.1' SILTSTONE: (ML) Brown, firm, damp
						140	25		
									27.1'-42.3' SANDY SILTSTONE: (ML) Brown, v. fine-fine, black stained sand grains, more firm than above
						135	30		
							35		

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Hole Size 24"

Hole No. AH-3

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-3

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Fairly distinct contact						130	35			42.3'-47.3' SANDY GRAVEL: (GP) Brown, fine-grained sand, poorly graded gravel to 2", subrounded, compact, locally unconsolidated
						125	40			47.3'-49.3' SANDSTONE: (SP) Gray, very fine-fine grained, poorly graded
						120	45			49.3'-50.0' SANDY PEA GRAVEL: (GP)
						115	50			50.0'-52.1' SANDSTONE: (SP) Gray, fine-medium grained, clean, poorly graded, scattered pea gravel
						110	55			52.1'-70.0' Gray-brown, very fine-fine-grained, poorly graded
						105	60			
						100	65			
						95	70			Bottom of hole 70 ft

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Hole Size 24"

Hole No. AH-3

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 1

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-4

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING —

LOCATION N249,515 E2,254 560 BEGUN 11 July 67 COMPLETED 11 July 67

OVERBURDEN 2.0 Ft DEPTH DRILLED INTO ROCK 9.5 Ft TOTAL DEPTH OF HOLE 11.5 Ft

ELEV. WATER TABLE None NO. CORE BOXES None NO. SAMPLES TAKEN —

CORE RECOVERY (%) 100 FEET 3.0 MODEL & MAKE OF DRILL Earthdrill Model 45

GROUND ELEV. +170.9 HOLE LOGGED BY Fox, Trantham DRILLER Myhren Drlg. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER			170	0	1	0'-0.7' GRAVELLY SILT: (GM) Brown, subround quartz gravel to 2" maximum diameter, organic material scattered throughout
Bag sample									
Bottle sample	100	19 / 33 / 38	STD. PEN	140	30	165	5	2	0.7'-2.0' CLAY: (CH) Dark brown, highly plastic, damp
			24 IN. BUCKET AUGER					3	2.0'-11.5' SILTSTONE: (ML) Dark brown, with pockets of clay as above, slightly damp, stiff
Bag sample							10		
Bottle sample	100	15 / 28 / 38	STD. PEN	140	30	160		4	
									Bottom of hole 11.5 ft

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Hole Size 24", 2"

Hole No. AH-4

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 1

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-5

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 249,300 E 2,253,740 BEGUN 11 JULY 67 COMPLETED 11 JULY 67

OVERBURDEN 2.0 FT DEPTH DRILLED INTO ROCK 9.5 FT TOTAL DEPTH OF HOLE 11.5 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 4

CORE RECOVERY (%) 100 FEET 2.4 MODEL & MAKE OF DRILL EARTH DRILL MODEL 45

GROUND ELEV. +177.6 HOLE LOGGED BY TRANTHAM DRILLER MYHREN DRLG CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER			175	0		1	0'-1.0' GRAVELLY SAND: (SP-GP) Brown, quartzitic, rounded gravel to 2", scattered organic material
Bag Sample										
Jar Sample	100	50/5"	STD. PEN	140	30		5		2	1.0'-2.0' SANDY CLAY: (CL) Dark Red brown, scattered white rootlets, high dry strength, tough
Formations dip 15° (±) Westerly			24 IN. BUCKET AUGER			170			3	2.0'-11.5' SANDSTONE: (SP) Red brown, scattered white roots, dense, damp
Bag Sample							10			6.0'-11.5' Tan, less dense than above, scattered caliche pockets
Jar Sample	100	11/6	STD. PEN	140	30	165			4	
							15			Bottom of hole 11.5 ft

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Hole Size 24", 2"

Hole No. AH-5

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-6

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 249,165 E 2,252,350 BEGUN 5 JULY 67 COMPLETED 6 JULY 67

OVERBURDEN 3.2 FT DEPTH DRILLED INTO ROCK 66.8 FT TOTAL DEPTH OF HOLE 70 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. 182.8 FT HOLE LOGGED BY MACKAY, FOX DRILLER MYHREN DRLG CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT./LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						180	0		0'-3.2' SANDY GRAVEL: (GP) Red brown, to 1-1/2", subround-round; upper 12" is loose, silty; friable, firm, dry below 1.7 ft
							5		3.2'-7.0' CLAYEY SILTSTONE: (ML) Red brown, scattered sand and gravel, firm, damp
Gradational contact						175			7.0'-10.2' SANDY SILTSTONE: (SM) Grayish red brown, scattered gravel, firm, slightly damp, trace carbonaceous material
							10		10.2'-19.4' SANDY GRAVEL: (GP) Red brown-gray, v. fine-v. coarse sand, gravel to 4" slightly friable-firm, locally silty and clayey
						170			
							15		19.4'-23.5' SANDY SILTSTONE: (ML) Red brown, massive, friable-firm, damp
						165			
Flat contact							20		23.5'-25.2' SILTY SANDSTONE: (SM) Red brown-dark gray, v. fine-medium, friable-slightly firm, damp, grades to sand-stone (SP) below 25.2', mica, scattered manganese and white clay flecks
						160			
Gradational contact							25		
						155			26.9'-29.3' CLAYEY SILTSTONE: (ML) Red brown, slightly sandy, friable-firm, damp
							30		29.3'-34.5' SANDSTONE: (SP) Red brown, v. fine-fine, friable-firm, damp, silty to 32.4' brownish dark gray below, poorly cemented, mica
Gradational contact						150			
							35		

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Hole Size 24"

Hole No. AH-6

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-6

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	CLASSIFICATION AND PHYSICAL CONDITION
Gradational contact			SAMPLE			145	35		34.5'-35.2' SANDY SILTSTONE: (ML) Light red brown, firm, damp
							40		35.2'-39.0' CLAYEY SILTSTONE: (ML) Red brown, indurated fragments, damp, firm-v.firm below 37'.
						140			39.0'-45.0' SILTSTONE: (ML)Red brown, slightly sandy, firm, micaceous, rare carbonaceous material
							45		45.0'-70.0' CLAYEY SILTSTONE: (ML) Red brown, firm, massive, scattered manganese
						135			
							50		
						130			From 56.9'-57.2' on southwest side of hole: pocket of red brown-slightly gray, v. fine to medium-grained, scattered, coarse, pebbly sand
							55		
						125			Less clayey at 59.0'
							60		
						120			Red brown, light gray, more firm below 61.5'
							65		
						115			263
							70		Bottom of Hole 70 ft
						110			

Hole Size 24"

Hole No. AH-6

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 1

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH 7

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 249,135 E 2,253,255 BEGUN 12 July 67 COMPLETED 12 July 67

OVERBURDEN 1.5 ft DEPTH DRILLED INTO ROCK 10 ft TOTAL DEPTH OF HOLE 11.5 ft

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 4

CORE RECOVERY (%) 100 FEET 2.8 MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. + 189.8 ft HOLE LOGGED BY TRANHAM DRILLER [illegible] D. L. O.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Bag Sample			24 IN. BUCKET AUGER				0			0'-1.5' SILTY, GRAVELLY, SAND: (SP) Red brown, v. fine-coarse, rounded gravel to 2", dry
						185	5		1	1.5'-2.5' CLAYSTONE: (CL) Red brown, scattered rounded gravel, stiff, tough, damp
Jar Sample		30 5/4"	STD. PEN	140	30				2	2.5'-5.5' SANDSTONE: (SP) Red brown, very fine-coarse, dense
Bag Sample			24 IN. BUCKET AUGER						3	Reddish tan, less dense, damp below 5.5'
						180	10			
Jar Sample		33 38	STD. PEN	140	30				4	
										Bottom of hole 11.5 ft
						175	15			

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Hole Size 24", 2"

Hole No. AH 7

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH 8

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 249,067 E 2,253,695 BEGUN 2 JULY 67 COMPLETED 5 JULY 67

OVERBURDEN 2.5 FT DEPTH DRILLED INTO ROCK 67.5 FT TOTAL DEPTH OF HOLE 70 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. + 192.4 HOLE LOGGED BY BOCK, MACKAY DRILLER MYHREN DRLG. CO

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			190	0			0'-1.0' SANDY SILT: (SM) Red brown, scattered pea gravel, porous, moderately firm, dry
							5			1.0'-2.5' SANDY CLAY: (CL) Dark red brown, scattered pea gravel, slightly porous, vertical joints, firm, dry
						185				2.5'-7.0' SANDY SILTSTONE: (ML) Red brown, trace mica, porous, damp, massive
							10			7.0'-11.0' SILTSTONE: (ML) Red brown, trace mica, porous
						180				11.0'-13.0' SANDY SILTSTONE: (ML) Red brown, slightly porous, mica, firm, damp
							15			13.0'-16.5' SILTY SANDSTONE: (SM) Light red brown, v. fine-fine, firm, damp, grades to gray brown, coarser at 16.5'
						175				16.5'-18.5' SILTSTONE: (ML) Light red brown, slightly porous, massive, firm
							20			18.5'-23.0' SILTY SANDSTONE: (SM) Red brown, v. fine-fine, mica, slightly porous, weakly cemented; friable @ 22'
						170				23.0'-26.5' SAND: (SP) Gray brown, well graded, trace mica, clean, friable, uncemented; 2" bed of 1/4" rounded gravel at 24.5'
							25			
						165				26.5'-29.5' SILTSTONE: (ML)Red brown, mica, firm, slightly porous, damp
							30			29.5'-32.2' SANDY SILTSTONE: (ML) Dark red brown, trace mica, slightly porous, scattered manganese, firm-v. firm, damp
						160				32.2'-34.5' SILTSTONE: (ML)
							35			

Hole Size 24"

Hole No. AH 8

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH 8

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
							35		34.5'-37.5' SILTY SANDSTONE: (SM) Red brown, v. fine to fine, firm, damp
						155			37.5'-45.0' SANDSTONE: (SP) Gray brown, fine to medium, trace silt, trace mica, firm, massive; clean, weakly cemented @41' 1" bed coarse sand and 1/4" rounded gravel at 45.0 ft
							40		
						150			
							45		45.0'-48.0' SILTY SANDSTONE: (SM) Light brown to gray brown, v. fine to medium, firm to v. firm
						145			48.0'-50.5' SANDSTONE: (SP) Gray-brown, coarse, well-graded
							50		50.5'-54.0' SILTSTONE: (ML) Red brown, firm, slightly porous trace mica
						140			54.0'-57.5' SANDSTONE: (SP-SM) Red brown, fine to medium, trace silt, firm, damp
							55		57.5'-58.0' SANDSTONE: (SP) Gray, fine to medium, clean
						135			58.0'-59.0' SILTY SANDSTONE: (SM) As above
							60		59.0'-62.5' SANDSTONE: (SP) Gray brown, well-graded, scattered pea gravel, trace mica firm-v. firm
						130			62.5'-64.0' SILTSTONE: (ML) Light gray-buff, porous, moderately firm, damp. (Coarse-v. coarse sand @ 63'-64' on north side of hole)
Bedding plane attitude: N75-80°E, 13°N							65		
						125			64.0'-66.5' SANDSTONE: (SP) Gray brown, trace silt, grades to coarse, pea gravel @ 66.5'
							70		66.5'-68.3' SANDY SILTSTONE: (ML) Red brown, mica, moderately firm, damp
						120			68.3'-70.0' SILTY SANDSTONE: (SM) Light gray-brown, v. fine-coarse
									Bottom of hole 70 ft

Hole Size 24"

