



GEORGE P. ZEBAL AND ASSOCIATES
INDUSTRIAL UTILIZATION OF GEOLOGY

GRAPHIC WELL REPORT

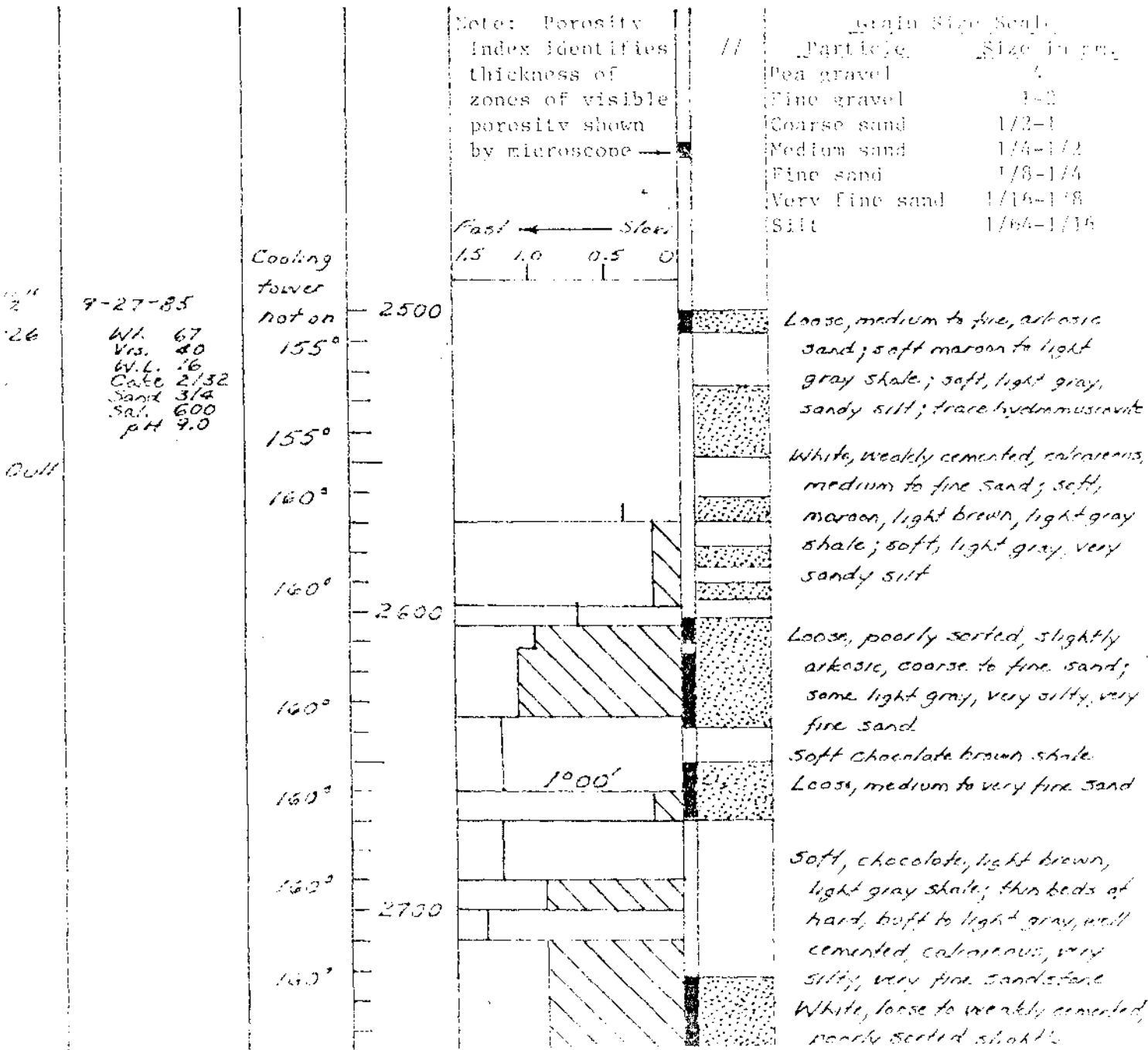
Client: Magma Power Company Well: Magma-USA 31-7
 Location: East Mesa
 Drilled by: H & W Drilling Co. No. 7 500 feet south and 500 feet west of
 Date: 11:00 PM 9-19-85 NE corner of Sec. 7, T 16 S, R 17 E.
 Elevation: _____
 Record: Ground Level 40 feet
 7/8-inch conductor set at 190 feet Kelly Bushing 54 feet
 7/8-inch surface set at 1386 feet Remarks: Production well
 1/2-inch hung to 3972 feet

