UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

LITHOLOGIC AND GEOPHYSICAL LOGS OF 30 COAL TEST HOLES DRILLED IN THE HANNA BASIN COAL FIELD, CARBON COUNTY, WYOMING

By

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This report has not been edited for conformity
with U.S. Geological Survey editorial standards
or stratigraphic nomenclature.

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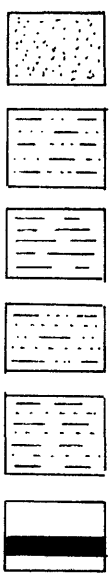
INTRODUCTION

During the fall of 1977, the U.S. Geological Survey drilled 30 coal test holes on Federal lands in the Hanna Basin coal field, Carbon County, Wyo. (Tps. 22-24 N., Rs. 80-81 W.). The purpose of this project was to obtain information on the thickness and lateral extent of coal beds for the classification and evaluation of federally owned coal lands. The holes were drilled by two U.S. Geological Survey crews using truck-mounted rotary drilling rigs. The drilling fluids were air, air-water-biodegradable foam, and mud. Cuttings, representative of each of the rock units encountered, were sampled and logged for many of the drill holes to help determine the thickness and location of the coal beds.

The holes were geophysically logged by U.S. Geological Survey personnel. Logs include natural gamma, gamma-gamma density, neutron, and caliper, and were run separately. Many of the holes tended to close soon after being drilled, making it necessary to run some of the logs through the drill pipe. This process attenuated the logs and produced spikes at pipe joints on the density logs. Coal beds are shown on the strip log adjacent to the geophysical log. The strip log, reduced to a scale of 1 inch to 50 feet, represents the best information available as to the thickness and depth of the coal beds, based on drill-hole cuttings

and geophysical logs. However, because of equipment malfunction, the location and thickness of some coal beds, based only on geophysical logs, may not be accurate. For example, the following neutron logs show possible curve reversals: CW-26, -29, -34, -35, and -36; E-18, -23, and -31F. Also, the following gamma-gamma density logs show possible curve reversals: E-31F, H-4, and TER-9. Because of these curve reversals, only coal beds 4.0 feet thick or greater are shown on the strip log unless samples are available. Where no lithology is shown, coal thickness is based on geophysical log interpretation only. No logs were made for hole H-1, which penetrated a free-flowing aquifer and was plugged. Hole E-31-F was an open abandoned drill hole that was found and logged.

Lithologic descriptions are based on records made in the field by the sampler. In this report, shale refers to fissile rock composed primarily of the clay-sized fraction. Rock composed mostly of the silt-sized fraction is called a siltstone because fissility could be adequately recognized in the drill cuttings. Blank logs indicate no samples taken. Rock lithologies are indicated in the strip log as follows:



Sandstone

Siltstone

Shale

Interbedded sandstone and siltstone

Interbedded sandstone and shale

Coal

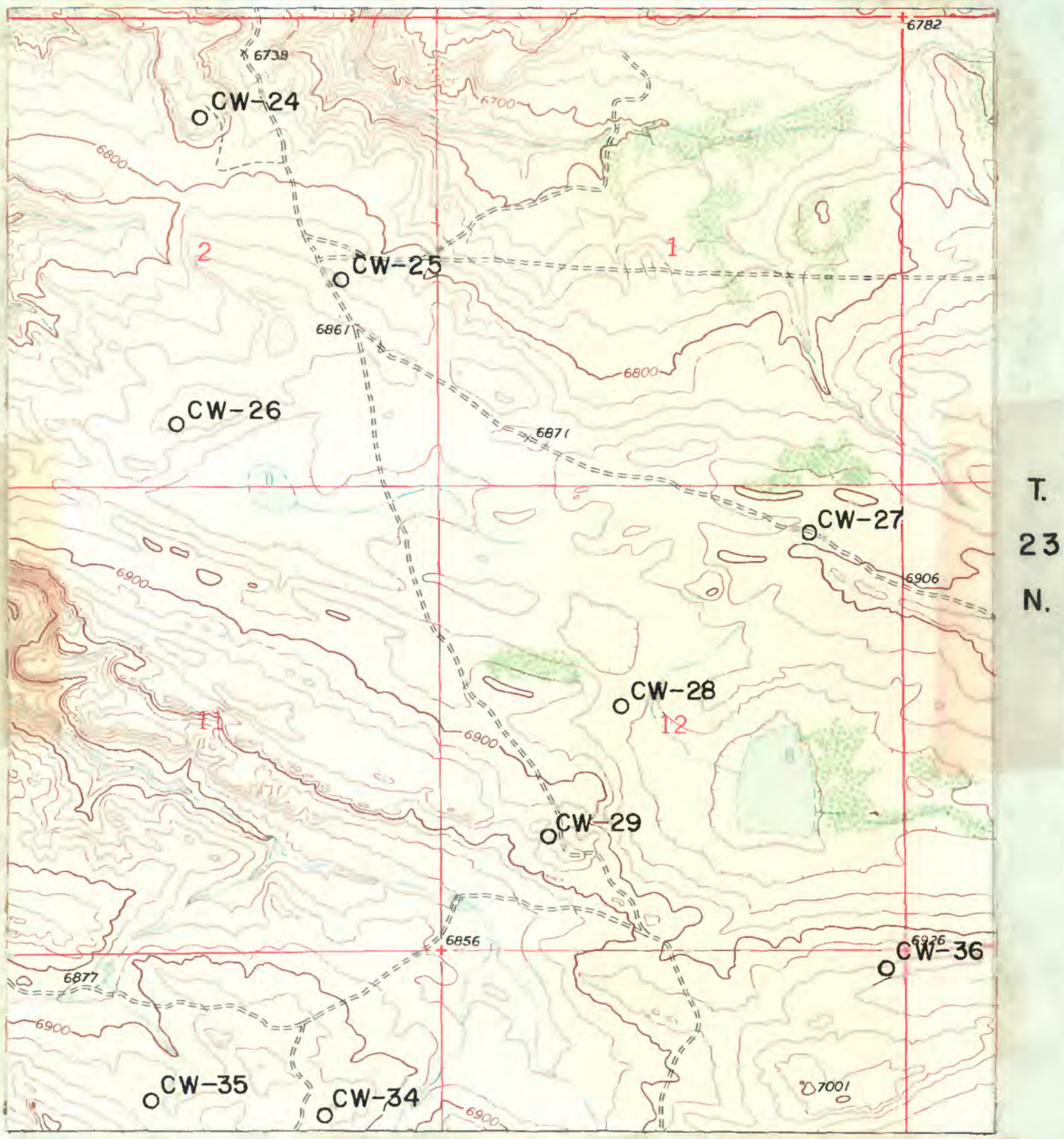


Figure 1.--Drill-hole locations in the northwest part of the Como West quadrangle, Carbon County, Wyo.

Figure 2.--Drill-hole locations in the north-central part of the Como West quadrangle, Carbon County, Wyo.

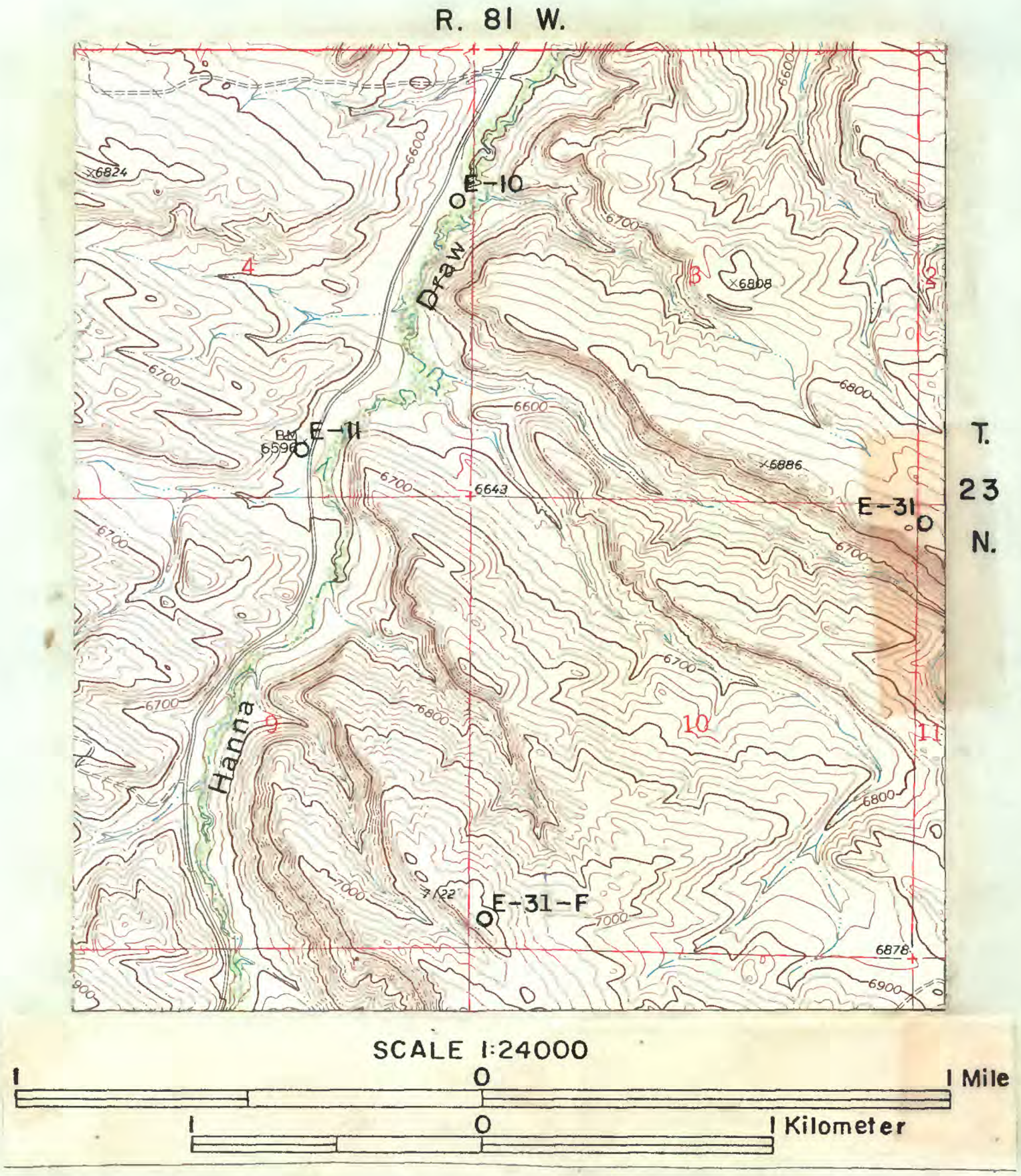


Figure 3.--Drill-hole locations in the northeast part of the Elmo quadrangle, Carbon County, Wyo.

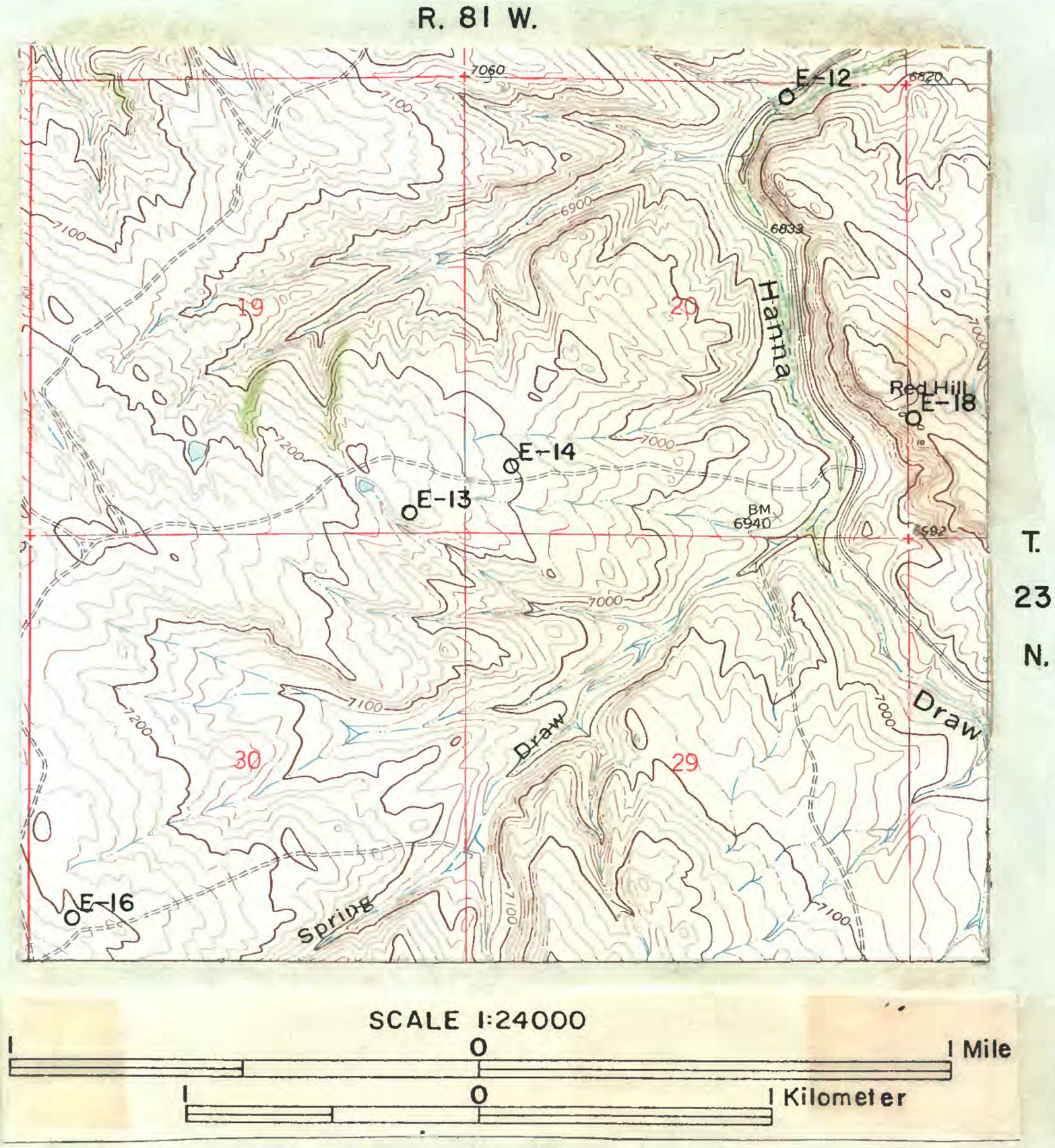


Figure 4.--Drill-hole locations in the central part of the Elmo quadrangle, Carbon County, Wyo.

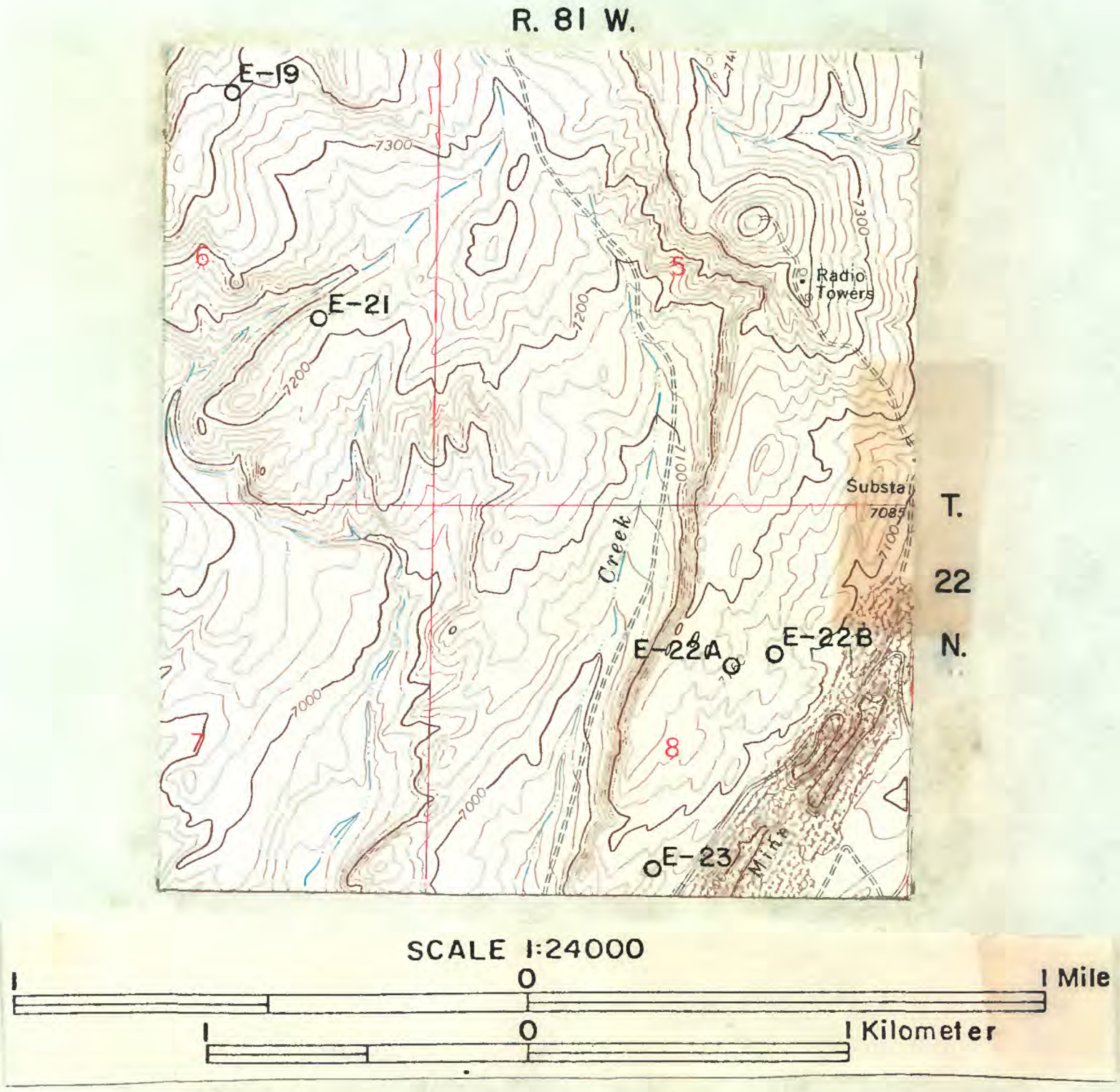


Figure 5.--Drill-hole locations in the southern part of the Elmo quadrangle, Carbon County, Wyo.

