UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Reconnaissance drilling during 1980 in the Goose Creek coal field, Cassia County, Idaho

by

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Open-File Report 83-~~447~~ 477

1983

CONTENTS

ILLUSTRATIONS

TABLES

ENGLISH-METRIC CONVERSION

[The metric system is not currently used to compute coal, oil, and gas resources in the United States]

English unit		multiplied by	Metric unit
Mile	=	1.609	Kilometers
Square mile	=	2.59	Square kilometers
Foot	=	.3048	Meter
Inch	=	2.54	Centimeter

INTRODUCTION

The Goose Creek coal field comprises an area of approximately 260 square miles in southern Idaho and adjacent parts of Nevada and Utah (fig. 1). Reconnaissance drilling was performed in the area during 1980 as part of a geological investigation conducted by the U.S. Geological Survey. Six holes were drilled on public domain in Cassia County, Idaho, to help determine the subsurface stratigraphy of uranium-bearing lignite reported in the area (Mapel and Hail, 1959).

Geologic setting

Lignite in the Goose Creek field is in several zones in the Idavada Volcanics of Miocene age (Mapel and Hail, 1959; Axelrod, 1964). These formations consist of interbedded volcanic ash, tuff, and fluvial and lacustrine sediments. The general stratigraphy and current nomenclature applied to the Tertiary in the Goose Creek field and vicinity are given in table 1.

Acknowledgments

The cooperation of the Bureau of Land Management and the U.S. Forest Service during this investigation was greatly appreciated. Mr. W. B. Whiteley and Mr. M. W. Cranney granted access through privately owned land in the area.

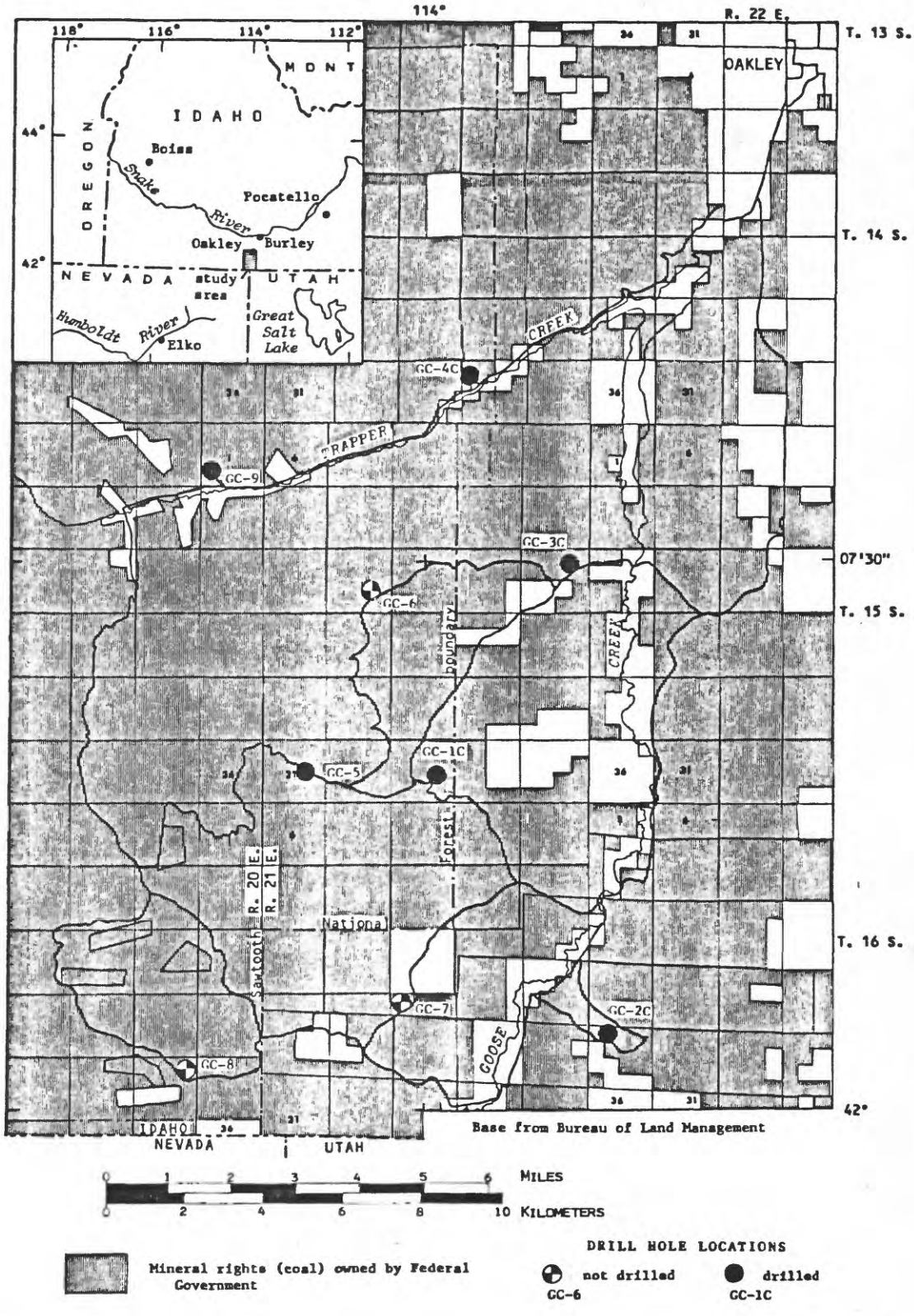


Figure 1.--Index map showing drill hole locations in the Goose Creek field, Cassia County, Idaho.

Table 1.--Stratigraphy and nomenclature of rock units in the Goose Creek field and vicinity (modified from Axelrod, 1964).

Lithology	Approx. thickness (feet)	Mapel and Hail (1959)		Axelrod (1964)	
Olivine basalt flows and associated sedimentary rocks.	300		not in area	Banbury Basalt	
Brown to gray quartz latite welded tuffs and flows; some vitric ash, and thin ashy sedimentary rocks locally.	700	Salt Lake Formation	upper	Idavada Volcanics	Cougar Point Formation
White vitric ash and tuff; few quartz latite welded tuffs; thin sandstone, conglomerate, and lake beds.	1,500		lower		Jenny Creek Formation
Pumiceous shale and ash, carbonaceous shale, diatomite, sandstone, and conglomerate beds.	900	Payette(?) Formation			Beaverdam Formation
Quartz latite porphyry and rhyolite porphyry.	1,000	rhyolite		Jarbidge Rhyolite	
Chiefly Paleozoic marine sediments; some Precambrian metasediments; Mesozoic granitics	2,000+	Pre-Tertiary rocks		Pre-Tertiary rocks	

DESCRIPTION OF DRILLING PROGRAM

Drilling in the Goose Creek field was performed during August 1980, by Jim Feighny Drilling, Inc., under Government Contract Number 14-08-0001-18795. Nine drill holes were originally staked in an area south and west of Oakley, in Cassia County, Idaho. Only six of the holes were actually drilled, however, due to impassible conditions of existing roads. The locations of the drill sites are shown in figure 1; table 2 contains descriptive information for each hole, including location, ground elevation, and total depth drilled and intervals cored.

All drilling was done with a portable (truck-mounted) drill rig, using a heavy drilling mud to prevent caving of the hole wall. Drill cuttings were collected from each hole at 5-ft intervals with a fine-mesh wire strainer and used to construct preliminary lithologic logs of the holes, following the procedures outlined in Hobbs (1979).

Four of the six rotary holes, GC-1C, GC-2C, GC-3C, and GC-4C, were "twinned" (re-drilled within a few yards of the initial hole) in order to obtain core samples of the lignite and associated rock. Each of these holes was drilled with compressed air and a conventional core barrel fitted with a diamond-studded coring bit was used in obtaining the core samples.

Table 2.--Drill hole numbers, locations, surface elevations, and depths drilled for six drill holes in the Goose Creek field, Cassia County, Idaho

[Elevations estimated from topographic base maps. C after drill hole number indicates cored hole]

Drill hole number	Location			USGS 7.5' quadrangle	Surface elevation (feet)	Total depth and [intervals cored] (feet)
	Section	Township	Range			
GC-1C	SE 1/4, 33	15 S	21 E	Blue Hill	5,585	390 [80.0-170.0]
GC-2C	NW 1/4, 25	16 S	21 E	Blue Hill	5,250	645 [30.0-50.0; 205.0-235.0; 240.0-315.0]
GC-3C	NE 1/4, 14	15 S	21 E	Blue Hill	4,925	403 [240.0-250.0]
GC-4C	NW 1/4, 34	14 S	21 E	Oakley	4,900	520 [no core recovered]
GC-5	NE 1/4, 31	15 S	21 E	Ibex Peak	5,920	312
GC-9	SW 1/4, 1	15 S	20 E	Severe Spring	5,250	520
The following three holes were staked but were inaccessible to the drill rig						
GC-6	SE 1/4, 17	15 S	21 E	Ibex Peak	5,820	---
GC-7	W 1/2, 21	16 S	21 E	Ibex Peak	5,300	---
GC-8	NE 1/4, 26	16 S	20 E	Ibex Peak	5,230	---

In general, the lignite-bearing strata in the study area are poorly consolidated and difficult to sample using conventional coring methods. Rocks of the target intervals in core holes GC-1C and GC-2C were fairly incompetent, resulting in poor core recovery. Artesian water encountered at a depth of approximately 60 feet in core holes GC-3C and GC-4C was a major problem during the coring operations. Casing was used in hole GC-3C with limited success toward core recovery; GC-4C was abondoned.