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Hole No. AH 8

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 1

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-9

PROJECT RANCHO SECO — ANGLE FROM HORIZ 90° — BEARING

LOCATION N 249,225 E 2,254,250 — BEGUN 11 July 67 — COMPLETED 11 July 67

OVERBURDEN 2.0 FT — DEPTH DRILLED INTO ROCK 9.5 FT — TOTAL DEPTH OF HOLE 11.5 FT

ELEV. WATER TABLE NONE — NO. CORE BOXES NONE — NO. SAMPLES TAKEN 4

CORE RECOVERY (%) 100 — FEET 3.0 — MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. +200.3 FT — HOLE LOGGED BY TRANTHAM — DRILLER MYHREN DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	SAMPLE	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	CLASSIFICATION AND PHYSICAL CONDITION
				24 IN. BUCKET AUGER			200	0	1	0-2.0' GRAVELLY SAND: (SP-GP) Brown, v. fine-coarse, subround-round gravel to 2", trace silt, scattered organic material, dry, compact
Bag Sample										
Jar Sample		100	7 11	STD. PEN	140	30	195	5	2	2.0'-6.0' SANDY CLAYSTONE: (CL) Dark red brown, scattered rounded pea gravel, quartzitic, scattered white rootlets and root hairs, dry-damp, firm-v. firm, plastic
				24 IN. BUCKET AUGER					3	
Bag Sample										
Jar Sample		100	15 24	STD. PEN	140	30	190	10	4	6.0'-11.5' SANDSTONE: (SP) Red tan, v. fine-coarse, scattered pea gravel, quartzitic, scattered white root hairs, dry-damp, scattered clay pockets
							185	15		Bottom of hole 11.5 ft

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Hole Size 24", 2"

Hole No. AH-9

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-10

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N249,160 E 2,255,435 BEGUN 7-17-67 COMPLETED 7-18-67

OVERBURDEN 1.5 FT DEPTH DRILLED INTO ROCK 68.4 FT TOTAL DEPTH OF HOLE 70 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 36

GROUND ELEV. + 189.6 HOLE LOGGED BY FOX, CAMPBELL DRILLER MYHREN DRLG. CO

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			189	0		0'-1.5' GRAVELLY SANDY SILT: (GM) Brown, gravel to 1-1/2", dry
									1.5'-2.3' SILTY CLAYSTONE: (CL) Red brown, scattered pea gravel, firm-tough
						185	5		2.3'-15.0' SILTSTONE: (ML) Light tan, light weight, dry above 3.2 ft, brown, damp, and firm below
						180	10		
Gradational contact						175	15		15.0'-22.9' SANDSTONE: (SP) Brown, fine to fine-grained, poorly graded, clean, and firm Lens: black-brown, fine-grained, very friable, 19.3-20.0 ft Lens: as above 20.9-21.5 ft
						170	20		
Contact: N15°W, 06°E									22.9'-23.9' SANDSTONE: (SP) Black-brown, medium-grained, poorly graded, manganese-stained, scattered 1/4" gravel. Becomes gravelly at 23.9' with scattered pebbles to 2"
						165	25		23.9'-30.0' SILTY CLAYSTONE: (CL) Brown, v. firm, damp
Gradational contact						160	30		30.0'-35.0' SILTSTONE: (ML) Brown, firm, damp, black manganese flecks, white carbonaceous or silica root hair replacement
Gradational contact						155	35		

Hole Size 24 "

Hole No. AH-10

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH 10

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
							35		35.0'-43.9' SANDSTONE: (SP) Brown, very fine to fine-grained, very friable, damp Below 38 ft: clean, moderately firm Below 40 ft: black-brown, fine to medium-grained, clean, very friable, scattered 1/4" gravels in bottom 9 inches
						150	40		
Contact: N49°W, 21°NE									
						145	45		43.9'-53.0' SILTY CLAYSTONE: (CL) Brown to red brown, moderately plastic, firm to very firm, damp
						140	50		
Gradational contact									53.0'-60.0' CLAYEY SILTSTONE: (ML) Brown, firm, and damp, massive, root replacement to 3/8" with anhydrous opal
						135	55		
Gradational contact						130	60		60.0'64.3' SILTY SANDSTONE: (SM) Brown, very fine to fine-grained, poorly graded, damp, firm Scattered 1/4-1/2 inch gravel below 62 ft
						125	65		64.3'-70.0' SILTSTONE: (ML) Gray, slightly clayey, firm, damp, root replacement with anhydrous opal
						120	70		Bottom of hole 70 ft

Hole Size 24" D.C.

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Hole No. AH 10

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-15

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,235 E 2,254,755 BEGUN 10 July 67 COMPLETED 1. July 67

OVERBURDEN 1.1 FT DEPTH DRILLED INTO ROCK 68.9 FT TOTAL DEPTH OF HOLE 70 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. +204.9 FT HOLE LOGGED BY FOX, ELSTON DRILLER MYHREN DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			200	0		0'-1.1' GRAVELLY SILT: (GM) Brown, gravel to 1-1/2" scattered sand, increase gravel at 1.1 ft.
							5		1.1'-2.3' CLAYSTONE: (CL-CH) Red brown, plastic, damp, firm
						195	10		2.3'-3.0' GRAVELLY SANDSTONE: (SP) Buff, fine-grained sand, gravel to 1", subround, poorly graded
									3.0'-6.1' SILTY SANDSTONE: (SM) Brown, very fine to fine, poorly graded
						190	15		6.1'-8.5' SILTY GRAVEL: (GM) Brown, gravel to 1" dia., sand well-graded, subround
									8.5'-21.5' SILTY SANDSTONE: (SM) Gray brown, fine-grained, poorly graded
						185	20		
									21.5'-47.3' SILTSTONE: (ML) Brown, non-plastic
						180	25		
						175	30		
						170	35		

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Hole Size 24"

Hole No. AH-15

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH 15

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						165	40		
						160	45		47.3'-48.9' SANDSTONE: (SP) Black-brown, fine to medium-grained, poorly graded
						155	50		48.9'-60.1' SILTSTONE: (ML) Brown, non-plastic
						150	55		
						145	60		Grades to silty sandstone at 60.1'
									61.1'-64.1' SILTSTONE: (ML) Brown, massive
						140	65		64.1'-65.0' CLAYEY SILTSTONE: (ML) Brown
									65.0'-70.0' SILTSTONE: (ML) Brown, massive
						135	70		Bottom of hole 70 ft

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Hole Size 24"

Hole No. AH 15

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-16

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,235 E 2,253,720 BEGUN 1 JULY 67 COMPLETED 5 JULY 67

OVERBURDEN 1.0 FT DEPTH DRILLED INTO ROCK 69.0 FT TOTAL DEPTH OF HOLE 70 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. + 198.0 FT HOLE LOGGED BY BOCK, MACKAY DRILLER MYHREN DRLG CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	CLASSIFICATION AND PHYSICAL CONDITION
								SAMPLE	
							0		0'-1.0' SANDY SILT: (SM) Red brown, fine-scattered coarse sand, scattered gravel
						195			1.0'-2.5' GRAVELLY SANDSTONE: (SP) Red brown, well-graded, gravel to 2", trace clay, firm
							5		2.5'-3.5' SANDY CLAYSTONE: (CL) Red brown, v. fine-fine sand, scattered pea gravel, firm, damp, slightly porous
						190			3.5'-4.5' SANDSTONE: (SP) Red brown, well-graded, scattered pea gravel, slightly silty, trace clay
							10		4.5'-9.2' GRAVELLY SANDSTONE: (SP) Red brown, well-graded, 35-40% rounded gravel to 1-1/2", trace silt, damp
						185			9.2'-11.5' SILTSTONE: (ML) Red brown, slightly porous, firm, damp, trace mica
							15		11.5'-17.5' SILTY GRAVEL: (GM) Red brown, 65-70% gravel to 3", rounded, sandy, damp
						180			17.5'-19.7' SANDY SILTSTONE: (ML) Red brown, slightly porous, massive, slightly firm, mica
							20		19.7'-24.7' SILTY SANDSTONE: (SM) Light brown, v. fine-fine, damp, trace mica
						175			24.7'-27.0' SILTSTONE: (ML) Light brown, slightly porous, damp, charcoal specks
							25		27.0'-34.3' SANDSTONE: (SM-SP) Red brown, v. fine-fine, v. silty, friable-firm, grades to gray brown, fine-medium, clean
						170			
							30		
						165			
							35		

Hole Size 24"

272

Hole No. AH-16

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-16

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						160	35			34.3'-36.5' SILTSTONE: (ML) Red brown, porous, firm, damp, mica
							40			36.5'-42.0' SANDY SILTSTONE: (ML) Dark red brown, trace v. fine sand, slightly porous, firm-very firm
						155	45			42.0'-44.5' CLAYEY SILTSTONE: (ML) Brown, closely fractured, (or jointed) abundant slick clay coatings and internal slicks, blocky, firm
						150	50			44.5'-65.5' SANDY SILTSTONE: (ML) Red brown, v.fine-fine sand, slightly porous, firm, damp dark red brown, firm-very firm
						145	55			
						140	60			
						135	65			
						130	70			65.5'-70.0' SILTSTONE: (ML) Gray, trace very fine sand, massive, firm, damp
						125				Bottom of hole 70 ft

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Hole Size 24"

Hole No. AH-16

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-17

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,255 E 2,252,965 BEGUN 7 July 67 COMPLETED 7 July 67

OVERBURDEN 2.0 FT DEPTH DRILLED INTO ROCK 68.0 FT TOTAL DEPTH OF HOLE 70.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. +169.5 FT HOLE LOGGED BY MACKAY, FOX DRILLER LYTHREN DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			165	0		0'-2.0' SILTY SANDY GRAVEL: (GM) Brown, well-graded, 2" maximum size, subround to round, dry, loose
							5		2.0'-70.0' SANDY CLAYEY SILTSTONE: (ML) Brown to red brown, scattered gravel at top of zone, clayey, firm, damp, massive
						160	10		Grades to: Increase clay between 10 and 13.5 ft. scattered carbonaceous material
						155	15		
						150	20		Increase clay, less sandy below 20 ft.
						145	25		274
						140	30		Red brown, trace of very fine sand, firm, damp, massive
						135	35		

Hole Size 24"

Hole No. AH-17

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-17

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						130	35		
						125	40		
						120	45		
						115	50		Increase sand 51.5'-52.5'
						110	55		
						105	60		
						100	65		
							70		Bottom of hole 70 ft

275

Hole Size 24"

Hole No. AH-17

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-18

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,228 E 2,252,345 BEGUN 1 JULY 67 COMPLETED 1 JULY 67

OVERBURDEN 1.5 FT DEPTH DRILLED INTO ROCK 68.5 FT TOTAL DEPTH OF HOLE 70 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. + 176.2 FT HOLE LOGGED BY BOCK, MACKAY DRILLER MYHREN DRLG CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Horizontal contact						175 170 165 160 155 150 145	0 5 10 15 20 25 30 35		0'-1.5' SANDY SILT: (SM) Red brown, v. fine sand, scattered pea gravel, porous, damp 1.5'-2.5' CLAYEY GRAVEL: (GC) Red brown, gravel to 2", trace fine sand, firm 2.5'-13.5' GRAVELLY SANDSTONE: (SP-GP) Red brown, fine-medium, scattered coarse, 35-40% gravel to 1-1/2", damp; grades to gray brown, predominantly coarse, 50-60% gravel, damp-moist below 6.5 13.5'-16.0' SILTSTONE: (ML) Red brown, trace v. fine sand, trace mica, moderately firm 16.0'-19.5' SANDY SILTSTONE: (ML) Gray brown, v. fine-fine sand, firm, damp 19.5'-23.7' SANDSTONE: (SP) Gray, trace silt, trace mica, friable-firm, damp 23.7'-49.0' SANDY SILTSTONE: (ML) Red brown, v. fine sand, firm, damp, mica slightly punky 276 small concretions

Hole Size 24"