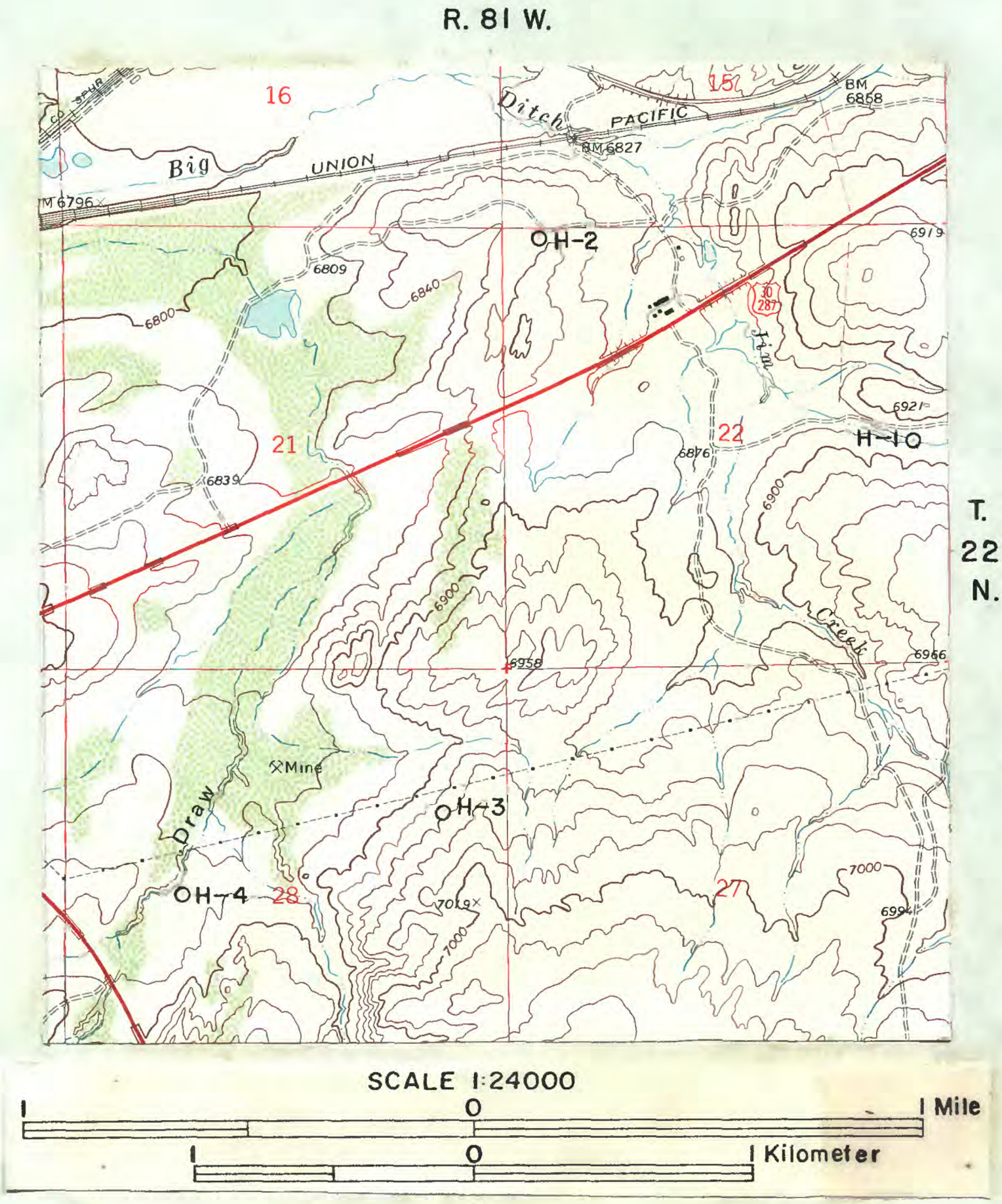


Figure 6.--Drill-hole locations in the northeast part of the Hanna quadrangle, Carbon County, Wyo.

Figure 7.--Drill-hole locations in the southeast part of the T. E. Ranch quadrangle, Carbon County, Wyo.

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

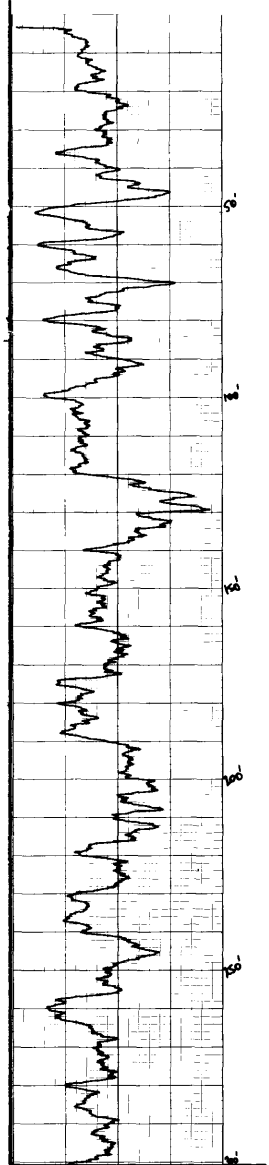
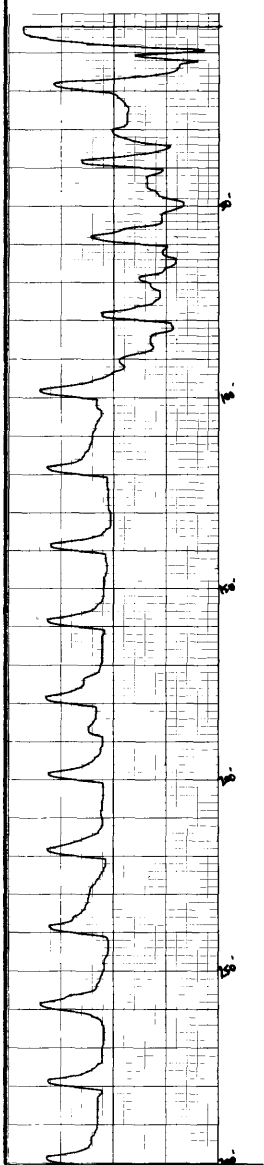
HOLE No. CW-24 STATE Wyoming COUNTY Carbon DATE LOGGED 9/16/77 ELEV. 6860 ft.

LOCATION: T. 23 N., R. 81 W., SEC. 2 ; 1100 FNL; 2625FEL; DATE DRILLED 9/16/77

DRILLED DEPTH 370′ LOGGED DEPTH 338′ DRILLING MEDIUM _____ FLUID LEVEL _____

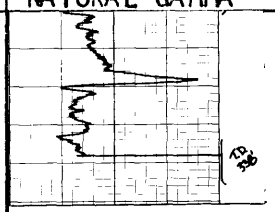
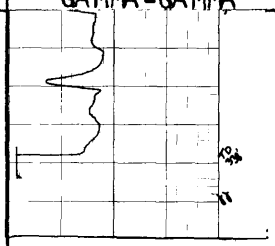
HOLE SIZE 5-1/8"

REMARKS: Logged through steel.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	GAMMA-GAMMA T.C. 4 sec SCALE 500 CPS SUPP. 4.0 SENS. 8.0 LOG SPEED 17 fpm		
0	0					
50	10					
100	20					
150	30					
200	40					
250	50					
300	60					
	70					
	80					
	90					

U.S. GEOLOGICAL SURVEY

HOLE No. CW-24 continued

DEPTH Ft	DEPTH M	LITH LOG	GEOPHYSICAL LOGS: NATURAL GAMMA	GAMMA-GAMMA		
						
350	100					
	110					
400	120					
	130					
450	140					
	150					
500	160					
550	170					
	180					
600	190					
650	200					
	210					
700	220					

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-25 STATE Wyoming COUNTY Carbon DATE LOGGED 9/17/77 ELEV. 6840 ft.

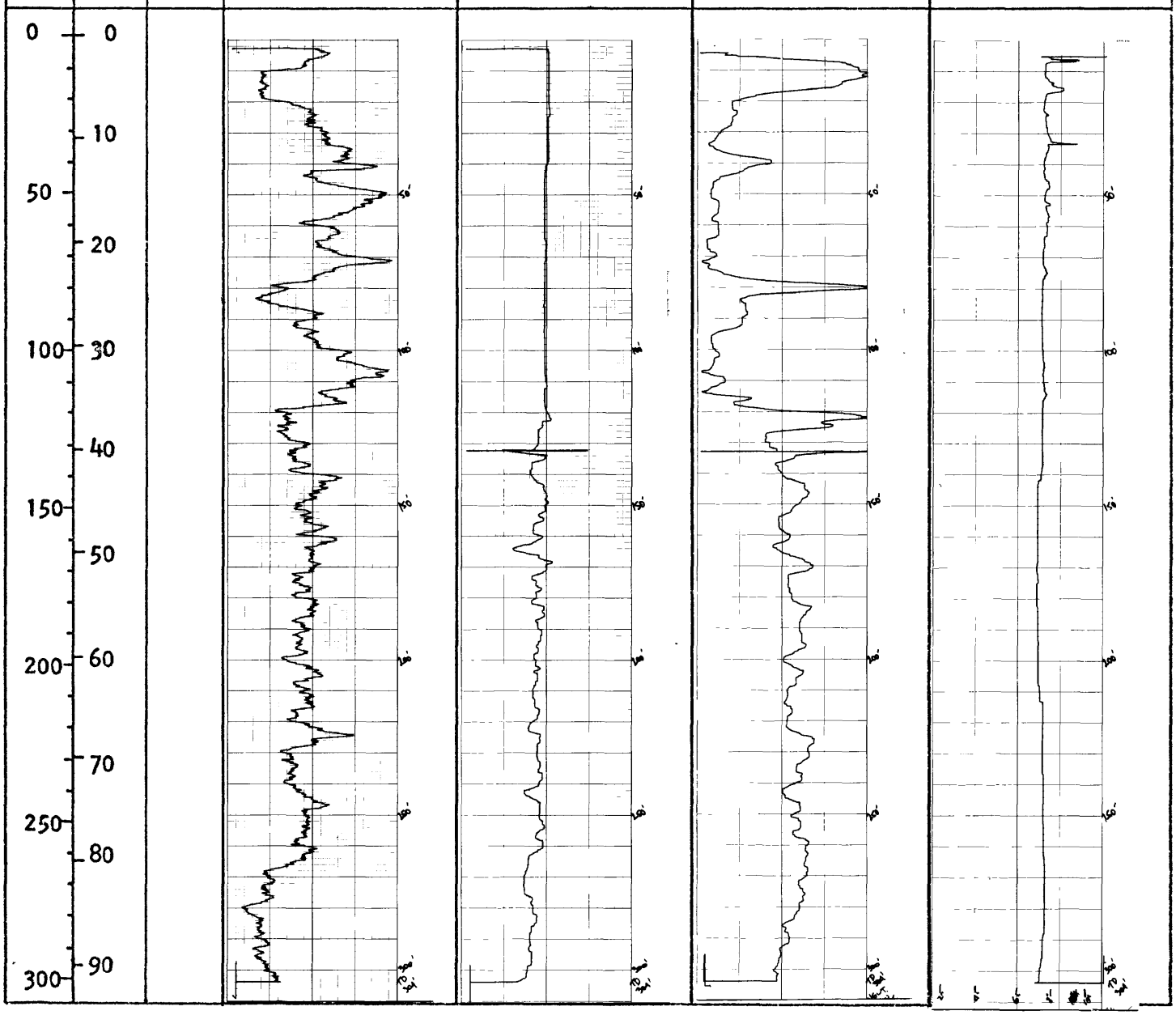
LOCATION: T. 23 N., R. 81 W., SEC. 2 ; 2375 FSL; 1025 FEL; DATE DRILLED 9/17/77

DRILLED DEPTH 310′ LOGGED DEPTH 304′ DRILLING MEDIUM water FLUID LEVEL 132′

HOLE SIZE 5-1/8"

REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/500 CPS SUPP. 3.0/4.0 SENS. 7.0/5.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 7.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-26 STATE Wyoming COUNTY Carbon DATE LOGGED 9/19/77 ELEV. 6885 ft.

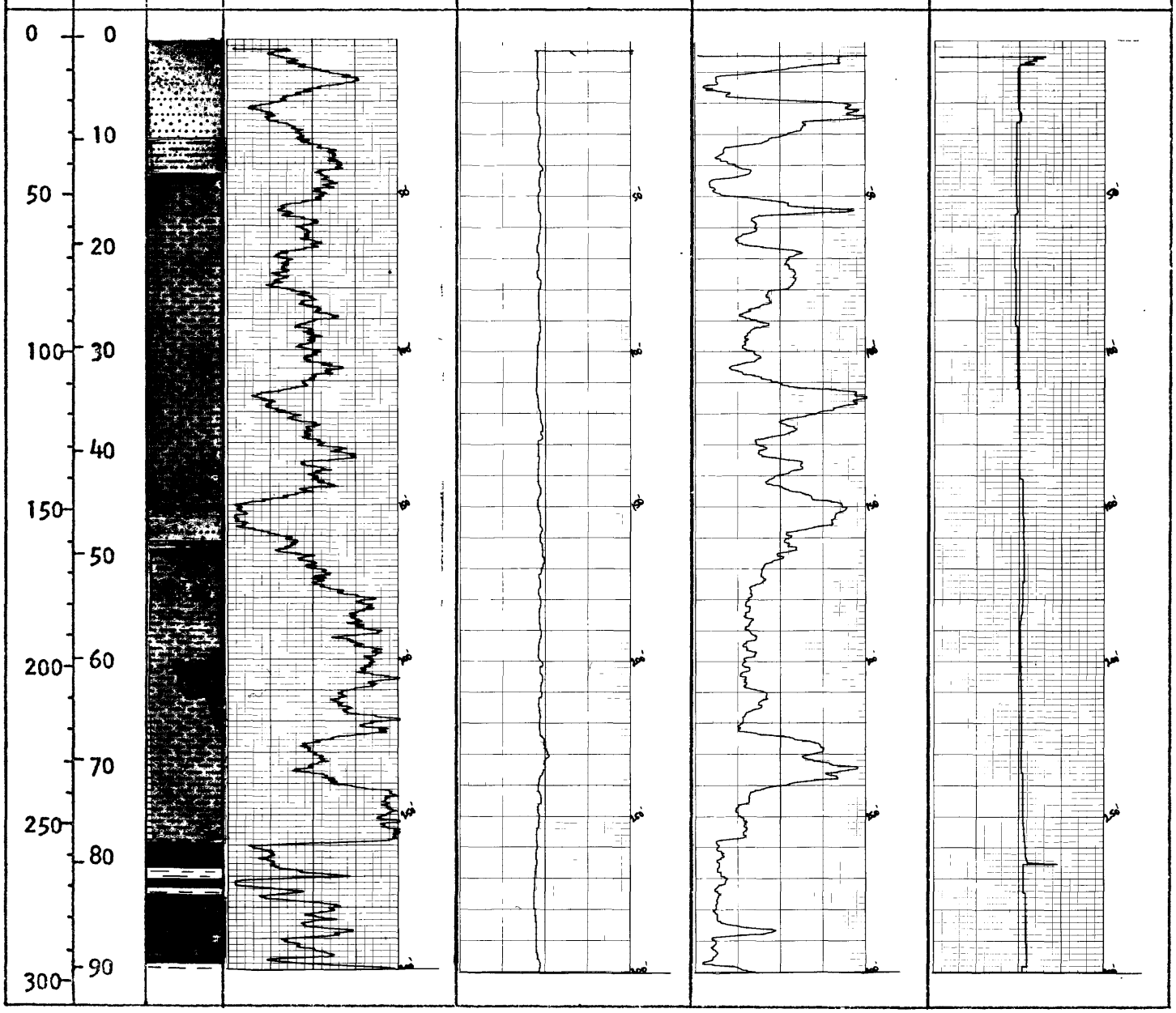
LOCATION: T. 23 N., R. 81 W., SEC. 2 ; 750 FSL; 1380FWL; DATE DRILLED 9/18/77

DRILLED DEPTH 410′ LOGGED DEPTH 404′ DRILLING MEDIUM water FLUID LEVEL 378′

HOLE SIZE 5-1/8"

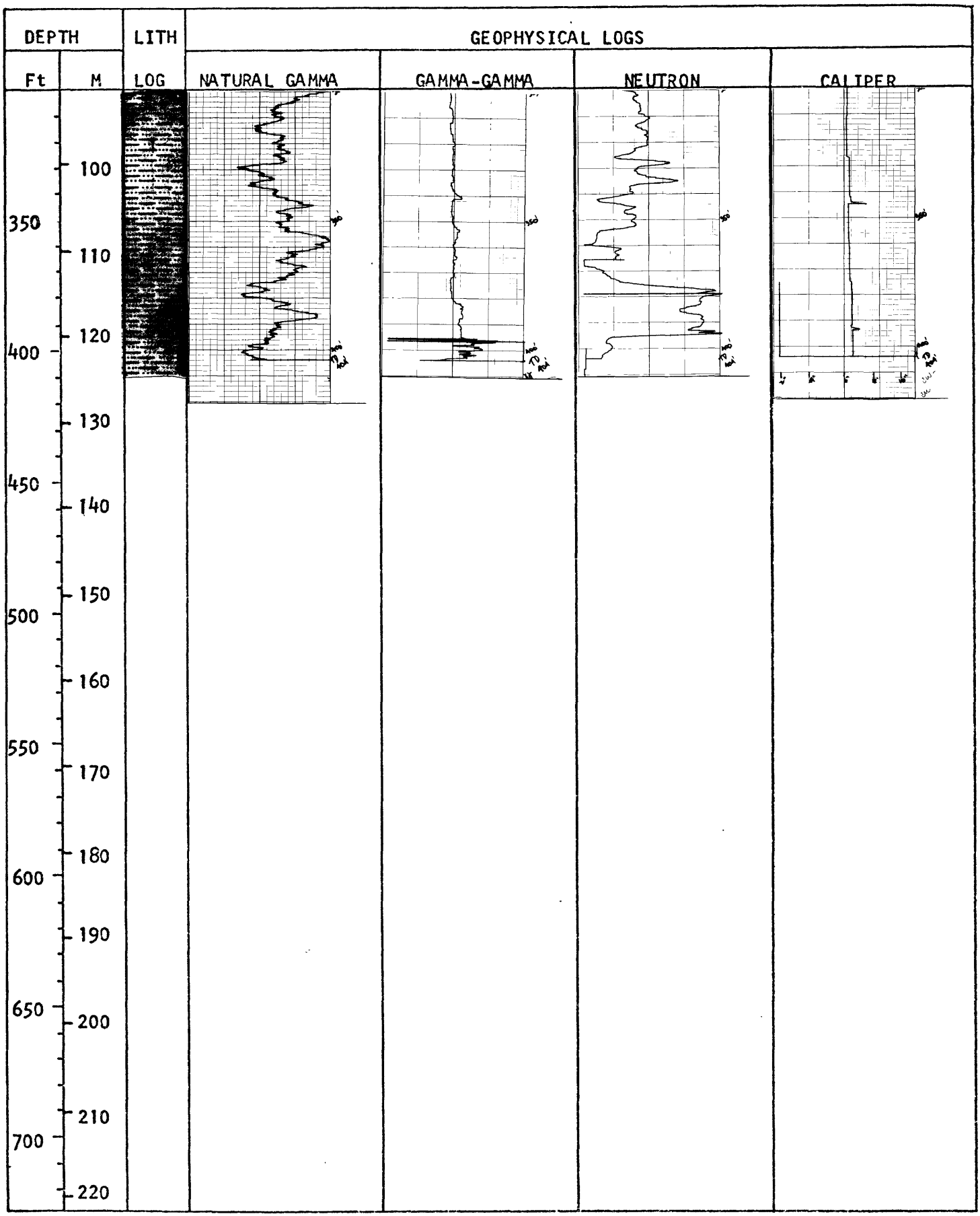
REMARKS:

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10 CPS SUPP. 3.0 SENS. 7.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.8/4.5 SENS. 7.7/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY

HOLE No. CW-26 continued



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-27 STATE Wyoming COUNTY Carbon DATE LOGGED 9/14/77 ELEV. 6880 ft.