Results of geophysical logging

Geophysical logs--natural gamma, gamma-gamma (density), resistivity, and caliper--were obtained for holes GC-1C, GC-2C, GC-3C, and GC-5. Spontaneous potential (S.P.) and neutron logs, in addition to the aforementioned logs, were obtained for holes GC-4C and GC-9 (no caliper log was made for GC-4C). Copies of the geophysical logs are included in the appendix.

Preliminary interpretation of the geophysical logs in conjunction with available core and cuttings indicate that bed thicknesses and lithologies vary widely from the basin interior to the margins. In particular, thickness and ash content of the lignite zones have high lateral variability, becoming increasingly thin and dirty towards the basin margins. Natural radioactivity of the lignite zones is anomalous in the southern and eastern parts of the study area, where the lignite is interbedded with sandstones.

REFERENCES

Axelrod, D. I., 1964, The Miocene Trapper Creek flora of southern Idaho: University of California Publications in Geological Sciences, v. 51, 148 p.

Hobbs, R. G., 1979, Guidelines for logging, describing, and sampling cores and cuttings of coal and associated rocks at the drill site: U.S. Geological Survey Open-File Report 79-1522, 23 p.

Mapel, W. J., and Hail, W. J., Jr., 1959, Tertiary geology of the Goose Creek district, Cassia County, Idaho, Box Elder County, Utah, and Elko County, Nevada: U.S. Geological Survey Bulletin 1055-H, p. 217-254.

Swanson, V. E., and Huffman, Claude, Jr., 1976, Guidelines for sample collecting and analytical methods used in the U.S. Geological Survey for determining chemical composition of coal: U.S. Geological Survey Circular 735, 11 p.

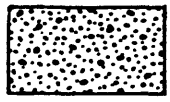
APPENDIX

Geophysical logs from six drill holes in the

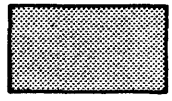
Goose Creek field, Cassia County, Idaho

EXPLANATION OF STRIP LOG PATTERNS

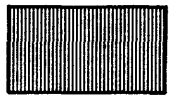
MAJOR LITHOLOGY



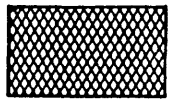
Alluvium; colluvium



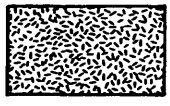
Air-fall tuff



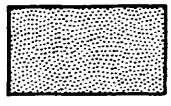
Tuff, water-laid, sandy, silty



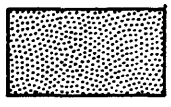
Altered volcanic ash (smectite)



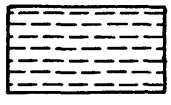
Welded tuff; vitrophyre



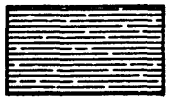
Sandstone, tuffaceous



Sandstone, conglomeratic



Siltstone, sandy, clayey



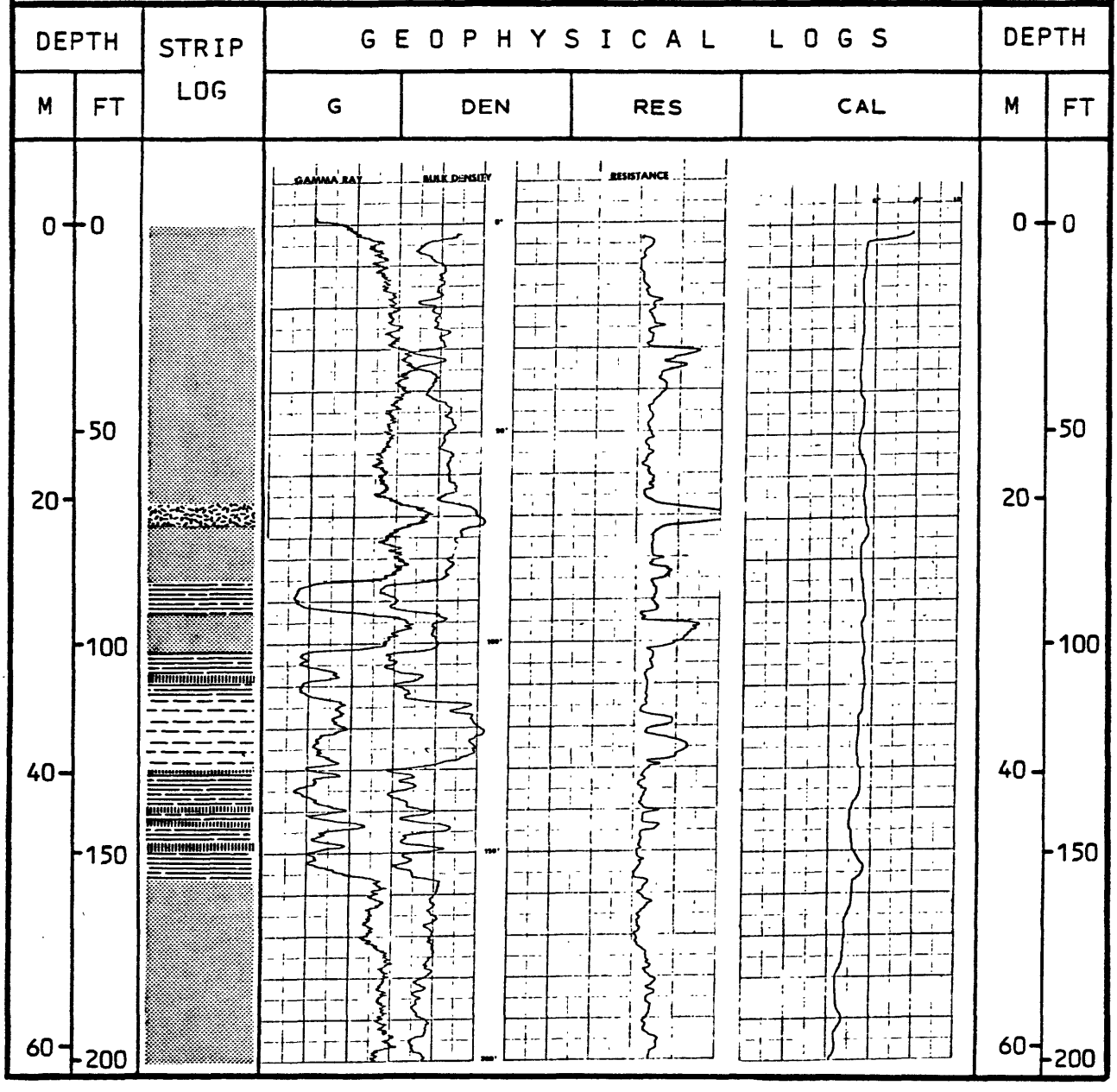
Carbonaceous shale; lignite

HOLE NO.: GC-1C GROUND ELEV. (EST.): 5,585 ft

LOCATION: SE 1/4, sec. 33, T. 15 S., R. 21 E.

TOTAL DEPTH: 390 ft CORED: YES X NO ___

GEOPHYSICAL LOGS:	T.C.:	SCALE:	LOGGING SPEED:
NATURAL GAMMA (G):	2 sec	25 cps/log div	15 ft/min
DENSITY (DEN):	2 sec	154 cps/log div	15 ft/min
RESISTANCE (RES):	2 sec	30 Ω/log div	15 ft/min
CALIPER (CAL):	2 sec	1 in/log div	30 ft/min



HOLE NO.: GC-1C

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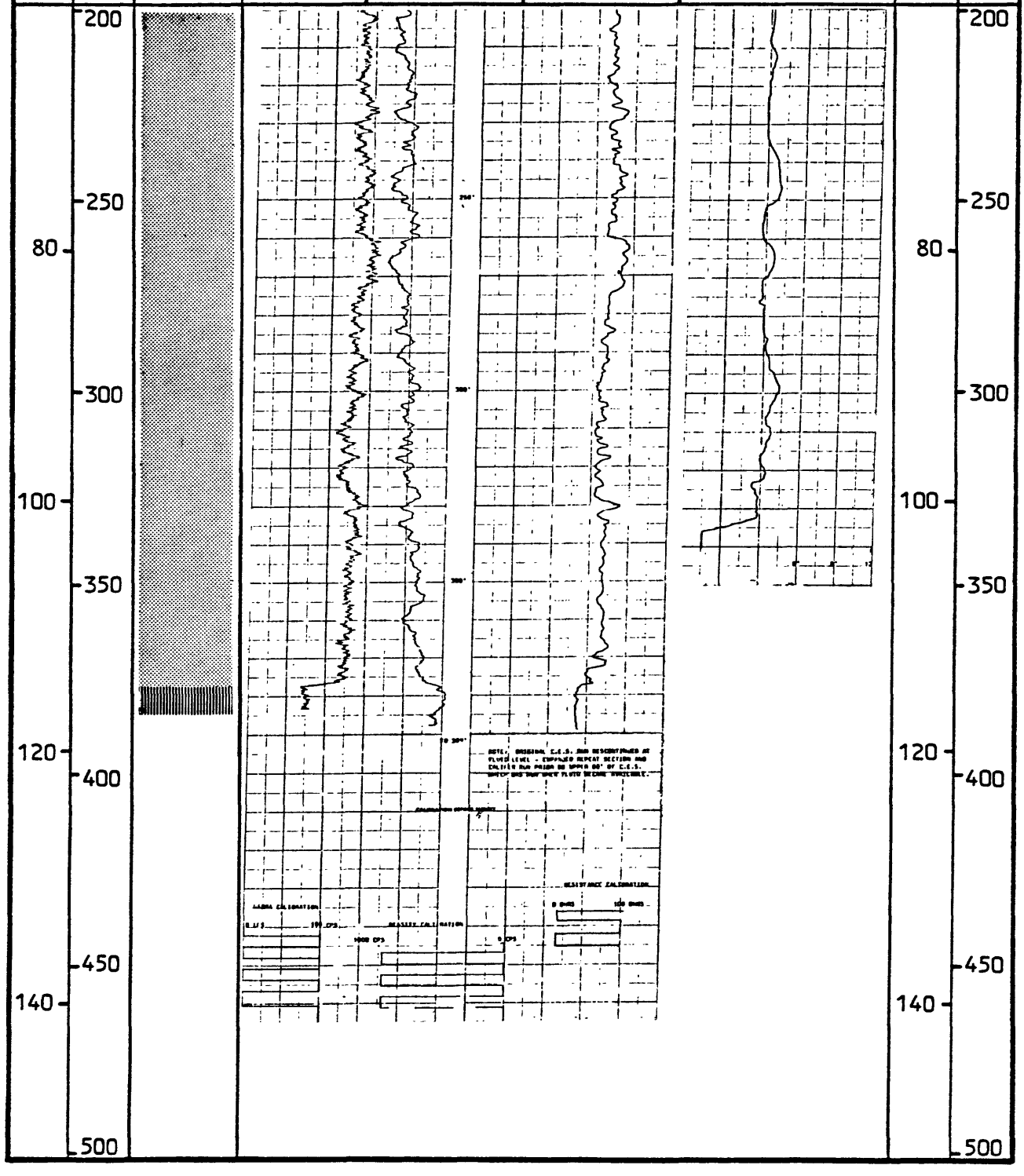