Engineering Data

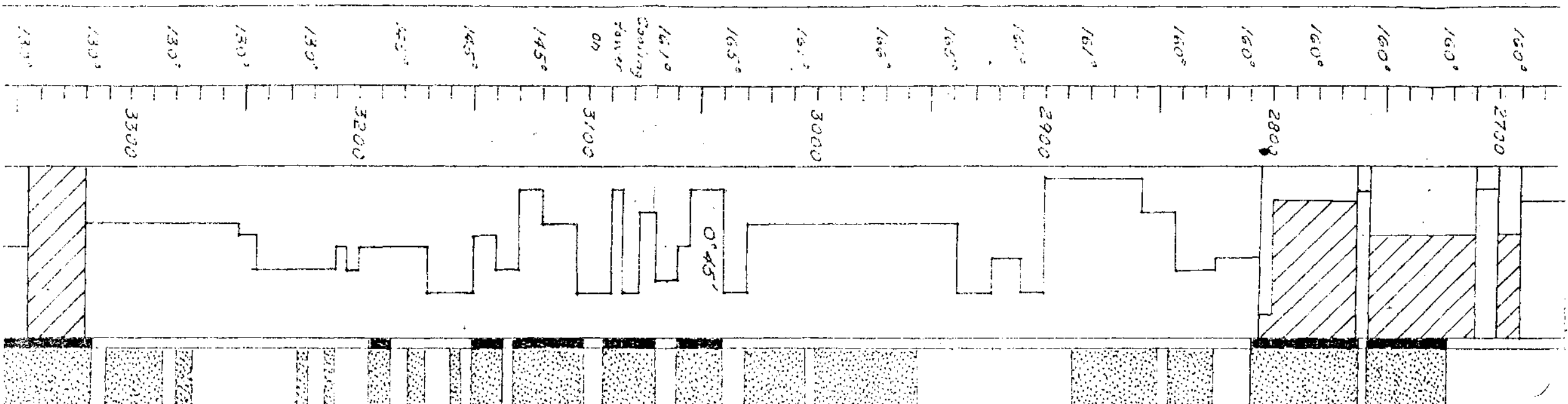
Record	Mud Record	Temp.
Type	Date	°F
No.	Type	at
Weight	Viscosity	flow
Water loss	line	
Cake		
Sand		
Salinity		
pH		

Geological Data

Drilling Time	Sample	Sample Description
Ft/min	Log	
Deviation	Porosity Index	
Degrees		



9-28-85
 W/L 57
 1/5 38
 W/L 14
 Gage 2, 32
 Sand 400
 500
 PH 10.0



Soft, chocolate, light brown, light gray shale; thin beds of hard, buff to light gray, well cemented, calcareous, very silty, very fine sandstone. White, loose to weakly cemented, poorly sorted, slightly arkosic, medium to very fine sand; soft, light gray silt sand, slightly arkosic, poorly sorted, coarse to very fine sand.

Soft, chocolate to gray, shale. White, loose to weakly cemented, calcareous, arkosic, fine to very fine sand; soft light brown to light gray shale; thin pyritic white, weakly to well cemented, calcareous, arkosic, fine to very fine sand; trace pyrite.

Soft chocolate, light gray shale; thin beds of hard, light gray, well cemented, calcareous, very silty, fine to very fine sandstone.

White, weakly cemented, calcareous, fine to very fine sand.

Soft, hard red shale.

White sand as above. Loose to weakly cemented, calcareous, fine to very fine sand. Brick red shale.

Loose to weakly cemented sand as above. Chocolate to gray shale.

Loose to weakly cemented sand as above.