Hole No. AH-18

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-18

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						140	35		manganese specks
						135	40		
						130	45		49.0'-49.5' SILTY SANDSTONE: (SM) Red brown, v. fine-fine, damp, manganese specks
									49.5'-50.0' CLAYEY SILTSTONE: (ML) Brownish gray, massive, slightly porous, firm, damp
						125	50		50.0'-53.0' SANDY SILTSTONE: (ML) Red brown, very porous, firm, damp, abundant black manganese, mica
									53.0'-54.0' SILTY SANDSTONE: (SM-SP) Red brown, well-graded, mica, very firm
						120	55		54.0'-59.0' SILTSTONE: (ML) Red brown, slightly sandy, mica, very firm, damp
						115	60		59.0'-64.0' SANDY SILTSTONE: (ML) Slightly porous, trace very thin, clayey slicks
Attitude on slick: N10°W, 39°W						110	65		64.0'-70.0' SILTSTONE: (ML)Red brown, trace sand, slightly porous, mica, firm, damp
						105	70		Bottom of hole 70 ft

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Hole Size 24"

Hole No. AH-18

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-21

PROJECT Rancho Seco ANGLE FROM HORIZ 90° BEARING —

LOCATION N247,980 E2,254,430 BEGUN 7 July 67 COMPLETED 7 July 67

OVERBURDEN 1.9 FT DEPTH DRILLED INTO ROCK 68.1 FT TOTAL DEPTH OF HOLE 70.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) — FEET — MODEL & MAKE OF DRILL Earthdrill Model 45

GROUND ELEV. +195.0 FT HOLE LOGGED BY Mackay, Fox DRILLER Myhren Drlg. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN BUCKET AUGER TO TOTAL DEPTH			195	0			0'-1.9' SILTY SANDY GRAVEL: (GM) Brown, well-graded, loose, dry
										1.9'-6.9' SANDY GRAVEL: (GW-GM) Red-brown, very fine to medium sand, well-graded gravel to 2" maximum size, silty, slightly damp. Moderately friable to moderately firm
						190	5			
										6.9'-70.0' SILTSTONE: (ML) Red brown-gray brown, good trace very fine to fine sand, rare scattered pebbles. Massive, firm, slightly damp, scattered black manganese flecks
						185	10			
										Light brown below 9 ft
						180	15			Slightly firm below 12.7 ft rare sand grains
										Moderately firm below 15 ft
						175	20			Red brown below 18 ft
						170	25			
						165	30			Firm below 30 ft
						160	35			

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Hole Size 24"

Hole No. AH-21

Site Rancho Seco

PROJECT Rancho Seco

SHEET 2 OF 2

HOLE NO. AH-21

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
							35		
						155	40		
						150	45		
						145	50		Moderately clayey below 49' scattered white clay
						140	55		
						135	60		Slightly damp
						130	65		
						125	70		Bottom of hole 70 ft

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Hole Size 24"

Hole No. AH-21

Site Rancho Seco

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-22

PROJECT Rancho Seco ANGLE FROM HORIZ 90° BEARING —

LOCATION N247,775 E2,255,005 BEGUN 18 July 67 COMPLETED 18 July 67

OVERBURDEN 2.5 FT DEPTH DRILLED INTO ROCK 67.5 FT TOTAL DEPTH OF HOLE 70.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) — FEET — MODEL & MAKE OF DRILL Earthdrill Model 36

GROUND ELEV. +201.9 FT HOLE LOGGED BY Fox, Campbell DRILLER Myhren Drlg. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			200	0		0'-1.8' SILT: (SM-GM) Brown, scattered sand and gravel to 1", roothairs, firm, dry
									1.8'-2.5' CLAY: (CL) Red brown, trace gravel to 1/2", firm, slightly damp
Gradational contact						195	5		2.5'-6.0' SILTSTONE: (ML) Tan, sandy, firm, damp, black rounded manganese fragments to 1/4"
Gradational contact						190	10		6.0'-9.7' SILTY SANDSTONE: (SM) Light brown-gray, very fine-fine-grained, manganese flecks, firm, slightly damp
Irregular contact						185	15		9.7'-10.3' GRAVELLY SANDSTONE: (SP) Light tan, fine grained, poorly graded, moderately friable, pebbles to 1", rust-stained, damp, pumice frags
						180	20		10.3'-13.1' SANDSTONE: (SP) Gray-tan-rust very fine to fine, scattered gravel to 1-1/4" moderately firm, damp, scattered manganese flecks
						175	25		13.1'-41.4' SILTSTONE: (ML) (Tuffaceous?): Tan, very light weight, firm, damp
						170	30		Grades to brown at 20 ft
							35		Heavier, coarser silt at 23.1'

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Hole Size 24"

Hole No. AH-22

Site Rancho Seco

PROJECT Rancho Seco

SHEET 2 OF 2

HOLE NO. AH-22

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						165	35		
							40		
						160			41.4'-43.1' SANDY SILTSTONE: (ML) Brown, very fine sand, root holes, firm, damp, trace manganese
							45		43.1'-54.8' SILTSTONE: (ML) Dark brown, firm, damp
						155			
							50		
						150			
							55		54.8'-56.9' SANDY SILTSTONE: (ML) Dark brown, fine-grained, damp
						145			56.9'-64.7' SILTSTONE: (ML) Dark brown, firm, damp, manganese and anhydrous opal root hair replacements
							60		
						140			
							65		64.7'-70.0' SILTY CLAYSTONE: (CL-ML) Dark brown, firm, damp, manganese-stained, trace internal slicks. (Not fault gouge) near base
						135			
							70		Bottom of hole 70 ft
						130			

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Hole Size 24"

Hole No. AH-22

Site Rancho Seco

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-25

PROJECT Rancho Seco ANGLE FROM HORIZ 90° BEARING —

LOCATION N 247,460 E2,252,330 BEGUN 30 Jun 67 COMPLETED 30 Jun 67

OVERBURDEN 2.0 FT DEPTH DRILLED INTO ROCK 68.0 FT TOTAL DEPTH OF HOLE 70.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) — FEET — MODEL & MAKE OF DRILL Earthdrill Model 45

GROUND ELEV. +148.4 FT HOLE LOGGED BY Bock, Mackay DRILLER Myhren Drlg. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			145	0		0-2.0' CLAYEY GRAVEL: (GC) Dark brown, pebbles to 3", scattered sand
							5		2.0'-2.5' CLAYSTONE: (CL) Dark brown, trace fine sand, firm damp
						140			2.5'-4.5' SILTY SANDSTONE: (SM) Red brown-brown, fine, hard, damp
							10		4.5'-13.0' SANDY SILTSTONE: (ML) Red brown, v. fine sand, mica, slightly porous, massive, damp
Gradational Contact						135			13.0'-16.5' SILTY SANDSTONE: (SM) Gray brown, fine-scattered medium, mica, manganese, friable, damp
							15		Scattered gravel at base of sand
Flat-lying contact									16.5'-18.0' CLAYEY SILTSTONE: (ML) Light brown-brown, massive, damp
						130	20		18.0'-22.5' SANDY SILTSTONE: (ML) Red brown-brown, mica, slightly porous, damp
						125			22.5'-25.5' SILTY SANDSTONE: (SM) Red brown, fine-grained, friable
							25		25.5'-36.0' CLAYEY SILTSTONE: (ML) Brownish gray-gray, massive, damp
						120	30		Red brown, slightly porous
									Trace fine sands
						115	35		Manganese specks

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Hole Size 24"

Hole No. AH-25

Site Rancho Seco

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-25

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
							35			36.0'-38.0' SILTY SANDSTONE: (SM) Gray brown, fine-medium trace manganese, mica, firm
						110				38.0'-43.5' SILTSTONE: (ML) Light gray, massive vertical white clay streaks Trace white sand
							40			
						105				43.5'-63.5' SANDY SILTSTONE: (ML) Red brown, v -fine- fine sand, massive, slightly porous, hard
							45			
						100				
							50			
						95				
							55			
						90				
							60			Hardness increases to 63.5'
						85				63.5'-70.0' SILTY GRAVEL: (GM) Red brown-brown, well-graded, fine-medium sand, clayey, firm-hard Moist clay seam at 67.0'
							65			
						80				
							70			Bottom of hole 70 ft.
						75				

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Hole Size 24"

Hole No. AH-25

Site Rancho Seco

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-27

PROJECT Rancho Seco ANGLE FROM HORIZ 90° BEARING

LOCATION N247,085 E2,255,395 BEGUN 18 July 67 COMPLETED 19 July 67

OVERBURDEN 1.2 FT DEPTH DRILLED INTO ROCK 68.8 FT TOTAL DEPTH OF HOLE 70 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL Earthdrill Model 36

GROUND ELEV. +214.7 FT HOLE LOGGED BY Fox, Hietbrink DRILLER Myhren Drlg Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Well defined irregular contact							0			0'-1.2' GRAVELLY SILT (GM) Brown, sandy, gravel to 1-1/2" subround-round, moderately firm, dry
Gradational Contact						210	5			1.2'-2.5' GRAVELLY CLAYSTONE (GC) Dark red brown, gravel (20%) to 2", firm, dry
										2.5'-11.5' SANDY SILTSTONE (SM) Brown, dry above 2.7 ft., damp below, scattered pea gravel above 4 ft. Grades to brown-tan, increase sand, less firm near base of zone
						205	10			
Well defined irregular contact: Dips southward 15°										11.6'-18.7' SILTY, SANDY GRAVEL (GM) Brown, fine to coarse-grained, well-graded gravel (75%) to 1 ", friable, damp
						200	15			
Well defined horizontal contact										
Gradational Contact						195	20			18.7'-20.1' SILTY SANDSTONE (SM) Light brown, very fine-fine-grained, poorly graded, moderately firm, damp
										20.1'-43.0' SILTSTONE (ML) Brown, moderately firm, damp, trace manganese
						190	25			
						185	30			
						180	35			

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Hole Size 24"

Hole No. AH-27

Site RANCHO SECO

PROJECT [redacted]

SHEET 2 OF 2

HOLE NO. AH-28

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Uneven contact approx. attitude N80°W, 10-12°S Probably stream channel deposits Uneven contact N75°W, 33°N						150 145 140 135 130 125 120 115	35 40 45 50 55 60 65 70			36.3'-37.0' CLAYEY SILTSTONE: (ML) Red brown, mica, firm, damp 37.0'-41.0' SANDSTONE: (SP) Gray brown, fine-medium, mica; friable, clean, abundant dark grains, grades coarser and slightly cemented towards bottom of zone 41.0'-60.5' SANDY SILTSTONE: (ML) Red brown, massive, porous, larger pores filled with white clay, slightly cemented Earthy 60.5'-70.0' SILTSTONE: (ML) Red brown, slightly porous, moderately firm, damp Bottom of hole 70 ft

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Hole Size 24"

Hole No. AH-28

Site Rancho Seco

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH 30

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 246, 850 E2,252,325 BEGUN 29 June 67 COMPLETED 30 June 67

OVERBURDEN 3.5 ft DEPTH DRILLED INTO ROCK 66.5 ft TOTAL DEPTH OF HOLE 70 ft

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. ± 160.6 ft HOLE LOGGED BY BOCK DRILLER MYHREN DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			160	0		0'-3.5' SILTY SAND AND GRAVEL: (SP-GM) Red brown, v. fine-fine, gravel to 3", subround, dry-damp
									3.5'-8.5' SANDY SILTSTONE: (ML) Red brown, firm, damp
						155	5		
									8.5'-12.3' SILTY SANDSTONE: (SM) Buff-light brown, v. fine-fine, trace dark grains, massive, firm, damp
						150	10		
									12.3'-14.5' INTERBEDDED SANDSTONE AND SILTSTONE: (SM-SP) Gray black-gray brown, fine-medium, clean, damp, red brown siltstone
						145	15		14.5'-17.5' SILTSTONE: (ML) Red brown, firm, damp purple-brown, massive below 16.5'
						140	20		17.5'-29.5' SANDY SILTSTONE: (ML) Red brown, slightly porous, firm, damp, trace mica, carbonaceous specks
						135	25		
									29.5'-31.0' SILTSTONE: (ML) Gray-brown, firm, blocky, brittle, damp
						130	30		31.0'-38.5' SANDY SILTSTONE: (ML) Red brown, fine-medium sand, trace mica, firm, damp, manganese specks, small blocky fragments
							35		

