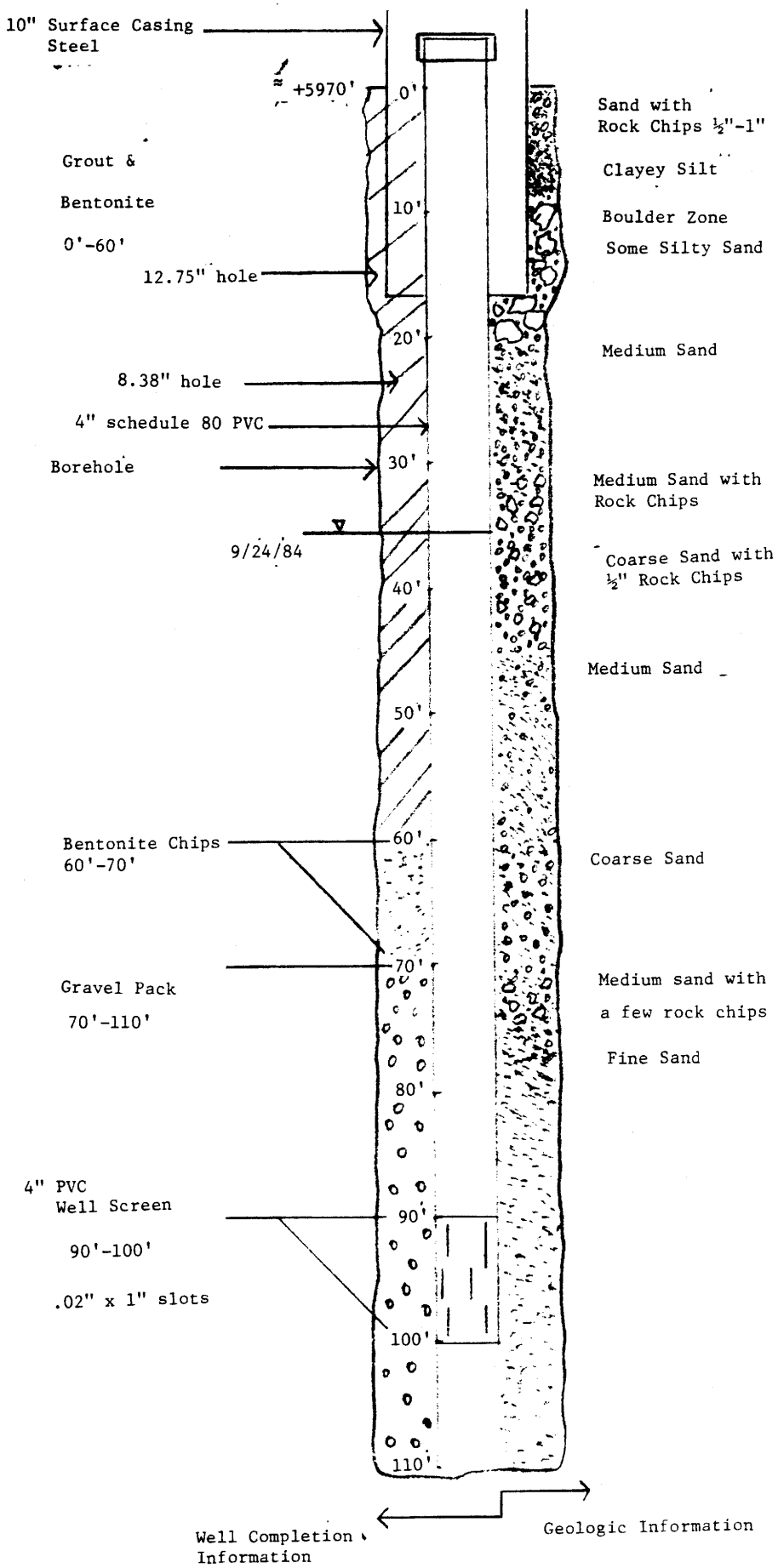
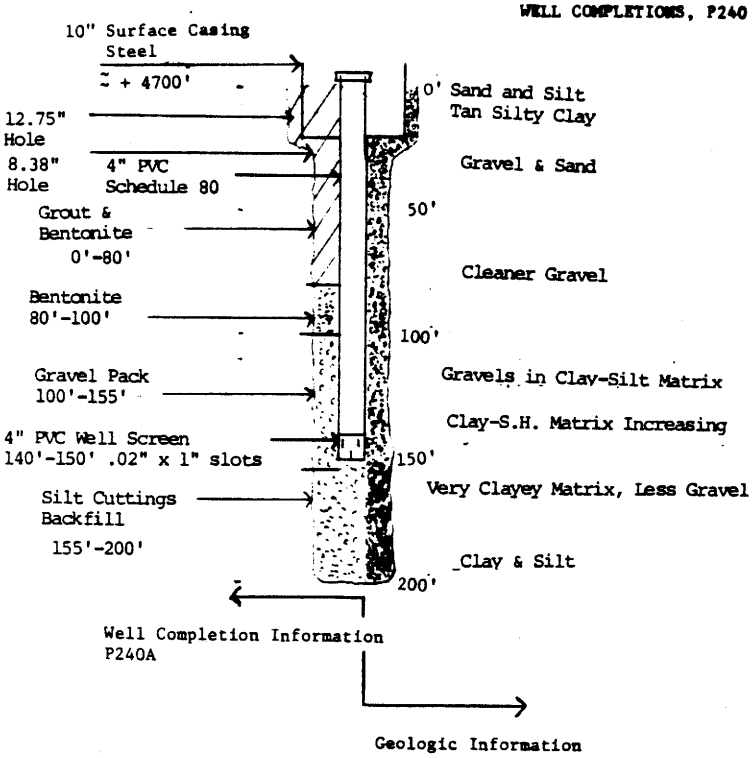
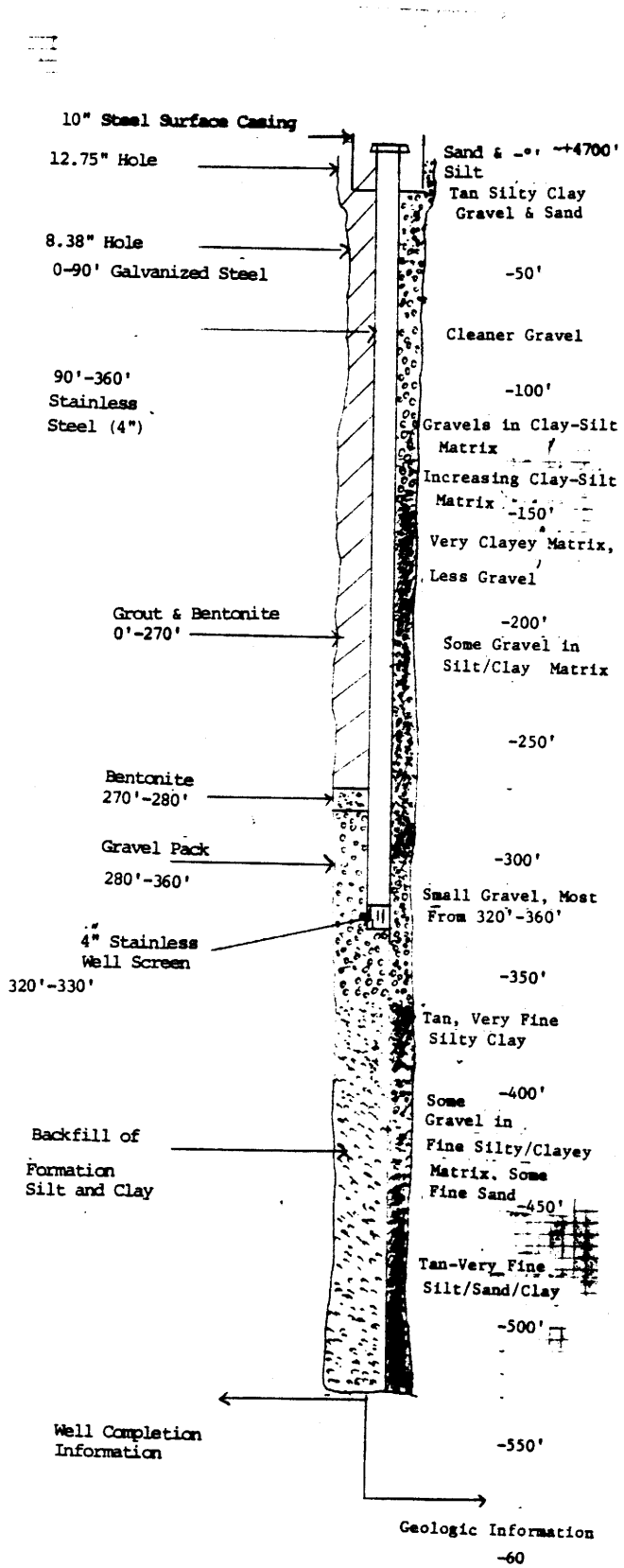
Figure B-1. Log for Monitor Well P239



WELL COMPLETIONS, P240 A,B

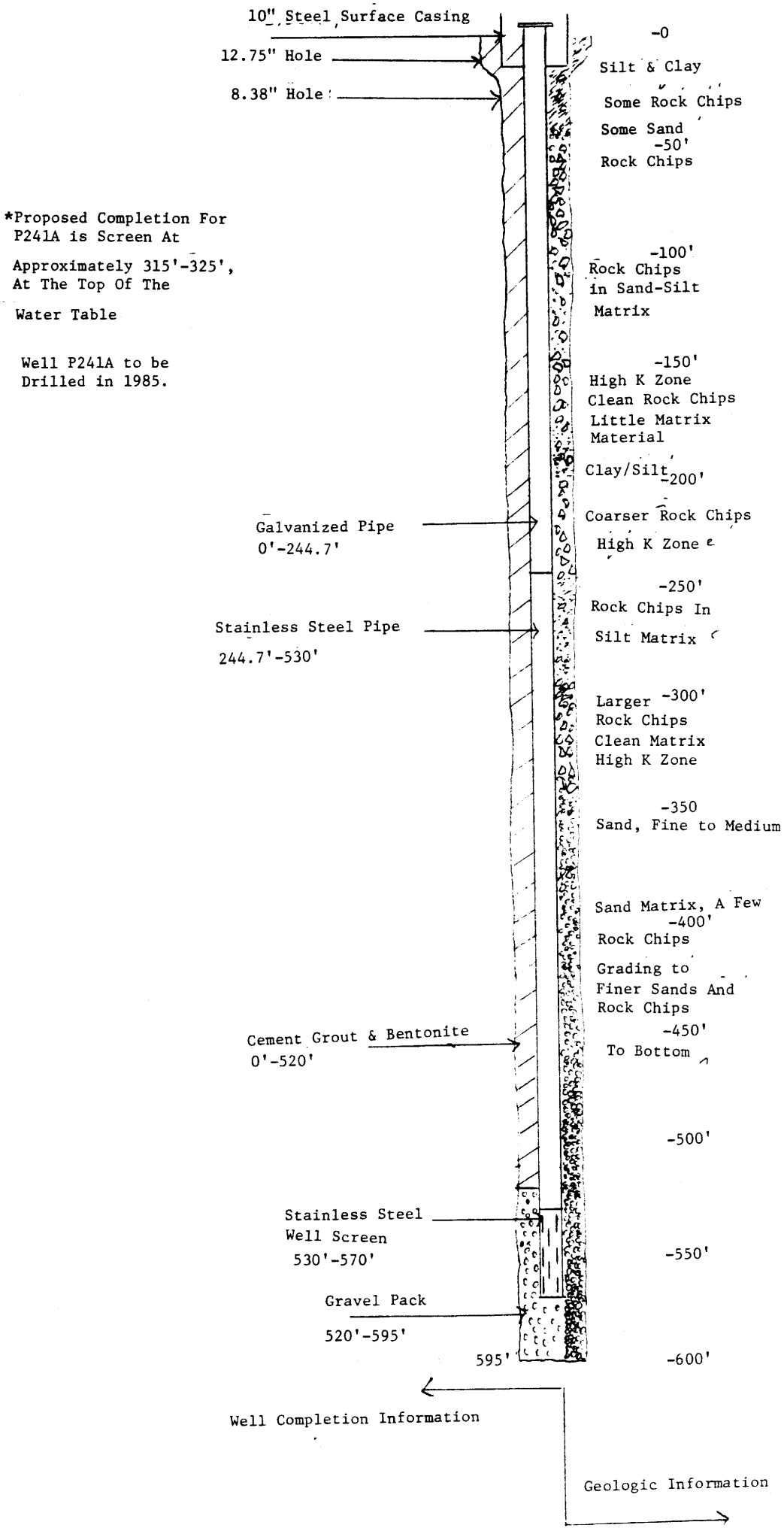




Well Completion Information

P240 B

Figure B-3. Log For Monitor
Well P241 A,B



CENTURY GEOPHYSICAL CORPORATION

Tulsa, Oklahoma

BOREHOLE: P241 B	DATE: 11-17-84
UNIT/OPERATOR: 7602/GRIMES	FIELD OFFICE: MOAB

COMPANY: KENNECOTT

BOREHOLE: P241 B

AREA: UCD

ELEVATION:

COUNTY: SALT LAKE

STATE: UT

SECTION: 22

TOWNSHIP: 3S

RANGE: 2W

HOLE DATA

TOTAL DEPTH — DRILLER	600'	BIT SIZE	8 3/4
TOTAL DEPTH — LOGGER	595'	CASING — TYPE & SIZE	10" STEEL
TOTAL FOOTAGE LOGGED	595'	CASING DEPTH	20'
LOGGING SPEED	30'/MIN	BOREHOLE FLUID	MUD
REFERENCE LEVEL	GL	FLUID RESISTIVITY	— @ °F
PROBE NO	903041-406	SOFTWARE LEVEL	8.2 D
		SCALE SELECTION	☐ OPERATOR ☐ CLIENT

REMARKS

EQUIPMENT DATA

PROBE MODEL	9910	9830	9000PS	9000	
PROBE DIAMETER	1.87"	2.8"	1.87"	1.4"	
NATURAL GAMMA: DETECTOR TYPE	Nal	Nal	Nal	Nal	
DETECTOR SIZE	.875" x 1.25"	1.125" x 4.5"	.875" x 4.0"	.5" x 3.0"	
STD. K-FACTOR	1.89 x 10⁻³	—	1.86 x 10⁻³	1.82 x 10⁻³	
STD. DEADTIME	1 μsec	—	1.10 μsec	1 μsec	
CALIB. MODEL LOC.		—			
CALIB DATE		—			
K-FACTOR x 10⁻³		—			
DEADTIME μsec		—			
TEST READING		—			
WATER FACTOR		—			
CASING FACTOR		—			
DENSITY: DETECTOR TYPE	—	Nal	—	Nal	
DETECTOR SIZE	—	5" x 1.5"	—	.5" x 3.0"	
SOURCE TYPE	—	Cs137	—	Cs137	
SOURCE NO	—	280	—		
SOURCE STRENGTH	—	125 mC	—		
SOURCE SPACING	—	8"	—		
NEUTRON: DETECTOR TYPE	—	—	He3	—	
DETECTOR SIZE	—	—	1.0" x 6.0"	—	
SOURCE TYPE	—	—	Amₐ̄	—	
SOURCE NO	—	—		—	
SOURCE STRENGTH	—	—		—	
SOURCE SPACING	—	—		—	
SINGL PT RESISTANCE	1.4"D x 2.5"L	—	1.4"D x 2.5"L	1.1"D x 2.5"L	
RESISTIVITY	—	6" FOCUSED	—	—	
SELF POTENTIAL	YES	—	YES	YES	
TEMPERATURE	—	—	YES	—	
DEVIATION	—	—	NO YES	—	
CALIPER	—	YES	—	—	