HOLE NO.: GC-2C GROUND ELEV. (EST.): 5,250 ft

LOCATION: NW 1/4, sec. 25, T. 16 S., R. 21 E.

TOTAL DEPTH: 645 ft CORED: YES X NO ___

GEOPHYSICAL LOGS:	T.C.:	SCALE:	LOGGING SPEED:
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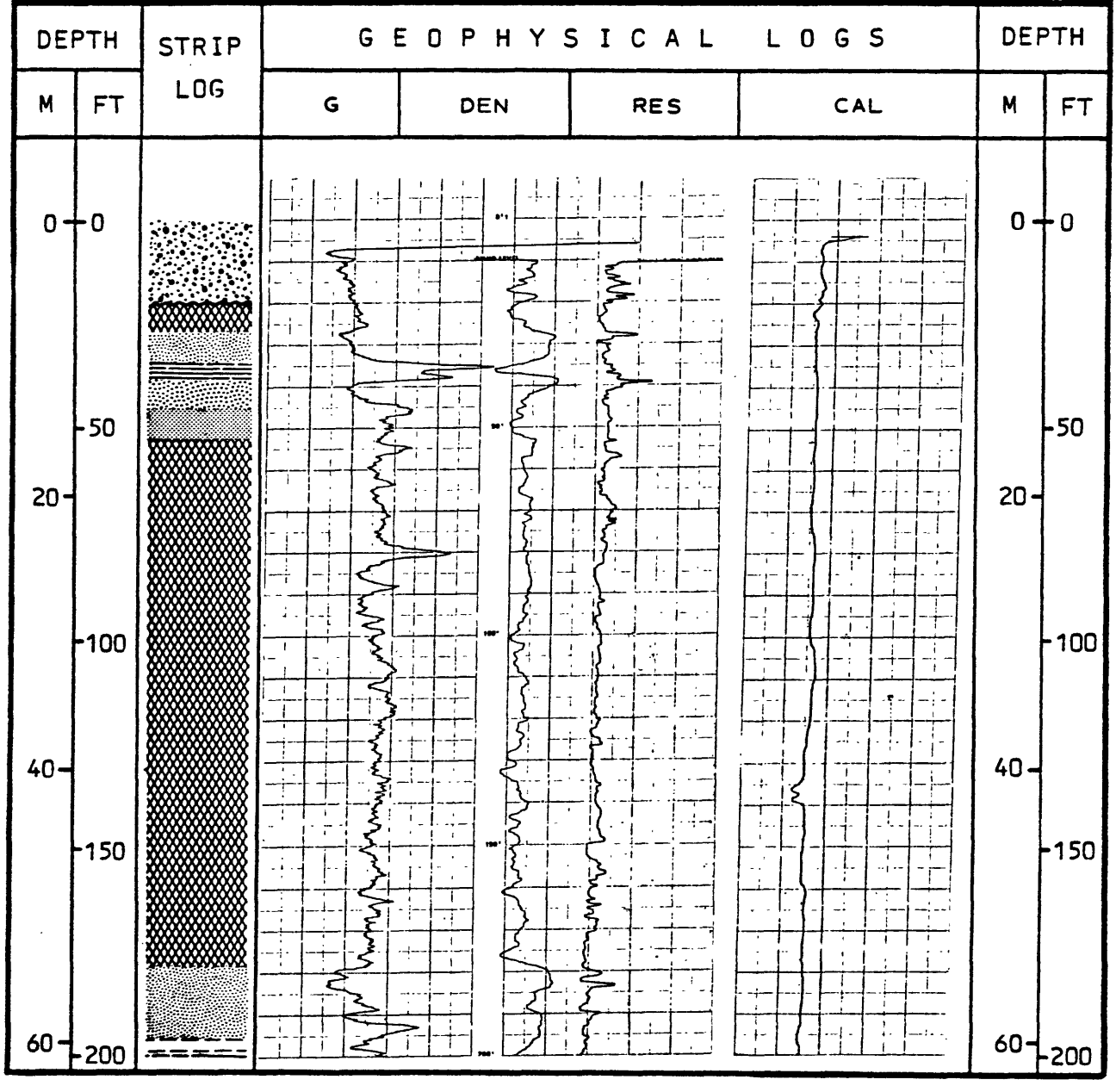
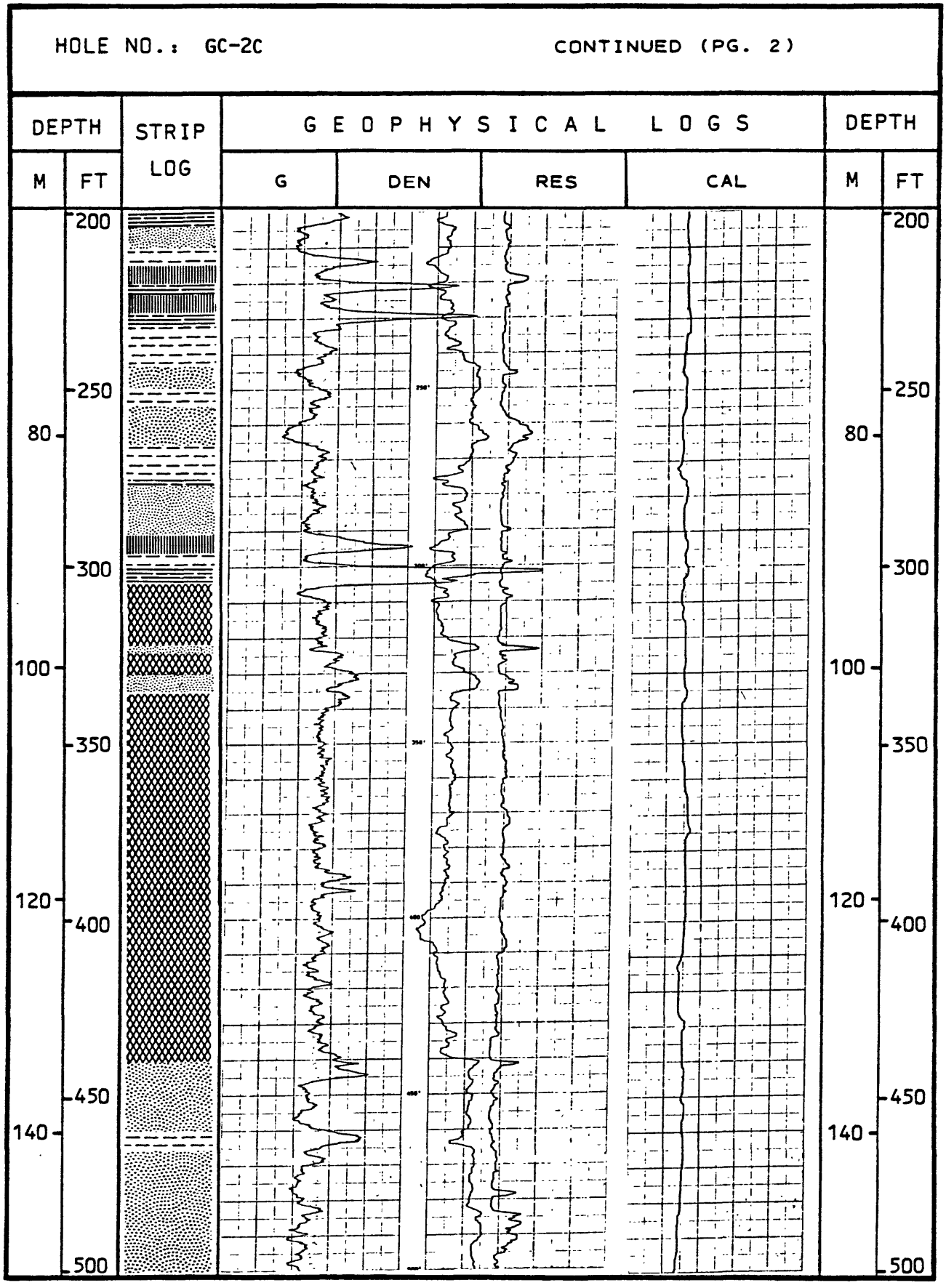
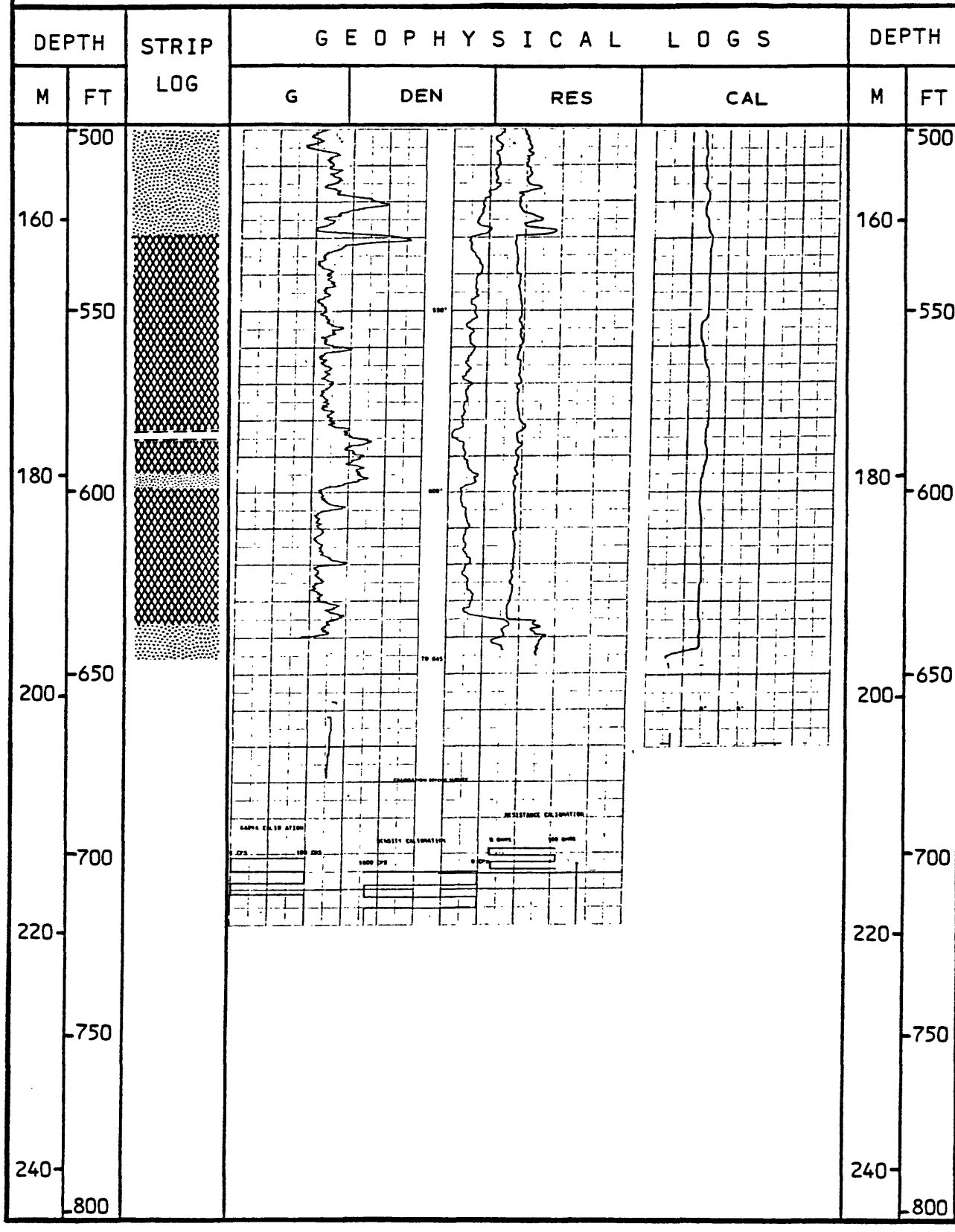
DENSITY (DEN):	2 sec	154 cps/log div	15 ft/min
RESISTANCE (RES):	2 sec	30 Ω/log div	15 ft/min
CALIPER (CAL):	2 sec	1 in/log div	30 ft/min