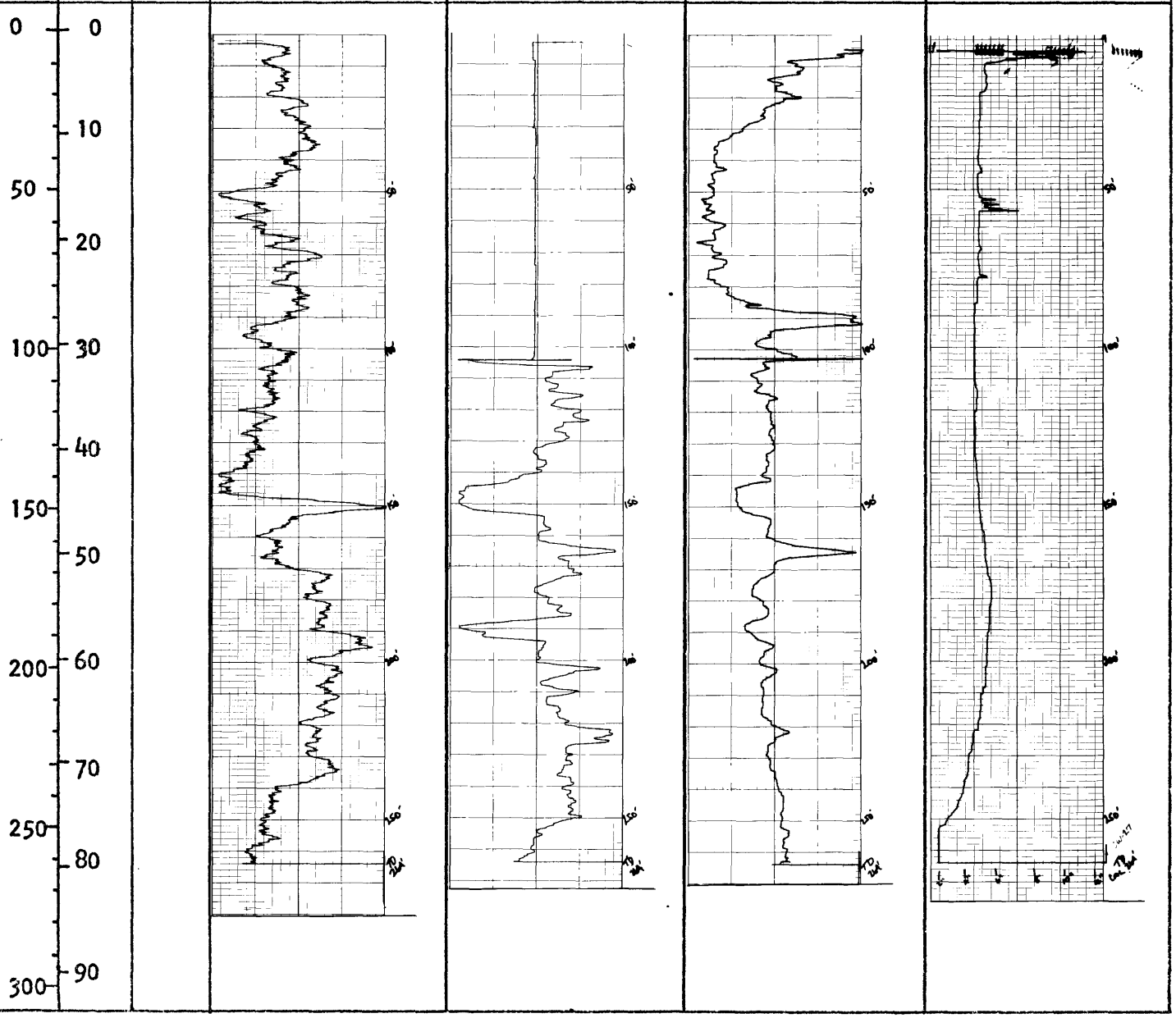
LOCATION: T. 23 N., R. 81 W., SEC. 12 ; 450 FNL; 1000 FEL; DATE DRILLED 9/14/77

DRILLED DEPTH 270′ LOGGED DEPTH 264′ DRILLING MEDIUM Water FLUID LEVEL 105′

HOLE SIZE 5-1/87

REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 3.0/2.7 SENS. 7.0/5.8 LOG SPEED 17 fpm	T.C. 4 sec SCALE 50/100 CPS SUPP. 3.6/4.5 SENS. 7.5/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-28 STATE Wyoming COUNTY Carbon DATE LOGGED 9/12/77 ELEV. 6850 ft.

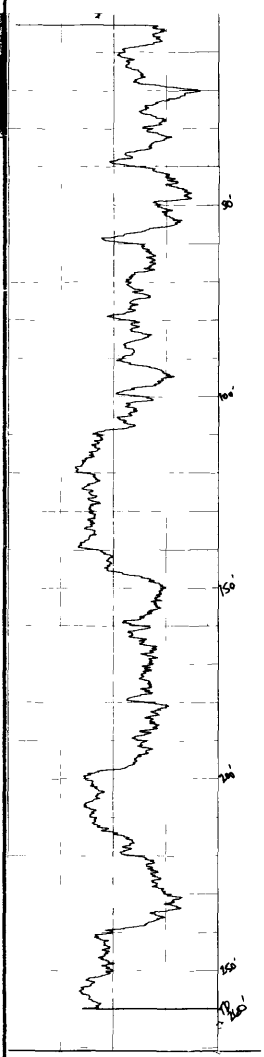
LOCATION: T. 23 N., R. 81 W., SEC. 12 ; 2450 FNL; 2050 FWL; DATE DRILLED 9/12/77

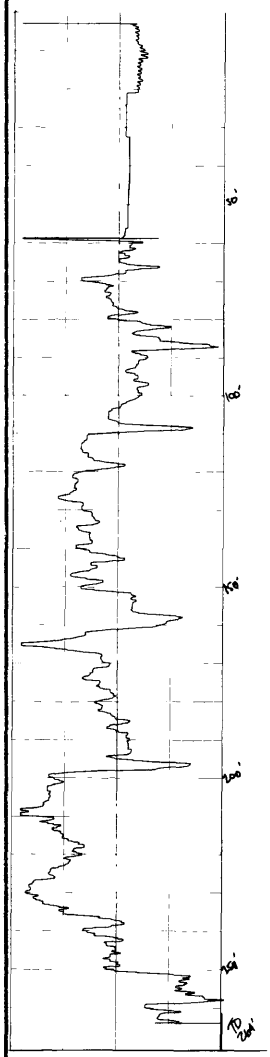
DRILLED DEPTH 270′ LOGGED DEPTH 260′ DRILLING MEDIUM water FLUID LEVEL 58′

HOLE SIZE 5-1/8"

REMARKS: Logged through steel.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	GAMMA-GAMMA T.C. 4 sec SCALE 100 CPS SUPP. 4.0/2.7 SENS. 9/0/7.0 LOG SPEED 17 fpm		
0	0					
	10					
50						
	20					
100	30					
	40					
150						
	50					
200	60					
	70					
250						
	80					
300	90					





U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-29 STATE Wyoming COUNTY Carbon DATE LOGGED 9/4/77 ELEV. 6940 ft.

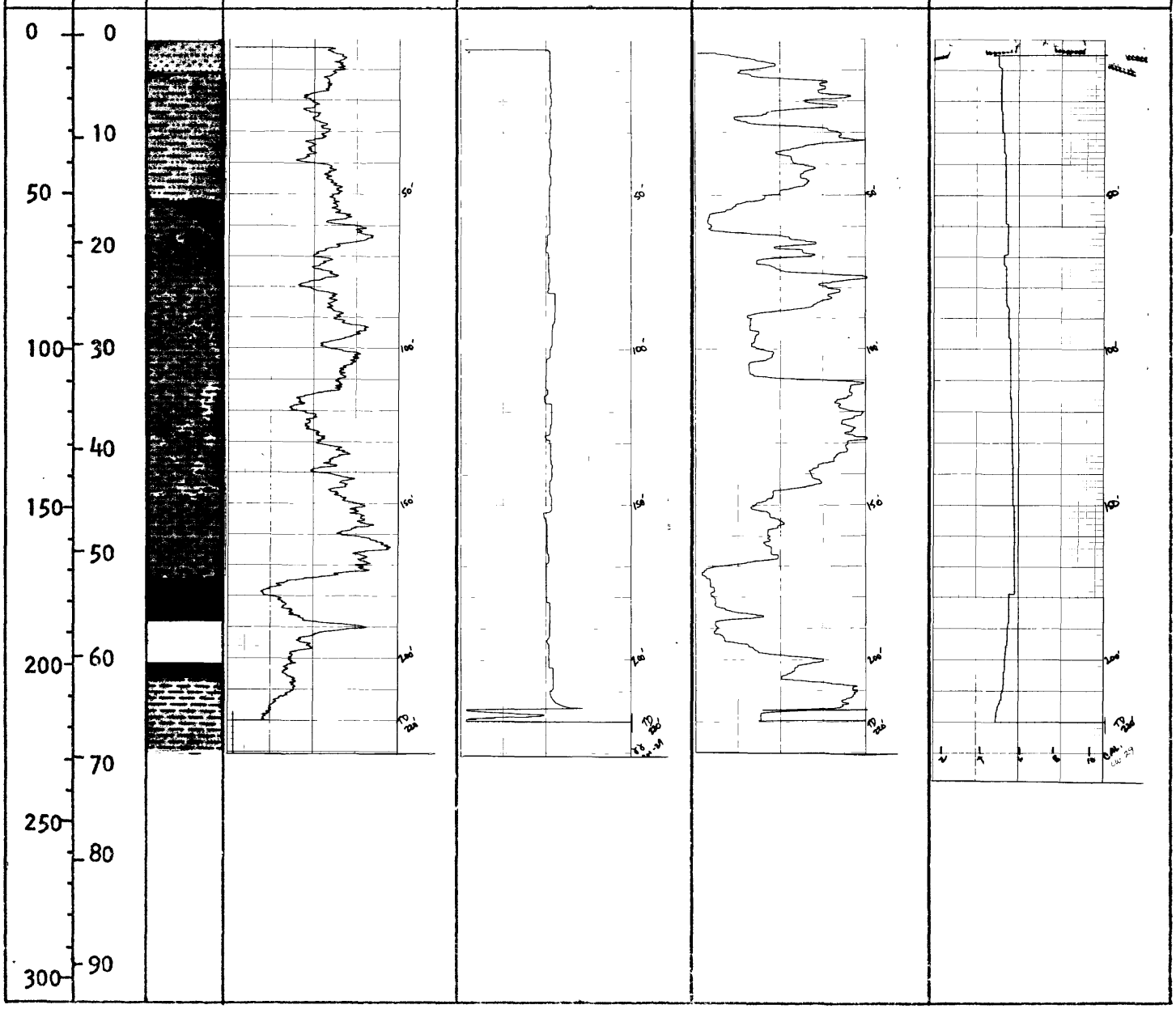
LOCATION: T. 23 N., R. 81 W., SEC. 12 ; 1300 FSL; 1200 FWL; DATE DRILLED 9/4/77

DRILLED DEPTH 230' LOGGED DEPTH 220' DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 5.0 SENS. 9.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 5.0 SENS. 9.0 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-30 STATE Wyoming COUNTY Carbon DATE LOGGED 9/16/77 ELEV. 6885 ft.

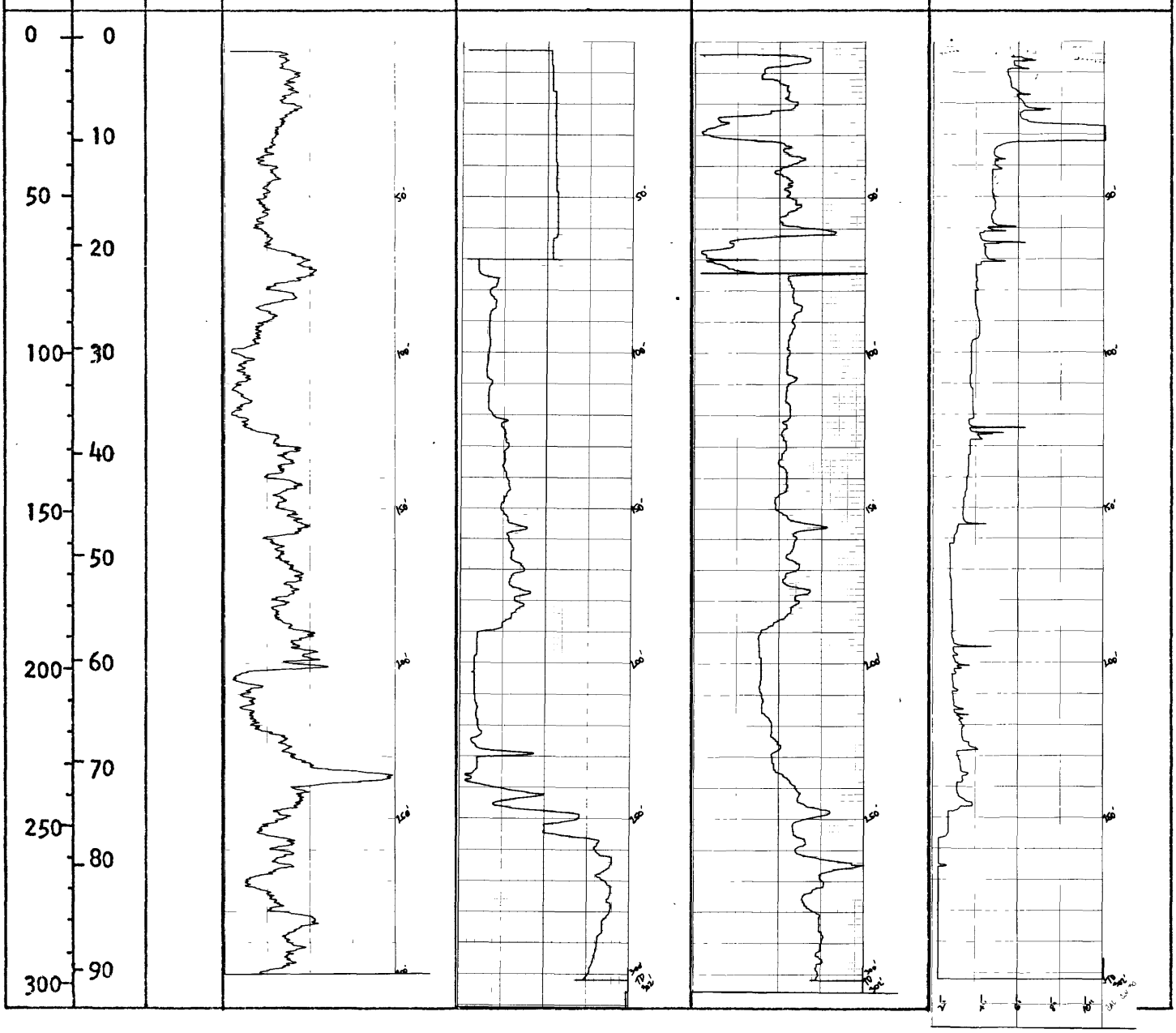
LOCATION: T. 23 N., R. 80 W., SEC. 8 ; 1950 FSL; 400 FWL; DATE DRILLED 9/16/77

DRILLED DEPTH 410′ LOGGED DEPTH 406′ DRILLING MEDIUM water FLUID LEVEL 77′

HOLE SIZE 5-1/8"

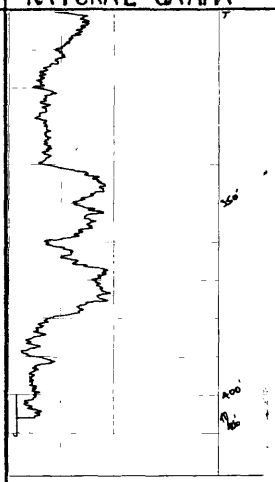
REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/500 CPS SUPP. 3.0/4.0 SENS. 7.0/5.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.6/4.5 SENS. 7.5/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY

HOLE No. CW-30 continued

DEPTH		LITH	GEOPHYSICAL LOGS			
Ft	M	LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
	100					
350	110					
	120					
400	130					
450	140					
	150					
500	160					
550	170					
	180					
600	190					
650	200					
	210					
700	220					

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-33 STATE Wyoming COUNTY Carbon DATE LOGGED 9/2/77 ELEV. 6840 ft.

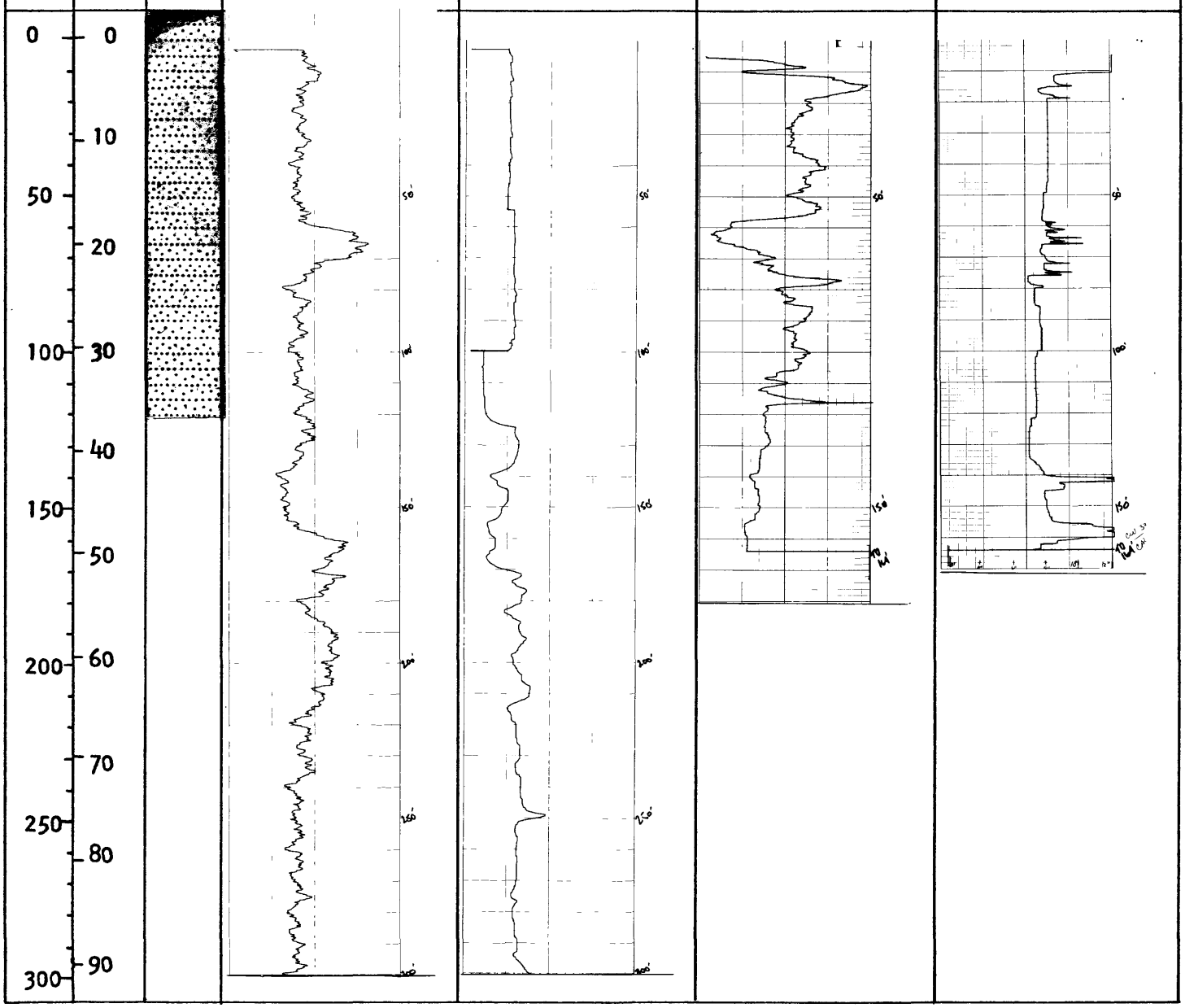
LOCATION: T. 23 N., R. 80 W., SEC. 18 ; 2000 FSL; 2600 FEL; DATE DRILLED 9/2/77