Hole Size 24"

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Hole No. AH 30

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-30

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						125	35		
									38.5'-42.5' SILTY SANDSTONE: (SM) Red brown, v. fine-fine, damp, trace mica, white clay specks
						120	40		
									42.5'-45.8' SANDSTONE: (SP) Gray-brown, fine-medium, trace silt, firm, damp pebbles
						115	45		
									45.8'-48.6' SILTSTONE: (ML) Brown-gray, firm, damp, trace mica
									48.6'-50.5' SANDY SILTSTONE: (ML) Gray brown-red brown, firm, damp-moist, trace mica, seeps
						110	50		
									50.5'-55.7' SILTSTONE: (ML) Gray, firm, closely jointed, seeps on southwest side of hole Soft, white clay streaks
						105	55		
									55.7'-70.0' SANDY SILTSTONE: (SM) Red brown, firm, damp, mica
						100	60		
						95	65		
									287
						90	70		Bottom of hole 70 ft

Hole Size 24"

Hole No. AH-30

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-32

PROJECT RANCHO SECO — ANGLE FROM HORIZ 90° — BEARING

LOCATION N 246,250 E 2,251,720 — BEGUN 30 JUNE67 — COMPLETED 30 JUNE 67=

OVERBURDEN 7.7 FT — DEPTH DRILLED INTO ROCK 37.3 FT — TOTAL DEPTH OF HOLE 45 FT

ELEV. WATER TABLE NONE — NO. CORE BOXES NONE — NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) — FEET — MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. + 143.9 FT — HOLE LOGGED BY BOCK — DRILLER MYHREN DRLG CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Perched water at 5.0' is from pond at tailings pile east of this hole this is not ground water table						140	0		0'-5.0' SANDY GRAVEL: (GW) Red brown-brown, loose, porous, water bearing
							5		5.0'-7.7' CLAYEY GRAVEL: (GC) Saturated
						135	10		7.7'-16.5' SANDSTONE: Gray brown, fine-medium, trace silt, saturated
						130	15		
						125	20		16.5'-24.5' SILTSTONE: (ML) Red brown, trace sand, trace mica, soft, moist
						120	25		24.5'-26.5' SANDSTONE: (SP) Gray brown, fine-medium, trace silt, moderately firm, wet
									26.5'-28.5' CLAYEY SILTSTONE: (ML) Red brown-light brown, moderately firm, moist
						115	30		28.5'-36.0' SANDY SILTSTONE: (ML) Red brown, v. fine-fine sand, moderately firm, moist, mica
						110	35		coarse sand, scattered pebbles

Hole Size 24"

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Hole No. AH-32

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-32

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
							35			36.0'-44.5' CLAYEY SILTSTONE: (ML) Red brown, massive, chunky, mica, moderately firm, moist
						105	40			
						100	45			44.5'-45.0' SANDY SILTSTONE: (ML) Red brown, micaceous, moist
										Bottom of hole 45 ft

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Hole Size 24"

Hole No. AH-32

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-33

PROJECT RANCHO SECO — ANGLE FROM HORIZ 90° — BEARING

LOCATION N 248,030 E 2,253,080 — BEGUN 19 JULY 67 — COMPLETED 21 JULY 67

OVERBURDEN 7.9 FT — DEPTH DRILLED INTO ROCK 62.1 FT — TOTAL DEPTH OF HOLE 71.5 FT

ELEV. WATER TABLE NONE — NO. CORE BOXES NONE — NO. SAMPLES TAKEN 28

CORE RECOVERY (%) 100 — FEET 20.6 — MODEL & MAKE OF DRILL EARTHDRILL MODEL 36

GROUND ELEV. + 179.0 FT — HOLE LOGGED BY FOX, HIETBRINK — DRILLER MYHREN DRILG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.

Odd numbered samples placed in bags

Even numbered samples placed in jars

Irregular contact

Attitude on irregular contact at 18.7': N20° E, 9° S

% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	PENETRATION TOOL	HAMMER WT/LBS	HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
		24 IN. BUCKET AUGER			179	0	1	0'-7.9' SILTY, SANDY, GRAVEL: (GM) Brown, subround-round, to 2" maximum size, fine-coarse sand, clayey below 4.0', firm, dry
100	10, 21, 28	STD. PEN	140	30	175	5	2	
		24 IN. BUCKET AUGER					3	7.9'-16.7' SILTSTONE: (ML) Brown, moderately light weight, firm, damp
100	18, 26, 25	STD. PEN	140	30	170	10	4	
		24 IN. BUCKET AUGER					5	Light brown, lighter weight than above, friable, damp
100	9, 11, 15	STD. PEN	140	30	165	15	6	Brown, firm, damp
		24 IN. BUCKET AUGER					7	16.7'-18.7' SANDSTONE: (SP) Black-brown, v. fine-fine, poorly graded, v. friable, locally silty, slightly damp
100	4, 7, 9	STD. PEN	140	30	160	20	8	18.7'-26.5' SILTSTONE: (ML) Brown, firm, damp
		24 IN. BUCKET AUGER					9	Sandy
100	4, 8, 32	STD. PEN	140	30	155	25	10	
		24 IN. BUCKET AUGER					11	26.5'-57.0' SILTY CLAYSTONE: (CL)
100	11, 23, 34	STD. PEN	140	30	150	30	12	
		24 IN. BUCKET AUGER			145	35	13	

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Hole Size 24", 2"

Hole No. AH-33

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-33

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100	12 22 46	STD. PEN	140	30		35		14	
			24 IN. BUCKET AUGER			140			15	
	100	14 33 50	STD. PEN	140	30		40		16	
			24 IN. BUCKET AUGER			135			17	
	100	12 23 33	STD. PEN	140	30		45		18	
			24 IN. BUCKET AUGER			130			19	
	100	17 27 36	STD. PEN	140	30		50		20	
			24 IN. BUCKET AUGER			125			21	
	100	9 26 50/5"	STD. PEN	140	30		55		22	
			24 IN. BUCKET AUGER			120			23	57.0'-70.0' SILTSTONE: (ML) Moderately firm
	100	13 40 50/2 1/2"	STD. PEN	140	30		60		24	
			24 IN. BUCKET AUGER			115			25	
	100	18 22 30	STD. PEN	140	30		65		26	
			24 IN. BUCKET AUGER			110			27	Increase clay 291
	100	7 15 26	STD. PEN	140	30		70		28	
										Bottom of hole 71.5 ft

Hole Size 24", 2"

Hole No. AH-33

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-34

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 247,290 E 2,2[illegible]3,165 BEGUN 12 July 67 COMPLETED 13 July 67

OVERBURDEN 1.0 FT DEPTH DRILLED INTO ROCK 45.5 FT TOTAL DEPTH OF HOLE 46.5 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 14

CORE RECOVERY (%) 100 FEET 10 MODEL & MAKE OF DRILL EARTHDRILL MODEL [illegible]

GROUND ELEV. + 165.9 FT HOLE LOGGED BY TRANTHAM, FOX DRILLER MYHREN DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	PENETRATION TOOL	HAMMER WT/LBS	HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Odd number samples placed in bags Even numbered samples placed in jars			24 IN. BUCKET AUGER			165	0	1	0'-1.0' SILTY CLAY: (CL) Black-brown, scattered gravel to 2"
	100	14 28 ?	STD. PEN	140	30	160	5	2	1.0'-4.1' SANDY SILTSTONE: (ML) tan, v.fine-fine, scattered gravel to 3/4", compact, dense
			24 IN. BUCKET AUGER					3	4.1'-23.5' SILTSTONE: (ML) Brown, black manganese flecks Light brown, light weight, poorly compacted
	100	11 14 21	STD PEN	140	30	155	10	4	
			24 IN. BUCKET AUGER					5	
	100	18 34 38	STD. PEN	140	30	150	15	6	
			24 IN. BUCKET AUGER					7	Very firm, trace v. fine sand
	100	18 27 40	STD. PEN	140	30	145	20	8	[redacted]
			24 IN. BUCKET AUGER					9	
	100	9 31 44/3"	STD. PEN	140	30	140	25	10	23.5'-26.1' SILTY SANDSTONE: (SM) Brown, v. fine-fine, poorly graded
			24 IN. BUCKET AUGER						26.1'-28.5' SILTY CLAYSTONE: (CL) Dark brown, very firm
						135	30	11	28.5'-45.9' CLAYEY SILTSTONE: (ML) Brown, white clay pockets, between 29.0' and 31.0'
							35		

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Hole No. AH-34

Hole Size 24", 2"

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-3

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100	10 27 28	STD. PEN	140	30		35		12	
			24 IN. BUCKET AUGER				40		13	
	100	21 50/4½"	STD. PEN	140	30		45		14	Bottom of hole 45.9 ft

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Hole Size 24", 2"

Hole No. AH-3

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 1

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-35

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 247,290 E 2,253,165 BEGUN 14 July COMPLETED 14 July 67

OVERBURDEN 4.0 FT DEPTH DRILLED INTO ROCK 22.5 FT TOTAL DEPTH OF HOLE 26.5 FT

ELEV. WATER TABLE None NO. CORE BOXES None NO. SAMPLES TAKEN 10

CORE RECOVERY (%) 100 FEET 7.5 MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. + 165.9 FT HOLE LOGGED BY FOX DRILLER MYHREN DRLG. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Odd numbered samples placed in bags Even numbered samples placed in jars			24 IN. BUCKET AUGER			165	0		0'-1.5' SANDY, SILTY, GRAVEL: (GM) Brown, well graded, subround gravel to 3", fine sand
	100	7 11 14	STD. PEN	140	30	160	5	2	1.5'-4.0' CLAY: (CH) Red brown, scattered gravel to 1", slightly silty
			24 IN. BUCKET AUGER					3	4.0'-8.5' SILTSTONE: (ML) tan, light weight
	100	7 12 15	STD. PEN	140	30	155	10	4	8.5'-11.5' SILTY SANDSTONE: (ML) Brown, v. fine-fine, poorly graded, moderately compact
			24 IN. BUCKET AUGER					5	11.5'-13.7' SILTSTONE: (ML) Brown
	100	13 23 32	STD. PEN	140	30	150	15	6	13.7'-17.4' CLAYEY SILTSTONE: (ML) Dark brown
			24 IN. BUCKET AUGER					7	17.4'-26.5' SILTSTONE: (ML) Tan, compact
	100	9 18 19	STD. PEN	140	30	145	20	8	
			24 IN. BUCKET AUGER					9	
	100	8 16 26	STD. PEN	140	30	140	25	10	
									Bottom of hole 26.5 ft

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Hole Size 24", 2"

Hole No. AH-35

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-36

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 245,580 E 2,254,050 BEGUN 13 JULY 67 COMPLETED 13 JULY 67

OVERBURDEN 1.9 FT DEPTH DRILLED INTO ROCK 44.6 FT TOTAL DEPTH OF HOLE 46.5 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 14

CORE RECOVERY (%) 100 FEET 9.8 MODEL & MAKE OF DRILL EARTHDRILL MODEL 45

GROUND ELEV. + 158.6 FT HOLE LOGGED BY FOX DRILLER MYHREN DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Odd numbered samples placed in bags Even numbered samples placed in jars			24 IN. BUCKET AUGER			155	0		0'-1.0' SILT: (ML) Brown, scattered sand and pea gravel 1.0'-1.9' CLAY: (CL) Red brown 1.9'-46.5' SILTSTONE: (ML) Brown black manganese flecks and staining
	100	27 50/3"	STD. PEN	140	30		5	2	
			24 IN. BUCKET AUGER			150		3	
	100	9 21 50/3¼"	STD. PEN	140	30		10	4	
			24 IN. BUCKET AUGER			145		5	
	100	17 40 50/4½"	STD. PEN	140	30		15	6	
			24 IN. BUCKET AUGER			140		7	
	100	18 30 50/4¾"	STD. PEN	140	30		20	8	
			24 IN. BUCKET AUGER			135		9	
	100	16 30 50/5"	STD. PEN	140	30		25	10	
			24 IN. BUCKET AUGER			130		11	
						125	30 35		