HOLE NO.: GC-2C
CONTINUED (PG. 2)
DEPTH
M
FT
STRIP LOG
GEOPHYSICAL LOGS
G
DEN
RES
CAL
DEPTH
M
FT
200
250
300
350
400
450
500
80
100
120
140

HOLE NO.: GC-2C

CONTINUED (PG. 3)

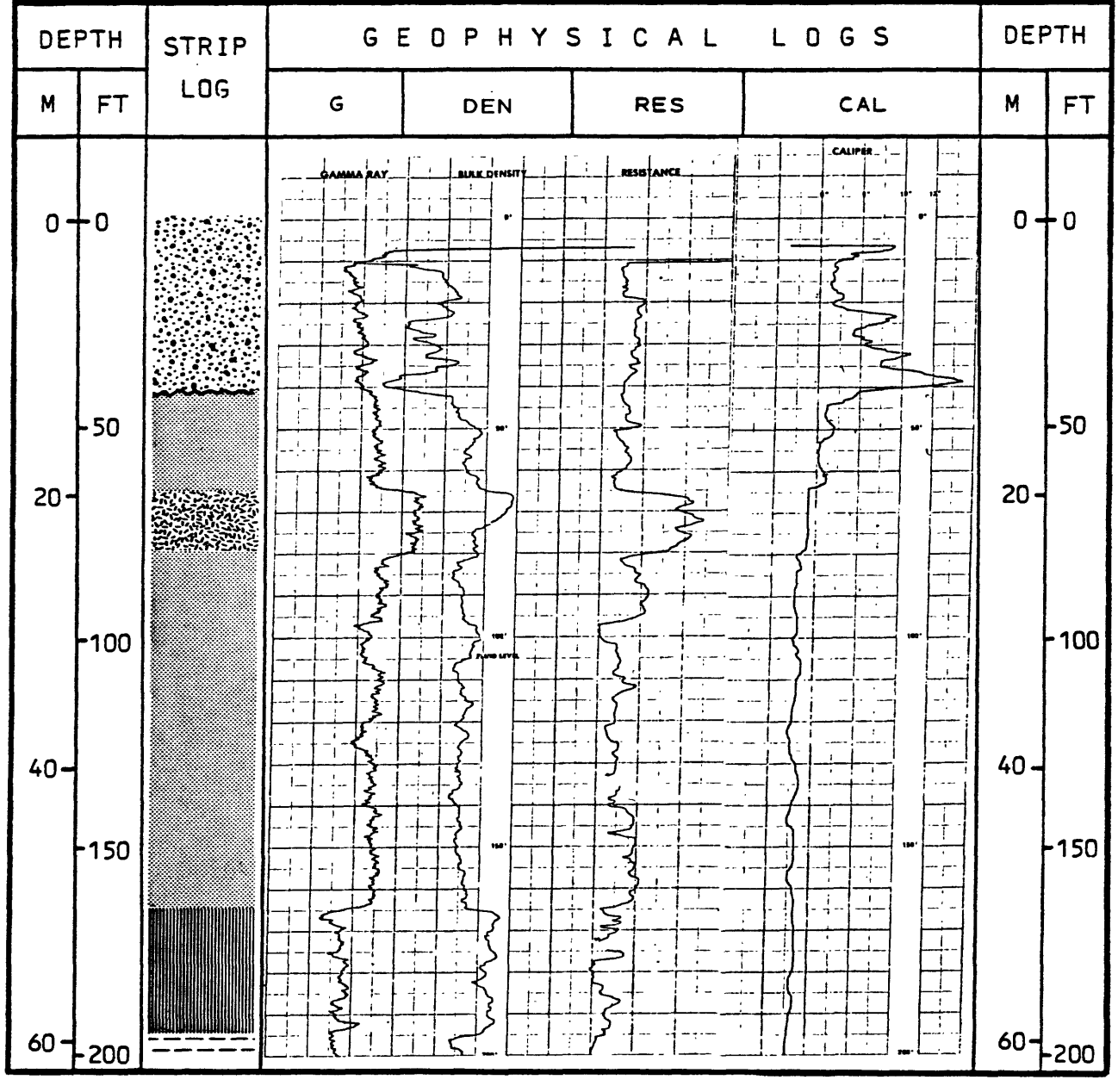


HOLE NO.: GC-3C GROUND ELEV. (EST.): 4,925 ft

LOCATION: NE 1/4, sec. 14, T. 15 S., R. 21 E.