CT 112 REV. 2-1-84

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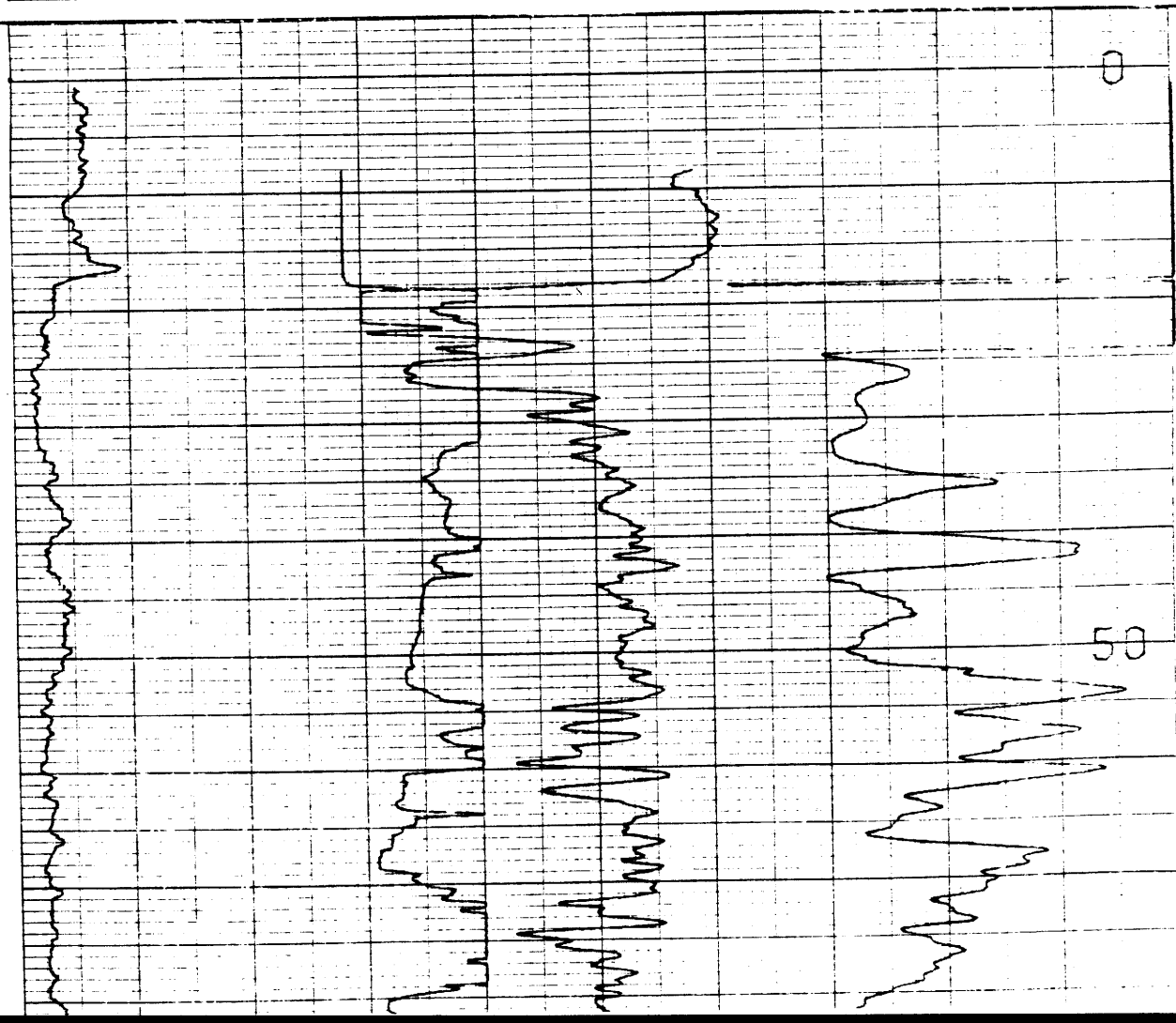
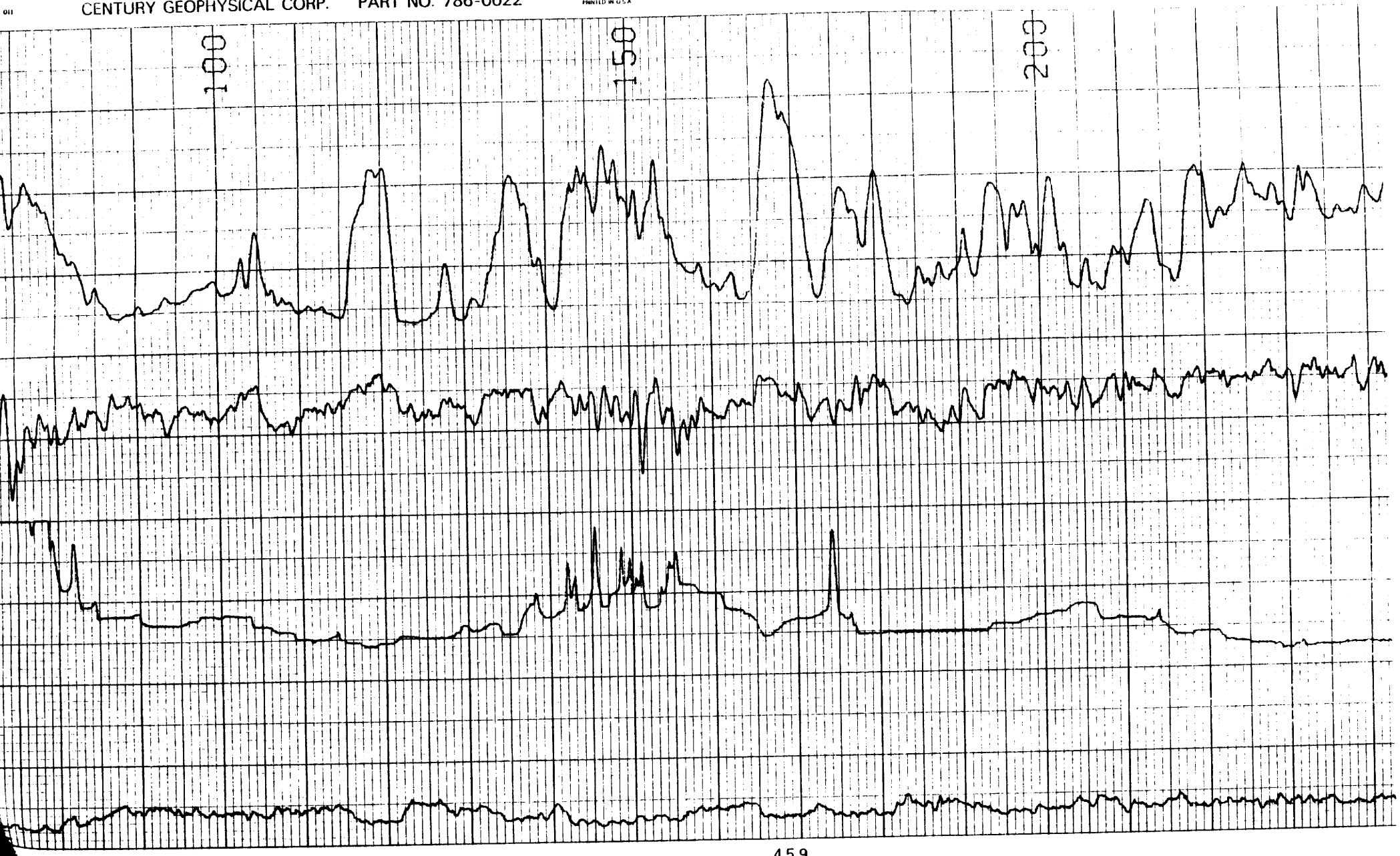


CENTURY GEOPHYSICAL CORP. PART NO. 766 0022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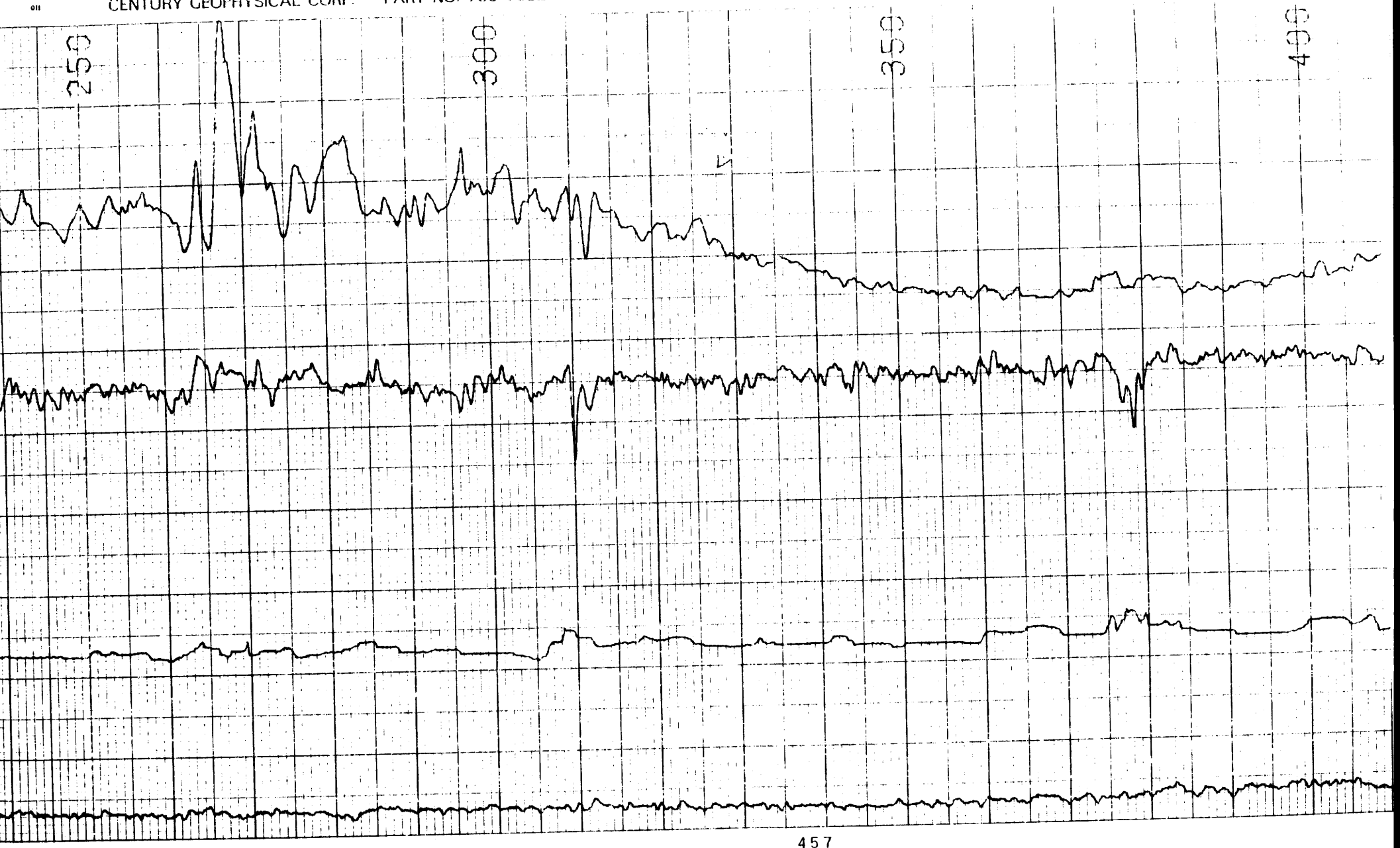

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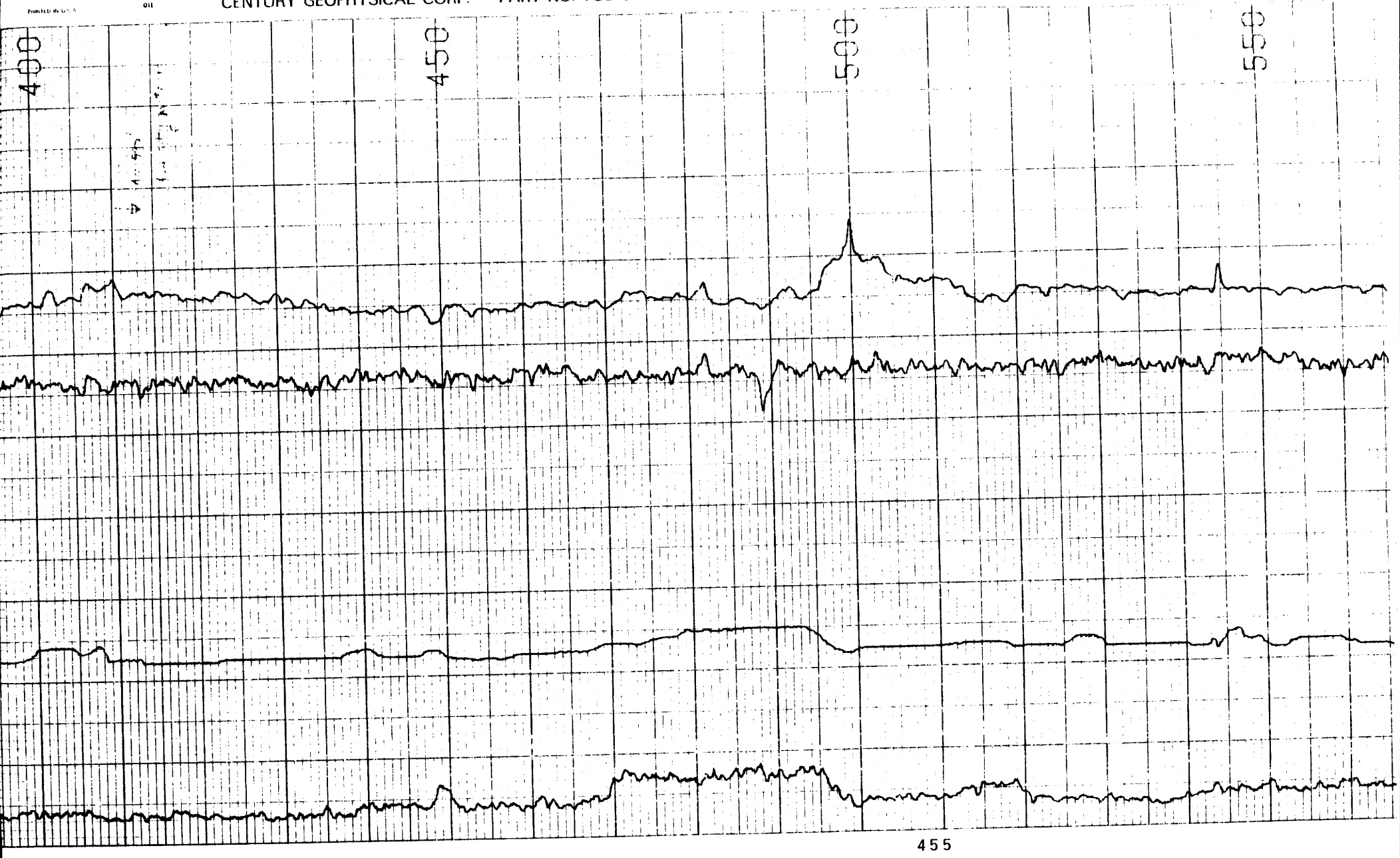
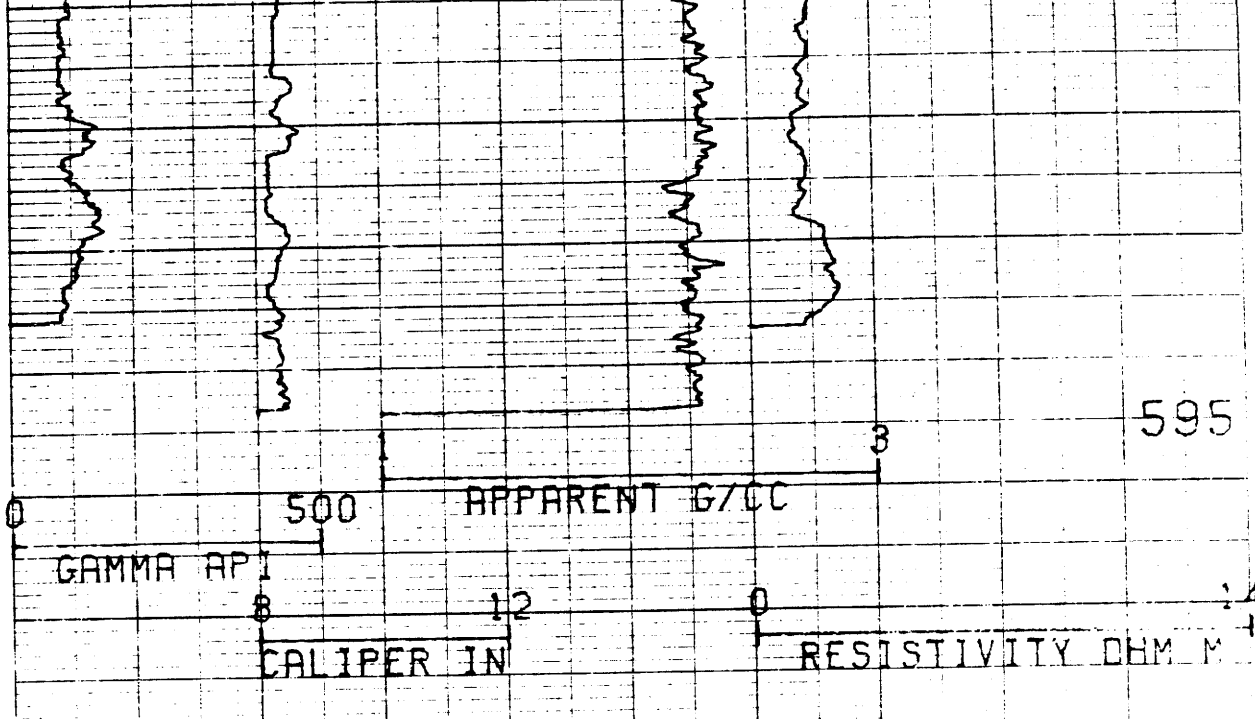