DRILLED DEPTH 510′ LOGGED DEPTH 500′ DRILLING MEDIUM water FLUID LEVEL 100′

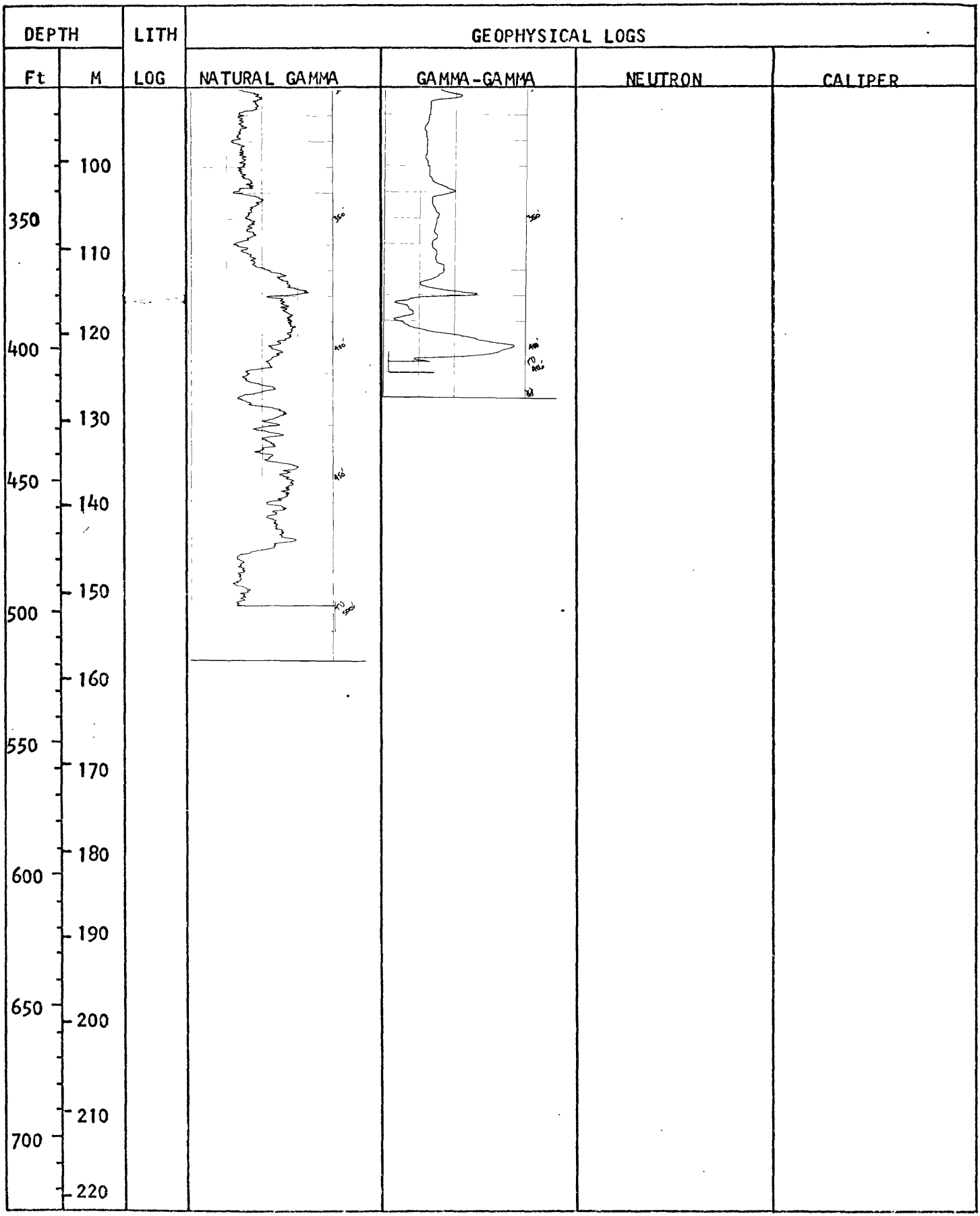
HOLE SIZE 5-1/8"

REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 5.0/4.0 SENS. 9.8/9.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 4.0/4.5 SENS. 9.12/9.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.12



HOLE No. CW-33 continued



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-34 STATE Wyoming COUNTY Carbon DATE LOGGED 9/20/77 ELEV. 6930 ft.

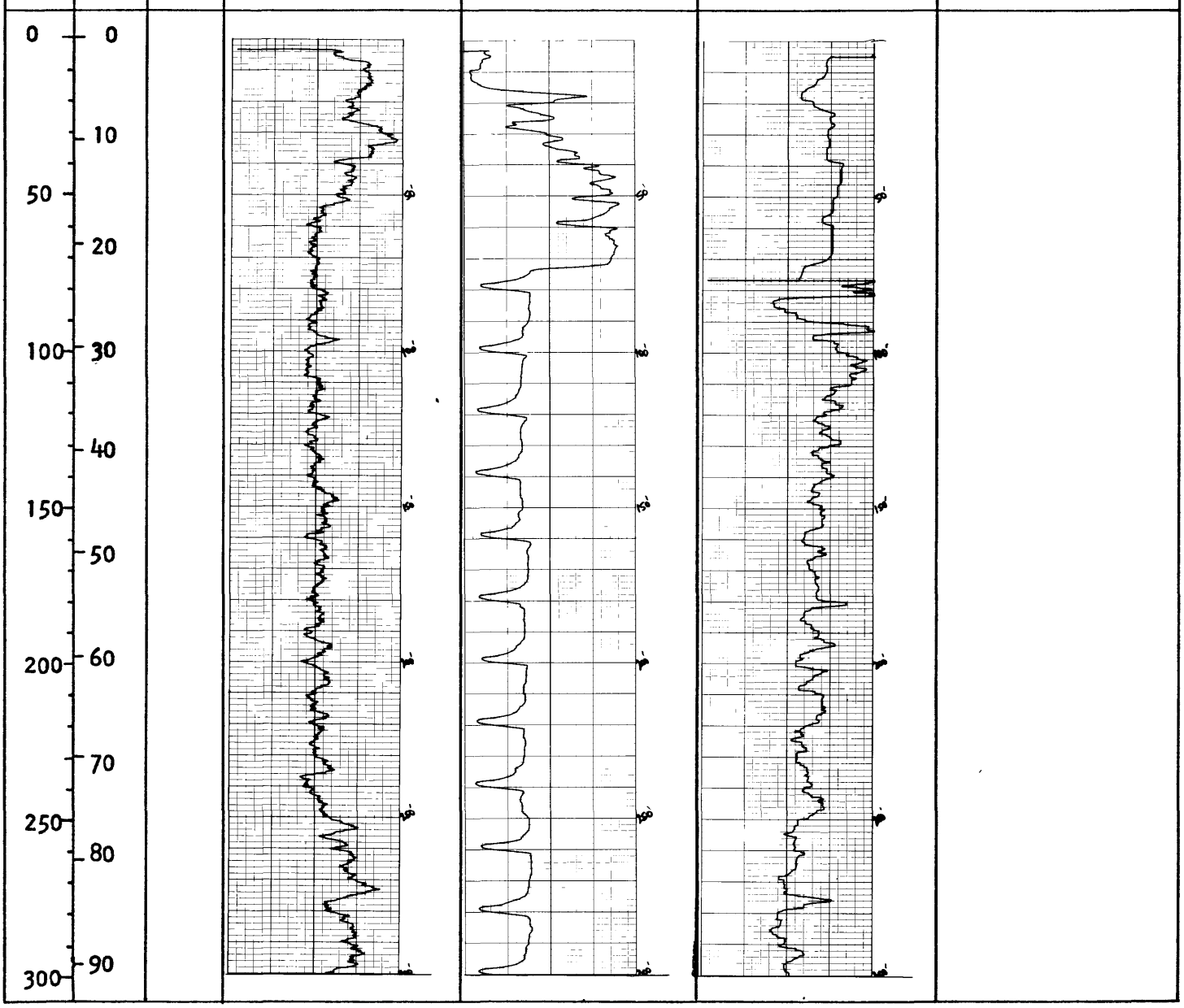
LOCATION: T. 23 N., R. 81 W., SEC. 14 ; 1750 FNL; 1350 FEL; DATE DRILLED 9/20/77

DRILLED DEPTH 510' LOGGED DEPTH 478' DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

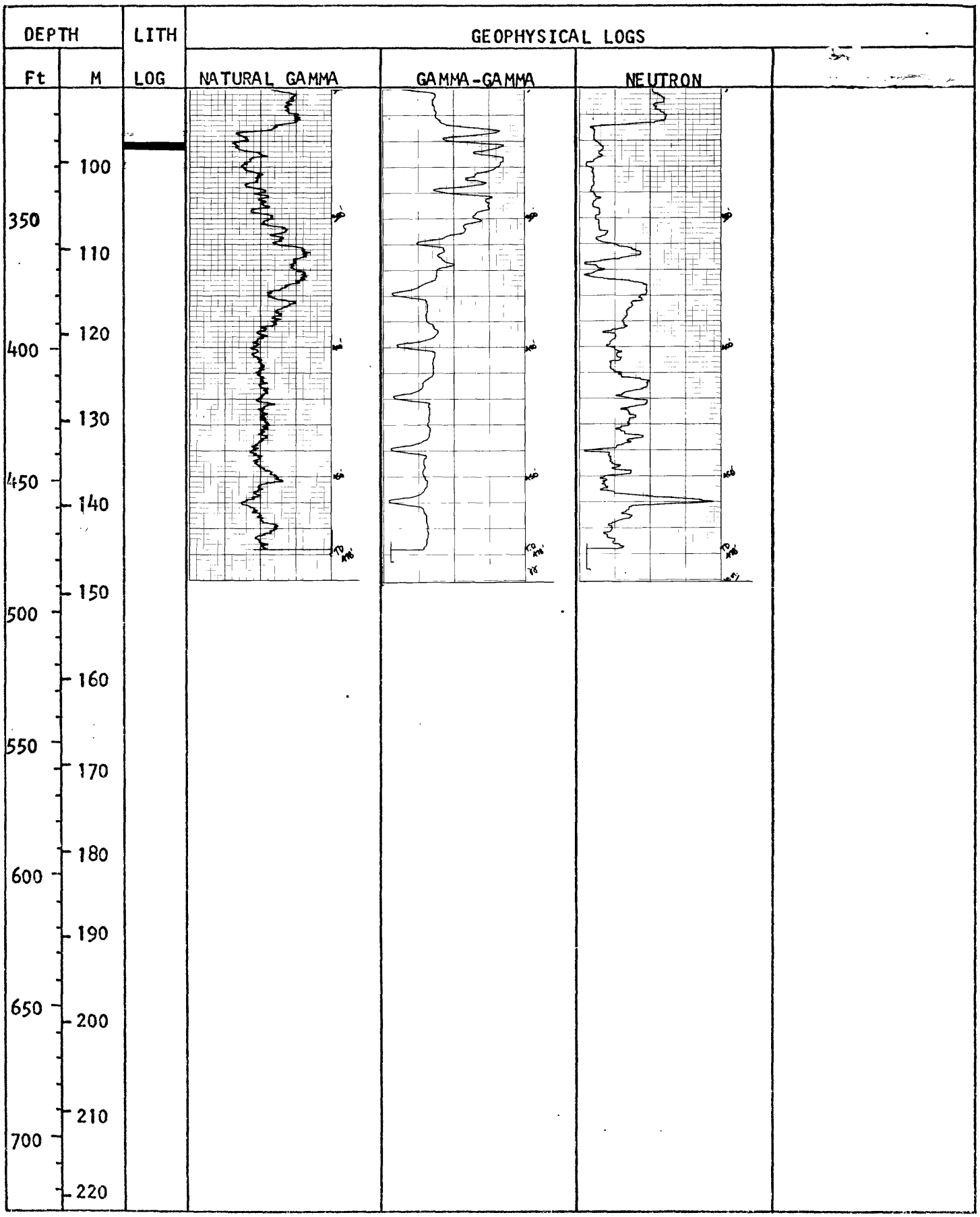
REMARKS: Logged through steel

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 500 CPS SUPP. 4.0 SENS. 8.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10 CPS SUPP. 2.7 SENS. 8.1 LOG SPEED 17 fpm	



U.S. GEOLOGICAL SURVEY

HOLE No. CW-34 continued



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-35 STATE Wyoming COUNTY Carbon DATE LOGGED 9/18/77 ELEV. 6920 ft.

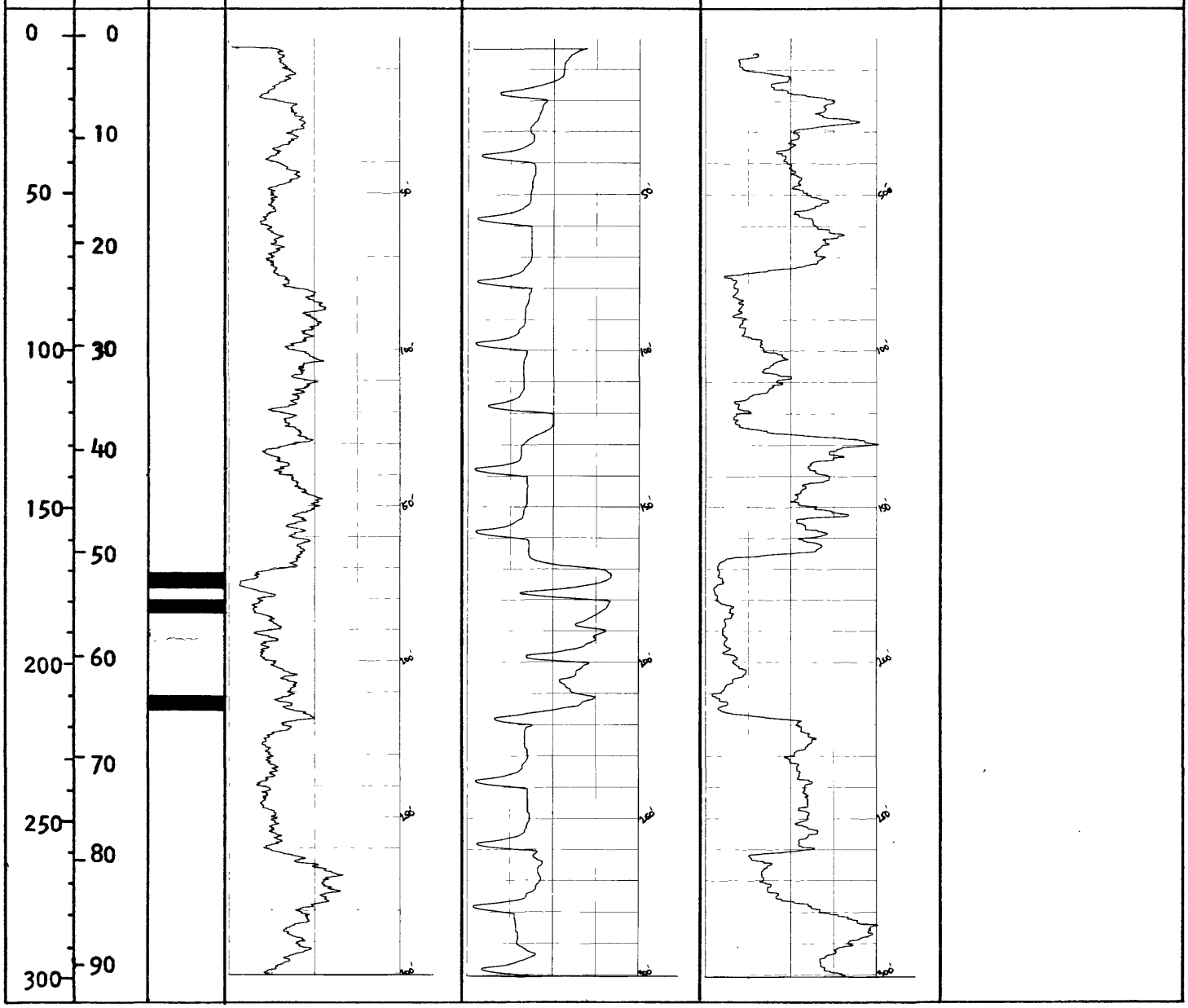
LOCATION: T. 23 N., R. 81 W., SEC. 14 ; 1600 FNL; 1025 FWL; DATE DRILLED 9/18/77

DRILLED DEPTH 710′ LOGGED DEPTH 678′ DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

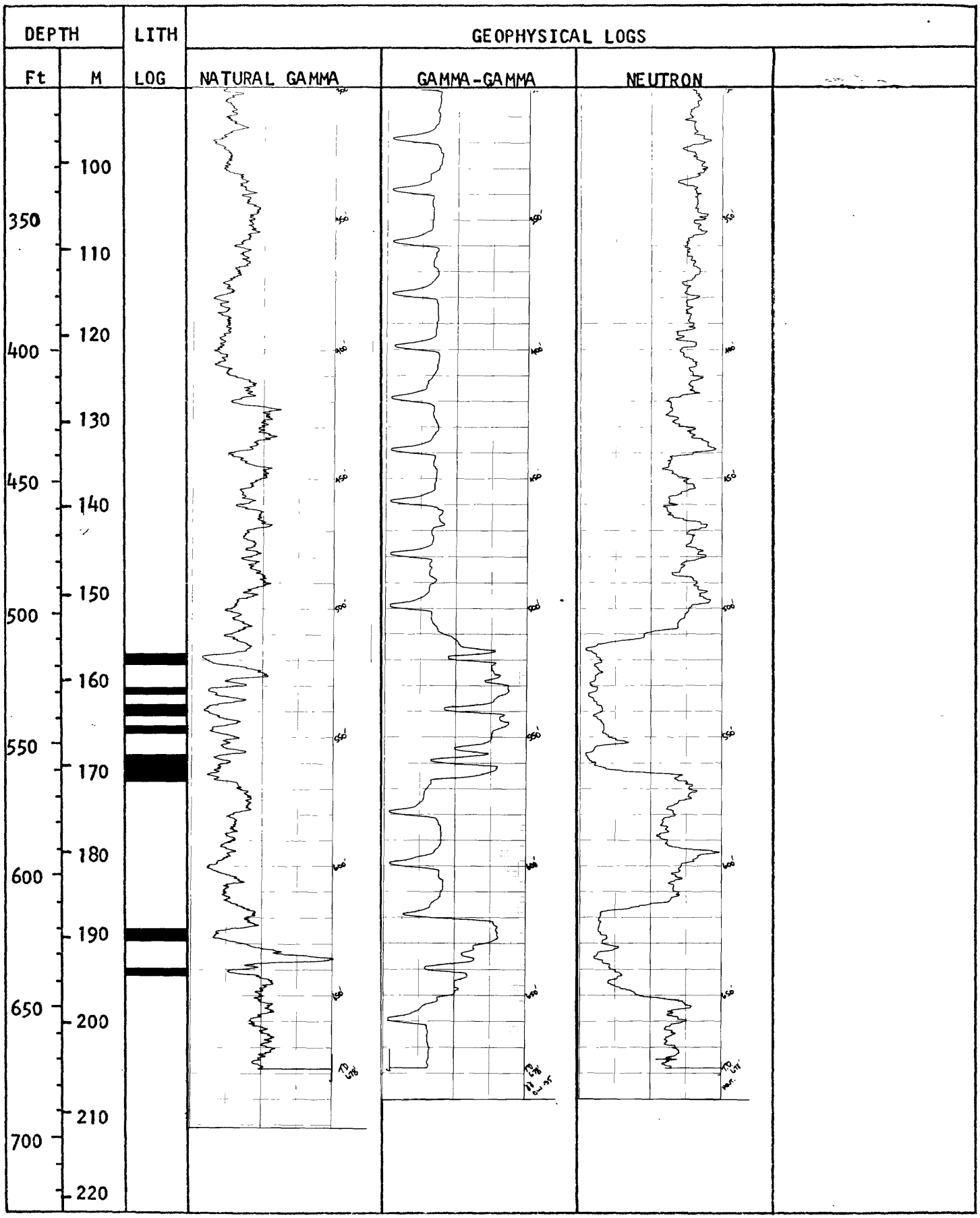
REMARKS: Logged through steel.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 500 CPS SUPP. 4.0 SENS. 8.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10 CPS SUPP. 2.7 SENS. 8.1 LOG SPEED 17 fpm	



U.S. GEOLOGICAL SURVEY

HOLE No. CW-35 continued



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. CW-36 STATE Wyoming COUNTY Carbon DATE LOGGED 9/4/77 ELEV. 6940 ft.