Loose sand as above. Light gray to white, weakly to well cemented, calcareous, silty, fine to very fine sand; chocolate to gray shale.

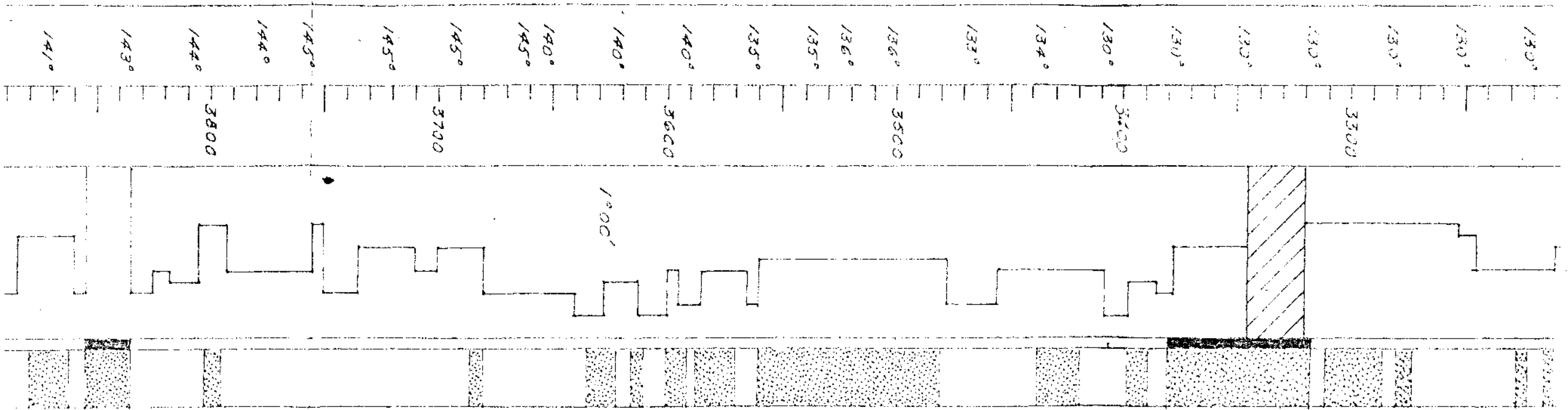
Hard, pale green to white, well cemented, very calcareous, from to very fine sandstone; chocolate to gray shale.

White, weakly cemented, slightly arkosic, calcareous, fine to very fine sand; soft gray shale.

Loose, clean, well sorted, medium to fine sand; trace pyrite.

9-29-85
 WT. 68
 V.S. 42
 M.L. 12.4
 G.A.G. 21.32
 SAND 1/2
 SAL. 45.0
 PH. 8.6

9-30-85
 WT. 68
 V.S. 38
 M.L. 13
 G.A.G. 21.32
 SAND 1/2
 SAL. 45.0
 PH. 9.5



Hard, pink green to white, well cemented, very calcareous, fine to very fine sandstone; chocolate to gray shale

White, weakly cemented, slightly calcareous, calcareous, fine to very fine sand; soft gray shale

Loose, clean, well sorted, medium to fine sand; fine gravel

Brown to gray sand

Hard, weakly cemented, calcareous, calcareous, fine to very fine sand; brick red, brown, gray sand

Brick red sand and gravel

White, weakly cemented, calcareous, very calcareous, pink, white coarse to very fine sand and gravel

Chocolate to gray, sandy to very green shale

White, weakly cemented, calcareous, calcareous, medium to fine to very fine sand; chocolate to light gray shale; to gray shale

Chocolate to gray, sandy, medium to weakly cemented, calcareous, very sand, surf

White, weakly cemented, calcareous, calcareous, silty, fine to very fine sand

Chocolate to gray, sandy, thin beds of white to light gray, weakly cemented, calcareous, silty, fine to very fine sand

White, weakly cemented, calcareous, silty, fine to very fine sand

Brick red chocolate to gray sand with thin beds of sand as well as white, sandy, calcareous, medium to very fine sand

Chocolate to gray, sandy, thin

9-30-85
 Wt. 68
 W.L. 38
 Gals. 1/3
 Sand 2/32
 Sand 1/4
 Sol. 450
 PH 9.5

144°

3800

144°

143°

141°

140°

3900

145°

7" casing
 hung to
 3972'