COMPU-LOG VBL2 PLOT 11-17-84

P241B

KENNECOTT

UCD

HOLE DIAMETER : 08.7

~~PROBE # 9030A1- 406~~

SENSOR #4 CAL STD CPS = 6588

SENSOR #4 CAL RUN CPS = 6441

SENSOR #4 CAL BIAS = 28

DATA VBL2 TRUCK # 7602

GRIMES ~~APPL #30 M~~

CENTURY GEOPHYSICAL CORP. PART NO. 786-0022

COMPU-LOG VBL2 PLOT 11-17-84

P241B

KENNECOTT

UCD

HOLE DIAMETER : 08.7

PROBE # 9030A1- 406

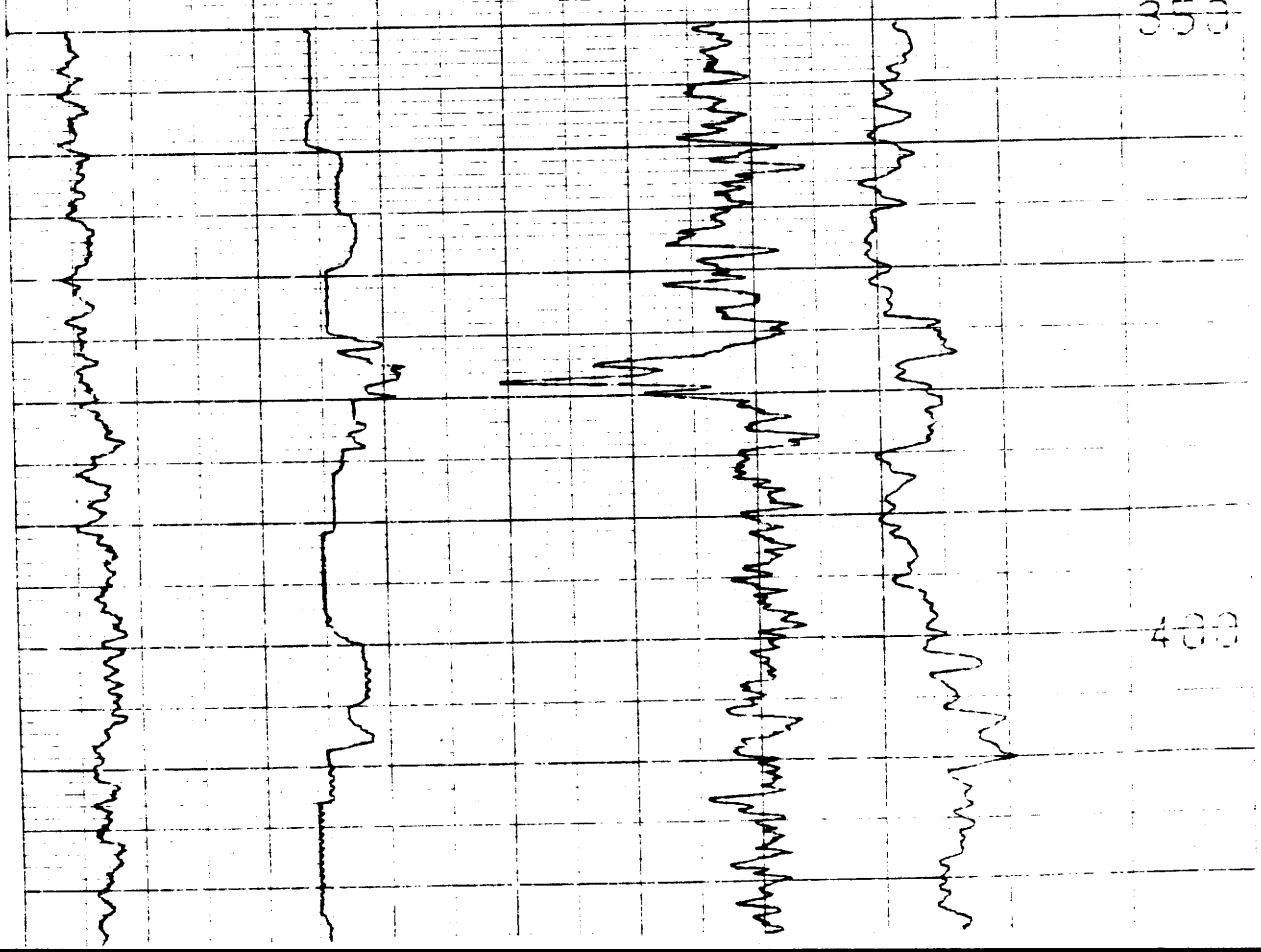
SENSOR #4 CAL STD CPS = 6588

SENSOR #4 CAL RUN CPS = 6441

SENSOR #4 CAL BIAS = 28

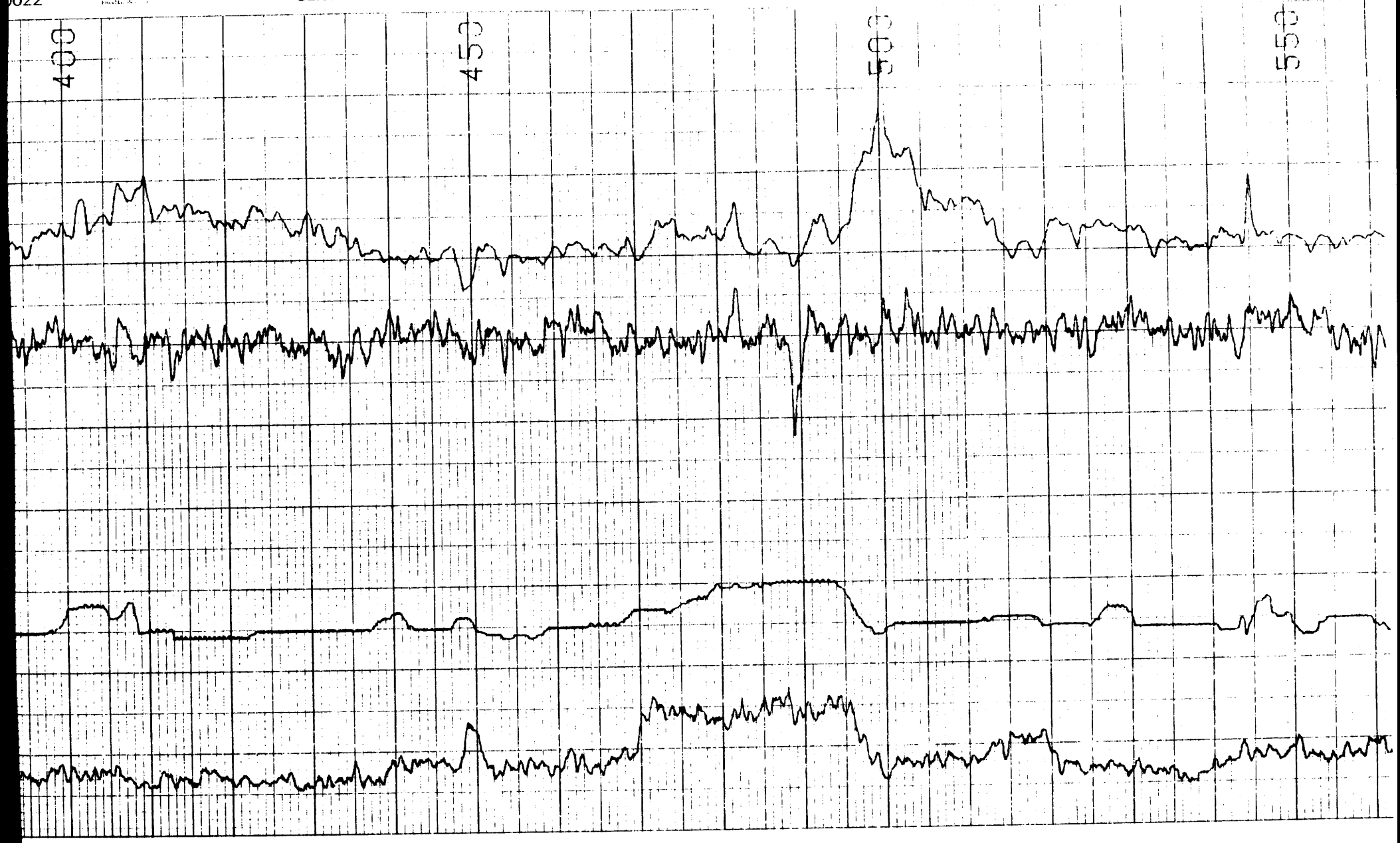
DATA VBL2 TRUCK # 7602

GRIMES APPL.#30 M



CENTURY GEOPHYSICAL CORP. PART NO 730 0022

CENTURY GEOPHYSICAL CORP. PART NO 730-0022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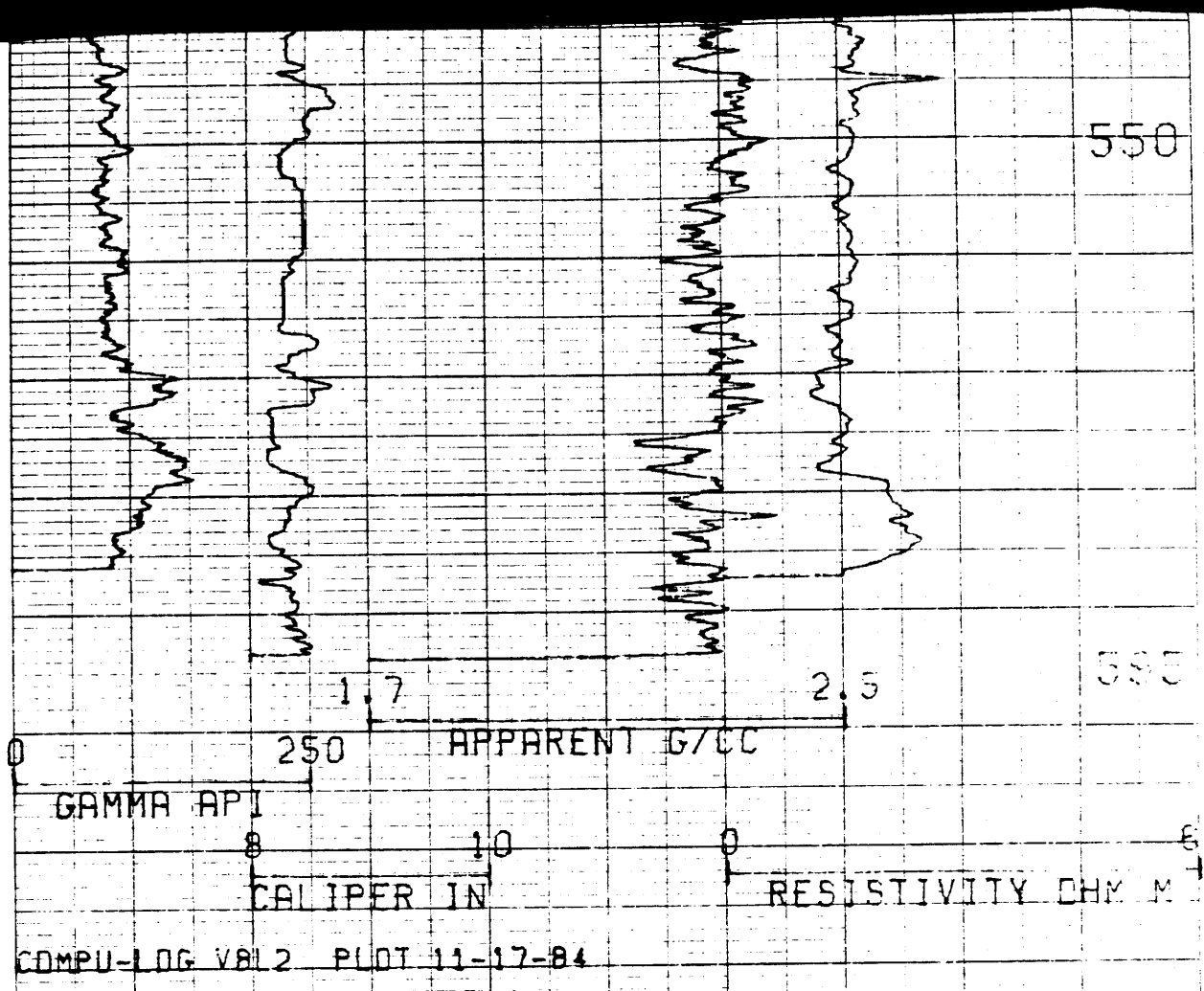

COMPU-LOG VBL2 PLOT 11-17-84

P241B

KENNECOTT

UCD

HOLE DIAMETER : 08.7

PROBE # 9030A1- 406

SENSOR #4 CAL STD CPS = 6588

SENSOR #4 CAL RUN CPS = 6441

SENSOR #4 CAL BIAS = 28

DATA VBL2 TRUCK # 7602

GRIMES APPL.#30 M

CORP. PART NO. 786-0022

CLINCKY GEOPHYSICAL CORP. PART NO. 786-0022

CENTURY GEOPHYSICAL CORPORATION

Tulsa, Oklahoma

BOREHOLE: P241B	DATE: 11-17-84
UNIT/OPERATOR: 7602/GRIMES	FIELD OFFICE: MOAB

COMPANY: KENNECOTT COPPER CORP.