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Hole Size 24", 2"

Hole No. AH-36

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-36

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100	12 26 42	STD. PEN	140	30		35		12	
			24 IN. BUCKET AUGER			120	40		13	
						115				
	100	9 26 43	STD. PEN	140	30		45		14	
										Bottom of hole 46.5 ft

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Hole Size 24", 2"

Hole No. AH-36

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-37

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,832 E 2,252,082 BEGUN 24 Aug 67 COMPLETED 25 Aug 67

OVERBURDEN 1.0 FT DEPTH DRILLED INTO ROCK 69.0 FT TOTAL DEPTH OF HOLE 70.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) FEET MODEL & MAKE OF DRILL EARTHDRILL MODEL 36

GROUND ELEV. +180.2 FT HOLE LOGGED BY CAMPBELL, MACKAY DRILLER MYHREN DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			24 IN. BUCKET AUGER TO TOTAL DEPTH			180	0			0'-1.0' GRAVELLY, SANDY SILT: (GM) Red brown, dry
										1.0'-2.1' SILTY CLAYSTONE: (CL) Gray brown, firm, dry
										2.1'-5.5' SILTY SANDSTONE: (SM) Brown, medium firm, mica
						175	5			5.5'-7.7' SANDSTONE: (SP) Gray, fine-coarse, firm, damp, v. micaceous
										7.7'-20.0' SILTY CLAYSTONE: (CL) Chocolate brown, v. firm, brittle, root holes, manganese-stained, mica
						170	10			
										20.0'-24.0' CLAYEY, SILTY, SANDSTONE: (SM) Gray brown, firm, increase worm and root holes, abundant manganese staining Below 21.0': gray-gray brown, v. fine, white clay flecks, less manganese staining
						165	15			
Gradational contact										
						160	20			24.0'-29.5' SILTY SANDSTONE: (SM) Gray, v. fine-fine, firm, damp 26.5' Silty, medium, friable, medium firm 27.8' Black, medium coarse, trace pumice, friable, damp 28.5' V. black, v. coarse, above uneven contact; below: brown-gray, fine-medium (inverted bedding)
						155	25			
At 29.5'-erosional contact N40°W, 11°S										
						150	30			29.5'-48.0' CLAYEY, SILTY SANDSTONE: (SM) Manganese-stained, worm & root holes, v. micaceous, firm, damp 33.0' Light brown-brown, abundant silty, fine sand 34.5' Increase silt
							35			

Hole Size 24"

Hole No. AH-37

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. AH-37

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						145	35		35.0' Red brown, v. clayey, root holes, v. firm, mica
						140	40		43.0' Brown, more sandy, v. micaceous
						135	45		
						130	50		48.0'-57.5' CLAYEY SILTSTONE: (ML) Brown, firm, root holes, damp, trace manganese staining 50.0' Grades to dark brown, brittle, white clay & anhydrous opal streaks, firm 53.0' Light brown, more clayey, slightly firm, damp 56.0' Medium brown, not brittle, sandy
						125	55		
Irregular contact - at 60.7'						120	60		57.5'-59.0' SILTY SANDSTONE: (SM) Mottled gray brown; fine-medium at 59.0' 59.0'-60' SANDY SILTSTONE: (ML) Brown, medium firm, damp 60.0'-60.7' SANDSTONE: (SP) Black, fine-medium, friable, mica
						115	65		60.7'-70.0' SANDY SILTSTONE: (ML) Medium brown, firm 65.0' Brown, firm, manganese-stained, damp
						110	70		Bottom of hole 70 ft

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Hole Size 24"

Hole No. AH-37

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-38

PROJECT Rancho Seco ANGLE FROM HORIZ 90° BEARING —

LOCATION N 247,752 E 2, 252,125 BEGUN 24 Aug 67 COMPLETED 24 Aug 67

OVERBURDEN 4.6 FT DEPTH DRILLED INTO ROCK 65.4 FT TOTAL DEPTH OF HOLE 70.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) — FEET — MODEL & MAKE OF DRILL Earthdrill Model 36

GROUND ELEV. +157.7 FT HOLE LOGGED BY Mackay, Campbell DRILLER Myhren Drlg. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
4.1'-4.6' Gradational contact Contact N30°E, 23-26°S Gradational contact			24 IN. BUCKET AUGER TO TOTAL DEPTH			155 150 145 140 135 130 125	0 5 10 15 20 25 30 35		0'-2.5' GRAVELLY SILT: (GM) Red brown, pebbles to 4", moderately firm, dry 2.5'-4.6' CLAY: (CH) Dark red brown, scattered gravel to 2", moist, plastic 4.6'-7.9' SILTSTONE: (ML) Light tan-brown, scattered sand and pea gravel, iron-stained, firm, dry, massive-weakly bedded 7.9'-10.3' SILTY SANDSTONE: (SM) Dark red brown-dark gray, v. fine-fine, trace clay, moderately firm, massive, dry-slightly damp 10.3'-70.0' SANDY, CLAYEY SILTSTONE: (ML) Light-red brown, massive, firm, dry 11.0' damp Below 11.5' dark red brown, damp, moderately firm Below 20.0': slightly firm, no root casts or inclusions 27.7'-29.5': interlaced with white brittle clay material, locally quite firm, black manganese staining 32.0' firm, increased clay, dry White clay streaks

Hole Size 24"

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Hole No. AH-38

Site Rancho Seco

PROJECT Rancho Seco

SHEET 2 OF 2

HOLE NO. AH-38

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						120	35		Moderately firm
							40		Slightly damp
						115			
							45		
						110			Medium brown
							50		Firm-very firm
						105			
							55		
						100			
							60		
						95			
							65		
						90			
							70		Bottom of hole 70 ft
						85			

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Hole Size 24"

Hole No. AH-38

Site Rancho Seco

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. AH-39

PROJECT Rancho Seco ANGLE FROM HORIZ 90° BEARING —

LOCATION N 248,765 E2,253,316 BEGUN 25 Aug 67 COMPLETED 25 Aug 67

OVERBURDEN 10 FT DEPTH DRILLED INTO ROCK 69.0 FT TOTAL DEPTH OF HOLE 70.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN NONE

CORE RECOVERY (%) — FEET — MODEL & MAKE OF DRILL Earthdrill Model 36

GROUND ELEV. +177.2 FT HOLE LOGGED BY Campbell, Mackay DRILLER Myhren Drlg. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						175	0			0'-1.0' GRAVELLY SANDY SILT: (GM) Red brown, dry
										1.0'-2.3' SANDSTONE: (SP) Gray, clayey, v. firm, dry, 1/2" plastic clay at 1.5'
Horizontal contact							5			2.3'-4.3' SILTY SANDSTONE: (SM) light brown, v. firm damp
						170				4.3'-14.1' SANDSTONE: (SP) Black, fine-coarse, variegated, mica, friable massive, damp
							10			Medium to coarse-grained
						165				Contact at 14.1 ft.
							15			Brownish black, friable
Southerly dip						160				17.1'-44.7' SILTSTONE: (ML) Red brown, sandy, moderately firm, damp-moist, mica at 19.0 ft, brittle, root holes, trace manganese
							20			Firm, root holes
						155				
							25			Moderately firm, trace white clay
						150				
							30			Firm, increase manganese, vugs, brittleness, decrease sand
						145				Moderately firm, less white clay
							35			

Hole Size 24"

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Hole No. AH-39

Site Rancho Seco

PROJECT Rancho Seco

SHEET 2 OF 2

HOLE NO. AH-39

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Horizontal contact						140 135 130 125 120 115 110 105	35 40 45 50 55 60 65 70		Brown, brittle, clayey, less manganese Brown, sandy, trace clay, manganese-stained, medium firm Sandy 44.7'-48.5' SANDSTONE: (SP) Brown-black, variegated grains fine-coarse, pumice, mica friable, damp 48.5'-70.0' SILTSTONE: (ML) Gray brown, sandy, clayey, brittle, locally quite firm, below 50.0': clayey, brittle Internal slicks, brittle clayey Root holes replaced with white silica Clayey, Red brown, v. brittle, manganese stained Bottom of hole 70 ft

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Hole Size 24"

Hole No. AH-39

Site Rancho Seco

BECHTEL CORPORATION

SHEET 1 OF 3

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH101

PROJECT Rancho Seco ANGLE FROM HORIZ 90° BEARING —

LOCATION N247,715 E2,253,065 BEGUN 7 July 67 COMPLETED 13 July 67

OVERBURDEN 2.0 FT DEPTH DRILLED INTO ROCK 112.0 FT TOTAL DEPTH OF HOLE 114.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 14

CORE RECOVERY (%) 83 FEET 22.1 FT MODEL & MAKE OF DRILL Portadrill

GROUND ELEV. +174.2 HOLE LOGGED BY Elston, Flores-Munoz DRILLER Boyles Bros. Drlg. Co.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drilled with compressed air			4 1/4 IN. ROCK BIT			170	0		0'-2.0' SILTY, SANDY, GRAVEL: (GM) Brown
							5		2.0'-10.0' SILTY SANDSTONE: (SM) Brown, fine-grained
						165	10		
	64		3 1/2 IN. PITCHER SAMPLER					1	10.0'-60.0' SANDY SILTSTONE: (SM) Gray, firm
			4 1/4 IN. ROCK BIT			160	15		
						155	20		Gray-brown, trace clay
	80		3 1/2 IN. PITCHER SAMPLER					2	
			4 1/4 IN. ROCK BIT			150	25		
						145	30		Brown, firm, v. fine grained sand
	56		3 1/2 IN. PITCHER SAMPLER					3	
						140	35		

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH 101

Site Rancho Seco

PROJECT Rancho Seco

SHEET 2 OF 3

HOLE NO. DH 101

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			4 1/4 IN. ROCK BIT				35		
						135	40		
	88		3 1/2 IN. PITCHER SAMPLER					4	
			4 1/4 IN. ROCK BIT			130	45		
						125	50		
	72		3 1/2 IN. PITCHER SAMPLER					5	
			4 1/4 IN. ROCK BIT			120	55		
						115	60		
Drills hard at 62.2' difficulty removing tools	80		3 1/2 IN. PITCHER SAMPLER					6	60.0'-69.0' SILTY SANDSTONE: (SM) Brown, v. fine-fine, poorly graded
			4 1/4 IN. ROCK BIT			110	65		
						105	70		
	72		3 1/2 IN. PITCHER SAMPLER					7	69.0'-80.0' SILTY CLAYSTONE: (CL) Brown, slightly firm, plastic, trace sand and gravel to 3/8"
Commence using drilling mud: (Quick-gel + fresh water)						100	75		

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH 101

Site Rancho Seco

PROJECT Rancho Seco

SHEET 3 OF 3

HOLE NO. DH 101

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			4 1/4 IN. ROCK BIT			95	75		
	100		3 1/2 IN. PITCHER SAMPLER				80	8	80.0'-93.3' SANDSTONE: (SP-SW) Brown, medium-coarse, scattered gravel to 1" above 85.0 ft
			4 1/4 IN. ROCK BIT			90			
	100	84	STD. PEN	140	30		85	9	
Slow drilling			4 1/4 IN. ROCK BIT			85	90		
	100		3 1/2 IN. PITCHER SAMPLER					10	93.3'-102.0' SILTY SANDSTONE: (SM) Brown, very fine, slightly plastic, compact
			4 1/4 IN. ROCK BIT			80	95		
	100	48 REFUSAL	STD. PEN	140	30			11	
			4 1/2 IN. ROCK BIT			75	100		Gradational contact
	100		3 1/2 IN. PITCHER SAMPLER					12	102.0'-112.0' SANDSTONE: (SP) Brown, grading from coarse at top to v. fine at 112.0 ft, mica
			4 1/2 IN. ROCK BIT			70	105		
	100	50/2"	STD. PEN	140	30			13	
			4 1/2 IN. ROCK BIT			65	110		305
	100		3 1/2 IN. PITCHER SAMPLER					14	112.0'-114.0' SILTY SANDSTONE: (SM) Brown-dark brown, very fine, damp-slightly moist
						60			Bottom of hole 114 ft

Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH 101

Site Rancho Seco

BECHTEL CORPORATION

SHEET 1 OF 3

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH-1?2

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,372 E 2,252,832 BEGUN 26 JULY 67 COMPLETED 2[illegible] JULY 67

OVERBURDEN 5.0 + FT DEPTH DRILLED INTO ROCK 96.5 FT TOTAL DEPTH OF HOLE 101.[illegible] FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 27

CORE RECOVERY (%) 95 FEET 29.3 MODEL & MAKE OF DRILL PORTA DRILL

GROUND ELEV. + 164.7 FT HOLE LOGGED BY FLORES-MUNOZ DRILLER BOYLES BROS. DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drilled with compressed air Drill time=28 min. from 0-10 ft			4 1/4 IN. ROCK BIT			160	0 5		0'-11.0' SILTY, SANDY, GRAVEL: (GP) Brown, very fine sand, gravel to 1", grades to firm, damp
	100		3 1/2 IN. PITCHER SAMPLER			155	10		
Drill time=15 min. from 12-15 ft			4 1/4 IN. ROCK BIT						11.0'-20.0' SANDSTONE: (SP) Red brown, very fine, firm, damp
15.0'-15.6': Lost sample	0	44 50/1"	STD. PEN	140	30	150	15	2	
Slow drilling			4 1/4 IN. ROCK BIT			145	20		
	100		3 1/2 IN. PITCHER 4 1/4 IN. ROCK BIT					3	20.0'-23.3' SILTY SANDSTONE: (SM) Brown, very fine, slightly plastic, damp
	100	25 40 50/4"	STD. PEN	[illegible]	30			4	
			4 1/4 IN. ROCK BIT			140	25		23.3'-101.5' SANDSTONE: Brown, dense, damp
	100	48 50/1"	STD PEN	140	30			5	
			4 1/4 IN. ROCK BIT			135	30		
	100		3 1/2 IN. PITCHER SAMPLER					6	
	100	50 50/4"	STD PEN	140	30			7	
			4 1/4 IN. ROCK BIT			130	35		

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Hole Size 2", 3 1/2", 4 1/4"

Hole No. DH 2

Site RANCHO SECO

PROJECT RANCHO SECO

HOLE NO. DH-102

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG: SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
							35		
	100	46	STD. PEN	140	30			8	silty, clayey, dense (SM-ML)
			4 1/4 IN. ROCK BIT			125			Brown, very fine-grained, damp (SP)
	100		3 1/2 IN. PITCHER SAMPLER				40	9	
	100	48	STD PEN	140	30			10	Micaceous, damp
			4 1/4 IN. ROCK BIT			120	45		
	100	43	STD PEN	140	30			11	Micaceous, damp
			4 1/4 IN. ROCK BIT			115	50		Hard, damp
	100		3 1/2 IN. PITCHER SAMPLER					12	
	100	50	STD. PEN	140	30			13	
			4 1/4 IN. ROCK BIT			110	55		
	100	50/5"	STD. PEN	140	30			14	Compact, dry
			4 1/4 IN. ROCK BIT			105	60		Brown, very fine grained, locally friable, damp
	100		3 1/2 IN. PITCHER SAMPLER					15	
62.0'-62.3': Lost sample	0	50/4"	STD. PEN	140	30			16	Hard
			4 1/4 IN. ROCK BIT			100	65		
	100	50	STD. PEN	140	30			17	Brown, firm, damp
			4 1/4 IN. ROCK BIT			95	70		
	100		3 1/2 IN. PITCHER SAMPLER					18	
	100	50/1"	STD. PEN	140	30			19	Brown, very fine-grained, firm, damp
			4 1/4 IN. ROCK BIT			90	75		

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Hole Size 2", 3 1/2", 4 1/4"

Hole No. DH-102

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 3 OF 3

HOLE NO. DH-1,2

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100	50/5"	STD.PEN	140	30		75	20	Red brown, v. fine to fine-grained, silty, hard, damp (SM-ML)
			4 1/4 IN. ROCK BIT			85			
	100		3 1/2 IN. PITCHER SAMPLER				80	21	Brown, silty, dense, damp
	100	50/4"	STD.PEN	140	30			22	Brown, very fine-fine, hard, damp (SP)
			4 1/4 IN. ROCK BIT			80	85		
87.0'-87.3': Lost sample	0	50/4"	STD.PEN	140	30			23	
			4 1/4 IN. ROCK BIT			75	90		
	100		3 1/2 IN. PITCHER SAMPLER					24	
	100	88/11"	STD. PEN		30			25	Brown very fine to medium-grained, friable, damp
			4 1/4 IN. ROCK BIT			70	95		
97.0'-97.4': Lost sample	0	50/5"	STD.PEN	140	30			26	
			4 1/4 IN. ROCK BIT			65	100		
	100		3 1/2 IN. PITCHER SAMPLER					27	Friable, damp
									Bottom of hole 101.5 ft

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Hole Size 2", 3 1/2", 4 1/4"

Hole No. DH 1,2

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 3

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH-103

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,241 E 2,252,995 BEGUN 18 JULY 67 COMPLETED 24 JULY 67

OVERBURDEN 3.0 FT DEPTH DRILLED INTO ROCK 99.0 FT TOTAL DEPTH OF HOLE 102.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 28

CORE RECOVERY (%) 88 FEET 37.3 MODEL & MAKE OF DRILL PORTADRILL

GROUND ELEV. +170.5 FT HOLE LOGGED BY FLORES-MUNOZ DRILLER BOYLES BROS. DRL. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drilled with compressed air			4 1/4 IN. ROCK BIT			170	0			0'-3.0' GRAVEL: (GP) Brown, silty, sandy, gravel to 1"
							5			3.0'-9.5' SANDSTONE: (SW) Brown, v. fine-coarse
	100		3 1/2 IN. PITCHER SAMPLER			165	10		1	9.5'-15.0' SILTY SANDSTONE: (SM) Red-brown, micaceous, trace manganese, damp, locally silty and clayey
	100	30 36 34 40	STD. PEN	140	30	160			2	
			4 1/4 IN. ROCK BIT				15			
	100		3 1/2 IN. PITCHER SAMPLER			155			3	15.0'-21.2' SILTY CLAY: (CL) Brown, slightly sandy
	100	13 41 60	STD. PEN	140	30				4	
			4 1/4 IN. ROCK BIT				20			
	100		3 1/2 IN.			150			5	
	100	30 50/2"	STD. PEN	140	30				6	21.2'-25.0' SANDSTONE: (SP) Brown, very fine-medium, micaceous, dry
			4 1/4 IN. ROCK BIT							
	100		3 1/2 IN.			145	25		7	25.0'-35.0' SILTY CLAY: (CL) Red brown, micaceous, damp
	100	18 26 50/2"	STD. PEN	140	30				8	
			4 1/4 IN. ROCK BIT							
	100		3 1/2 IN. PITCHER SAMPLER			140	30		9	
	100	13 29 50	STD. PEN	140	30				10	Trace manganese
			4 1/4 IN. ROCK BIT				35			

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Hole Size 2", 3 1/2", 4 1/4"

Hole No. DH-103

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 3

HOLE NO. D[illegible]

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100		3 1/2 IN. PITCHER SAMPLER			135	35	11	35.0'-43.0' SILTY SANDSTONE: (SM) Brown, very fine-grained, damp, trace mica, manganese
	100	23 47 50/5"	STD. PEN	140	30			12	
38.4'-40.0': Drill time=17 minutes			4 1/4 IN. ROCK BIT						
40.0'-42.0': Lost sample	0		3 1/2 IN. PITCHER SAMPLER			130	40	13	Brown-dark brown
	100		3 1/2 IN. PITCHER SAMPLER					14	
	100	32 50/1"	STD. PEN	140	30			15	43.0'-55.0' SANDSTONE: (SP) Brown, very fine-grained, dense, damp
			4 1/4 IN. ROCK BIT						
	100		3 1/2 IN. PITCHER SAMPLER			125	45	16	
	100	50 50	STD. PEN	140	30			17	Micaceous, trace manganese
			4 1/4 IN. ROCK BIT						
	0		3 1/2 IN. PITCHER SAMPLER			120	50	18	
Slow drilling			4 1/4 IN. ROCK BIT						
	100		3 1/2 IN. PITCHER SAMPLER			115	55	19	55.0'-78.0' SILTY SANDSTONE: (SM) Brown, very dense, micaceous, manganese flecks, dry
	100	37 50/4"	STD. PEN	140	30			20	Slightly damp
			4 1/4 IN. ROCK BIT						
	100		3 1/2 IN. PITCHER SAMPLER			110	60	21	
			4 1/4 IN. ROCK BIT			105	65		
	100		3 1/2 IN. PITCHER SAMPLER			100	70	22	
							75		

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Hole Size 2", 3 1/2", 4 1/4"

Hole No. D[illegible]

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 3 OF 3

HOLE NO. DH-103

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100	46 / 50	STD PEN	140	30	95	75		23	
			4 1/4 IN. ROCK BIT							78.0'-80.5' SILTY CLAY: (CL) Brown, damp
	100		3 1/2 IN. PITCHER			90	80		24	80.5'-85.0' SILTY, CLAYEY GRAVEL: (GM) Brown, gravel to 1", dense, moist
			4 1/4 IN. ROCK BIT							
	100	46 / 50/4"	STD. PEN	140	30	85	85		25	85.0'-89.0' SILTY GRAVEL: (GM) Brown, gravel to 1", dense, damp
			4 1/4 IN. ROCK BIT							
										89.0'-91.0' SILTY CLAY: (CL) Brown, dense, plastic
	100		3 1/2 IN. PITCHER SAMPLER			80	90		26	91.0'-99.5' SANDSTONE: (SP) Brown, very fine, friable, damp
			4 1/4 IN. ROCK BIT							
95.0'-96.0': Lost sample	0	50 / 50	STD. PEN	140	30	75	95		27	
			4 1/4 IN. ROCK BIT							
	100		3 1/2 IN. PITCHER SAMPLER			70	100		28	99.5'-102.0' SILTY CLAY: (CL) Brown, damp, grades to silty sand (SM)
										Bottom of hole 102 ft

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Hole Size 2", 3 1/2", 4 1/4"

Hole No. DH-103

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 3

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DE-104

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,205 E 2,252,500 BEGUN 31 JULY 67 COMPLETED 2 AUGUST 67

OVERBURDEN 13.0 FT DEPTH DRILLED INTO ROCK 102.2 FT TOTAL DEPTH OF HOLE 115.2 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 10

CORE RECOVERY (%) 76 FEET 25.2 FT MODEL & MAKE OF DRILL PORTADRILL

GROUND ELEV. + 174.2 FT HOLE LOGGED BY FOX DRILLER BOYLES BROS. DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			4 1/4 IN. ROCK BIT			170	0		0'-13.0' SILTY GRAVEL: (GM) Brown, gravel to 2", sub-round, firm, dry at top
	0		3 1/2 IN. PITCHER SAMPLER				5		
			4 1/4 IN. ROCK BIT			165	10		
	0	46 57	STD. PEN	140	30	160	15		13.0'-19.0' SANDSTONE: (SP) Brown-black, very fine to fine grained, poorly graded
			4 1/4 IN. ROCK BIT			155	20	1	19.0'-80.0' SILTSTONE: (ML) Brown, scattered sand and sub-rounded gravel
	100		3 1/2 IN. PITCHER SAMPLER						
	0	16 48 50/3"	STD. PEN	140	30	150	25		
			4 1/4 IN. ROCK BIT			145	30	2	
	100		3 1/2 IN. PITCHER SAMPLER						
	0	14 45 50/2"	STD. PEN	140	30	140	35		
			4 1/4 IN. ROCK BIT						