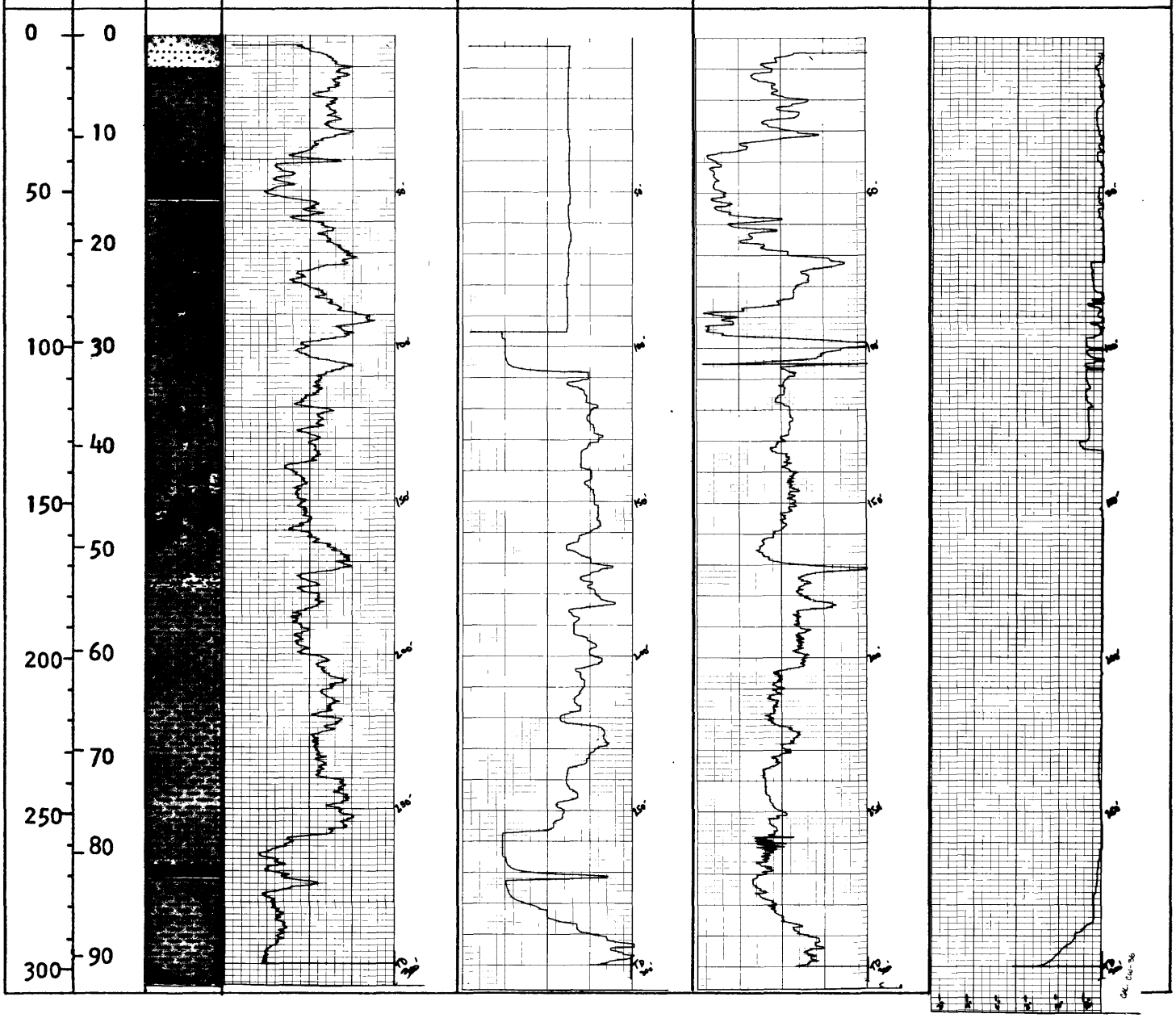
LOCATION: T. 23 N., R. 81 W., SEC. 13 ; 200 FNL; 200 FEL; DATE DRILLED 9/4/77

DRILLED DEPTH 310′ LOGGED DEPTH 300′ DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 4.0/2.32 SENS. 9.2/9.5 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 5.0/9.0 SENS. 9.0/10.0 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.24



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-10 STATE Wyoming COUNTY Carbon DATE LOGGED 10/19/77 ELEV. 6620 ft.

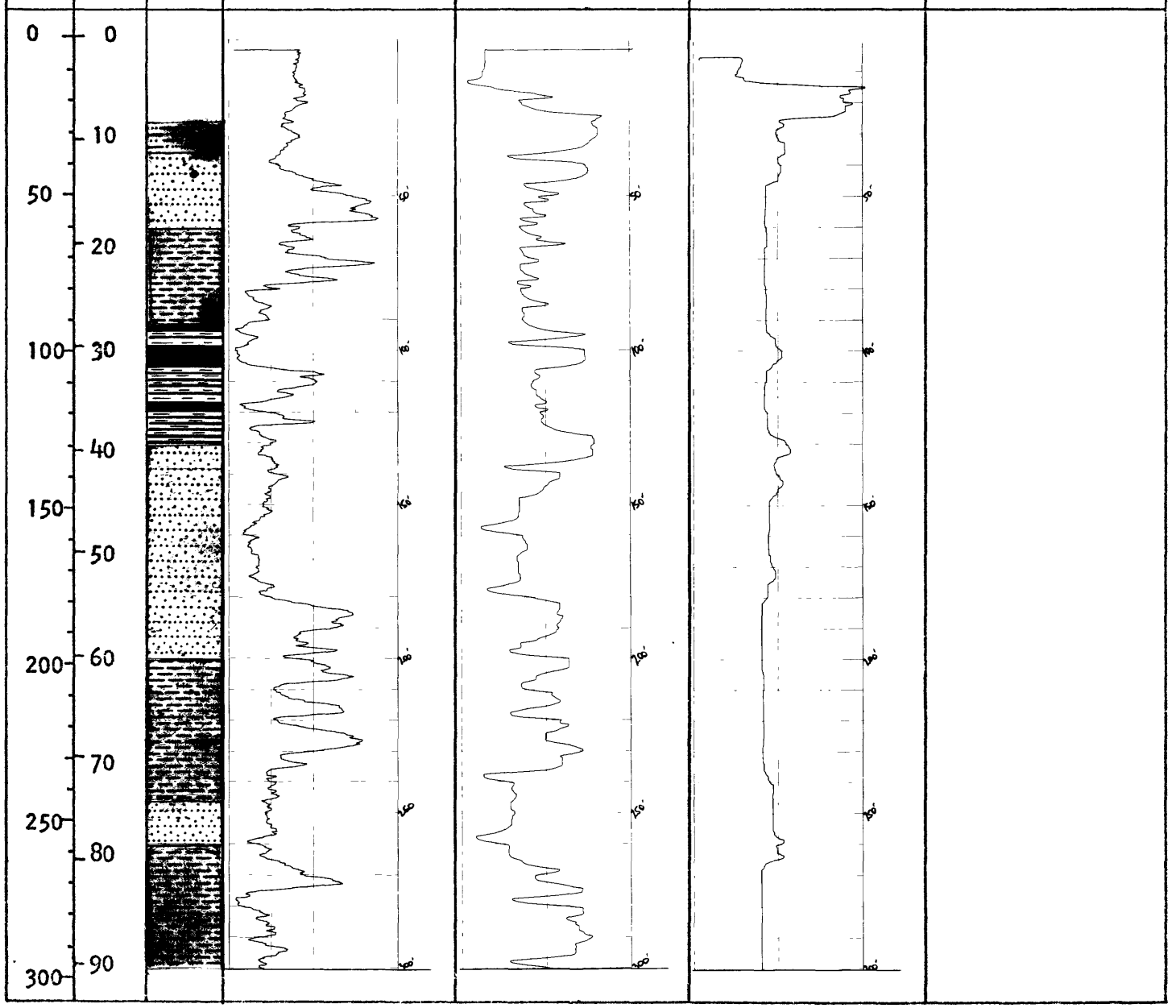
LOCATION: T. 23 N., R. 81 W., SEC. 4 ; 1800 FNL; 125 FEL; DATE DRILLED 10/19/77

DRILLED DEPTH 470' LOGGED DEPTH 438' DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

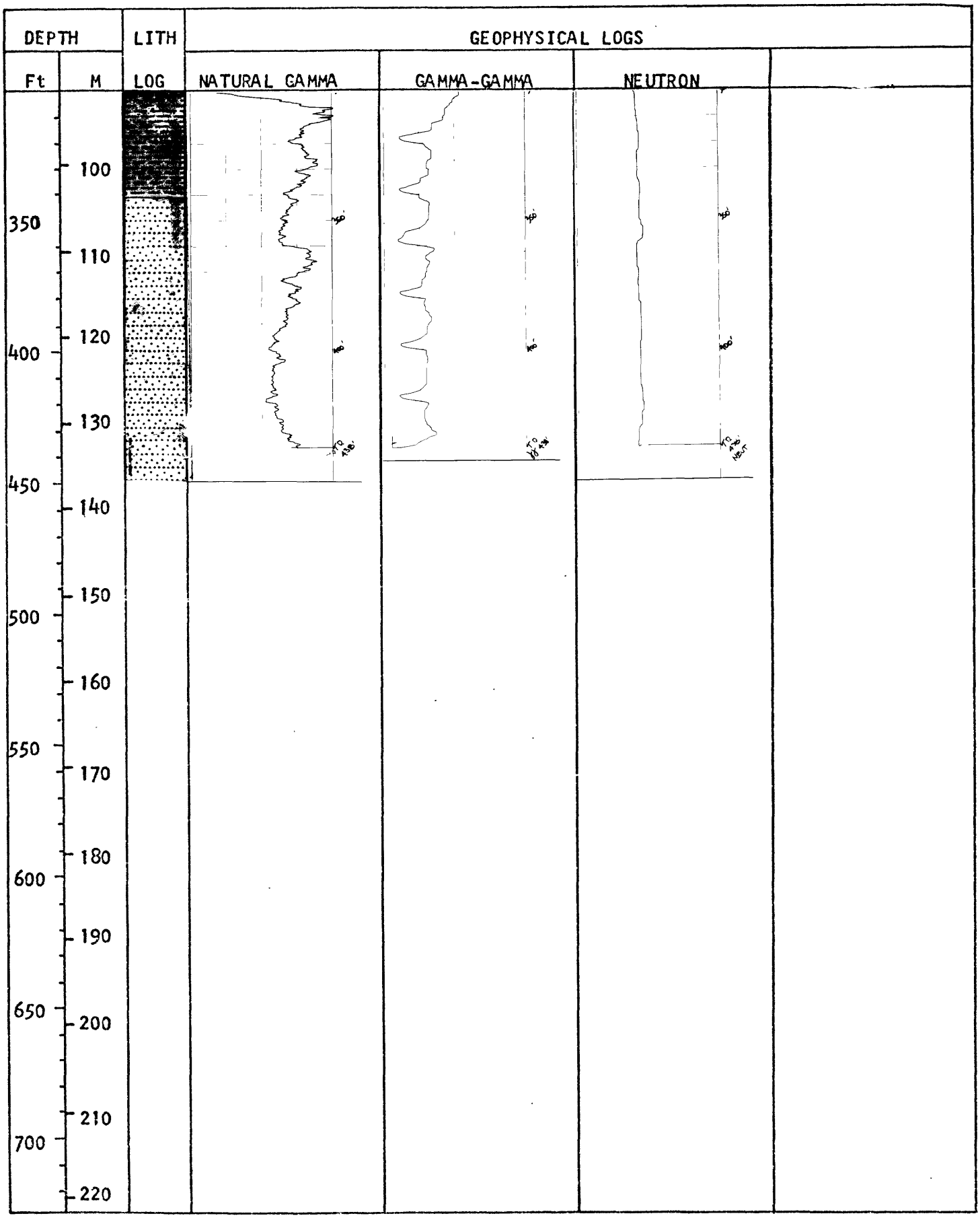
REMARKS: Logged through steel.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	
			T.C. 4 sec SCALE 50 CPS SUPP. 7.0 SENS. 8.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 500 CPS SUPP. 4.0 SENS. 8.0 LOG SPEED 17 fpm	T.C. 4 sdec SCALE 100 CPS SUPP. 3.5 SENS. 8.0 LOG SPEED 17 fpm	



U.S. GEOLOGICAL SURVEY

HOLE No. E-10 continued



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-11 STATE Wyoming COUNTY Carbon DATE LOGGED 10/28/77 ELEV. 6590 ft.

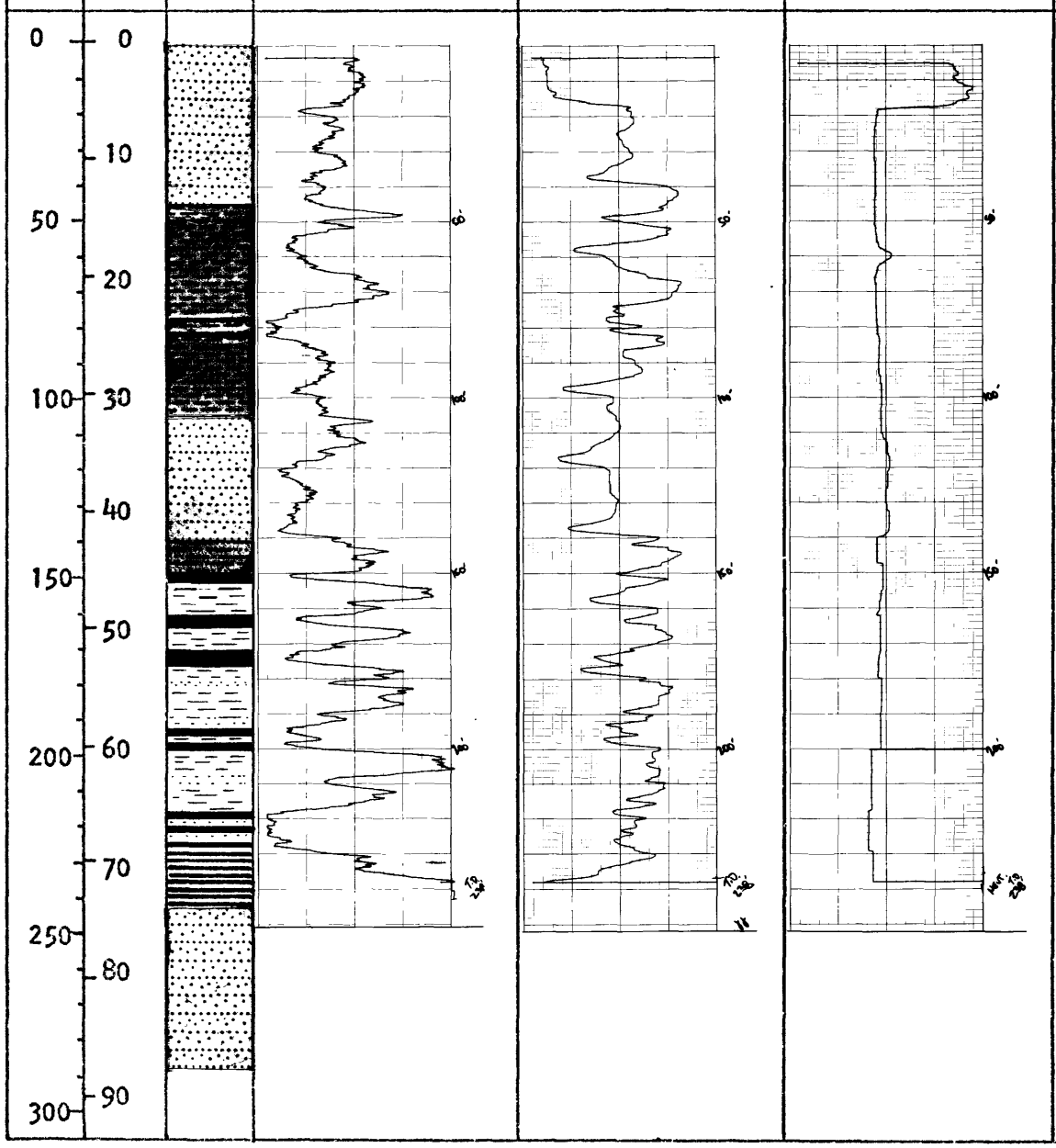
LOCATION: T. 23 N., R. 81 W., SEC. 4 ; 550 FSL; 1950 FEL; DATE DRILLED 10/28/77

DRILLED DEPTH 385' LOGGED DEPTH 238' DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

REMARKS: Logged through steel.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 500 CPS SUPP. 4.0 SENS. 8.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 3.5 SENS. 8.0 LOG SPEED 17 fpm	



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-12 STATE Wyoming COUNTY Carbon DATE LOGGED 10/3/77 ELEV. 6800 ft.