BOREHOLE: P241B

AREA: UCD

ELEVATION:

COUNTY: SALT LAKE

STATE: UT

SECTION: 22

TOWNSHIP: 3S

RANGE: 2W

HOLE DATA

TOTAL DEPTH — DRILLER	600'	BIT SIZE	8 3/4
TOTAL DEPTH — LOGGER	595'	CASING — TYPE & SIZE	10 STEEL
TOTAL FOOTAGE LOGGED	595'	CASING DEPTH	20'
LOGGING SPEED	60'/MIN	BOREHOLE FLUID	MUD
REFERENCE LEVEL	GL	FLUID RESISTIVITY	— @ °F
PROBE NO.	9055B-69	SOFTWARE LEVEL	8.2+7
		SCALE SELECTION	☐ OPERATOR ☐ CLIENT

REMARKS

EQUIPMENT DATA

PROBE MODEL	5910	5900	5900/35	5900C	
PROBE DIAMETER	1.87"	2.0"	1.87"	1.4"	
NATURAL GAMMA: DETECTOR TYPE	Nai	Nai	Nai	Nai	
DETECTOR SIZE	.875" x 1.25"	1.125" x 4.5"	.875" x 4.0"	.5" x 3.0"	
STD. K-FACTOR	1.89 x 10⁻³	—	588 x 10⁻³	1.82 x 10⁻³	
STD. DEADTIME	1 μ sec	—	1.16 μ sec	1 μ sec	
CALIB. MODEL LOC		—			
CALIB DATE		—			
K-FACTOR x 10⁻³		—			
DEADTIME μ sec		—			
TEST READING		—			
WATER FACTOR		—			
CASING FACTOR		—			
DENSITY: DETECTOR TYPE	—	Nai	—	Nai	
DETECTOR SIZE	—	5" x 1.5"	—	5" x 3.0"	
SOURCE TYPE	—	Co⁶⁰	—	Co⁶⁰	
SOURCE NO	—		—		
SOURCE STRENGTH	—		—		
SOURCE SPACING	—		—		
NEUTRON: DETECTOR TYPE	—	—	He³	—	
DETECTOR SIZE	—	—	1.0" x 6.0"	—	
SOURCE TYPE	—	—	AmBe	—	
SOURCE NO	—	—	291	—	
SOURCE STRENGTH	—	—	1 Ci	—	
SOURCE SPACING	—	—	16.75"	—	
SINGL. PT. RESISTANCE	1.4"D x 2.5"L	—	1.4"D x 2.5"L	1.17"D x 2.5"L	
RESISTIVITY	—	8" FOCUSED	—	—	
SELF POTENTIAL	YES	—	YES	YES	
TEMPERATURE	—	—	YES	—	
DEVIATION	—	—	NO YES	—	
CALIPER	—	YES	—	—	

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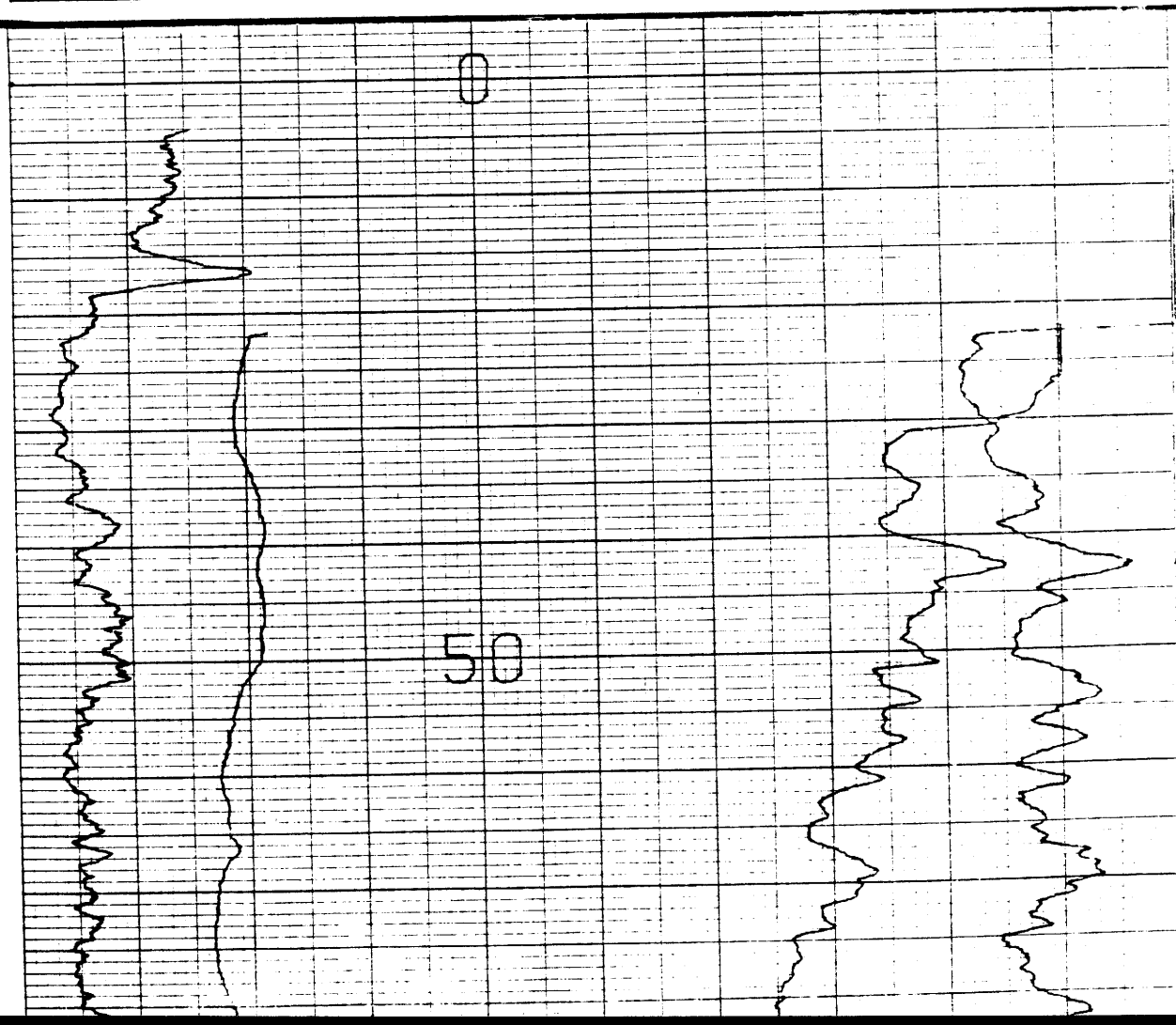
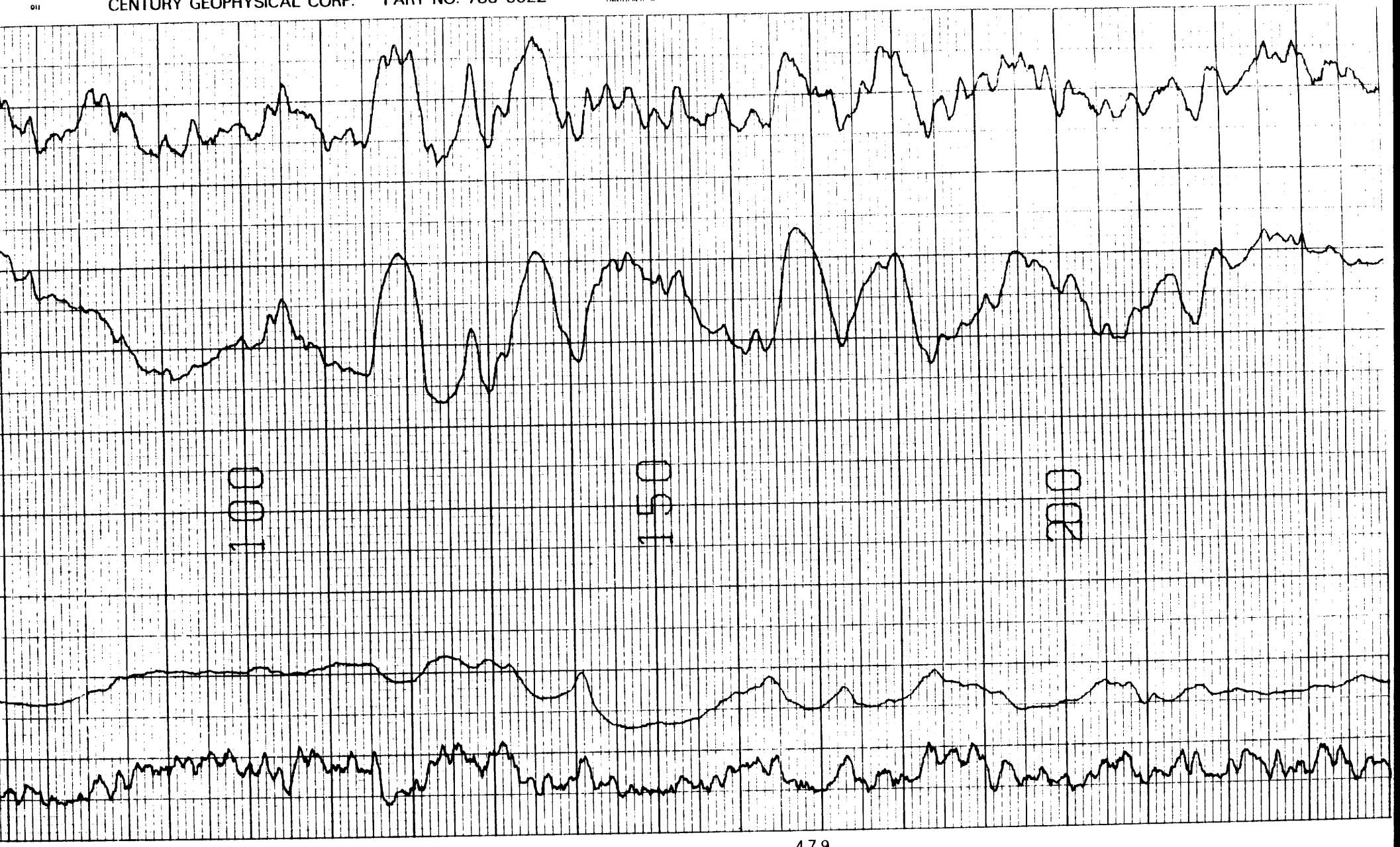


CENTURY GEOPHYSICAL CORP. PART NO. 786 0022

CENTURY GEOPHYSICAL CORP. PART NO. 786-0022



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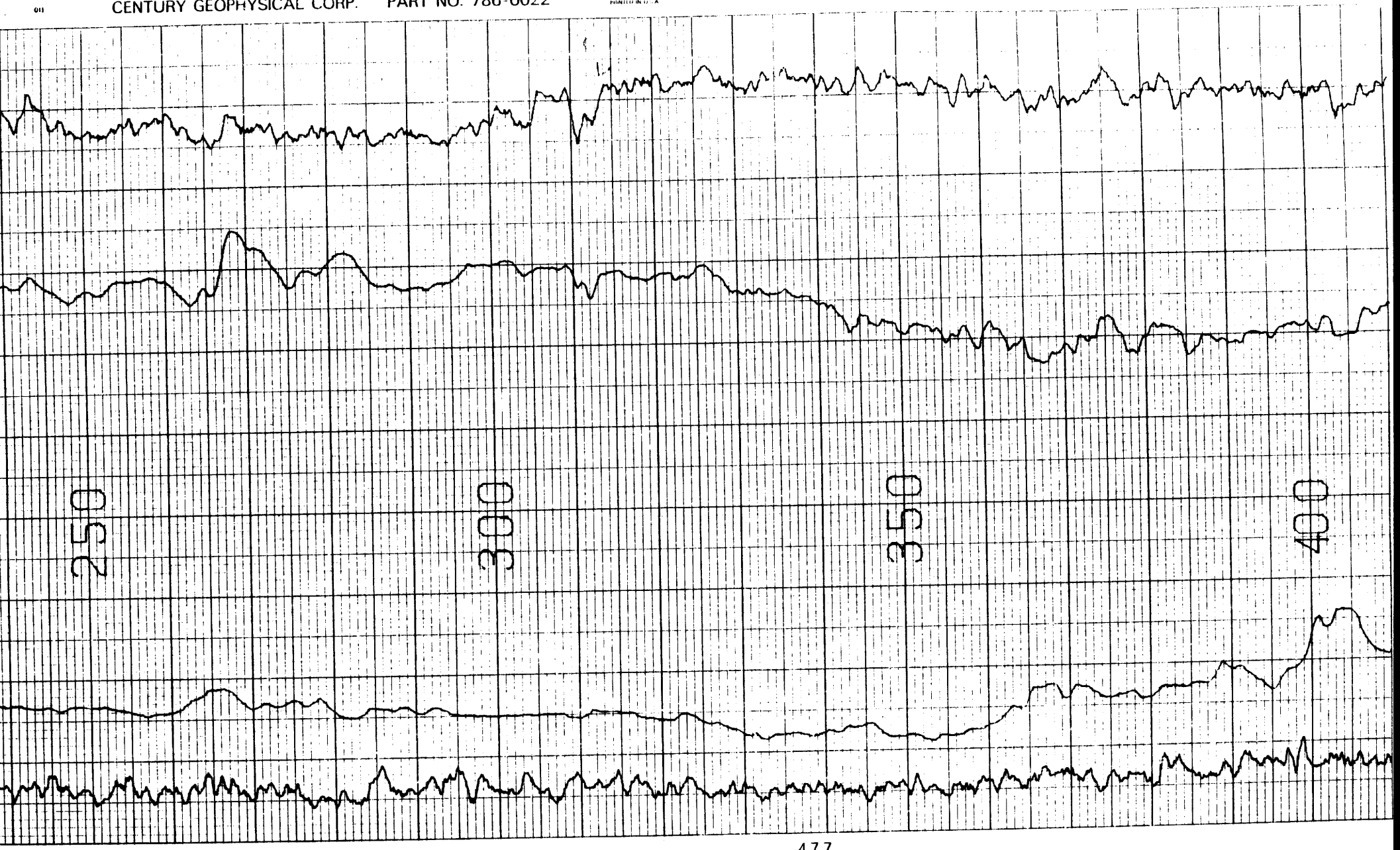