TOTAL DEPTH: 403 ft CORED: YES X NO ___

GEOPHYSICAL LOGS:	T.C.:	SCALE:	LOGGING SPEED:
NATURAL GAMMA (G):	2 sec	25 cps/log div	15 ft/min
DENSITY (DEN):	2 sec	154 cps/log div	15 ft/min
RESISTANCE (RES):	2 sec	30 Ω/log div	15 ft/min
CALIPER (CAL):	2 sec	1 in/log div	30 ft/min



HOLE NO.: GC-3C

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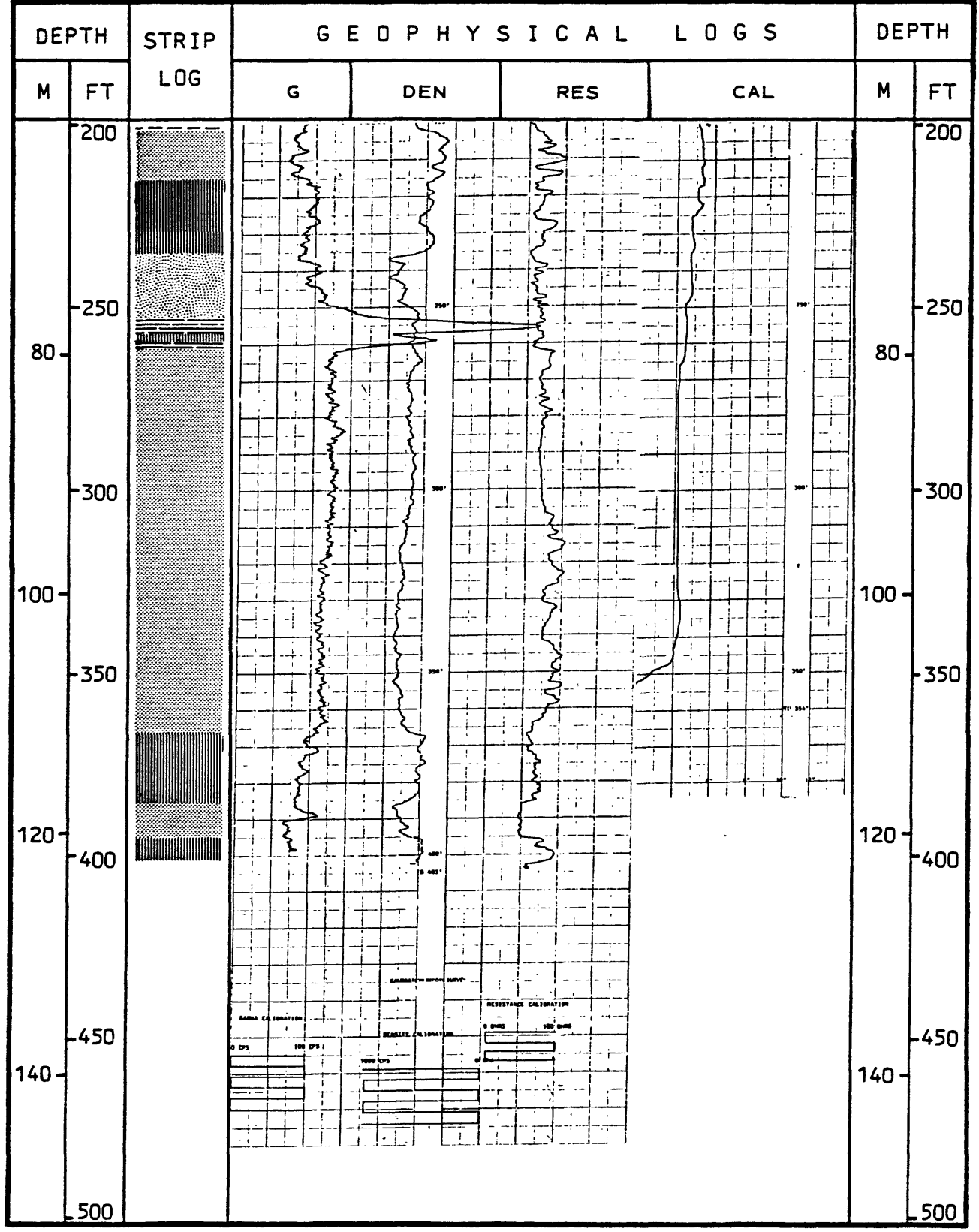
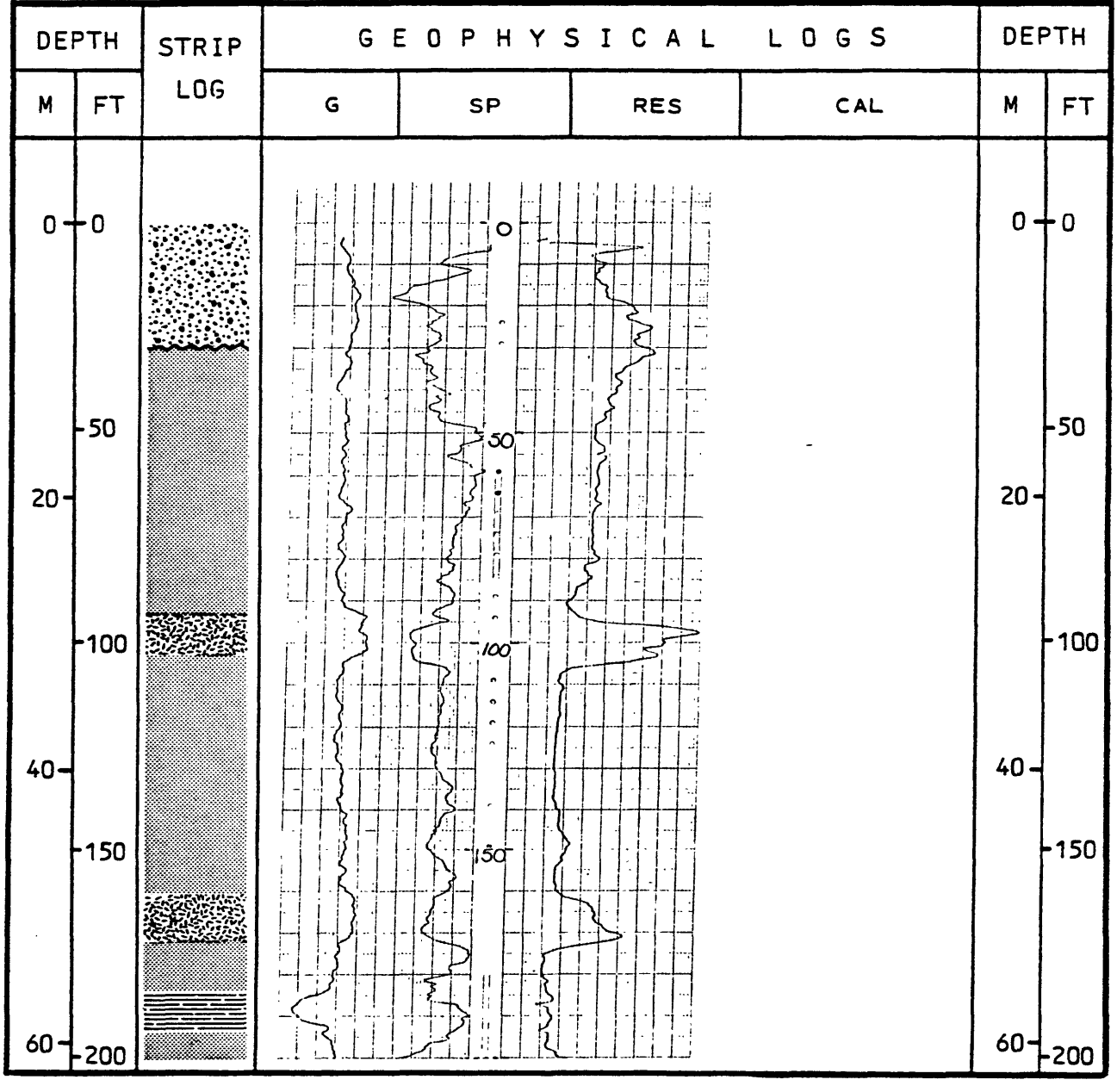


HOLE NO.: GC-4C GROUND ELEV. (EST.): 4,900 ft

LOCATION: NW 1/4, sec. 34, T. 14 S., R. 21 E.

TOTAL DEPTH: 520 ft CORED: YES__ NO X

GEOPHYSICAL LOGS:	T.C.:	SCALE:	LOGGING SPEED:
NATURAL GAMMA (G):	1 sec	20 cps/log div	15 ft/min
DENSITY (DEN):	1 sec	200 cps/log div	15 ft/min
RESISTANCE (RES):	1 sec	20 Ω/log div	25 ft/min
CALIPER (CAL):	--	--	--
S. P. (SP):	1 sec	5 mv/log div	25 ft/min
NEUTRON (N):	1 sec	50 cps/log div	15 ft/min