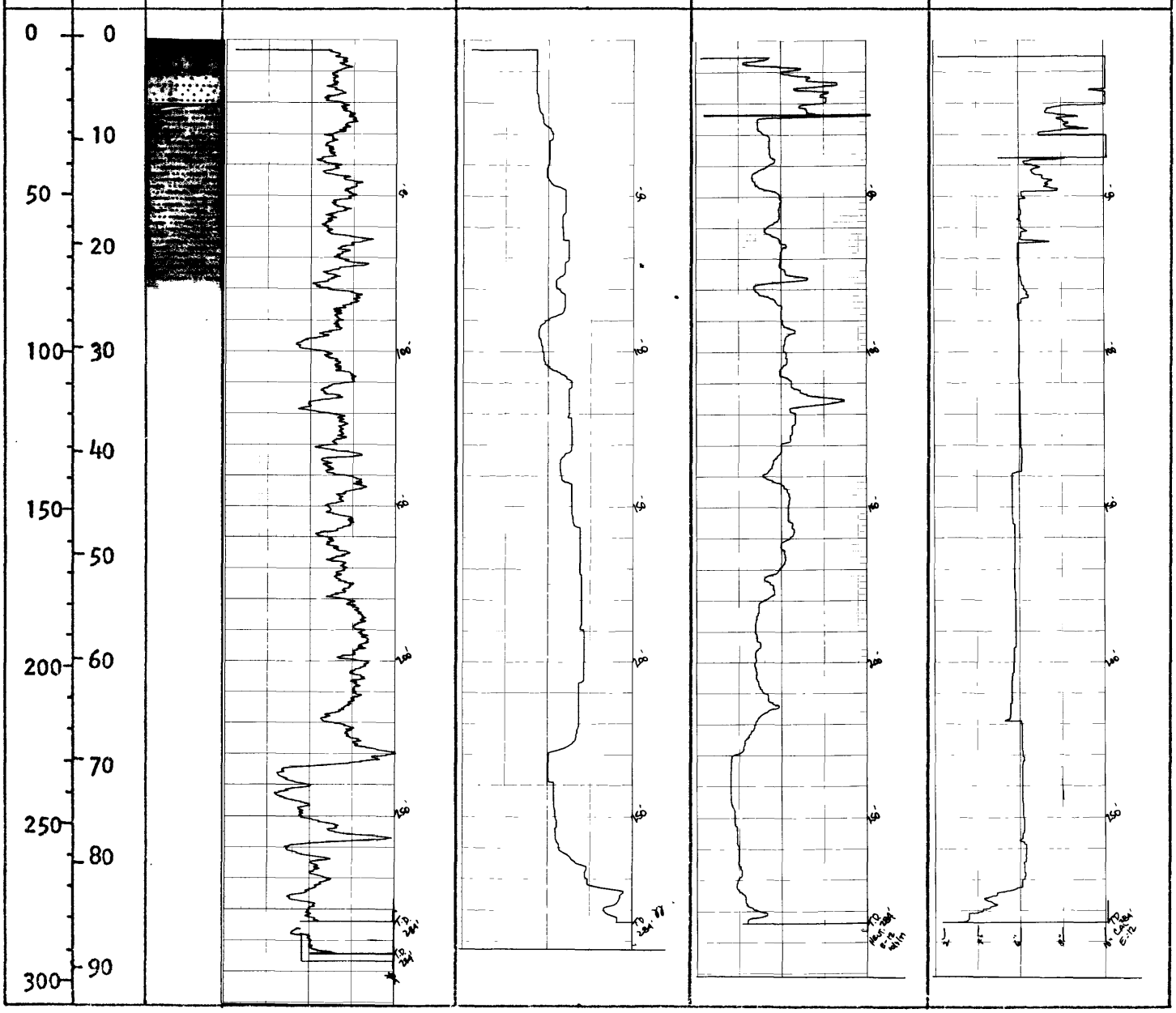
LOCATION: T. 23 N., R. 81 W., SEC. 20 ; 150 FNL; 1350 FEL; DATE DRILLED 10/3/77

DRILLED DEPTH 290′ LOGGED DEPTH 284′ DRILLING MEDIUM water FLUID LEVEL 25′

HOLE SIZE 5-1/8"

REMARKS: Logged through steel. Caliper run after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 500 CPS SUPP. 3.0 SENS. 7.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 7.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-13 STATE Wyoming COUNTY Carbon DATE LOGGED 10/14/77 ELEV. 7180 ft.

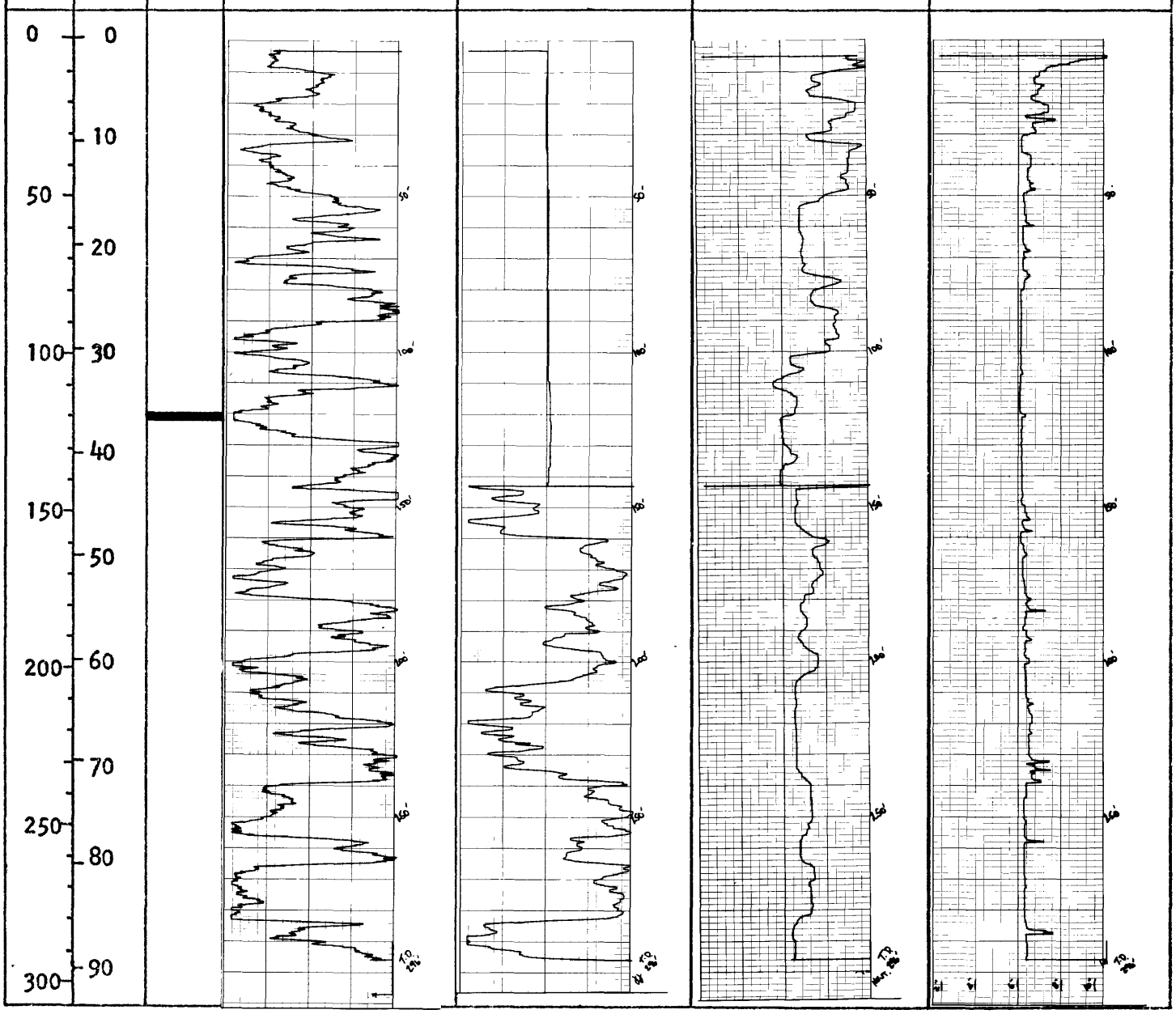
LOCATION: T. 23 N., R. 81 W., SEC. 19 ; 275 FSL; 600FEL; DATE DRILLED 10/12/77

DRILLED DEPTH 310' LOGGED DEPTH 296' DRILLING MEDIUM water FLUID LEVEL 142'

HOLE SIZE 5-1/8"

REMARKS:

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 9.0 SENS. 8.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/100 CPS SUPP. 3.0/3.3 SENS. 9.0/669 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-14 STATE Wyoming COUNTY Carbon DATE LOGGED 10/5/77 ELEV. 7100 ft.

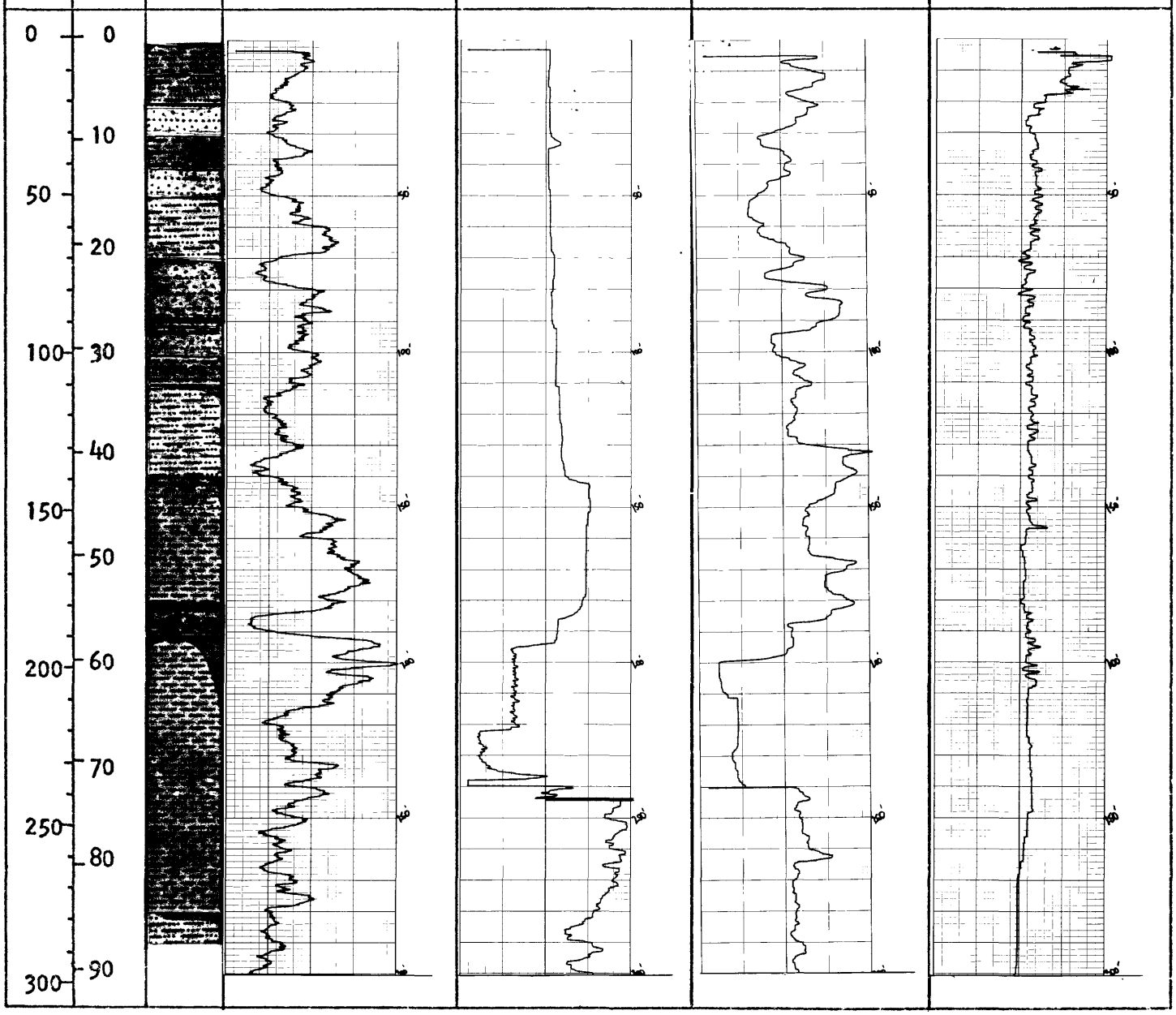
LOCATION: T. 23 N., R. 81 W., SEC. 20 ; 850 FSL; 550 FWL; DATE DRILLED 10/5/77

DRILLED DEPTH 510' LOGGED DEPTH 504' DRILLING MEDIUM water FLUID LEVEL 240'

HOLE SIZE 5-1/8"

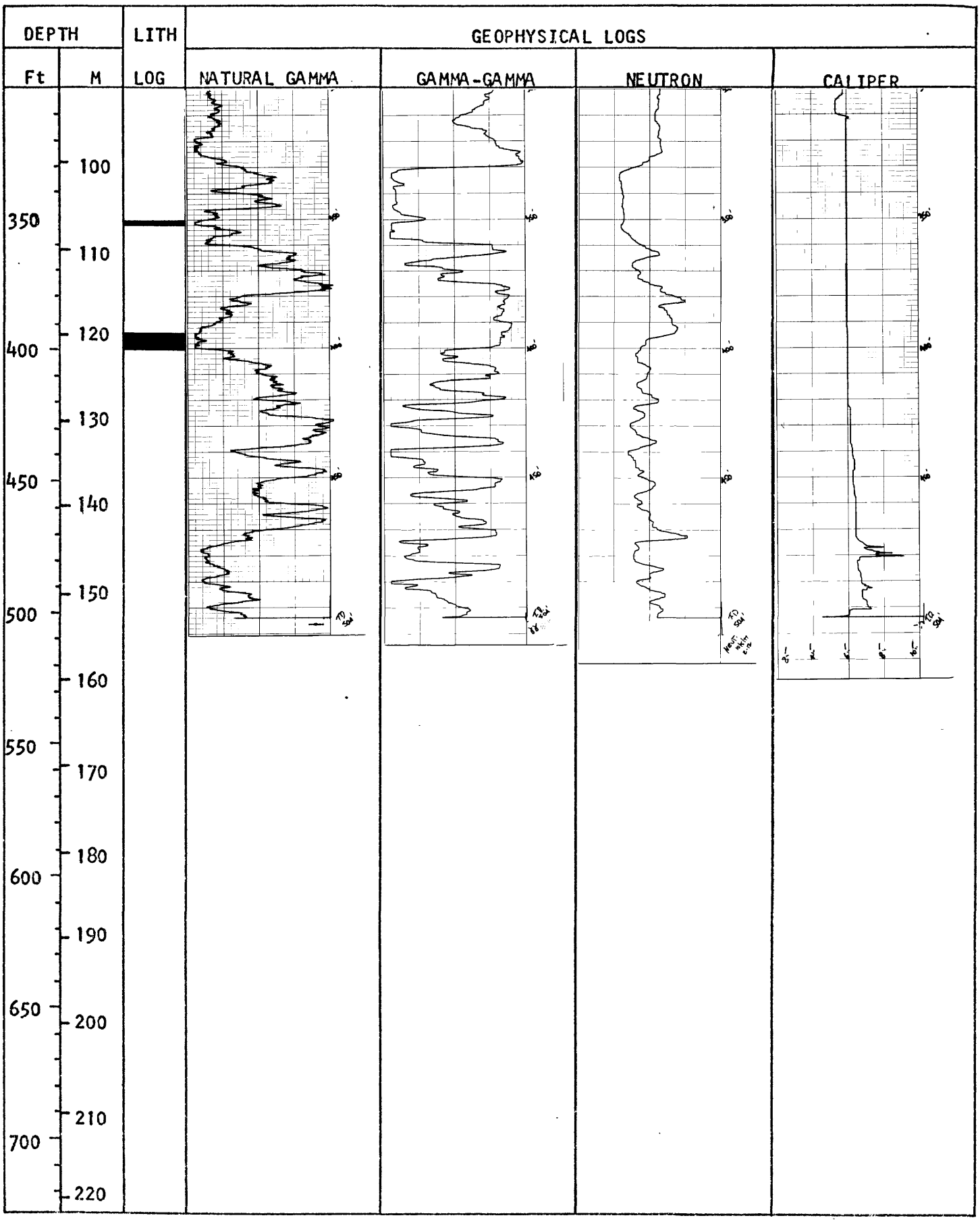
REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH x Ft	M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 9.4 SENS. 9.4 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/100 CPS SUPP. 3.0/3.3 SENS. 9.0/6.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 7.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY

HOLE No. E-14 continued



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-16 STATE Wyoming COUNTY Carbon DATE LOGGED 10/14/77 ELEV. 7310 ft.

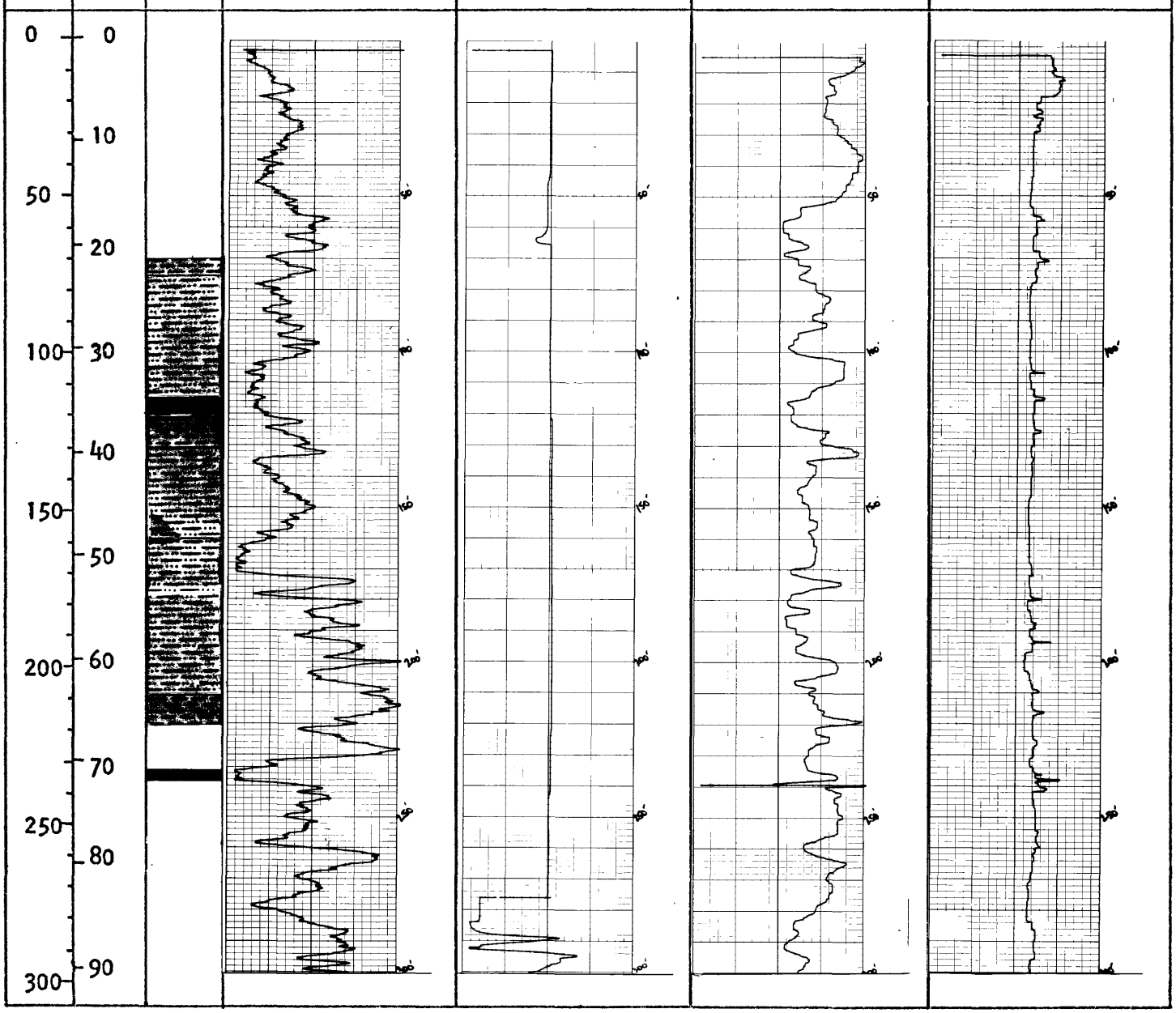
LOCATION: T. 23 N., R. 81 W., SEC. 30 ; 850 FSL; 525 FWL; DATE DRILLED 10/14/77