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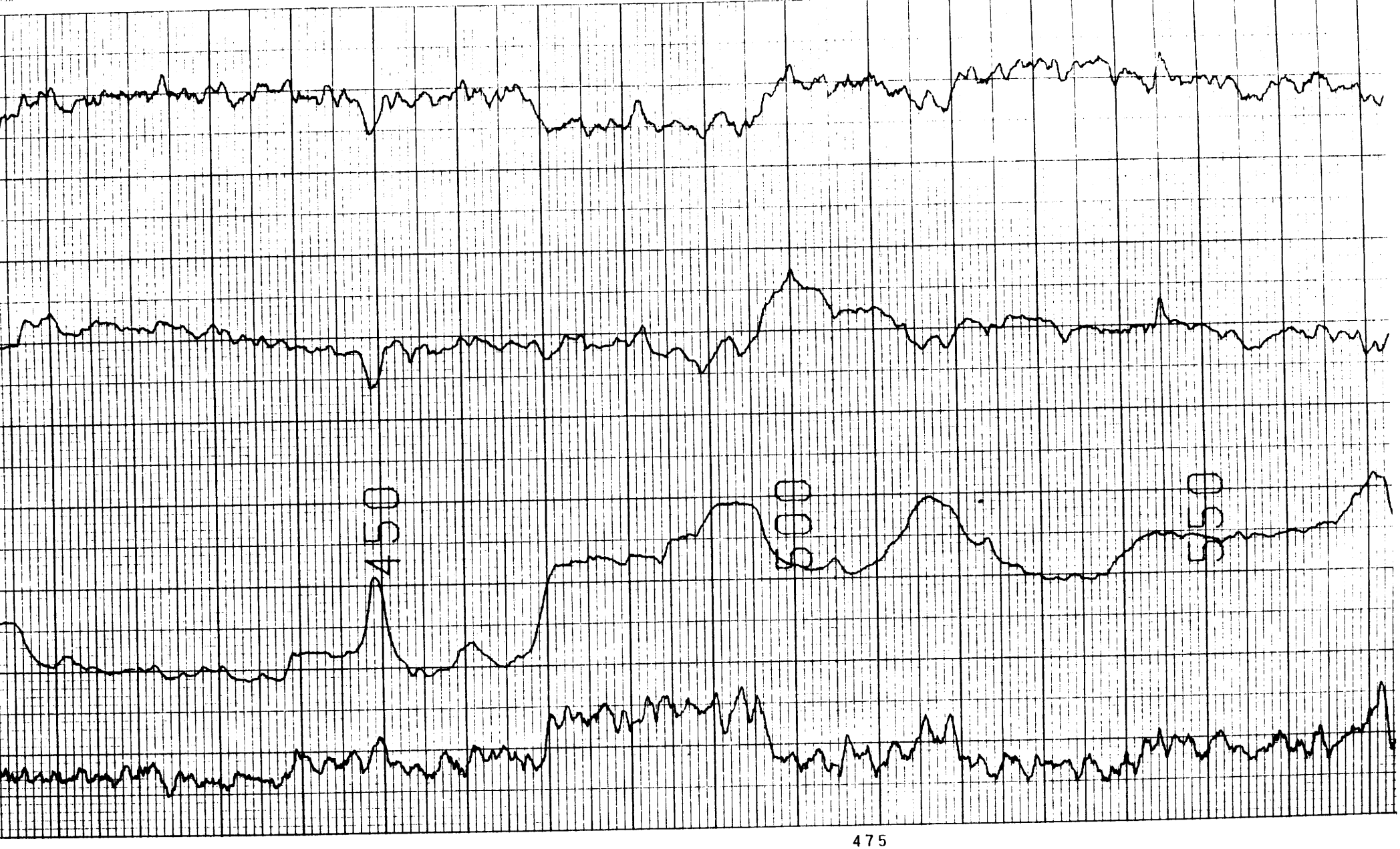
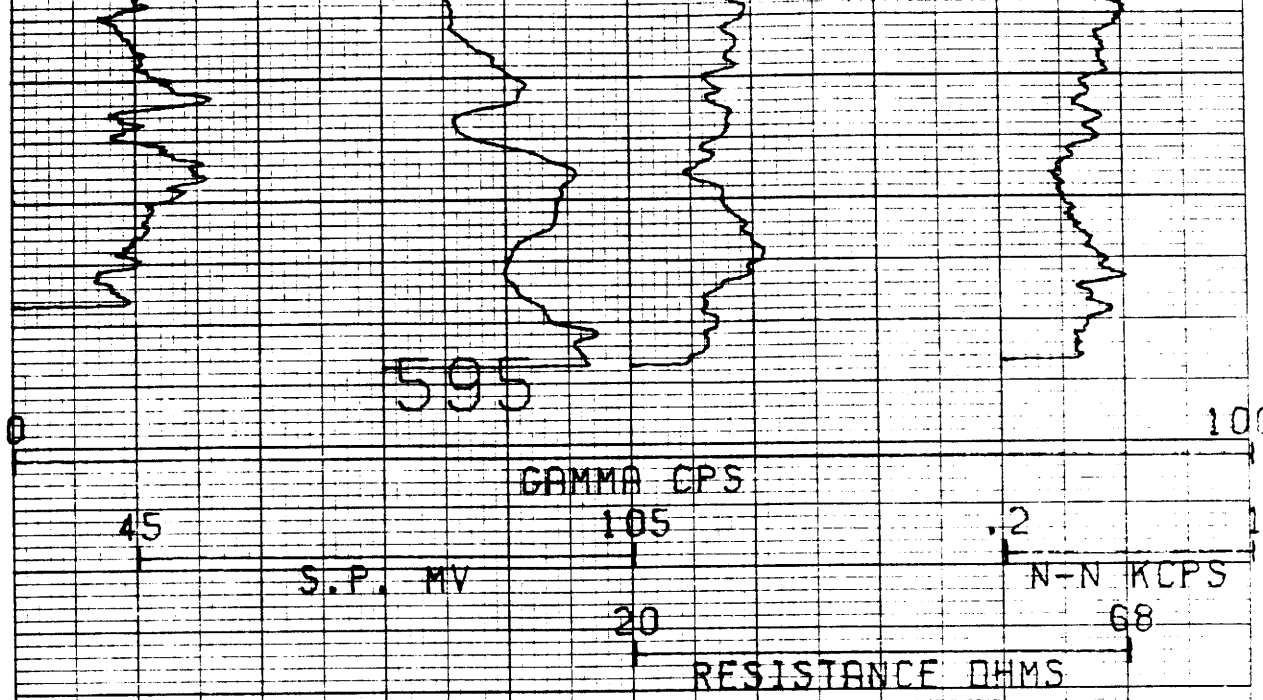




COMPU-LOG VBL2 PLOT 11-17-84

P241B

KENNECOTT

UCD

HOLE DIAMETER : 08.7

PROBE # 9055A - 069

SENSOR #4 CAL STD CPS = 152

SENSOR #4 CAL RUN CPS = 146

SENSOR #4 CAL BIAS = 0

DATA VBL2 TRUCK # 7602

GRIMES APPL.#1085 M

CENTURY GEOPHYSICAL CORP. PART NO. 786-0022

CENTURY GEOPHYSICAL CORP. PART NO. 786-0022

COMPU-LOG VBL2 PLOT 11-17-84

P241B

KENNECOTT

UCD

HOLE DIAMETER : 08.7

PROBE # 9055A - 069

SENSOR #4 CAL STD CPS = 152

SENSOR #4 CAL RUN CPS = 146

SENSOR #4 CAL BIAS = 0

DATA VBL2 TRUCK # 7602

GRIMES APPL.#1005 M

VERTICAL DEVIATION

COMPU-LOG VBL1 DEVIATION
DATA FROM : VBL2

CLIENT : KENNECOTT
LOCATION : UCD
HOLE ID : P241B
DATE OF LOG : 11-17-84
PROBE : 9055A 0069

SCALE: 2 FT/IN
MAG DECL: 15.0
TRUE DEPTH: 594. FT
AZIMUTH: 60.
DISTANCE: 8.2 FT

+ = 25 FOOT INCR
Δ = TOP OF ZONE
◇ = BOTTOM OF ZONE

TRUE NORTH ↑

CENTURY GEOPHYSICAL CORP. PART NO 786 0022

CENTURY GEOPHYSICAL CORP. PART NO 786 0022

VERTICAL DEVIATION

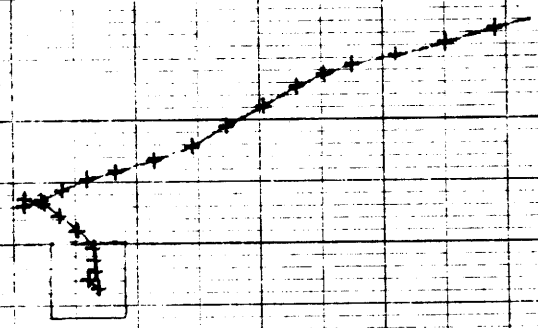
COMPU-LOG VBL1 DEVIATION
DATA FROM : VBL2

CLIENT : KENNECOTT
LOCATION : UCD
HOLE ID : P241B
DATE OF LOG : 11-17-84
PROBE : 9055A 0069

SCALE: 2 FT/IN
MAG DECL: 15.0
TRUE DEPTH: 594. FT
AZIMUTH: 60.
DISTANCE: 8.2 FT

+ = 25 FOOT INCR
Δ = TOP OF ZONE
◇ = BOTTOM OF ZONE

TRUE NORTH ↑



CENTURY GEOPHYSICAL CORP. PART NO. 786-0022

CENTURY GEOPHYSICAL CORP. PART NO. 786-0022

P239

Sheet 1 of 3

PROJECT UCD - SW Study 490088 (Replacement for K67R) **LOG OF TEST BORING NO.** P239

JOB NO. 490088 DATE 9-21-84

RIG TYPE Holemaster / Failing 15

BORING TYPE Air / Mud Rotary

SURFACE ELEV. ~5971', Just N. of drainage

DATUM ~ 10' N. of 67R where leach solution f/...

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				B					12 3/4" Bit to 19'	Fine to Coarse Tan & Grey Sand with Rock Chips 1/2" - 1" ϕ (Volcanics?)
5									At 5' Using water	At 5', a tan clayey silt (moist) cutting on drill bit.
10									Using Foam too after 5' Driller: Robert	At ≈ 9' hit bedrock? boulder rig noisy + drilling hard - Driller uses some foam - Tan silty sand to 10'
15										Same, with ϕ rock chips ≈ 1/2" - 1" ϕ quartzite?
20									At 19' set Sand Casing - when brought 12 3/4" bit up, only foam on bit indicating "clean" bedrock (ie not much silt + sand matrix)	Not as noisy - easier drilling - Difficult to evaluate samples, in general tan silt sand with ϕ rock fragments - hit 19' at 12:30 PM after cleaning out hole for approx. 20 mins. - Set 10" Sand Casing
25									20-30' tan brown med. Sand	Let cement grout around sand casing set till 2:15 PM then started drilling with 9 7/8" bit
30									30-35' tan med. sand with 1/2" rock chips	Cement grout kept coming up - Quit at 3:30 PM and drillers eventually got to 40' on 9/21/84 Thurs.
40									35'-40' Coarse sand with 1/2" rock chips, quartzite	
45									40-45' Coarse Sand Brown, with ϕ 1/2" rock chips, quartzite	Fri. AM 8:00 I arrived - The swivel broke, I left ~9:00 AM after logging samples -
50									45'-50' Med. Sand Brown-Black No rock chips	Sat AM started at 40', ~10:15 AM 9/22/84

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

P239

Sheet 2 of

LOG OF TEST BORING NO. P239

PROJECT UCD GW Study

JOB NO. [illegible] DATE 9-23-84 Sunday

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
* 50									Grey-Black Med. Sand, No rock fragments	9/29/84 Sample appears to have more water in it - Very difficult to determine, since drilling with water + foam. Drillers agreed more water [illegible] #Drilling ~ 15'/hr.
									11:10 AM Brown-Orange Coarse Sand, No rock fragments	IN Competent Bedrock
* 60									Grey-Black Coarse Sand - No Rock Fragments	Distinct change in Lithology at 60' Bedrock ?
65									Grey-Black Coarse Sand - No Rock Fragments	
70									12:20 PM Med. Grey Sand - A few rock chips	Some Rig Chatter at ~71' Drilling Slower
75									Much finer, more water! Fn - Med Grey Black Sand -	
80									Same	
85									2:10 pm Same	I left site at 2:45 for SDT's office to work
90									2:40 pm Same	
95									Same	* Drillers got to 100' on Sunday & left at 4:00 pm
100										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

P239

Sheet 3 of 3

LOG OF TEST BORING NO. P239

PROJECT

JOB NO. 490088 DATE 9-24-89

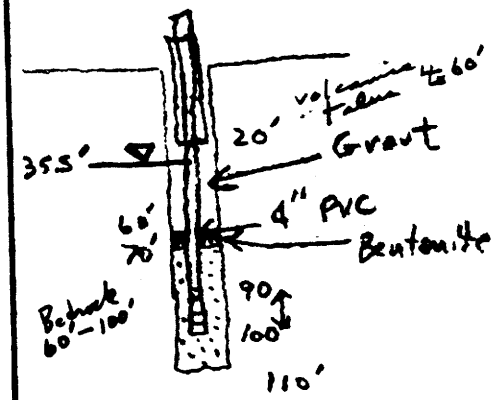
RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
100									Same Fine-Med. Grey-Black Sand	I arrived Mon AM 8:00
105									Same	
									8:30 AM	Driller surging/cleaning out the hole. Got larger cuttings when blowing out hole.
110										I measured WL 11 10/A. ~ 2 hrs. after surging, d. to w ≈ 35.5' top of surface casing
										Driller completed hole 9-24 & 9-25 as per specs



GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

K 67 R

UCD GEOLOGY DEPT.

WELL AND DRILL HOLE LOG

OWNER: K.C.C

HOLE NO. K67R

REFERENCE: EAST SIDE MONITOR NO. 6

DRILLED BY: GARDNER

COLLAR ELEVATION 5971

METHOD: Churn 6" DATE: Start

Rotary Finish

Diamond

LOCATION: N 2,745 T

E 12,842 T

¼ S T R

REMARKS: WATER LEVEL DATA UNCLEAR

ELEV	GRAPHIC LOG	DEPTH	GEOLOGIC LOG (Logged by date)	DRILLERS LOG	SAMPLES	CASING	WATER
				CLAY & ROCKS		6"	
5950		20		BEDROCK		18'	
		40					
5911				BOTTOM OF HOLE			
		60					

P240A

Sheet 1 of 3

PROJECT 490088 UCD GW MW Study Replacement for P198

JOB NO. _____ DATE 9/26/84 Weds.

LOG OF TEST BORING NO. P240A

RIG TYPE Failing 15, Mud/Air Rotary

BORING TYPE _____

SURFACE ELEV. ~4700'

DATUM Just NE of Old Evaporation Ponds

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				ML					Tan V. fine Sand - Silt	9/26/84 weds
5				ML					Tan V. fine Sand - Silt	9/27/84 Thurs.
10				CL					Tan silty clay	
15				GP					Gravel ⅛" - 1" Gravel channel?	Drilling very slow - hard Clutch broke - Downtime 10:00 AM → 3:00 PM, I left for Nose meeting at 1:00 PM - I returned to site, Driller at ~25', I left ~4:00 PM & had Driller bag samples.
20				GP					Same	
25				GW					Smaller Gravel more uniform size ⅛" - ½" Tan - White	
30				GP					Less Uniform ⅛" - ½", generally larger gravel Tan - White	9/28/84 FRI. Fri. AM I arrived 9:30 AM - driller had stopped drilling because hole kept caving due to gravel - Robert went back to shop to pick up clear mud + bentonite
35				GP					Same	
40				GM					Lithologic change ⅛" gravel in coarse sand matrix	Possibly making some water at ~40'
45				GP					⅛" - 2" gravel in a sand matrix tan - brown sand 2" round gravel	
50										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

P240A

LOG OF TEST BORING NO. P240A

Sheet 2 of 5

PROJECT

JOB NO. DATE 9/28/84

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
50									~ orange-tan quartzite gravel 1/2" - 1/16", generally 1/4" size, clean	9/28/84 FRI - after 50' no drilling, mixing mud in pits -
				GP						10/1/84 Mon. late PM driller got to 70', Large cobbles/boulders No samples
55									# Samples from 55' on from new hole where we moved N. 5' Started using the water from the S.L. Water Conservancy District on 10/2/84 PM	
				GC						10/2/84 Tues. AM - hole cored to 40', re-drilling at 50' at 10:00 AM, thickening mud
60										
65									55'-75' gravel in a clay & silt brown matrix gravel slightly larger to 3/4", more rounded	
										Decided to move ahead ~5' to a new hole
70										
75				GW					Cleaner ~ 1/16" - 1/2" gravels, same to ~112'	
80										
85										
90										
95										
100										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