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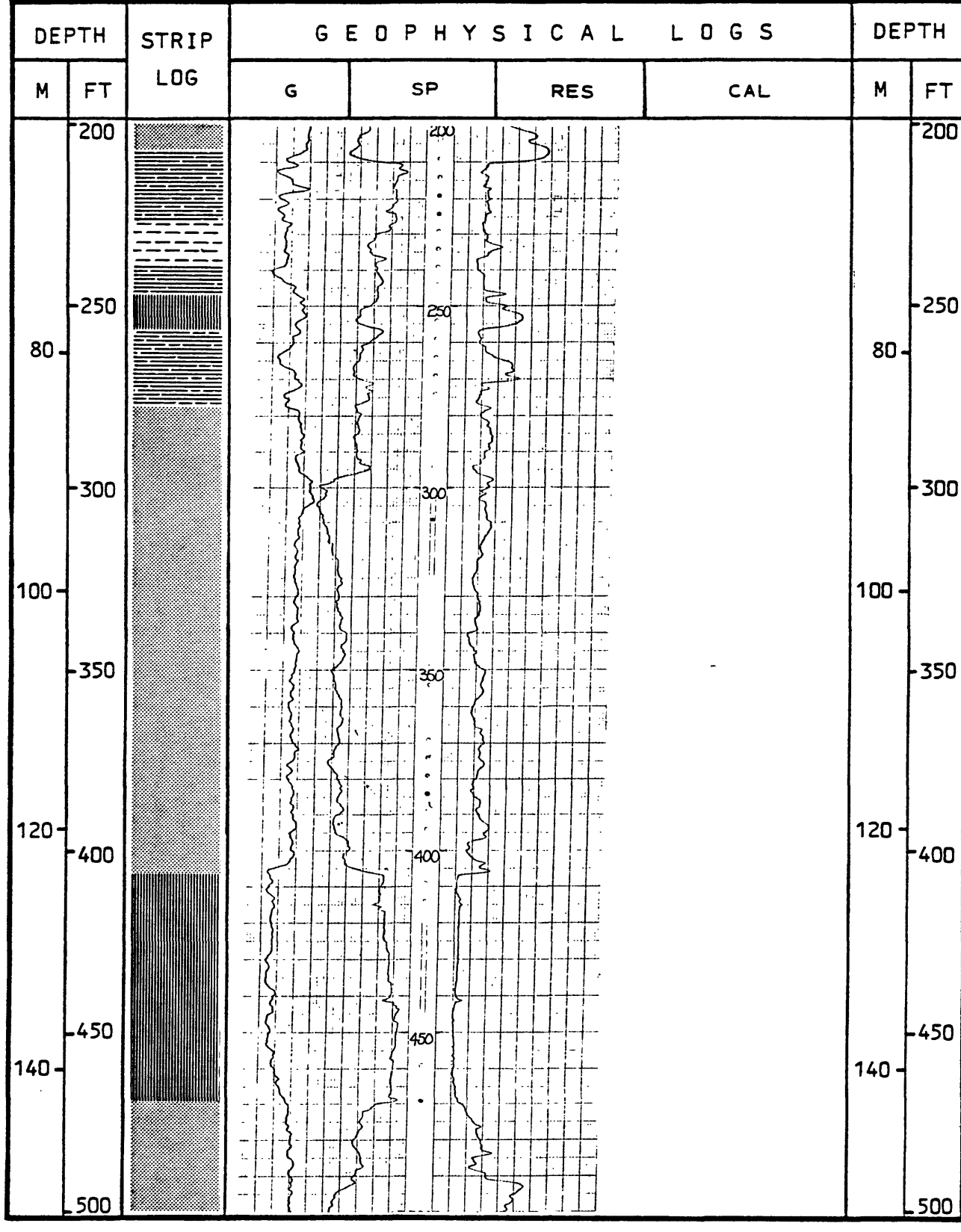
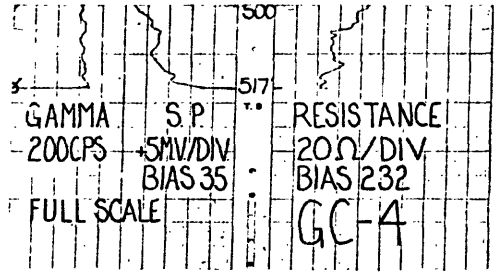


HOLE NO.: GC-4C

CONTINUED (PG. 3)

DEPTH M	DEPTH FT	STRIP LOG	GEOPHYSICAL LOGS: G	SP	RES	CAL	DEPTH M	DEPTH FT
	500							500
160							160	
	550							550
180							180	
	600							600
	650							650
200							200	
	700							700
220							220	
	750							750
240							240	
	800							800



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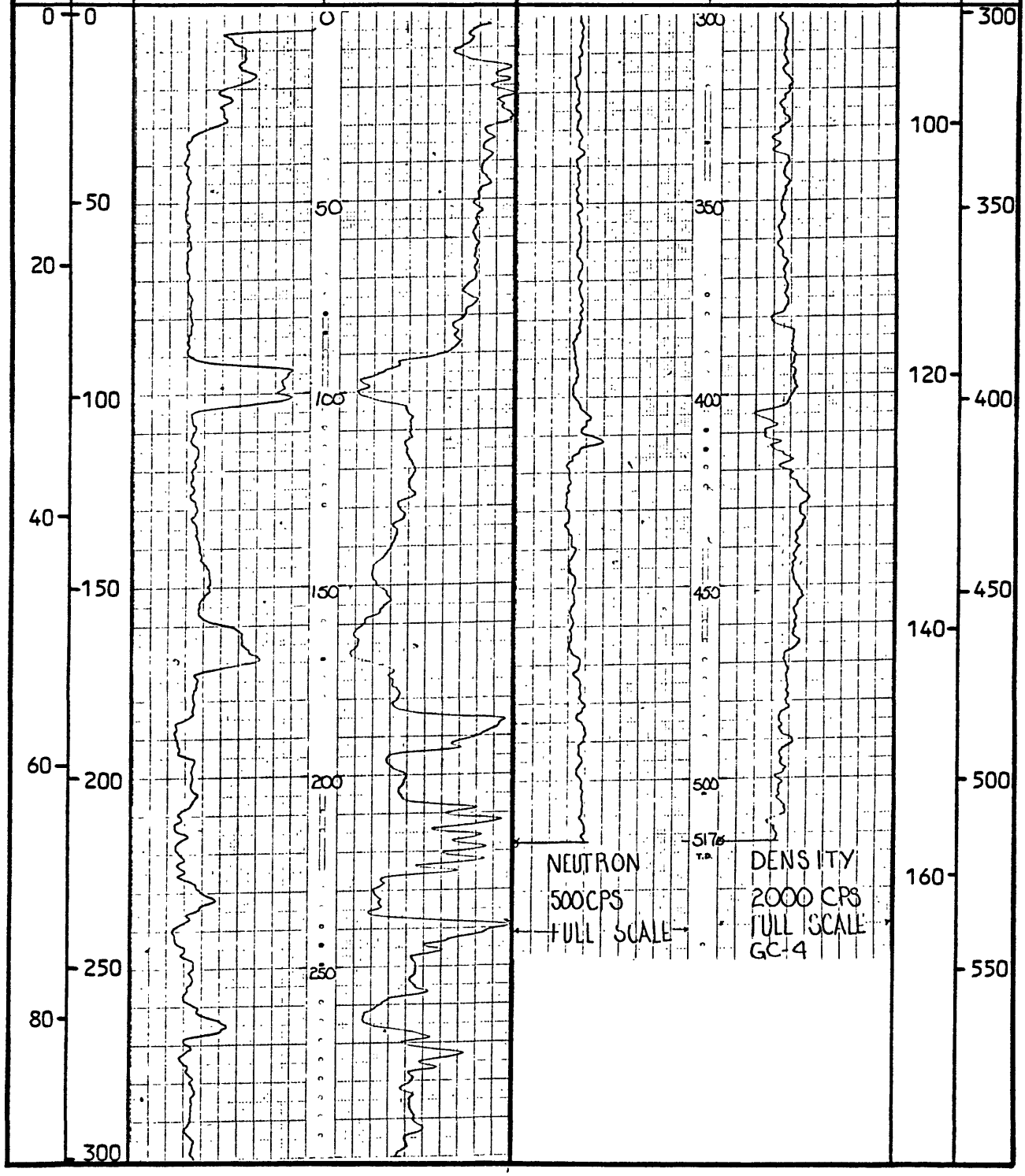
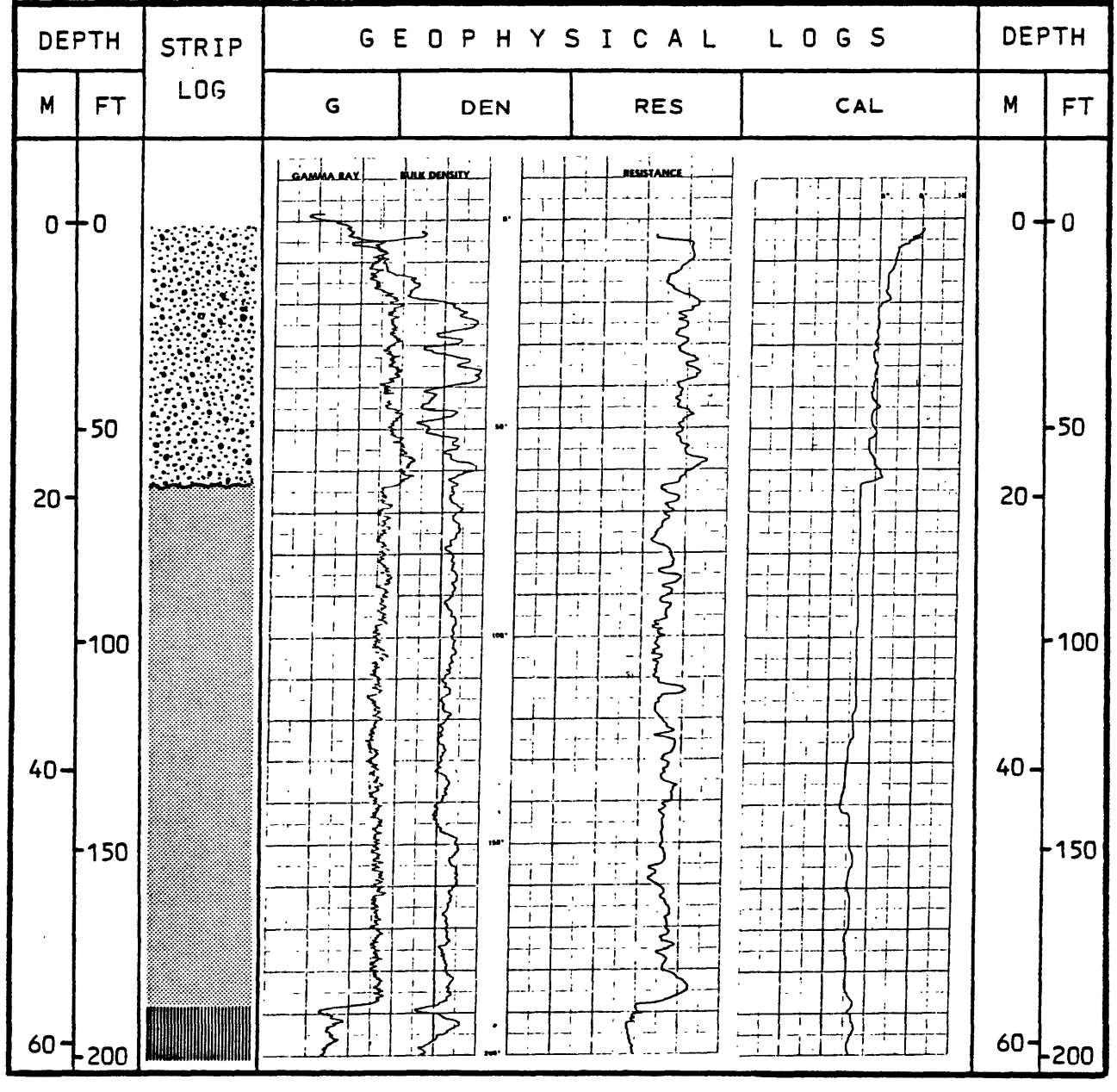


HOLE NO.: GC-5 GROUND ELEV. (EST.): 5,920 ft

LOCATION: NE 1/4, sec. 31, T. 15 S., R. 21 E.