DRILLED DEPTH 450' LOGGED DEPTH 444' DRILLING MEDIUM water FLUID LEVEL 275'

HOLE SIZE 5-1/8"

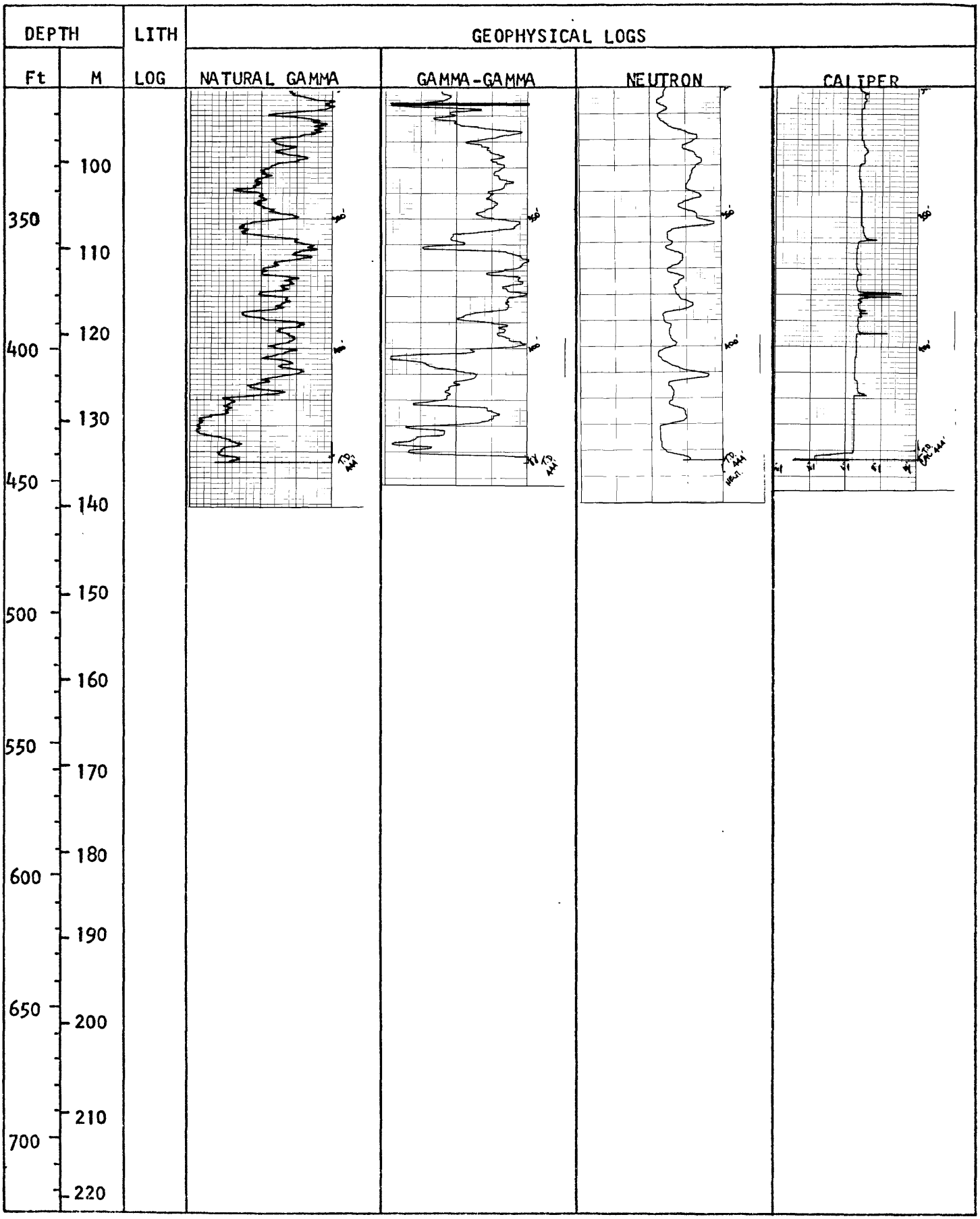
REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 9.2 SENS. 9.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/100 CPS SUPP. 3.0/3.3 SENS. 9.0/6.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY

HOLE No. E-16 continued



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-18 STATE Wyoming COUNTY Carbon DATE LOGGED 10/1/77 ELEV. 7090 ft.

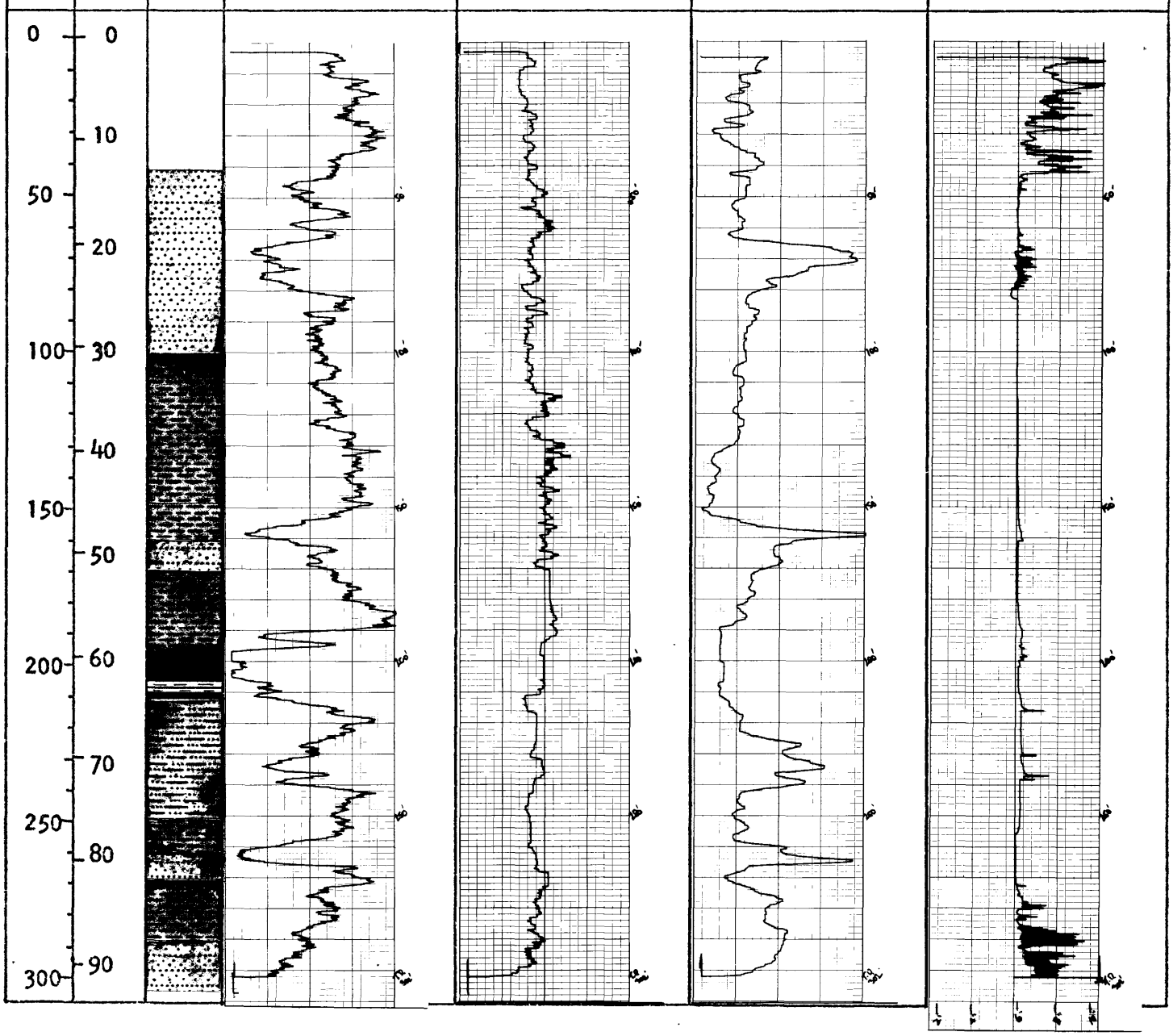
LOCATION: T. 23 N., R. 81 W., SEC. 20 ; 1400 FSL; 75 FWL; DATE DRILLED 10/1/77

DRILLED DEPTH 310' LOGGED DEPTH 302' DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

REMARKS: _____

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 9.8 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10 CPS SUPP. 8.0 SENS. 9.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 3.0 SENS. 7.0 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-19 STATE Wyoming COUNTY Carbon DATE LOGGED 10/16/77 ELEV. 7400 ft.

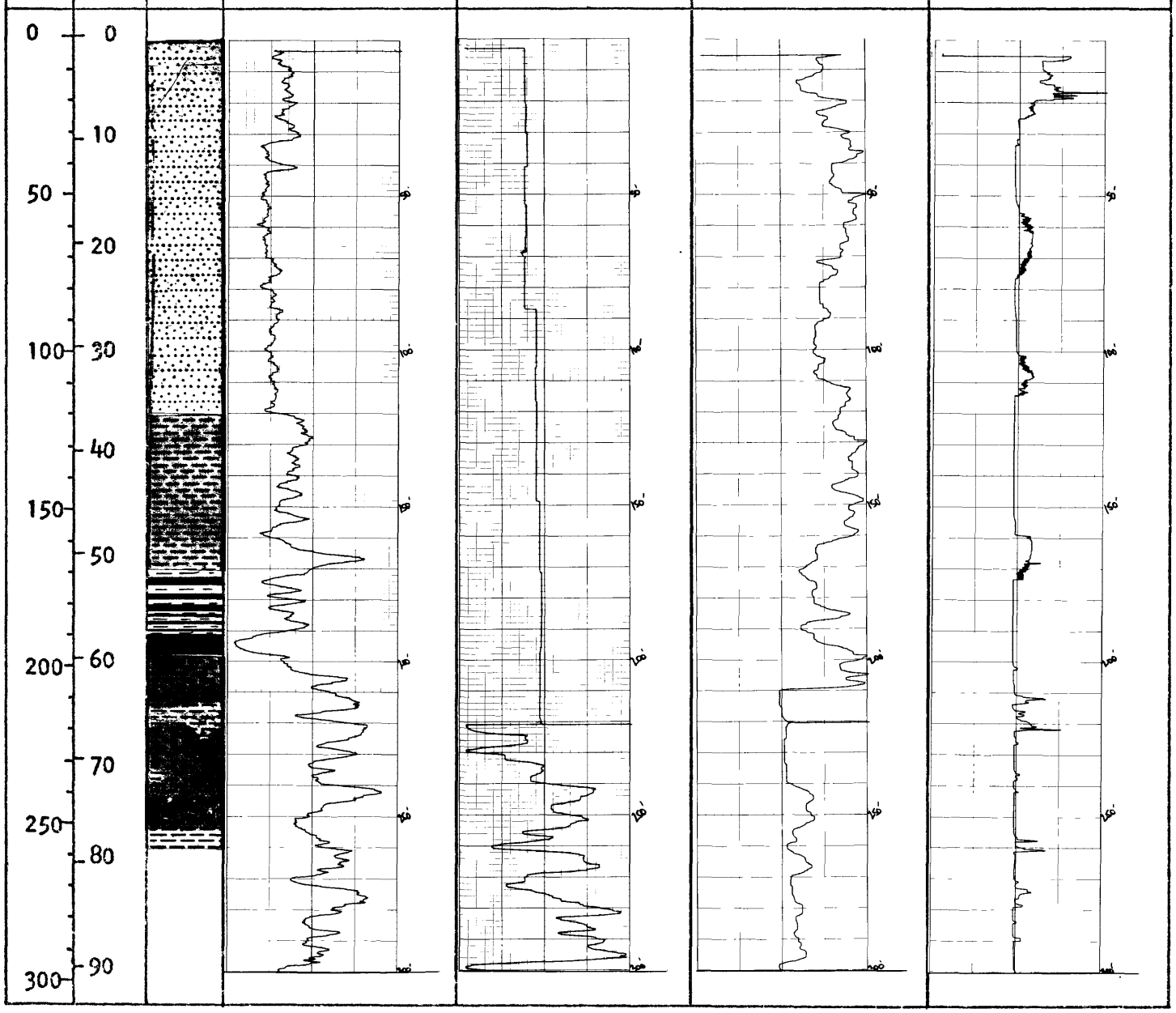
LOCATION: T. 22 N., R. 81 W., SEC. 6 ; 400 FNL; 2125 FEL; DATE DRILLED 10/16/77

DRILLED DEPTH 350′ LOGGED DEPTH 344′ DRILLING MEDIUM water FLUID LEVEL 220′

HOLE SIZE 5-1/8"

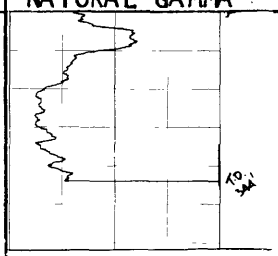
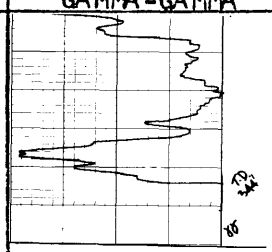
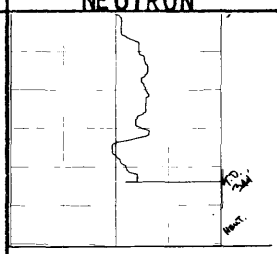
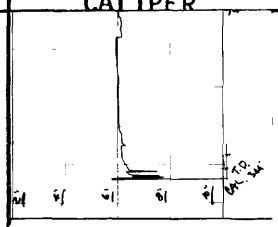
REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 7.0 SENS. 8.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/100 CPS SUPP. 3.0/3.3 SENS. 9.0/6.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY

HOLE No. E-19 continued

DEPTH Ft	DEPTH M	LITH LOG	GEOPHYSICAL LOGS: NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
						

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-21 STATE Wyoming COUNTY Carbon DATE LOGGED 10/17/77 ELEV. 7220 ft.

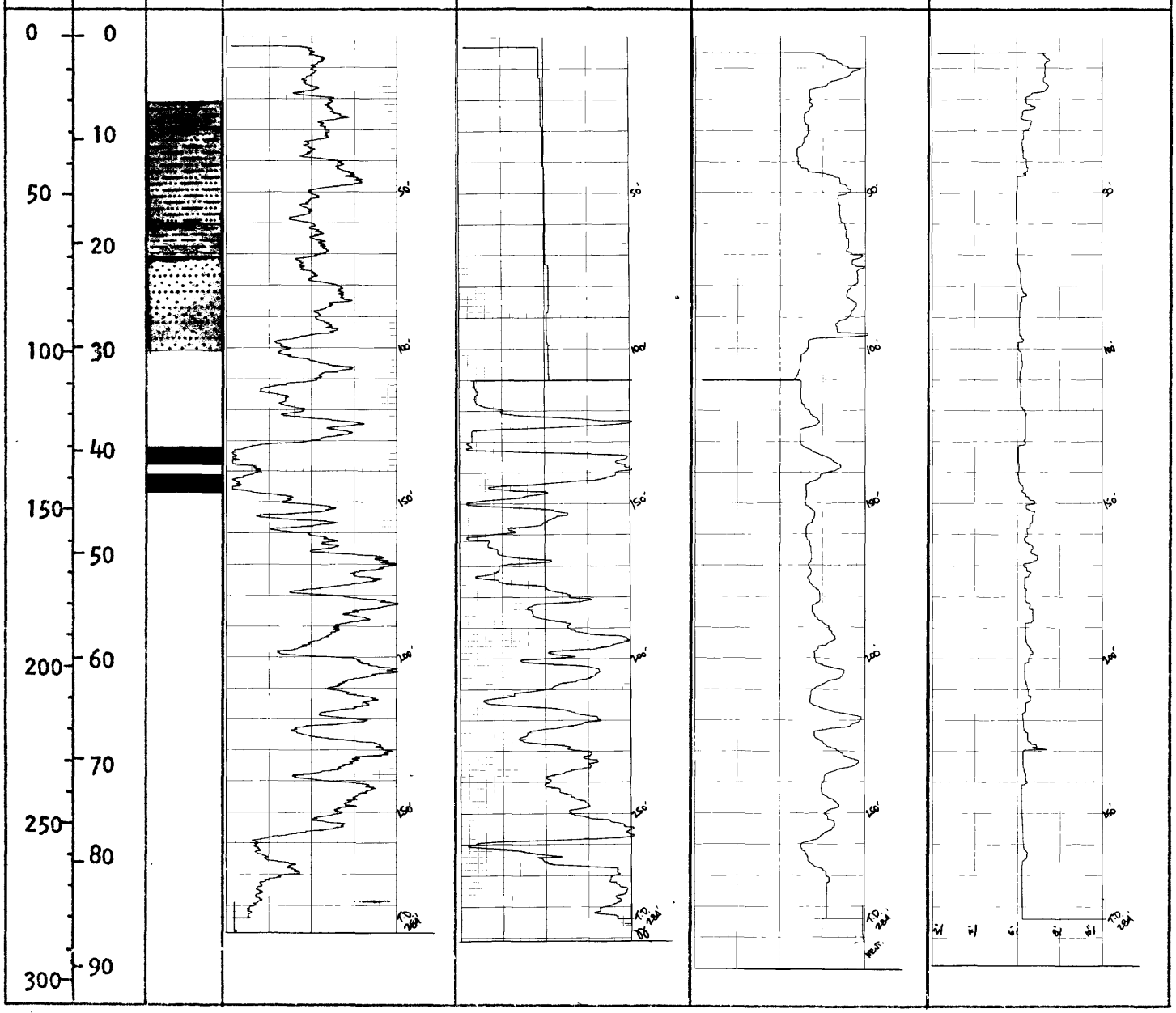
LOCATION: T. 22 N., R. 81 W., SEC. 6 ; 1975 FSL; 1175 FEL; DATE DRILLED 10/17/77

DRILLED DEPTH 290′ LOGGED DEPTH 284′ DRILLING MEDIUM water FLUID LEVEL 110′

HOLE SIZE 5-1/8"

REMARKS: Logged through steel. Caliper logged after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/100 CPS SUPP. 3.0/3.3 SENS. 9.0/6.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-22A STATE Wyoming COUNTY Carbon DATE LOGGED 10/19/77 ELEV. 7180 ft.