P240A

PROJECT
JOB NO. DATE

LOG OF TEST BORING NO. P240A

Sheet 3 of 5

RIG TYPE
BORING TYPE
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
100									Same - clean gravels 1/8" - 1/2"	10-3-99
105				GW						
110										
				FC					112' - 1/4" - 1/2", gravels in clay/silt matrix	Rig drilling quicker, Less chatter
115										* From ~112' in a gravel/silt/clay zone, which could be defined as the beginning of a confining zone because of its thickness & clay/silt matrix, which becomes more clayey at ~150'
120										
125										
130									10:50 AM	Very easy drilling * Decided to screen 140'-150', G. Pack 100'-150' Bentonite 90-100 Grout 0-90'
135									10:55 AM	
140				FC					11:00 AM	Same
145									Slightly more clay-silt matrix	
150									11:40 AM	

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

P240A

LOG OF TEST BORING NO. P240A

Sheet 4 of 5

PROJECT _____

JOB NO. _____ DATE _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
150				GC					From 150'-160' very clayey matrix with coarser gravel 1" - 1/16"	V. easy drilling through the clay/gravel zone. Definite Gradation to "confining zone" at 150'
155										
160									11:55 AM	Added rods
	GC			GC-CL					V. clayey matrix with gravel, f-med. 1/16" - 1/2"	Some chatter at ~163'
165									12:10 pm	V. slow drilling Rig chatter at 167' = 12:30 pm
170				FC-CL					V. clayey matrix with gravel, f-med. gravel 1/16 - 1/2"	Still slow drilling
175									2:45 pm	
180									Clayier/Siltier Less Gravel	
190				CL						10/4/84 Thurs. AM
195				CL					Nearly all clay/silt	
200										Stopped at 200', 9:30 AM since still in v. clayey material

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

P 240A

LOG OF TEST BORING NO. P240A

Sheet 5 of 5

PROJECT

JOB NO. DATE

RIG TYPE

BORING TYPE

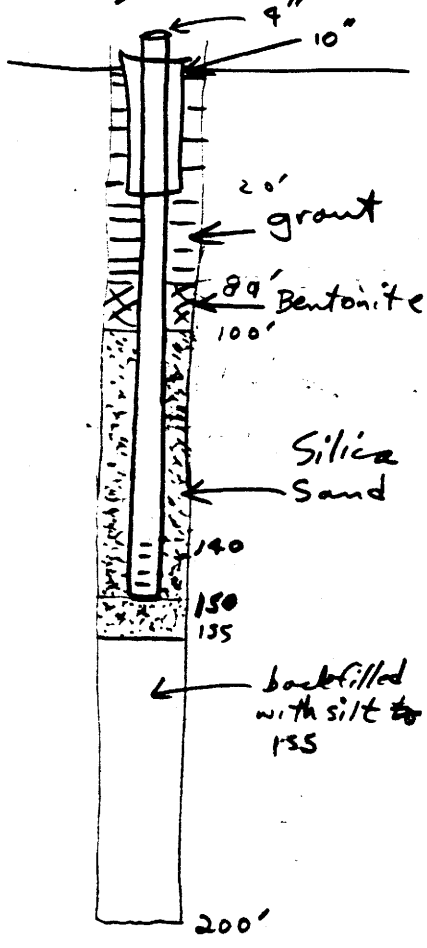
SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
200									Did not go deeper for this shallow well since we kept getting into clayey/silty material	
205										
210									Purpose in open zone at 190-200' especially to intercept a water zone. 100-150 to be sure. The WL in P198 = 106'	

Final Construction

~~P198 A~~ = P240A



GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

Near P240A

P199

D-D PIEZOMETER HOLE [Sample Log]

1-19-76 Started drilling 11-18-76.

0-5' SILT, MODLY GRVLY, SLY. SDY., FINE GRAVEL (PEBBLE) QTZITE SUBANGULAR. V.F-V. CRS SD.

5-10' SILT, MORE GRVLY THAN ABOVE, SLY SDY. (V.F-V.CRS. SD REST SAME

0-15' SANDY GRAVEL, GRANULE (PEBBLE); V.F-V.CRS. SD QTZITE SUBANGULAR

5-20' SLY. STY., MOSTLY GRVLY., FINE GRAVEL (PEBBLE), SLY. SDY., V.F.-V.CRS. SD., QTZITE, SUBANGULAR PALE YELLOW

20-25' MODLY GRVLY., SLY STY., GRVLY SAND, V.F-V.CRS. SAND, QTZITE SUBANGULAR.

25-30' LIGHT SANDY GRAVEL, (PEBBLE), V.F.-V. CS. SAND, QTZITE SUBANGular.

30-35' GRVLY SAND (light); (PEBBLE-GRANULE) V.F.-V. CRS. SAND, QTZITE SUBANGular;

35-40' LIGHT SDY GRAVEL, V.F.-V. CRS. SAND, GRANULE PEBBLE, QTZITE SUBANGULAR.

40-45' GRVLY SAND, M.G-V.CRS. SAND, FINE GRAVEL QTZITE SUBANG.

(Started using foam @ 43'.)

45-50' STARTED USING REVERT MUD AT 50'. SDY GRVL., COARSE GRAVEL, V.F-V.CRS. SD QTZITE SUBANGULAR.

55' SLY SDY, MSTLY GRAVEL, UNIFORMLY GRADED GRAVEL PEBBLE-GRANULE, QTZITE SUBANGULAR V.F-CRS. SAND.

11-22-76

55-60' LIGHT SDY GRVL., GRANULE-PEBBLE, WELL-GRADED, QTZITE SUBANGULAR, M.CRS-V.CRS. SAND

60-65'- SAME AS ABOVE

65-70' LIGHT SDY GRVL, V.F-V.CRS. SAND, UNIFORMLY GRADED, QTZITE SUBANGULAR.

70-75' LIGHT GRVLY SAND, V.F-V.CRS. SAND, WELL GRADED, QTZITE SUBANGULAR

75-80' SAME AS ABOVE

80-85' SAME AS ABOVE EXCEPT SLY MORE GRVLY WITH SOME SMALLER GRANULES.

85-90 SAME AS ABOVE

90-95' GRVLY (PEBBLE-GRANULE), SLY SDY, V.F-V.CRS SAND, QTZITE SUBANGULAR.

95-100' SAME AS ABOVE EXCEPT V. SLY. CLY.

100-105' SAME AS ABOVE

11-24-76

105-110' SDY. GRVL., LIGHT GRANULES-PEBBLE, SLY. CL, V.F-V.CRS. SD, QTZITE, VOLCS. (MINOR AMT.)

1 4-76

110-115' SDY. GRVL, SLY CLY, MOSTLY UNIFORM SIZED GRAVEL, V.F-V.CRS. SAND, QTZITE, SUBANGULAR-SUBROUNDED, (OCCASIONAL VOLCANICS)

115-120' SAME AS ABOVE EXC. LESS SAND

120-125' SAME AS ABOVE

125-130 SDY. GRVL W SOME CLAY, GRAVEL, UNIFORMLY SIZED, M.C.-V.CRS. SAND, QTZITE - SUBANGULAR TO SUBROUNDED.

130-135' SAME AS ABOVE

135-140' SAME AS ABOVE

140-145' SAME AS ABOVE EXCEPT MORE SAND.

145-150 SAME AS ABOVE, UNIFORM SIZED GRAVEL ≈ 1 cm.

150-155 SAME AS ABOVE, GRAVEL INCREASED IN UNIFORM GRAVEL SIZE UP TO 2 cm in SIZE.

155-160 SAME AS ABOVE

160-165 SAME AS ABOVE

165-170 SDY. GRAVEL SLY CLY. (PEBBLE-GRANULE) M.F.-V.CS. SAND, QTZITE SUBANGULAR TO SUBROUNDED UNIFORMLY SIZED GRAVEL ≈ 2 cm.

4-76

170-175' SAME AS ABOVE

175-180' SANDY-CLY GRAVEL; GRANULES OF GRAVEL SMALLER THAN ABOVE (ABOUT 3 MM.), F.-V. CRS. SAND, QTZITE SUBANGULAR TO SUBROUNDED.

180-185' SAME AS ABOVE

185-190' SDY.-CLYEY GRAVEL, GRAVEL COARSER THAN ABOVE (≈1.5 cm). QTZITE SUBANGULAR TO SUBROUNDED, F-V. CRS SAND.

190-195 A MIX OF APPROX. 50% CLYEY SAND - 50% GRAVEL GRANULES OF GRAVEL SLY LARGER THAN ABOVE, QTZITE SUBANGULAR TO SUBROUNDED.

195-200' WIDE RANGE OF GRAVEL SIZES. SDY-CLYEY GRAVEL. QTZITE SUBANGULAR TO SUBROUNDED, LESS CLAYEY SAND THAN ABOVE.

200-205' SAME AS ABOVE EXCEPT MORE CLAYEY SAND THAN ABOVE.

205-210' SAME AS ABOVE.

LOGGED 11-26-76

210-215' SAME AS ABOVE

215-220' SANDY, CLAYEY GRAVEL; QTZITE (SOME VOLCANICS) SUBANGULAR TO SUBROUNDED;

GGED 11-26-76

220-225' SANDY-CLAYEY GRAVEL. LARGER GRANULES THAN ABOVE (≈ 2 cm.), QTZITE SUBANGULAR TO SUBROUNDED, F-V. CRS. SAND; WIDE RANGE OF GRAVEL SIZES

225-230' GRVLY-CLAYEY SAND, GRAVEL FINER THAN ABOVE, QTZITE SUBANGULAR TO SUBROUNDED, V.F.-V.CRS. SAND WIDE RANGE OF GRAIN SIZES

230-235' SAME AS ABOVE

235-240' SAME AS ABOVE

240-245' GRVLY-CLAYEY SAND, LIGHT, MORE SAND THAN ABOVE, MSTLY CRS. SAND. REST SAME AS ABOVE

245-250' SAME AS ABOVE EXCEPT MORE SAND

250-255' SAME AS ABOVE

255-260' GRVLY-CLAYEY SAND, MOSTLY SAND WITH SML. AMT. CLAY, GRAVEL-FINE REST SAME AS ABOVE.

260-265' SAME AS ABOVE EXCEPT SLTLY MORE FINE GRAVEL.

265-270' SAME AS ABOVE

270-275' SANDY-CLAYEY GRAVEL, GRAVEL UP TO 1.5 cm. QTZITE SUBROUNDED TO SUBANGULAR, M.F.-V.CRS. SAND.

LOGED 11-26-76

275-280' GRVLY-SAND, SLTLY CLAYEY. GRVL SAME AS ABOVE (≈1.5 CM.) QTZITE (FEW VOLCANICS), SUBROUNDED TO SUBANGULAR.

280-285' SANDY-CLAYEY GRVL. (75% GRVL.-25% SANDY-CLAYEY MIXTURE). LES SAME AS ABOVE

285-290' SAME AS ABOVE

290-295' SAME AS ABOVE EXCEPT MORE CLAY.

295-300' GRVLY-CLAYEY SAND, MOSTLY CRS. GRAIN SAND, QTZITE (V. FEW VOLCANICS), SUBROUNDED TO SUBANGULAR.

300-305 SAME AS ABOVE

305-310' " " "

310-315' " " "

315-320' " " "

320-325' " " "

325-330' SAME AS ABOVE EXCEPT SLTLY MORE CLAY.

-76

330-335 LIGHT, CLAYEY-GRULY SAND; COARSE GRAIN SAND, GRAVEL (PEBBLE), QTZITE SUBROUNDED TO SUBANGULAR, V. FEW VOLCANICS;

335-340 SAME AS ABOVE

340-345 SAME AS ABOVE EXCEPT SLY MORE GRULS.

345-350 SAME AS ABOVE

350-355 SAME AS ABOVE

355-360 SAME AS ABOVE EXCEPT MORE VOLCANICS

360-365 SAME AS ABOVE EXCEPT SAME AMT. OF VOLCANICS AS 10' ABOVE.

365-370 LIGHT, CLAYEY-SANDY GRUL; WIDE RANGE OF GRULS, QTZITE SUBANGULAR TO SUBROUNDED, FEW VOLCANICS, SAND IS FINE TO COARSE GRAIN, SOME CLAY

370-375' SAME AS ABOVE

375-380' SAME AS ABOVE

380-385 " " "

385-390 " " "

390-395 " " " EXCEPT SLY MORE SAND(?

395-400 " " "

400-405 " " " WITH EVEN MORE SAND ?

[illegible]-76

330 - 335'
330 - ~~405~~ frozen; unable to log today

405 - 410' Light; sly grvly, sly clay, mostly Sand.
FINE - Coarse Grain, qtzite subangular
(Few pebbles), Some Volcanics (few)

410 - 415' Same as above except sly more gravel

415 - 420 Same as above with increasing gravel.
A few up to 15 cm

420 - 425 Same as above

425 - 430 Same as above

430 - 435 About even distribution of sand and gravel
with some clays. Even distribution of
fine gravel. Driller noted harder to drill.
More qtzite.

435 - 440 Same as above

440 - 445 " " "

445 - 450 " " "

12-3-76

450-455 Light, poorly graded gravel; sandy-clayey gravel. Mostly med. grain sand; qtzite subangular to subrounded with [illegible] volcanics

455-460' Same as above

460-465 Same as above

465-470 Same as above

470-475 Same as above except with sly more sand, gravel same size (pebble)

475-480 Same as above

480-485 Same as above

485-490 Same as above

490-495 Same as above

495-500 Same as above

500-505 Sand, MOD. GRVLY, SLY CLAYEY, V.F-V.CRS. SD, FINE GRAVEL, (GRANULE - PEBBLE) QTZITE, SUBANGULAR TO SUBROUNDED LIGHT-MED. IN COLOR, V. FEW VOLCANICS,

505-510 SAND, SLY GRVLY, SLY CLAYEY, SD. 80% CRS - 20% MED., QTZITE, SUBANGULAR TO SUBROUNDED GRAVEL (GRANULE - PEBBLE), PALE BROWN (V. FEW VOLCANICS)

510-515' Same as above

515-520' Same as above

(6/76 P199

520-525' - SD, SLY GRVLY., SLY. CLAYEY, SD. V.F - V. CRS, FINE GRAVEL (GRANULE - PEBBLE) QTZITE, SUBANGULAR TO SUBROUNDED, PALE BROWN

525-530' - Same as above

530-535' - Same as above except sly. more GRAVEL

535-540 - Same as above

540-545 - Same as above

545-550 - SD, SLY GRVLY, SLY CLAYEY, V.F - V. CRS. SAND, FINE GRAVEL (GRANULE - PEBBLE). ALL GRAVELS ARE ABOUT THE SAME SIZE, MOSTLY QTZITE SUBANGULAR TO SUBROUNDED

550-555 - Same as above

555-560 - Same as above

560-565 - Same as above

565-570 - Same as above except sly. more clay.

570-575 - Same as above

575-580 - Same as above

[illegible]-585 - Same as above

585-590 - Same as above

590-595 - Same as above

P199

595 - 655 clay + gravel

(see attached original (poor legible) well log

PROJECT 490088 UCD GW MW Study P240B **LOG OF TEST BORING NO.** P240B

JOB NO. _____ DATE 9/26/84 Weds.

RIG TYPE Failing 15, Mud/Air Rotary

BORING TYPE Replacement for P198.