10-2-85

Wt. 68
 W.L. 42
 Gals. 10.8
 Sand 1/4
 Sol. 500
 PH 9.0

4000

Charcoal and gray shale

White, weakly cemented calcareous
 fine to very fine sand

Cone No. 1 4020' - 4050'
 See detailed description below

10-03-85

Wt. 68
 W.L. 42
 Gals. 10.8
 Sand 2/32
 Sand 1/4
 Sol. 500
 PH 12.1

4100

White, fine to very fine to well
 cemented calcareous sand to
 very fine sand

Gray to black shale

130°

4200

130°

1030'

White, weakly cemented, slightly
 calcareous, fine to very fine
 sand

White, well cemented calcareous
 fine to very fine, silty, sand-
 stone

Light gray to black shale
 well cemented sandstone or shales

Light gray to gray shale
 well cemented sandstone or shales

Light gray to dark gray shale

White well cemented calcareous,
 fine to very fine, silty sandstone
 Gray to dark gray shale
 well cemented sandstone or shales;
 trace kaolinite

Gray to dark gray shale

10-04-85

Wt. 67
 W.L. 37
 Gals. 12.6
 Sand 2/32
 Sand 1/4
 Sol. 500
 PH 11.9

138°

4300

135°

135°

135°

130°

130°

142°

4400

140°

140°

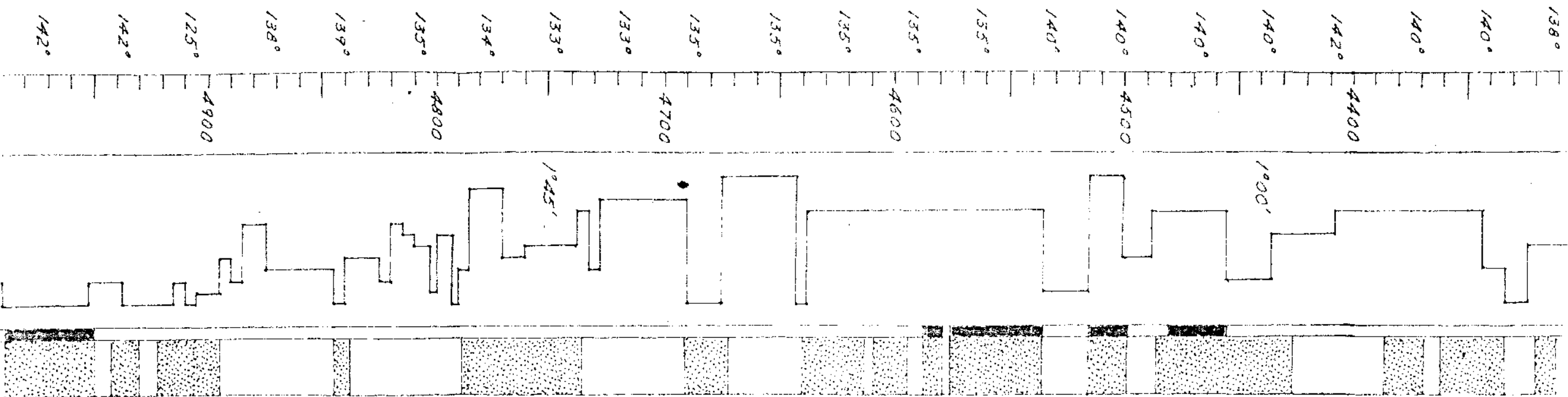
140°

1000'

Loose to weakly cemented, clean,
 well-sorted, fine sand; some

10-04-85
 W/L 67
 V/S 37
 W.L. 12.6
 Calk 2/32
 Sand Trace
 Sol 56.9
 PH 11.9

10-05-85
 W/L 67
 V/S 38
 W.L. 10.8
 Calk 2/32
 Sand Trace
 Sol 61.0
 PH 11.4



Well cemented sandstone as above.
 Light gray to dark gray sand.
 White well cemented calcarenous fine to very fine silty sandstone.
 Gray to dark gray shale.
 Well cemented sandstone as above.
 Trace kaolinite.
 Gray to dark gray shale.