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Hole Size 2", 3 1/2", 4 1/4"

Hole No. DE-104

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 3

HOLE NO. DH-104

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100	17 50/4"	STD. PEN	140	30		35		Brown, scattered sand and gravel, firm, damp
			4 1/4 IN. ROCK BIT			135			
	70		3 1/2 IN. PITCHER SAMPLER				40	3	
	100	49 50/4"	STD. PEN	140	30				
						130	45		
			4 1/4 IN. ROCK BIT						
						125	50	4	Brown, firm, damp, white silica root fillings, clayey
	75		3 1/2 IN. PITCHER SAMPLER						
	100	46 50/5"	STD. PEN	140	30				Light tan, very light weight
						120	55		
						115	60	5	Brown, clayey, trace manganese
	100		3 1/2 IN. PITCHER SAMPLER						
	100	36 50	STD. PEN	140	30				
						110	65		
						105	70	6	Brown, trace fine-grained sand, firm, damp
	85		3 1/2 IN. PITCHER SAMPLER						
	100	24 25 34	STD. PEN	140	30				
						100	75		

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Hole Size 2", 3 1/2", 4 1/4"

Hole No. DH-104

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 3 OF 3

HOLE NO. D[illegible]4

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			4 1/4 IN. ROCK BIT			95	75 80		
	90		3 1/2 IN. PITCHER SAMPLER					7	80.0'-108.0' SANDY SILTSTONE-SILTY SANDSTONE: (ML-SM) Brown, very fine-grained, poorly graded, scattered coarse-grained sand and pea gravel
	100	16 50/4"	STD. PEN	140	30	90	85		
			4 1/4 IN. ROCK BIT			85	90		
	100		3 1/2 IN. PITCHER SAMPLER					8	Below 90.0', Clayey, with white silica root fillings
	100	51/6"	STD. PEN	140	30	80	95		
			4 1/4 IN. ROCK BIT						
	85		3 1/2 IN. PITCHER SAMPLER			75	100	9	
	100	50/4"	STD. PEN	140	30				
			4 1/4 IN. ROCK BIT			70	105		
	85		3 1/2 IN. PITCHER SAMPLER			65	110	10	108.0'-115.2' SANDSTONE: (SP) Brown-gray, very fine to fine-grained, poorly graded, subangular to subround, clean, quartzitic
			4 1/4 IN. ROCK BIT			60	115		
	100	50/2"	STD. PEN	140	30				Bottom of hole 115.2'

Hole Size 2", 3 1/2", 4 1/4"

Hole No. D[illegible]4

Site RANCHO SECO

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BECHTEL CORPORATION

SHEET 1 OF 3

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH-105

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248, 235 E 2,252,700 BEGUN 20 JULY 67 COMPLETED 25 JULY 67

OVERBURDEN 2.0 FT DEPTH DRILLED INTO ROCK 100.0 FT TOTAL DEPTH OF HOLE 102.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 39

CORE RECOVERY (%) 98 FEET 50.4 MODEL & MAKE OF DRILL PORTADRILL

GROUND ELEV. +164.0 FT HOLE LOGGED BY FLORES-MUNOZ DRILLER BOYLES BROS. DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			4 1/4 IN. ROCK BIT			160	0			0'-2.0' SANDY GRAVEL: (GP) Brown, gravel to 1", silty, dry
							5			2.0'-6.5' GRAVELLY SANDSTONE: (SW)
	100		3 1/2 IN. PITCHER SAMPLER						1	6.5'-17.0' SANDSTONE: (SP) Brown, very fine-grained, friable, damp
	100	8 26	STD. PEN	140	30	155	10		2	
	100		PITCHER						3	
			4 1/4 IN. ROCK BIT							
	100	15 18 20	STD. PEN	140	30				4	
			4 1/4 IN. ROCK BIT			150	15			
	100		3 1/2 IN. PITCHER SAMPLER						5	Brown, very firm, dry
	100	44 50/4"	STD. PEN	140	30				6	17.0'-35.0' SILTY SANDSTONE: (SM) Brown, very fine-to fine-grained, locally dense, damp
			4 1/4 IN. ROCK BIT			145	20			
	100		3 1/2 IN. PITCHER SAMPLER						7	Dense
	100	60	STD. PEN	140	30				8	
			4 1/4 IN. ROCK BIT			140	25			
	100		3 1/2 IN. PITCHER SAMPLER						9	
	100	33 50/4"	STD. PEN	140	30				10	
			4 1/4 IN. ROCK BIT			135	30			
	100		3 1/2 IN. PITCHER SAMPLER						11	
	100	37 50	STD. PEN	140	30				12	Local silty clay
			4 1/4 IN. ROCK BIT			130	35			

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-105

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 3

HOLE NO. DH-105

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100		3 1/2 IN. PITCHER SAMPLER				35		13	35.0'-40.0' SANDSTONE: (SP) Red brown, very fine-grained, dense, locally friable, slightly damp, micaceous, trace manganese
	100	48 50/4"	STD. PEN	140	30				14	
			4 1/4 IN. ROCK BIT			125				
	100		3 1/2 IN. PITCHER SAMPLER				40		15	40.0'-42.0' SILTY SANDSTONE: (SM) Red brown, very fine-grained, dense, slightly damp, slightly plastic
	100	3[illegible] [illegible]	STD. PEN	140	30				16	
			4 1/4 IN. ROCK BIT			120				42.0'-47.8' SANDSTONE: (SP) Brown, scattered white, very fine-grained, very firm, damp trace white clay Red brown, fine to medium-grained, very firm, dry
	100		3 1/2 IN. PITCHER SAMPLER				45		17	
	100	50/4"	STD. PEN	140	30				18	
			4 1/4 IN. ROCK BIT			115				47.8'-55.0' SILTY SANDSTONE: (SM) Red brown, very fine to coarse-grained, dense, damp
	100		3 1/2 IN. PITCHER SAMPLER				50		19	
	100	36 25 39	STD. PEN	140	30				20	
			4 1/4 IN. ROCK BIT			110				
	100		3 1/2 IN. PITCHER SAMPLER				55		21	55.0'-57.0' SILTY CLAYSTONE: (CL) Brown, dense, moderately plastic
	100	41 50	STD. PEN	140	30				22	57.0'-60.0' SANDSTONE: (SP) Red Brown, very fine-grained, micaceous
			4 1/4 IN. ROCK BIT			105				
	100		3 1/2 IN. PITCHER SAMPLER				60		23	60.0'-66.0' GRAVELLY SANDSTONE: (SP-GP) Brown, coarse sand, gravel to 1", moist
	0	72/5"	STD. PEN	140	30				24	
			4 1/4 IN. ROCK BIT			100				Scattered gravel to 1"
	100		3 1/2 IN. PITCHER SAMPLER				65		25	
	100	70	STD. PEN	140	30				26	66.0'-86.0' SANDSTONE: (SP) Brown, very fine to medium-grained, dense
			4 1/4 IN. ROCK BIT			95				
	100		3 1/2 IN. PITCHER SAMPLER				70		27	
	100	50/4"	STD. PEN	140	30				28	Brown, very fine-grained, dense
			4 1/4 IN ROCK BIT			90	75			

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-105

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 3 OF 3

HOLE NO. DH-105

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVER.	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT./LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100		3 1/2 IN. PITCHER SAMPLER				75		29	Brown, very fine to medium-grained, locally friable, damp
	100	N G.	STD.PEN	140	30				30	
			4 1/4 IN. ROCK BIT			85				Medium to coarse-grained, friable, dry
	100		3 1/2 IN. PITCHER				80		31	
	100	50	STD.PEN	140	30				32	Coarse-grained, scattered gravel to 1"
			4 1/4 IN. ROCK BIT			80				Red brown with abundant white clay
	100		3 1/2 IN. PITCHER				85		33	V. fine-grained, dense, dry
	100	53	STD.PEN	140	30				32	86.0'-86.5' SILTY CLAYSTONE: (CL) Brown, scattered gravel to 1"
			4 1/4 IN. ROCK BIT			75				86.5'-90.0' SILTY SANDSTONE: (SM) Brown, v. fine-grained, damp, micaceous
	100		3 1/2 IN. PITCHER				90		35	
	100	50	STD.PEN	140	30				36	
			4 1/4 IN. ROCK BIT			70				90.0'-100.0' SANDSTONE: (SP) Gray, very fine-grained, friable, damp
	100		3 1/2 IN. PITCHER SAMPLER				95		37	
	0	50	STD.PEN	140	30				38	
			4 1/4 IN. ROCK BIT			65				
	100		3 1/2 IN. PITCHER SAMPLER				100			100.0'-102.0' SILTY SANDSTONE: (SM) Brown-gray, friable, damp
						60				Bottom of hole 102 ft

317

Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-105

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 3

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH-106

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 248,020 E 2,252,440 BEGUN 2 AUGUST 67 COMPLETED 3 AUGUST 67

OVERBURDEN 9.0 FT DEPTH DRILLED INTO ROCK 93.3 FT TOTAL DEPTH OF HOLE 102.3 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 10

CORE RECOVERY (%) 78 FEET 21.2 MODEL & MAKE OF DRILL PORTADRILL

GROUND ELEV. + 170.3 FT HOLE LOGGED BY FOX DRILLER BOYLES BROS. DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drilled with compressed air			4 1/2 IN. ROCK BIT			170	0		0'-9.0' SILTY GRAVEL: (GM) Brown, dry at top
						165	5		
	55		3 1/2 IN. PITCHER SAMPLER			160	10	1	9.0'-52.5' SILTSTONE: (ML) Light brown, firm, light weight, damp, non-plastic
	100	50/6"	STD. PEN	140	30				
			4 1/4 IN. ROCK BIT			155	15		
	65		3 1/2 IN. PITCHER SAMPLER			150	20	2	Brown, firm, damp, non-plastic
	100	30 50/5"	STD. PEN	140	30				
			4 1/4 IN. ROCK BIT			145	25		
30.0'-32.0' No recovery due to caved gravel wedged between tube and barrel	0		3 1/2 IN. PITCHER SAMPLER			140	30		
32.0'-34.0' Disturbed removing sample from tube	65		3 1/2 IN. PITCHER SAMPLER					3	
	100	50/6"	STD. PEN	140	30		35		

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-106

Site RANCHO SECO

PROJECT RANCHO SECO

HOLE NO. DH-106

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			4 1/4 IN. ROCK BIT			135	35		Brown, firm, damp, non-plastic
	80		3 1/2 IN. PITCHER SAMPLER			130	40	4	
	100	50/6"	STD. PEN	140	30				
			4 1/4 IN. ROCK BIT			125	45		
	80		3 1/2 IN. PITCHER SAMPLER			120	50	5	
	100	48/50	STD. PEN	140	30				52.5'-60.0' SANDSTONE: (SP) Brown, fine-grained, poorly graded, clean, damp
			4 1/4 IN. ROCK BIT			115	55		
	80		3 1/2 IN. PITCHER SAMPLER			110	60	6	60.0'-78.0' CLAYEY SILTSTONE: (ML) Brown, trace manganese
	100	50	STD. PEN	140	30				
			4 1/4 IN. ROCK BIT			105	65		
	90		3 1/2 IN. PITCHER SAMPLER			100	70	7	
	100	50/4"	STD. PEN	140	30		75		

319

Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-1

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 3 OF 3

HOLE NO. DH-106

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
			4 1/4 IN. ROCK BIT			95	75		
	100		3 1/2 IN. PITCHER SAMPLER			90	80	8	78.0'-90.0' SANDY SILTSTONE: (ML) Brown, scattered coarse sand and pea gravel, firm, damp
	100	50	STD.PEN	140	30				
			4 1/4 IN. ROCK BIT			85	85		
	90		3 1/2 IN. PITCHER SAMPLER			80	90	9	90.0'-98.0' CLAYEY SILTSTONE: (ML) Brown, firm, damp
	100	50/4"	STD.PEN	140	30				
			4 1/4 IN. ROCK BIT			75	95		
	90		3 1/2 IN. PITCHER SAMPLER			70	100	10	98.0'-102.3' SANDSTONE: (SP) Brown-gray, v. fine to fine-grained, subangular-subround, quartzitic, poorly graded, firm, damp
	100	50/4"	STD.PEN	140	30				
									Bottom of hole 102.3 ft.