SURFACE ELEV. ~4700'

DATUM Just NE of Old Evaporation Ponds

Lof 11

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0				ML					Tan V. fine Sand - Silt	9/26/84 weds
5				ML					Tan V. fine Sand - Silt	9/27/84 Thurs.
10										
15				GL						
20				GP					Other - 1" Gravel channel? Same	Drilling very slow hard C Clutch broke Down time 10:00 AM → 3:00 PM, I left for Nose meeting at 1:00 PM - I returned to site, Driller at ~25', I left ~4:00 PM & had Driller bag samples.
25									Smaller Gravel more uniform size ⅛"-½" Tan-White	
30				GP					Less Uniform ⅛"-½", generally larger gravel Tan-White	9/28/84 FRI. Fri. AM I arrived 9:30 AM - drilling had stopped drilling because hole Kept caving C to gravel - Robert went back to shop to pick up clear mud + bentonite
35				GP					Same	
40				GM					Lithologic change ⅛" gravel in coarse sand matrix	Possibly making some water at ~40'
45				GP					⅛"-2" gravel in a sand matrix tan-brown sand 2" round gravel	
50										

P 240B LOG

Note: Use this same well log for P240A for P240B, since within 5' head to 200', since other - 1"

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

P240B

LOG OF TEST BORING NO. P240B

Sheet 2 of 11

PROJECT

JOB NO. DATE 9/28/84

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
50									* orange-tan quartzite gravel ½" - 1/16", generally ¼" size, clean	9/28/84 FRI - after 50 No drilling, mixing mud in pits - C
				GP						10/1/84 Mon. late PM drilling at to 70' Large cobbles/boulders No Sampler
55									# Samples from 55' on, from new hole where we moved N. 5' Started using water from the S.L Water Conservancy District on 10/2/84 PM	
				GC						10/2/84 Tues. AM - hole caved to 40', re-drilling at 50' at 10:00 AM, thickening mud
60										
									55'-75' gravel in a clay & silt brown matrix gravel slightly larger to ¾", more rounded	
65										
70										Decided to move ahead ~5' to a new hole
75									Cleaner * 1/16" - ½" gravel, Same to ~112'	
				GW						
80										
85										
90										
95										
100										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

P240B

LOG OF TEST BORING NO. P240B

Sheet 3 of 11

PROJECT

JOB NO. DATE

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth Scale	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
100									Same - clean gravels 1/8" - 1/2"	10-3-99
105				GW						
110										
									112' - 1/4" - 1/2", gravels in clay/silt matrix	Rig drilling quicker, Less chatter
115				FC						* From ~ 112' in a gravel/silt/clay zone, which could be defined as the beginning of a confining zone because of its thickness & clay/silt matrix, which becomes more clayey at ~ 150'
120										
125										
130									10:50 AM	Very easy drilling
135									10:55 AM	* Decided to screen 140'-150', G. Pack 100'-150' Bentonite 90-100 Grout 0-90'
140				FC					11:00 AM	Same
145									Slightly more clay-silt matrix	
150									11:40 AM	

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

P240B

LOG OF TEST BORING NO. P240E

Sheet 4 of 11

PROJECT

JOB NO. DATE

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
150				GC					From 150'–160' very clayey matrix with coarse gravel 1" – 1/16"	V. easy drilling through the clay/gravel zone Definite Gradation to "confining zone" at 150'
155										
160									11^55 AM	Added rods
	GC			GC-CL					V. clayey matrix with gravel, f-med. 1/16" – 1/2",	Some chatter at ~163'
165									12^10 pm	V. slow drilling Rig chatter at 167' = 12^30 pm
170				FC-CL					V. clayey matrix with gravel, f-med. gravel 1/16 – 1/2"	Still slow drilling
175									2^45 pm	
180										
185									Clayier/Siltier Less Gravel	
190				CL						10/4/84 Thurs. AM
195				CL					Nearly all clay/silt	
200										Stopped at 200', 9^30 AM since still in v. clayey material

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

P240B

Sheet 5 of 11

LOG OF TEST BORING NO. P240B

PROJECT

JOB NO. 490088 DATE 10-12-84

RIG TYPE (Replacement for P198 deep)

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
200									Brown clay/silt with grand intermixed. Appx. 25% gravel	
205									Hole caving. Need thicker mud	
210										
215										
220										
225										
230									Same - less gravel	
235										
240										
245										
250										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

Sheet 6 of 11

P240B

LOG OF TEST BORING NO. P240 B

PROJECT _____

JOB NO. _____ DATE _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
250									Same	
255										
260										
265										
270										
275									Same	
280										
285									Tan, V. fine silt/clay	
290									Same	
295									more gravel at 295-	
300										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

P240B

LOG OF TEST BORING NO. P240B

PROJECT

JOB NO. DATE

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
300									Same less gravel	Gravel pack 290'-350'
305										
310									Same, Some gravel	
315									Same Slight increase in v. small gravel	
320									More Gravel	Set Screen
325										
330										290-330 open
335									Same	
340										
345										
350									Same	

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sam
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

P240B

Sheet 8 of 11

LOG OF TEST BORING NO. P240B

PROJECT

JOB NO. DATE

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
350									Same	
355										
360									Tan, v. fine silt & clay	
365										
370									Same	
375									Same	
380										
385										
390									Same	
395										
400									Some slight moisture in general	

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample

S – 2" O.D. 1.38" I.D. tube sample.

U – 3" O.D. 2.42" I.D. tube sample.

T – 2" O.D. thin-walled Shelby tube

P240B

Sheet 4 of 11

LOG OF TEST BORING NO. P240B

PROJECT

JOB NO. DATE

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
400									Same	
405										
									Same	
410									Same	
415										
420									Same	
425										
430										
435									Tan, V. fine silt/clay sand	
440									Same	
445										
450										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

LOG OF TEST BORING NO. P240B

PROJECT _____

JOB NO. _____ DATE _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
450										
455										
460									Same	
465										
470										
475									Tan, V. fine silt/sand clay	
480										
485									Same	
490									Same	
495									Same	
500										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

LOG OF TEST BORING NO. P240B

PROJECT _____

JOB NO. _____ DATE _____

RIG TYPE _____

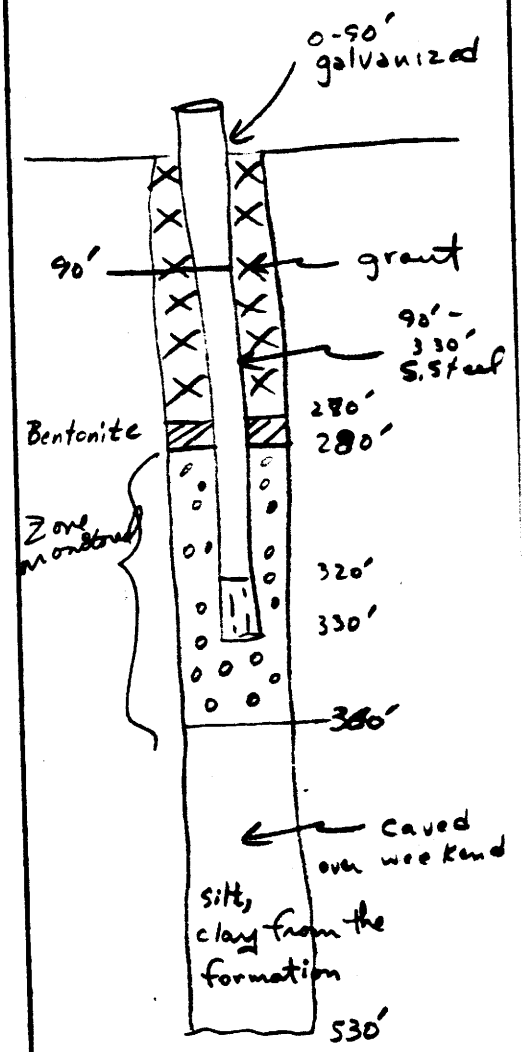
BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS
500									Tan - V. fine silt/sand clay
505									
510									
515									
520									
525									Tan - V. fine silt/sand clay
530									

VISUAL CLASSIFICATION



Screen 320' - 330'
Gravel 290' - 360'
Bentonite 280' - 290'
Grout 0' - 280'

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.

Deep replacement for P202C

Sheet 1 of 12

PROJECT Set up on 10/29/84

JOB NO. DATE Completed 11/27/84

LOG OF TEST BORING NO. P241B

RIG TYPE Mud Rotary Holemaster, Failing

BORING TYPE Drille

SURFACE ELEV. Note: P241B replaces P202C

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
0									CL	Brown, silt-clay topsoil - No rock fragments
5										
10									CL	Same - Clayier material
20									CL	Same
30										Silt/clay mostly some rock chips ≤ 1/8"
40										Light brown - tan rock chips 1/8 - 1/2" quantities in a sand/silt matrix hard, noisy drilling
50										

DRILLERS: Robert Payne replaced by Mike Dayd

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

*Sample every 10' due to large depth

* Indicate potentially high K zone

LOG OF TEST BORING NO. P241B

PROJECT _____
JOB NO. _____ DATE _____

RIG TYPE _____
BORING TYPE _____
SURFACE ELEV. _____
DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
50										V. coarse clean chips 1/4"-1/2" hard noisy drilling clean matrix
60										
70										* V. coarse rock chips 1/4-3/4" clean sand matrix. V. clean chips - High K zone
80										* Same
90										* Same - Even Coarser rock chips
100										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

Sheet 3 of 12

LOG OF TEST BORING NO. P241B

PROJECT _____

JOB NO. _____ DATE _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
100										
110										Tan-Brown 1/8-1/4" rock chips in sand, some silt matrix
120										Same
130										Same - slightly sandier cleaner matrix material moderate K-zone
140										larger rock chips 1/4-1/2" in silt/clay matrix moderate K-zone grading into cleaner material
150										* At 150 high K

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

LOG OF TEST BORING NO. 1241B

PROJECT _____
JOB NO. _____ DATE _____

RIG TYPE _____
BORING TYPE _____
SURFACE ELEV. _____
DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
150									*	Much cleaner rock chips 1/8-1/2". high K zone
160									*	Tan-Brown Smaller rock fragments 1/8-1/4", clean sand matrix
170									*	Same
180									CL	Same Lower K material
190									CL	Same - more silt/clay matrix material lower K zone
200										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

LOG OF TEST BORING NO. P241B

PROJECT _____
JOB NO. _____ DATE _____

RIG TYPE _____
BORING TYPE _____
SURFACE ELEV. _____
DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
200										Some gravel, rock chips in more silt/clay/sand matrix 1/8"-1/4"
210										Same
220										Tan 1/8"-1/4" grading into coarser/cleaner material than above *Screen for shallow well, if there's water here!
230									*	1/8"-1/2" hard rock chips clean matrix sand
240										Same
250										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

LOG OF TEST BORING NO. P241B

PROJECT

JOB NO. DATE

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
250										Same, but more silt matrix material low K
260										Tan, 1/8"-1/4" hard (quartzitic?) rock (gravel) chips. V. hard drilling ≈ 13'/hour with new bit
270										Same
280										Same
290										Large rock chips 1/4"-1/2" Cleaner matrix high K zone
300										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

LOG OF TEST BORING NO. P241B

PROJECT _____

JOB NO. _____ DATE _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
300									*	1/4-1/2" rockchips clean matrix high k zone
310									*	1/4"-1/2" rock chips same material
320									*	Same
330									*	Same
340									*	Same
350										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

LOG OF TEST BORING NO. P291B

PROJECT
JOB NO. DATE

RIG TYPE
BORING TYPE
SURFACE ELEV.
DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
350										Tan, fine clean sand ↓ medium very consistent size
360										
370										
380										Coarser 1/8 - 1/4", tan-orange ~~+~~ rock chips, clean sand matrix material
390										
400										Same - slightly coarser

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

LOG OF TEST BORING NO. P291B

PROJECT _____

JOB NO. _____ DATE _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
400										Tan-Orange Coarse 1/8" - 1/2" Fragments 4
410										Same
420										Slightly finer cuttings At ~ 420' kept grading into finer material - Probably not as high Ka above 420'
430										Same
440										
450										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

Sheet 10 of 12

LOG OF TEST BORING NO. P241B

PROJECT _____

JOB NO. _____ DATE _____

RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
450										Tan, fine – med. sand + gravel – very consistent size
460										Same
470										Same, even smaller rock cuttings
480										Same
490										1:20 pm 11/14/89 (TDV) drilling easier, not so noisy finer rock/sand no clay size from fine – med sand, rock chips
500										

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube

Sheet 11 of 13

LOG OF TEST BORING NO. P241B

PROJECT

JOB NO. DATE

RIG TYPE

BORING TYPE

SURFACE ELEV.

DATUM

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
500										finer material Drilling ~ 7'/hr.
510										
520										
530										To 530' 11/16/84 Fri Drilling ~ 7'/hr.
540										I phoned Bill Grimes (Cent. Geophys.) He is planning on coming out Sat 11/17/ ~ 1:00 PM
550										Dave Stuff, D&M to take over on Sat 11/17/84

GROUND WATER

DEPTH	HOUR	DATE

SAMPLE TYPE

A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

Sheet 1 of 1

LOG OF TEST BORING NO. P241B

PROJECT _____

JOB NO. _____ DATE _____

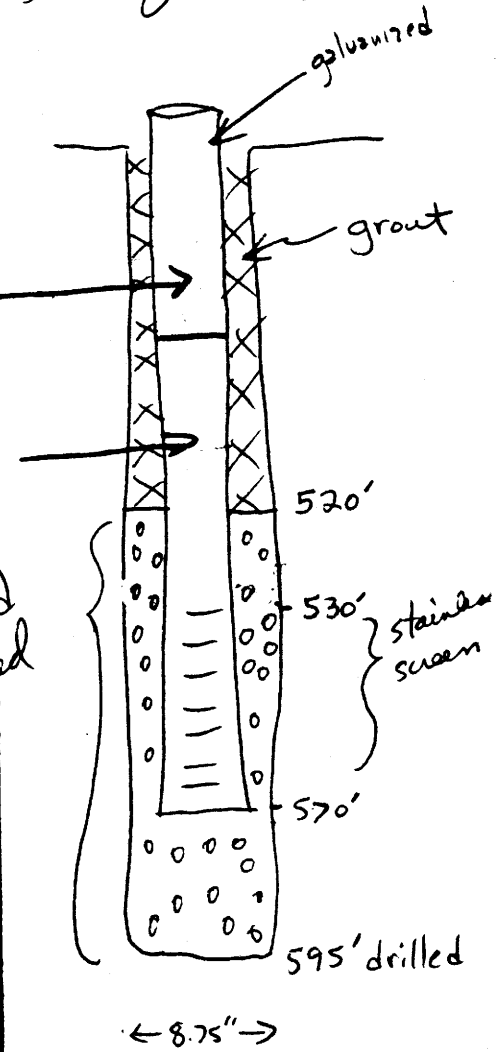
RIG TYPE _____

BORING TYPE _____

SURFACE ELEV. _____

DATUM _____

Depth in Feet	Continuous Penetration Resistance	Graphical Log	Sample	Sample Type	Blows per foot 140 lb. 30" free-fall drop hammer	Dry Density Lbs. per cu. ft.	Moisture Content Per Cent of Dry Wt.	Unified Soil Classification	REMARKS	VISUAL CLASSIFICATION
550										Finer material - Drilling ~ 20'/1.25 hrs.
560									249.71' of galvanized pipe	
									285.29' of stainless pipe	
570									sand packed	
580										
590										
595										
600										



Rig Broke at 595'. Since material so fine & geophysical logging truck on site, Decided to stop at 595'

GROUND WATER

DEPTH	HOUR	DATE

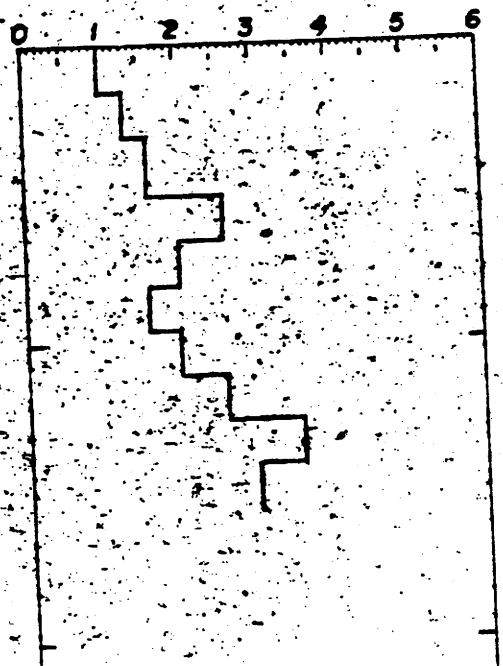
SAMPLE TYPE

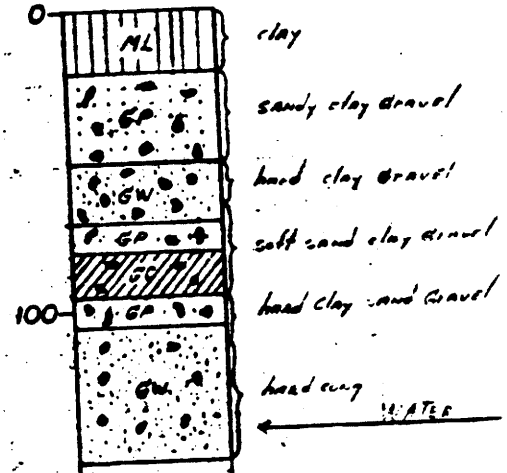
A – Auger cuttings. B – Block sample
S – 2" O.D. 1.38" I.D. tube sample.
U – 3" O.D. 2.42" I.D. tube sample.
T – 3" O.D. thin-walled Shelby tube.