TOTAL DEPTH: 312 ft CORED: YES__ NO X

GEOPHYSICAL LOGS:	T.C.:	SCALE:	LOGGING SPEED:
NATURAL GAMMA (G):	2 sec	25 cps/log div	15 ft/min
DENSITY (DEN):	2 sec	154 cps/log div	15 ft/min
RESISTANCE (RES):	2 sec	30 Ω/log div	15 ft/min
CALIPER (CAL):	2 sec	1 in/log div	30 ft/min



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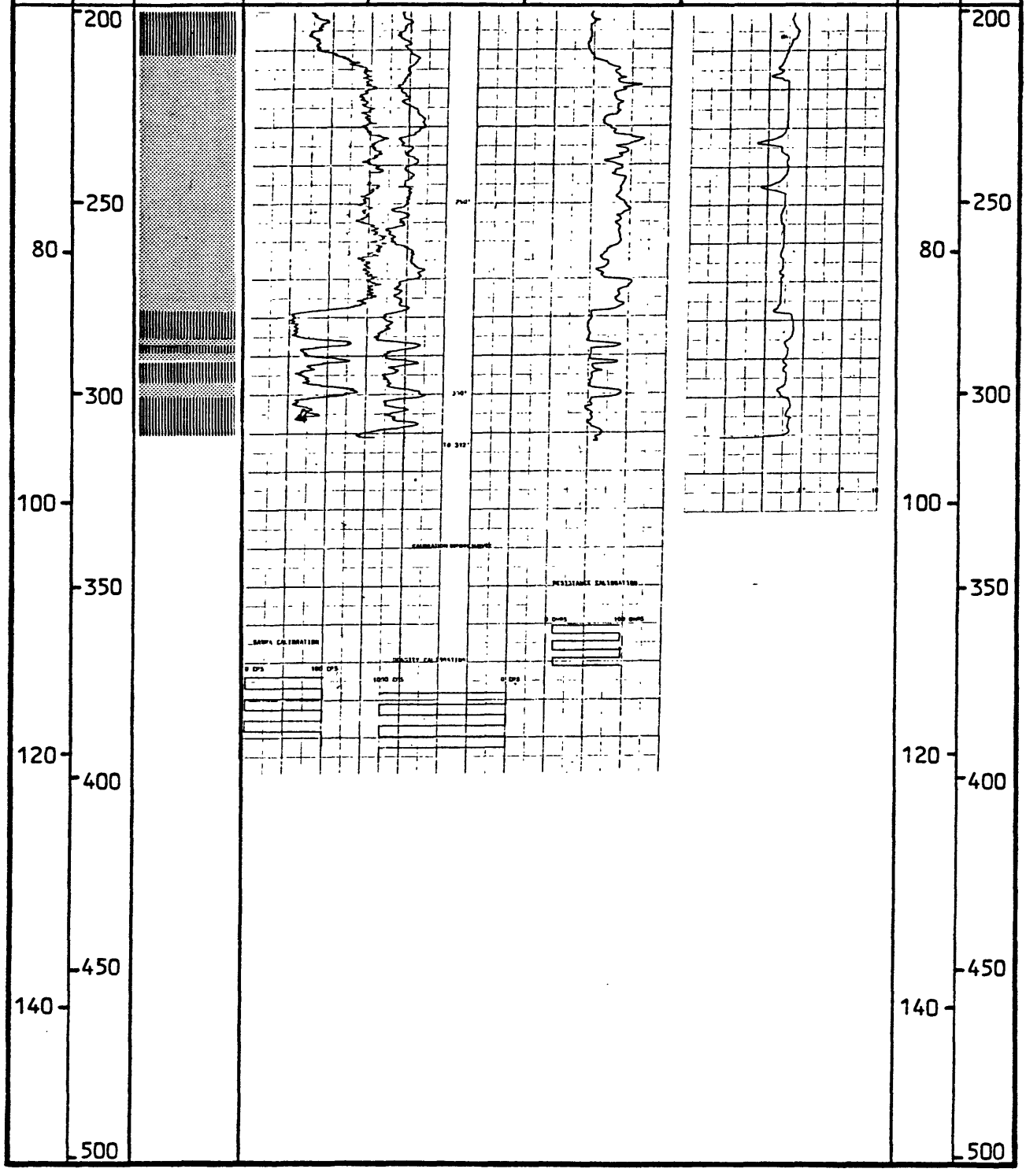
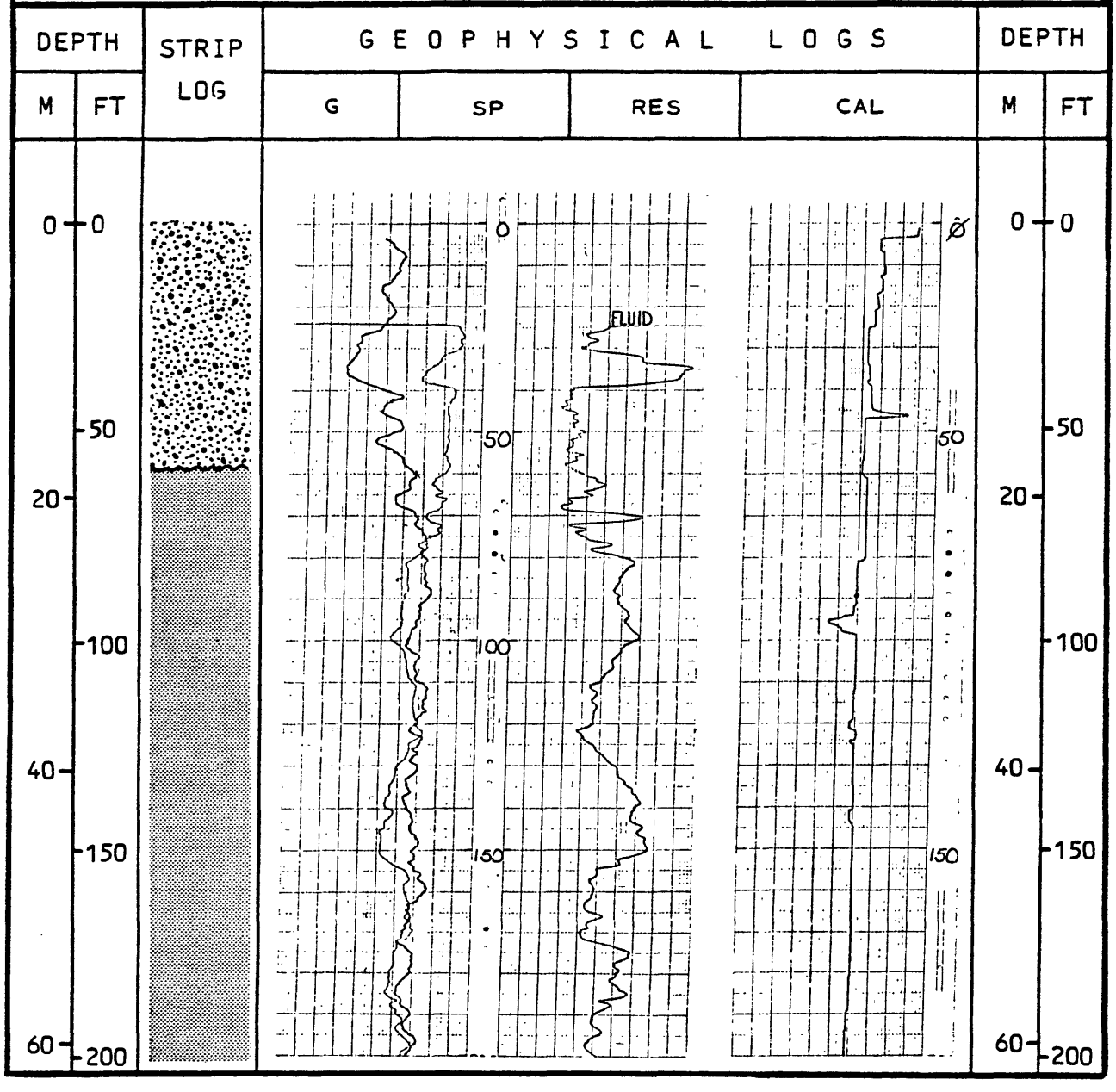


HOLE NO.: GC-9 GROUND ELEV. (EST.): 5,250 ft

LOCATION: SW 1/4, sec. 1, T. 15 S., R. 20 E.