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-106

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH-107

PROJECT RANCHO SECO ANGLE FROM HORIZ 90° BEARING

LOCATION N 247,570 E 2,253,215 BEGUN 17 JULY 67 COMPLETED 18 JULY 67

OVERBURDEN 10.5 FT DEPTH DRILLED INTO ROCK 51.5 FT TOTAL DEPTH OF HOLE 62.0 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 11

CORE RECOVERY (%) 100 FEET 19.0 MODEL & MAKE OF DRILL PORTADRILL

GROUND ELEV. + 164.6 HOLE LOGGED BY FLORES-MUNOZ DRILLER BOYLES BROS. DRLG. CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drilled with compressed air 1.0'-10.0': 37 minute drill time			4 1/4 IN. ROCK BIT			160	0 5			0'-10.5' SANDY GRAVEL: (GP) Brown, 1" maximum size Very fine-grained to 1" gravel
11.5'-15.0': 15 minute drill time	100		3 1/2 IN. PITCHER SAMPLER 4 1/4 IN. ROCK BIT			155 150	10 15		1	10.5'-30.0' SANDSTONE: (SP) Red brown, very fine-grained, trace mica, dry
17.0'-20.0': 30 minute drill time	100	19 20 1	STD. PEN	140	30				2	Micaceous, trace manganese
	100		4 1/4 IN. ROCK BIT 3 1/2 IN. PITCHER SAMPLER 4 1/4 IN. ROCK BIT			145 140	20 25		3	Very fine to medium-grained, micaceous, trace manganese, trace white clay, dry
27.0'-30.0': 25 minute drill time	100	18 22 16 18	STD. PEN	140	30				4	321
	100		4 1/4 IN. ROCK BIT 3 1/2 IN. PITCHER SAMPLER 4 1/4 IN. ROCK BIT			135 130	30 35		5	30.0'-35.0' SILTY CLAY: (CL) Red brown, plastic, damp

Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-107

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. DH-107

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
36.0'-40.0': 20 minute drill time	100	40/61	STD. PEN	140	30		35		6	35.0'-40.0' SILTY SANDSTONE: (SM) Brown, very fine-grained, micaceous
			4 1/4 IN ROCK BIT			125	40			
42.0'-45.0': 15 minute drill time	100		3 1/2 IN. PITCHER SAMPLER						7	40.0'-50.0' SILTY CLAYSTONE: (CL) Brown, micaceous, dry grading to damp at 42.0'
			4 1/4 IN. ROCK BIT			120	45			Trace mica, manganese
	100	32/37/42/40	STD. PEN	140	30				8	
47.0'-50.0': 30 minute drill time			4 1/4 IN. ROCK BIT			115	50			
	100		PITCHER SAMPLER						9	50.0'-62.0' SILTY SANDSTONE: (SM) Red brown, very fine-grained, trace manganese
51.0'-55.0': 10 minute drill time			4 1/4 IN. ROCK BIT							
						110	55			Micaceous
	100	26/26/28/30	STD. PEN	140	30				10	
57.0'-60.0': 16 minute drill time			4 1/4 IN. ROCK BIT			105	60			Damp
	100		3 1/2 IN. PITCHER SAMPLER						11	
										Bottom of hole 62 ft.

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-107

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 3

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH-10S

PROJECT RANCHO SECO — ANGLE FROM HORIZ 90° — BEARING

LOCATION N 248,025 E 2,252,645 — BEGUN 4 AUGUST 67 — COMPLETED 8 AUGUST 67

OVERBURDEN 3.0 FT — DEPTH DRILLED INTO ROCK 99.5 FT — TOTAL DEPTH OF HOLE 102.5 FT

ELEV. WATER TABLE NONE — NO. CORE BOXES NONE — NO. SAMPLES TAKEN 10

CORE RECOVERY (%) 90 — FEET 25.3 — MODEL & MAKE OF DRILL PORTADRILL

GROUND ELEV. ± 161.7 FT — HOLE LOGGED BY FOX — DRILLER BOYLES BROS DRLG CO.

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drilled with compressed air			4 1/4 IN. ROCK BIT			160	0		0'-3.0' SILTY GRAVEL: (GM) Brown
									3.0'-30.0' SILTSTONE: (ML) Brown
						155	5		
	100		3 1/2 IN. PITCHER SAMPLER				10	1	Light brown, firm, light-weight, trace manganese, damp
	100	3/45 50/2 1/2	STD. PEN	140	30	150			
			4 1/4 IN. ROCK BIT				15		
						145			
	80		3 1/2 IN. PITCHER SAMPLER				20	2	
	100	38 50/4"	STD. PEN	140	30	140			
			4 1/4 IN. ROCK BIT				25		
						135			
							30		
	75		3 1/2 IN. PITCHER SAMPLER					3	30.0'-40.0' CLAYEY SILTSTONE TO SILTY CLAYSTONE: (ML-CL) Brown, firm, black manganese, damp
	100	23 50	STD. PEN	140	30	130			
			4 1/4 IN. ROCK BIT				35		

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-10S

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 3

HOLE NO. DH-108

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						125	35			
	100		3 1/2 IN. PITCHER SAMPLER				40		4	40.0'-42.0' SILTSTONE TO SILTY SANDSTONE: (ML-SM) Brown, firm, damp, trace black manganese
	100	28 35 50/2½"	STD. PEN	140	30	120				42.0'-50.0' SANDSTONE: (SP) Brown, v. fine to fine-grained, scattered medium to coarse and pea gravel, damp
			4 1/4 IN. ROCK BIT			115	45			
	80		3 1/2 IN. PITCHER SAMPLER				50		5	50.0'-60.0' CLAYEY SILTSTONE: (ML) Brown, firm, damp, trace manganese
	100	48 50/2½"	STD. PEN	140	30	110				
			4 1/4 IN. ROCK BIT			105	55			
	100		3 1/2 IN. PITCHER SAMPLER				60		6	60.0'-70.0' SANDY SILTSTONE: (ML) Brown, very firm, damp
	100	50/4¼"	STD. PEN	140	30	100				
			4 1/4 IN. ROCK BIT			95	65			More sandy from 66.0'-67.3'
	70		3 1/2 IN. PITCHER SAMPLER				70		7	70.0'-80.0' SILTY SANDSTONE: (SM) Brown, very fine to fine-grained, subangular to sub-round, quartzitic, firm, damp
	100	41 50/5"	STD. PEN	140	30	90				
			4 1/4 IN. ROCK BIT				75			

324

Hole Size 2", 3-1/2", 4-1/4'

Hole No. DH-108

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 3 OF 3

HOLE NO. DH-108

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
						85	75		
	90		3 1/2 IN. PITCHER SAMPLER			80	80	8	80.0'-89.0' SANDY SILTSTONE: (ML) Brown, firm, damp
	100	50/5"	STD.PEN	140	30				
			4 1/4 IN. ROCK BIT			75	85		
Easy drilling below 89.0 ft	90		3 1/2 IN. PITCHER SAMPLER			70	90	9	89.0'-102.5' SANDSTONE: (SP) Brown-black, very fine to fine-grained, poorly graded, clean, damp
	100	45 50/5"	STD. PEN	140	30				
			4 1/4 IN. ROCK BIT			65	95		
	75		3 1/2 IN. PITCHER SAMPLER			60	100	10	Gray
	100	50/5 1/2"	STD.PEN	140	30				
									Bottom of hole 102.5 ft

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-108

Site RANCHO SECO

BECHTEL CORPORATION

SHEET 1 OF 2

GEOLOGIC LOG OF DRILL HOLE

HOLE NO. DH-109

PROJECT RANCHO SECO ANGLE FROM HORIZ 90 BEARING

LOCATION N 247,712 E2,253,355 BEGUN 13 JULY 77 COMPLETED 17 JULY 77

OVERBURDEN 3.0 FT DEPTH DRILLED INTO ROCK 69.5 FT TOTAL DEPTH OF HOLE 72.5 FT

ELEV. WATER TABLE NONE NO. CORE BOXES NONE NO. SAMPLES TAKEN 11

CORE RECOVERY (%) 100 FEET 17.1 MODEL & MAKE OF DRILL PORTADRILL

GROUND ELEV. +161.7 HOLE LOGGED BY FLORES-MUNOZ DRILLER GONZALES BROS DRLG CO

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG / SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
Drilling with compressed air Slow drilling			4 1/4 IN. ROCK BIT			160	0		0'-3.0' GRAVEL: (GP) Brown to 1" maximum size, silty, sandy
						155	5		3.0'-10.0' GRAVELLY SANDSTONE: (SW) Brown, very fine-grained, pea gravel
	100	32/50	STD. PEN	140	30	150	10	1	10.0'-12.0' CLAYEY, SILTY, SANDSTONE: (SC-SM) Brown, dense
			4 1/4 IN. ROCK BIT				15		12.0'-30.0' SILTY SANDSTONE: (SM) Brown, very fine-grained, dense
	100		3 1/2 IN. PITCHER SAMPLER			145		2	
			4 1/4 IN. ROCK BIT				20		
	100	50	STD. PEN	140	30			3	
			4 1/4 IN. ROCK BIT			140			
	100	50/1"	STD. PEN	140	30		25	4	
Slow drilling			4 1/4 IN. ROCK BIT			135			
	100	40/80	STD. PEN	140	30		30		30.0'-35.0' SANDY, SILTY, CLAYSTONE: (CL-ML) Brown, dense
			4 1/4 IN. ROCK BIT			130	35		

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Hole Size 2", 3-1/2", 4-1/4"

Hole No. DH-109

Site RANCHO SECO

PROJECT RANCHO SECO

SHEET 2 OF 2

HOLE NO. DH-109

NOTES ON WATER TABLE LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.	% CORE RECOVERY	SAMPLE DATA: BLOW COUNT	SAMPLE DATA: PENETRATION TOOL	SAMPLE DATA: HAMMER WT/LBS	SAMPLE DATA: HAMMER FALL-INCHES	ELEVATION	DEPTH	LOG	SAMPLE	CLASSIFICATION AND PHYSICAL CONDITION
	100		3 1/2 IN PITCHER SAMPLER				35		6	35.0'-40.0' SILTY SANDSTONE: (SM) Brown, very fine to fine-grained, trace clay with medium plasticity
Slow drilling			4 1/4 IN. ROCK BIT			125				
	100	24 35 50 50	STD. PEN	140	30	120	40		7	40.0'-44.0' SILTY CLAYSTONE: (CL) Brown, dense
Slow drilling			4 1/4 IN. ROCK BIT							
	100		3 1/2 IN. PITCHER SAMPLER			115	45		8	44.0'-72.5' SILTY SANDSTONE: (SM) Brown, dense
Slow drilling			4 1/4 IN. ROCK BIT							
	100	32 54, [illegible] 79/8"	STD. PEN	140	30		50		9	
						110				
			4 1/4 IN ROCK BIT				55			
						105				
	100		3 1/2 IN. PITCHER SAMPLER				60		10	
						100				
Slow drilling			4 1/4 IN. ROCK BIT				65			
						95				
	100		3 1/2 IN. PITCHER SAMPLER				70		11	Damp
						90				
							75			Bottom of hole 72.5 ft

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Hole Size 2", 3-1/3", 4-1/4"

Hole No. DH-109

Site RANCHO SECO