Piezometer Hole No. P-202-A Near P241B

Date Sept. 5 1978

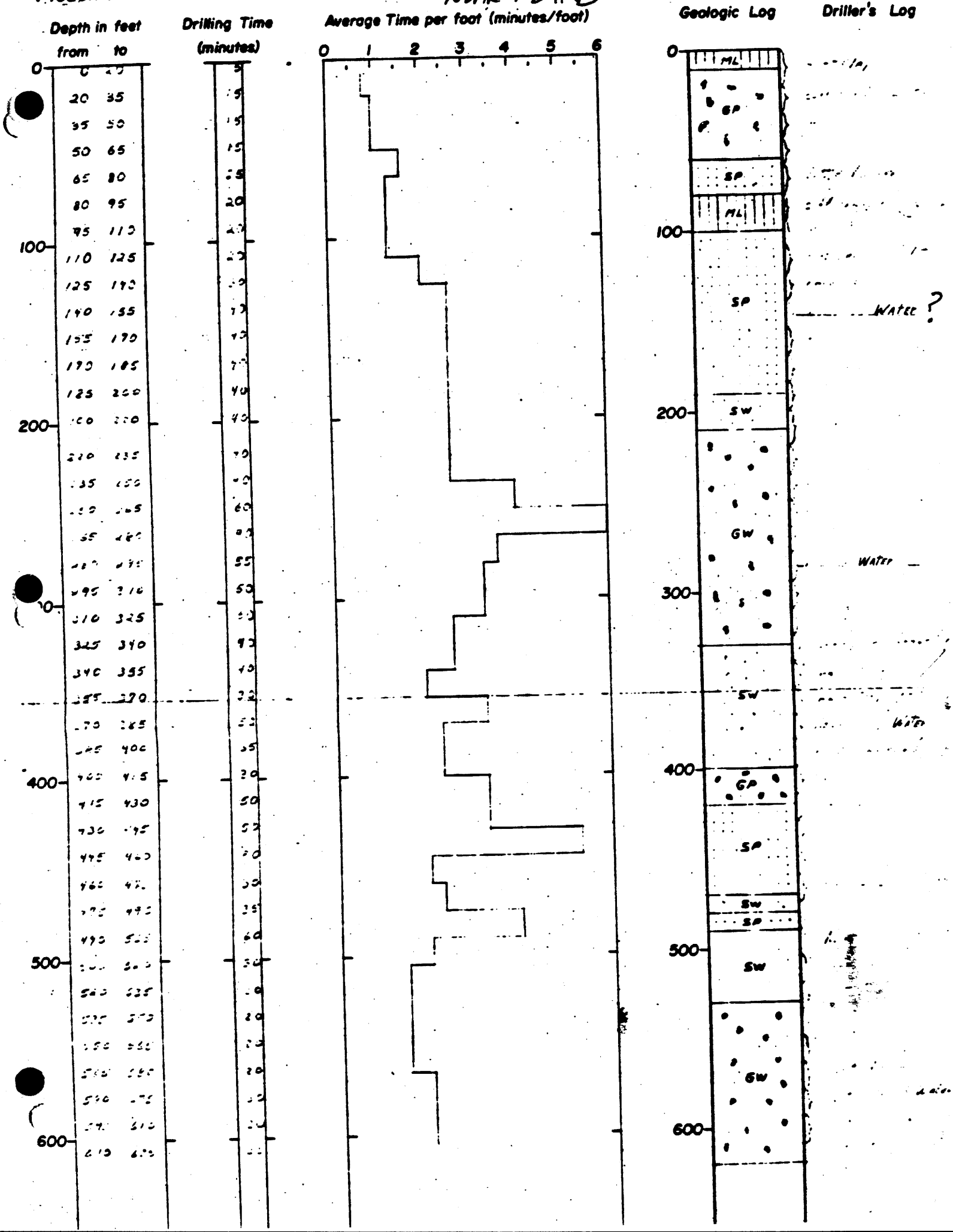
Depth in feet from	to	Drilling Time (minutes)
0	20	20
20	35	20
35	50	20
50	65	25
65	80	40
80	95	30
95	110	25
110	125	30
125	140	40
140	155	55
155	170	95



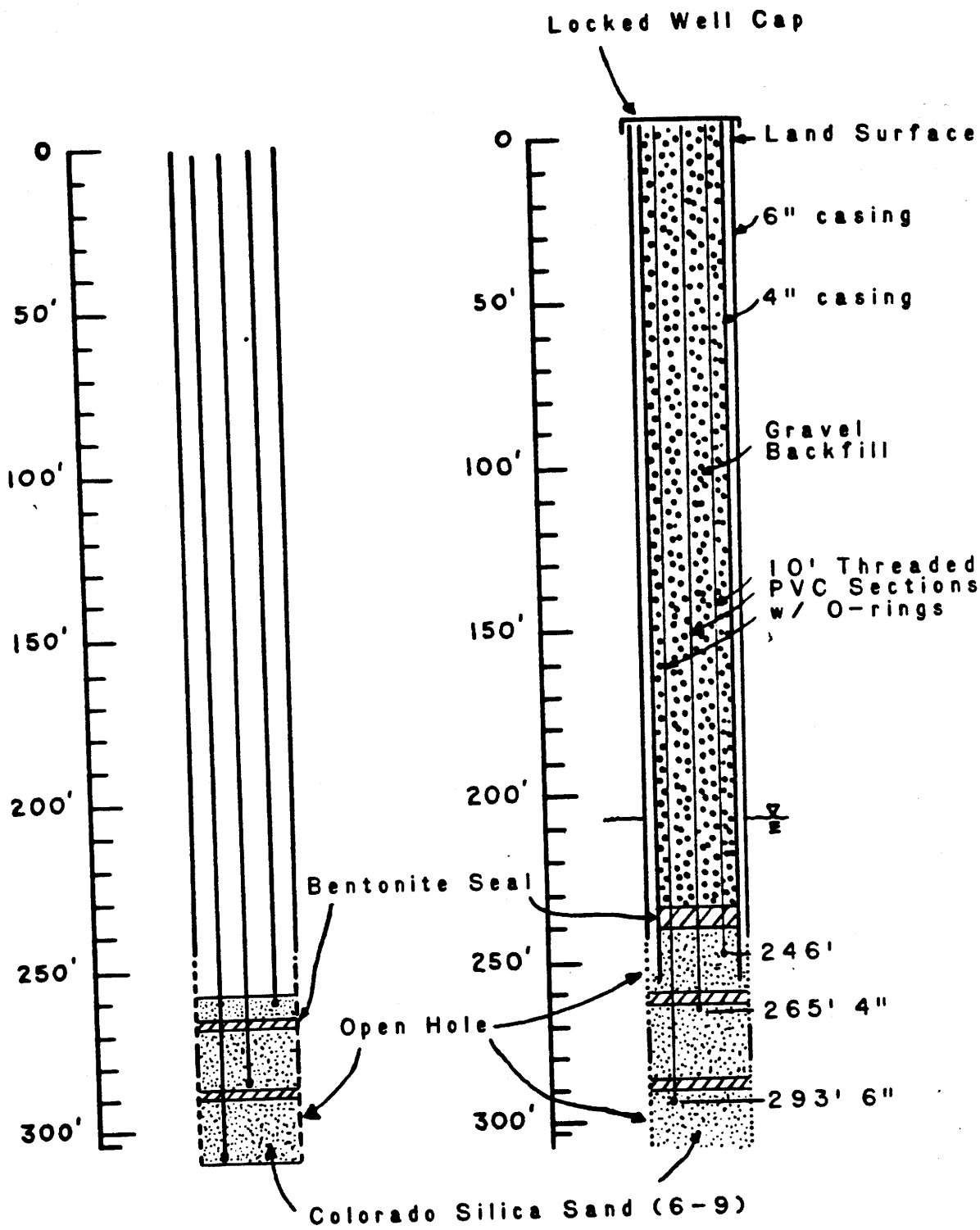


0 100 200 300 400 500 600

Piezometer Hole No. 202 C NEAR P241B Date July 25, 1978



USU Monitor Well



Updated installation scheme.

Final placement and development of three samplers.

USU Monitor Well

ANALYSIS AND SAMPLES WHILE DRILLING

Lab ID#	Depth Interval	SO_4 (mg/l)	Cl^- (mg/l)
298	238'-240'	2160	147
299	258'-261'	2020	141
300	273'-275'	2080	146
301	275'-276'	2020	147
302	301'	1740	148
303	310'	1380	167
304	320'	1380	165
305	330'	1480	158

ANALYSIS OF TEMPORARILY PLACED BARCAD SAMPLER

180 + 181	replicates	330'	1565	162

TOTAL ANALYSIS OF TEMPORARILY PLACED 330' SAMPLER (mg/l)

	Ca	Mg	Na	K	B	SiO_2	TDS	SO_4	AK	Cl	NO_3-N	Fe	pH
a)	410	206	141	8.8	250 µg/l	15.4	3064	1630	401	164	<.3	63.6	6.6
b)	422	210	145	8.3	271 µg/l	18.7	3250	1500	439	161	<.3	75.3	6.7

Samples From
Utah Water Research Laboratory
Monitoring Well Located at
10200 South 3600 West

Table 5. Geologic and static water level data taken while drilling.

DEPTH INTERVAL (feet)	DESCRIPTION OF MATERIAL	
0 - 3	silty soil and fines	
3 - 30	gravel	
30 - 45	sand	
45 - 65	cobbles	
65 - 77	clay	
77 - 88	gravel	
88 - 100	fine sand	
100 - 110	sand and clay	
110 - 135	gravel, some clay, and fines	
135 - 175	gravel	
175 - 215	cobbles with occasional cement, clay, sand, and fines	
215 - 218	possible trace of water	
221	cementation	
221 - 274	gravel and sand, with static water level = 207' (observed when drilling passed 240')	(Major Upper Water Bearing Zone)
282	static water level = 205'	
310	cementation	
317	tight formation with cementation	(Confining Bed?)
317 - 330	gravel	

Water quality in this well was outlined in the Hydrogeochemisty section.

Monitoring program

The BARCAD sampling units utilize a gas volume exchange principal to lift the water column up permanently installed riser tubes. The principles of operation are sketched in Figure 42. A specially designed sampling head is necessary to apply the nitrogen to the tube annulus, while allowing the water sample to rise up the inner tubing leak-free. The procedure for the entire operation is:

1. Check tank pressure by opening valve.

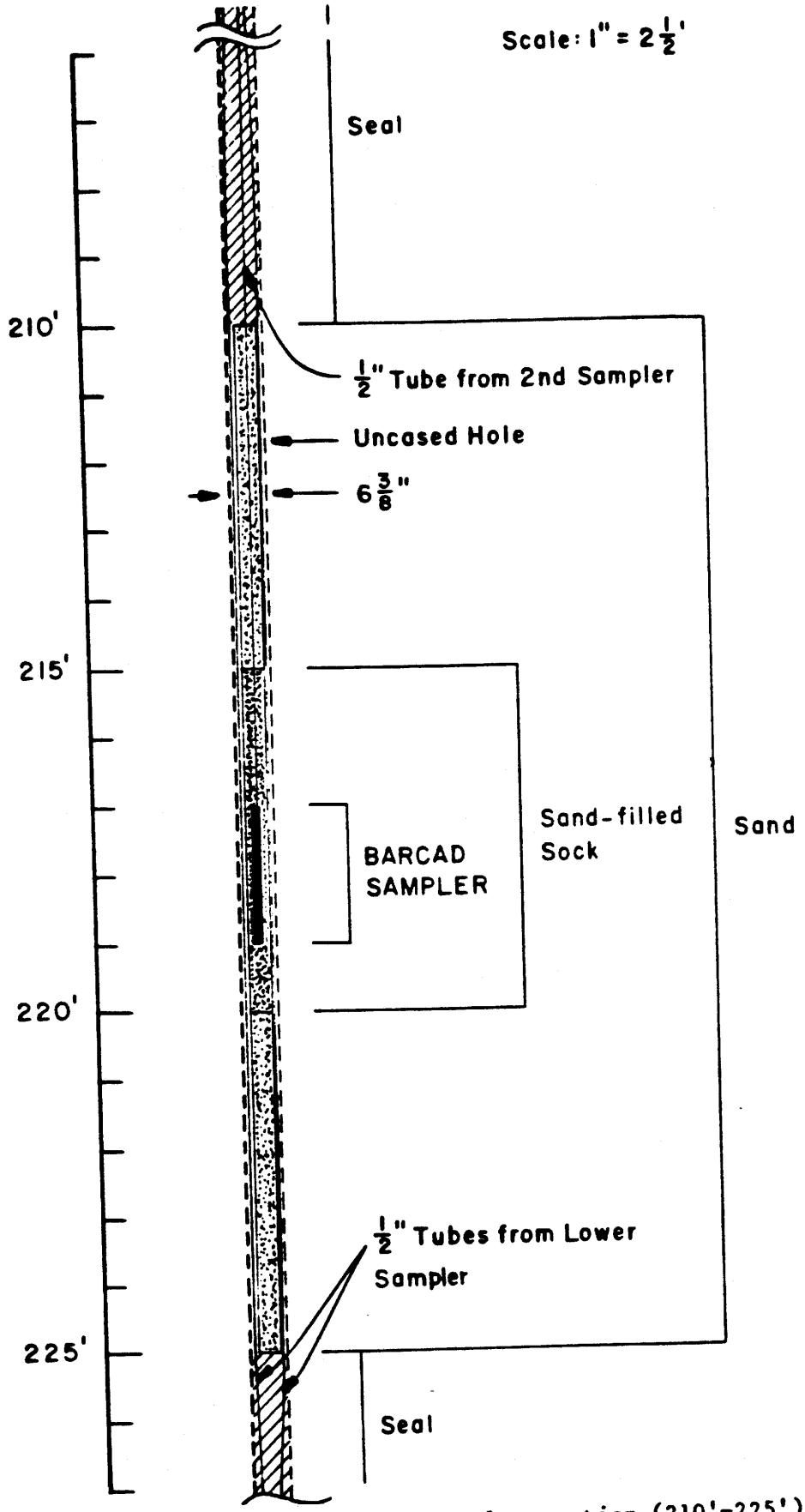


Figure 38. Scale diagram of middle sampler section (210'-225').