Loose to weakly cemented, well sorted, fine sand, some pale green calcareous shale, trace muscovite, trace kaolinite.

Gray to dark gray to buff shale.
 Loose to weakly cemented, medium well sorted fine sand light to dark gray, some trace kaolinite.

Loose to weakly cemented slightly calcareous well sorted fine sand, trace muscovite, trace kaolinite, pale green calcarenous shale.
 Light to dark gray shale.

Light to weakly cemented calcarenous fine to very fine sand, light to dark gray, some trace kaolinite.
 Light gray to dark gray to buff shale.

White weakly cemented calcarenous fine to very fine sand, trace kaolinite.
 Light to dark gray to buff shale, trace pale green calcarenous shale.

White weakly cemented calcarenous fine to very fine sand, trace kaolinite.
 Light to dark gray to brown shale.

White weakly cemented calcarenous fine to very fine sand, light to dark gray to brown shale.

White weakly cemented calcarenous calcarenous fine to very fine sand, trace kaolinite, light to dark gray shale.

Loose, calcareous calcarenous fine to very fine sand, trace kaolinite, trace muscovite, trace kaolinite.

W/L 67
Vis. 39
W/L. 12.6
Calc 2/32
Sand Trace
S&I 480
PH 10.6

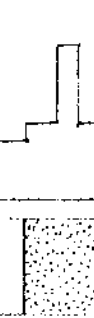
135°
5500



Calcareous, med to very fine sandstone
Core No. 2 5572'-5587'

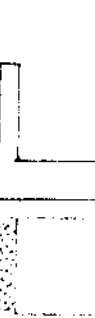
W/L 67
Vis. 39
W/L. 12.0
Calc 2/32
Sand Trace
S&I 480
PH 10.6

144°
5600



Black shale
Hard, well cemented, calcareous, medium to fine sandstone, trace fossiliferous
Light to dark gray sh. Hard, well cemented, poorly sorted, calcareous, coarse to very fine sandstone, light to dark gray sh. Hard sandstone as above

135°
5700



Light to dark gray to blue sh. Light gray, well cemented, calcareous, very sandstone. Hard, calc. med cemented, calcareous fine to very fine sandstone
Light to dark gray, med. light gray, poorly cemented, calcareous, very sandy, med. to coarse of hard sand as above, very purple

158°
5800



White, weakly to well cemented, calcareous, poorly sorted, medium to very fine sand, gray to very fine sandstone, trace fossiliferous
Light to dark gray, calcareous, well cemented, calcareous, sandy, med. to coarse, trace fossiliferous

W/L 67
Vis. 39
W/L. 11.6
Calc 2/32
Sand Trace
S&I 480
PH 11.0

Driller T.O. 5850 feet
Solum T.O. 5529 feet

No. 1 4023'-4058' Recovered 4 feet Cutting time: 100 minutes
4028-4037 No recovery (probably loose sand)
4037-4037 1/2 Dark gray, featureless shale

4037 1/2-4040 1/2 White, weakly to well cemented, slightly calcareous, fine to very fine sand
4040 1/2-4041 White, well cemented, slightly calcareous, silty, fine to very fine sandstone
4041-4058 No recovery (probably loose sand)

Note: Core time indicates that sands from 4037 1/2 to 4058 feet are probably composed of alternating thin zones of sand as described above and soft, loose sand that was washed away. The recovered sand was composed of layers of cemented sand 1/4 to 1/2-inch thick.
No evidence of fractures in core.

No. 2 5572'-5587' Recovered 4 feet Cutting time: 24 minutes

5572'-5578' No recovery
5578-5587 1/2 Highly cemented (2 inches of relief) mixture of black shale and light gray, dense, well cemented, calcareous, very silty, fine to very fine sandstone
5578 1/2-5578 5/4 Black, fissile shale
5578 5/4-5579 Hard, white to light gray, well cemented, calcareous, fine to very fine sandstone
5579-5582 White, weakly to well cemented, slightly calcareous, fine to very fine sandstone
5582-5587 No recovery