TOTAL DEPTH: 520 ft CORED: YES__ NO X

GEOPHYSICAL LOGS:	T.C.:	SCALE:	LOGGING SPEED:
NATURAL GAMMA (G):	1 sec	10 cps/log div	15 ft/min
DENSITY (DEN):	1 sec	200 cps/log div	15 ft/min
RESISTANCE (RES):	1 sec	20 Ω/log div	25 ft/min
CALIPER (CAL):	1 sec	1 in/log div	30 ft/min
S. P. (SP):	1 sec	5 mv/log div	25 ft/min
NEUTRON (N):	1 sec	50 cps/log div	15 ft/min



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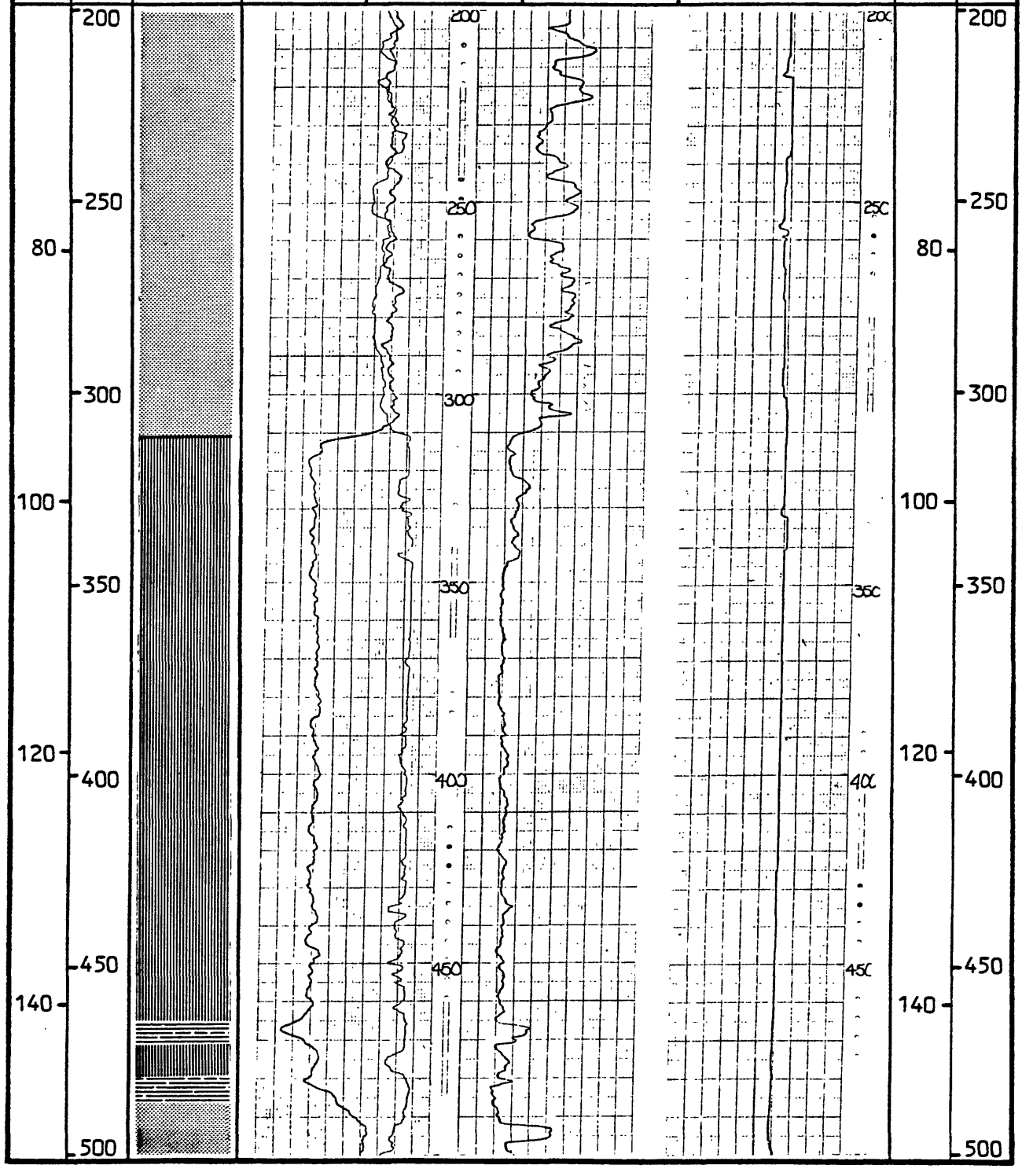

HOLE NO.: GC-9 CONTINUED (PG. 3)

DEPTH M	DEPTH FT	STRIP LOG	GEOPHYSICAL LOGS: G	SP	RES	CAL	DEPTH M	DEPTH FT
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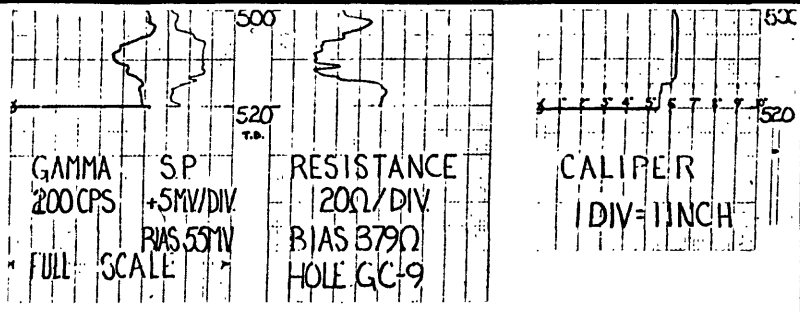
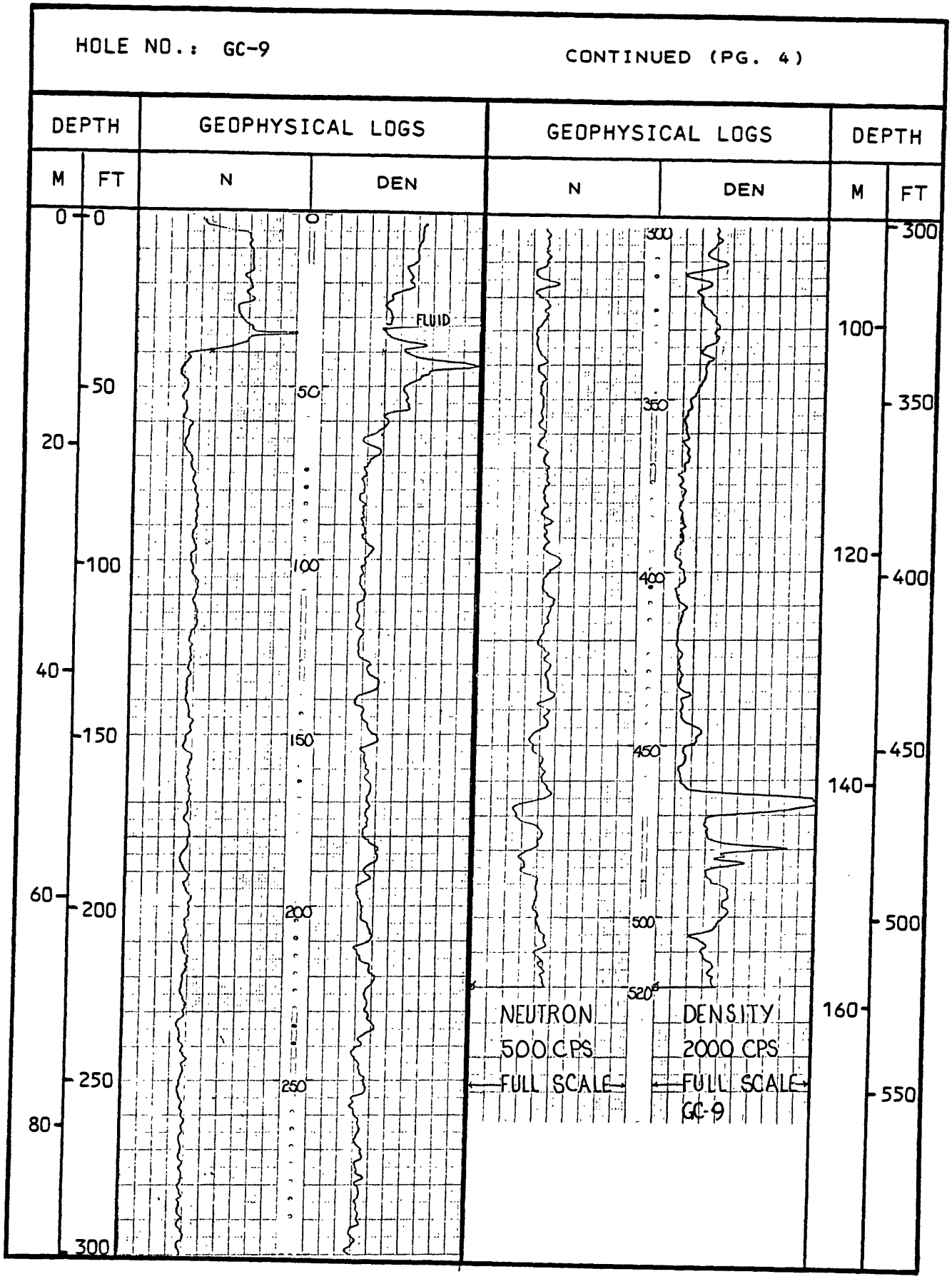
160							160	
	550							550
180							180	
	600							600
	650							650
200							200	
	700							700
220							220	
	750							750
240							240	
	800							800




HOLE NO.: GC-9
CONTINUED (PG. 4)
DEPTH
GEOPHYSICAL LOGS
GEOPHYSICAL LOGS
DEPTH
M
FT
N
DEN
N
DEN
M
FT
FLUID
NEUTRON
500 CPS
FULL SCALE
DENSITY
2000 CPS
FULL SCALE
GC-9