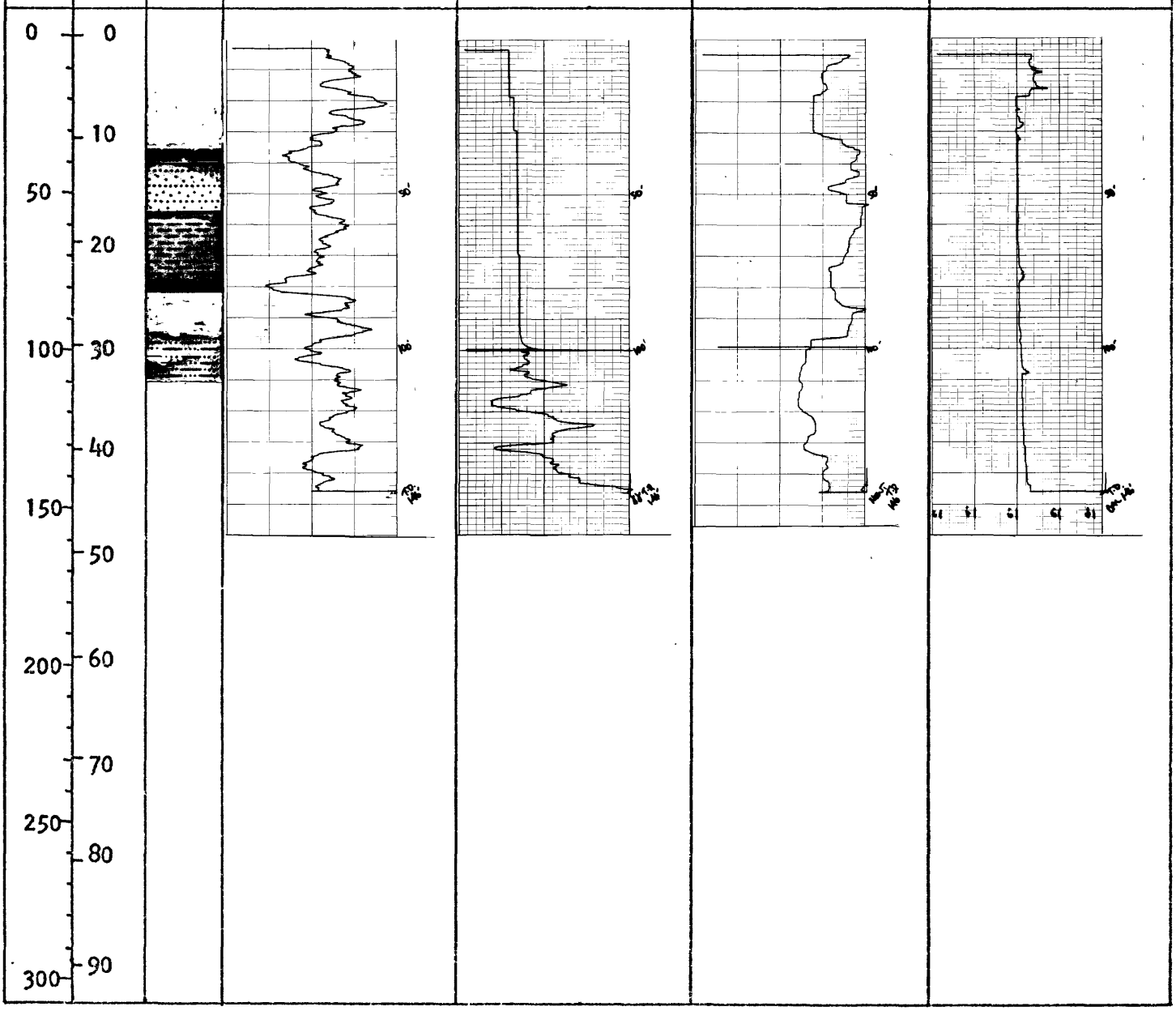
LOCATION: T. 22 N., R. 81 W., SEC. 8 ; 1750 FNL; 1975 FEL; DATE DRILLED 10/19/77

DRILLED DEPTH 150′ LOGGED DEPTH 140′ DRILLING MEDIUM water FLUID LEVEL 100′

HOLE SIZE 5-1/8"

REMARKS:

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 7.0 SENS. 8.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/100 CPS SUPP. 3.0/3.3 SENS. 9.0/8.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-22B STATE Wyoming COUNTY Carbon DATE LOGGED 10/19/77 ELEV. 7140 ft.

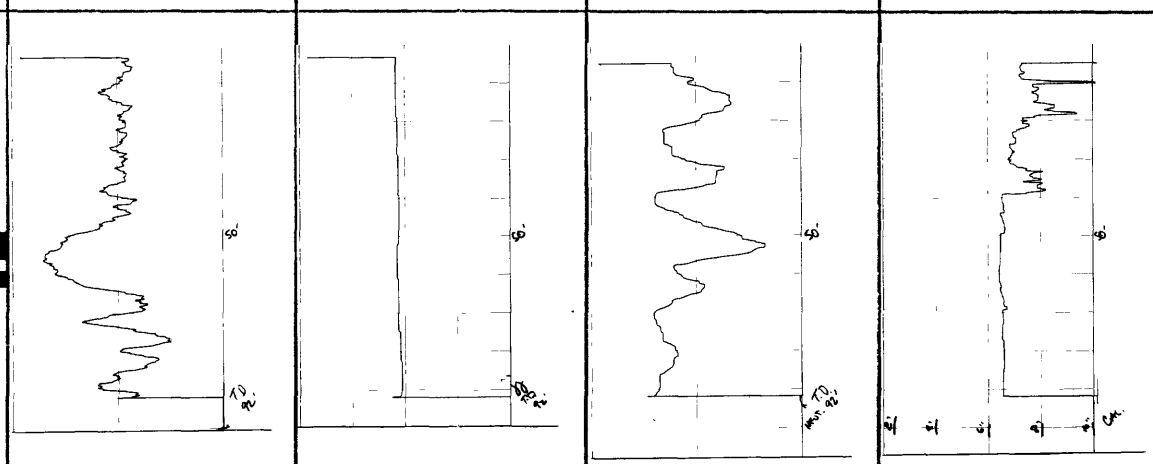
LOCATION: T. 22 N., R. 81 W., SEC. 8 ; 1650 FNL; 1500FEL; DATE DRILLED 10/10/77

DRILLED DEPTH 100' LOGGED DEPTH 92' DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

REMARKS: _____

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 7.0 SENS. 8.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10 CPS SUPP. 3.0 SENS. 9.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 3.0 SENS. 9.0 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18
0	0					
	10					
50						
	20					
100	30					
	40					
150						
	50					
200	60					
	70					
250						
	80					
300	90					



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-23 STATE Wyoming COUNTY Carbon DATE LOGGED 10/18/77 ELEV. 7050 ft.

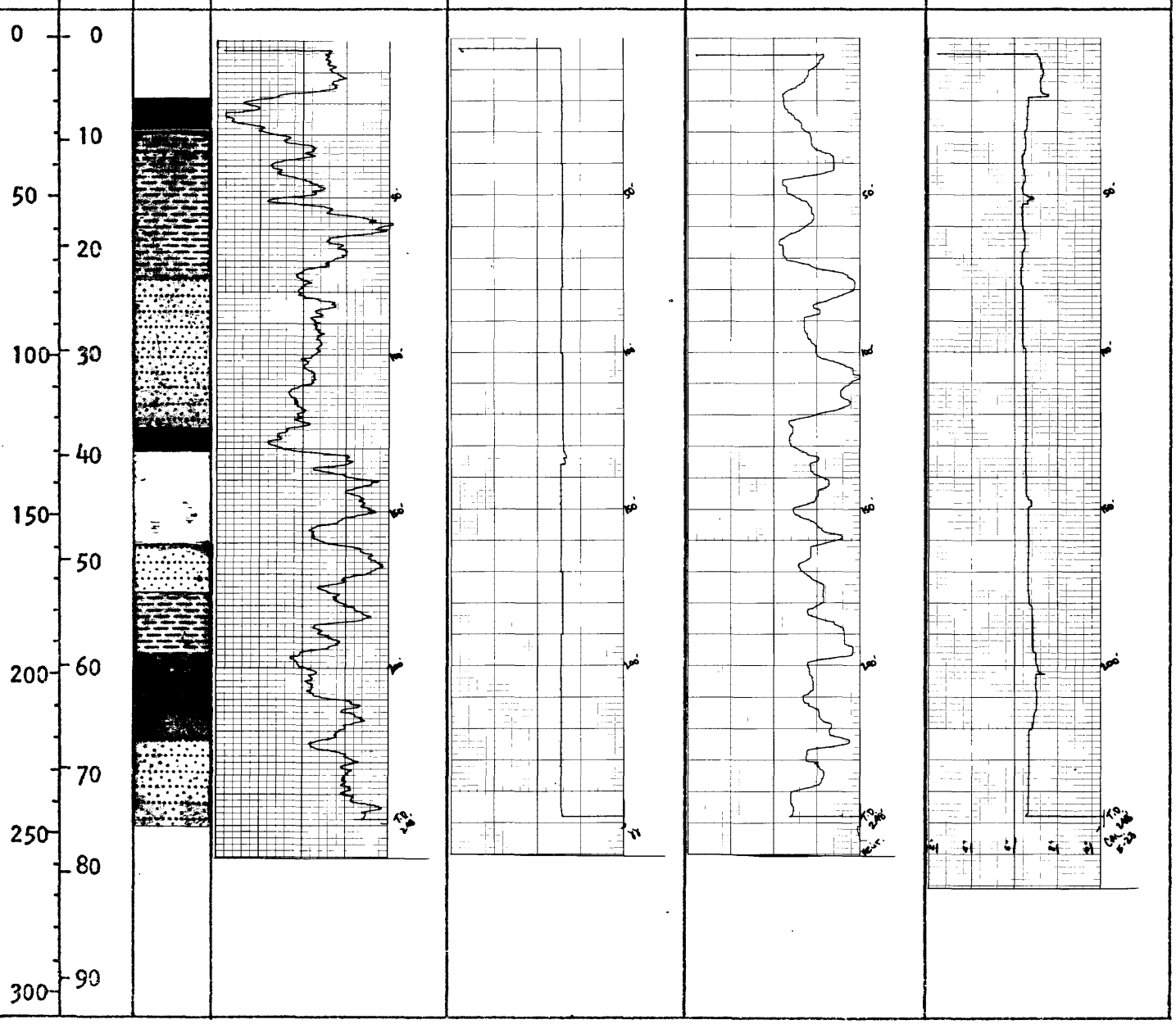
LOCATION: T. 22 N., R. 81 W., SEC. 8 ; 1300 FSL; 2450FWL; DATE DRILLED 10/18/77

DRILLED DEPTH 250' LOGGED DEPTH 248' DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

REMARKS: _____

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 7.0 SENS. 8.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 50 CPS SUPP. 3.0 SENS. 9.0 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-31 STATE Wyoming COUNTY Carbon DATE LOGGED 9/22/77 ELEV. 6890 ft.

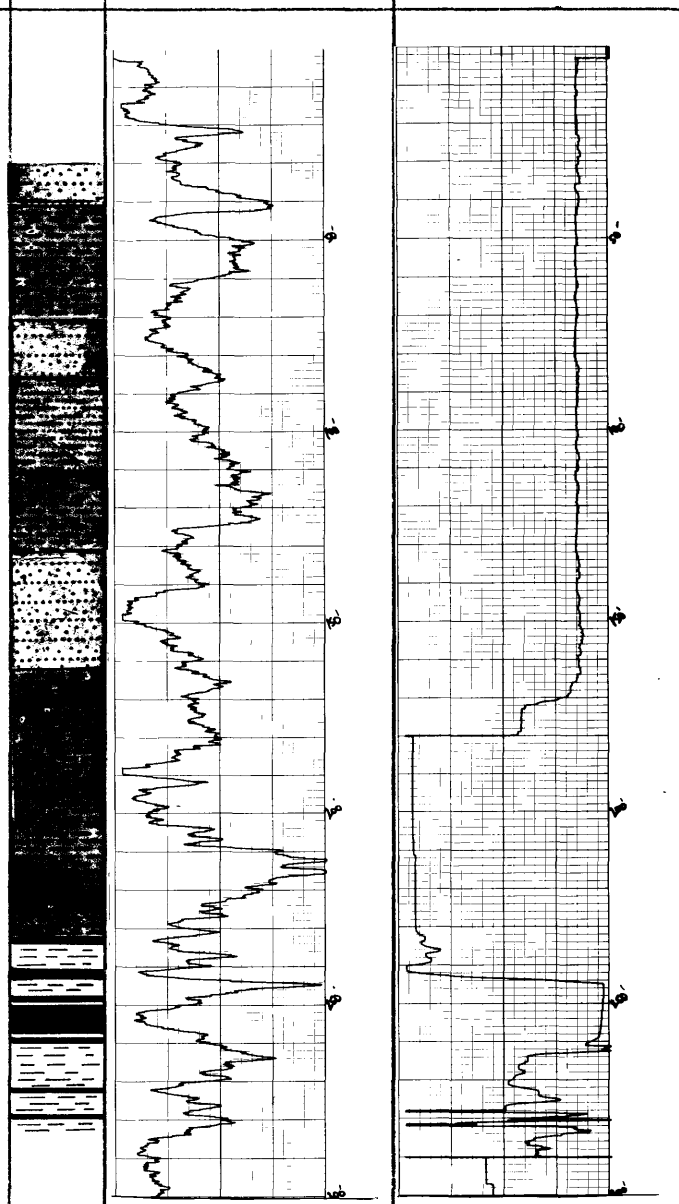
LOCATION: T. 23 N., R. 81 W., SEC. 11; 200 FNL; 50 FWL; DATE DRILLED 9/20/77

DRILLED DEPTH 450' LOGGED DEPTH 440' DRILLING MEDIUM water=mud FLUID LEVEL 250'

HOLE SIZE 5-1/8"

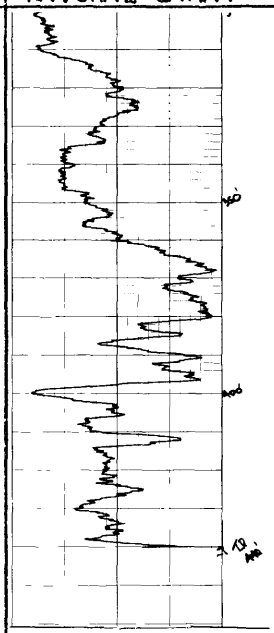
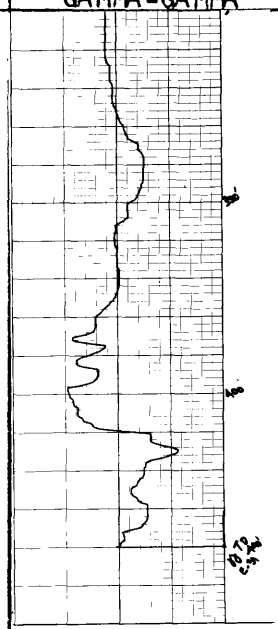
REMARKS:

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 9.0 LOG SPEED 17 fpm	GAMMA-GAMMA T.C. 4 sec SCALE 10/500 CPS SUPP. 3.0/4.0 SENS. 6.0/5.0 LOG SPEED 17 fpm		
0	0					
	10					
50						
	20					
100	30					
	40					
150						
	50					
200	60					
	70					
250						
	80					
300	90					



U.S. GEOLOGICAL SURVEY

HOLE No. E-31 continued

DEPTH Ft	DEPTH M	LITH LOG	GEOPHYSICAL LOGS: NATURAL GAMMA	GAMMA-GAMMA		
	100					
350	110					
	120					
400	130					
450	140					
	150					
500	160					
550	170					
	180					
600	190					
650	200					
	210					
700	220					

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. E-31-F STATE Wyoming COUNTY Carbon DATE LOGGED 9/28/77 ELEV. 7110 ft.

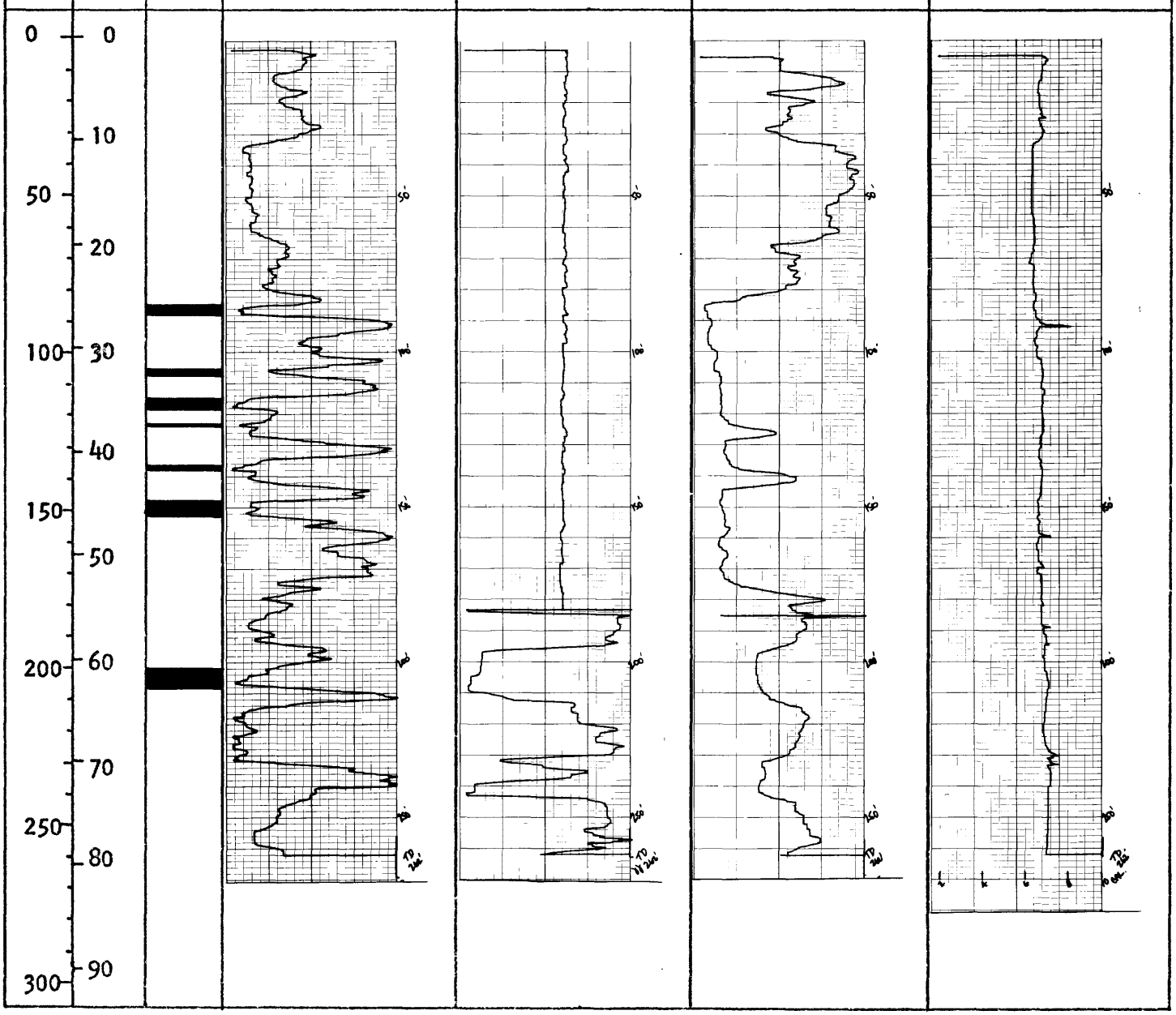
LOCATION: T. 23 N., R. 81 W., SEC. 10 ; 300 FSL; 200FWL; DATE DRILLED unknown

DRILLED DEPTH ? LOGGED DEPTH 262′ DRILLING MEDIUM unknown FLUID LEVEL 184′

HOLE SIZE Unknown

REMARKS: Found open hole.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/500 CPS SUPP. 3.0/5.0 SENS. 9.0/8.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 7.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 17 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. H-2 STATE Wyoming COUNTY Carbon DATE LOGGED 11/2/77 ELEV. 6880 ft.

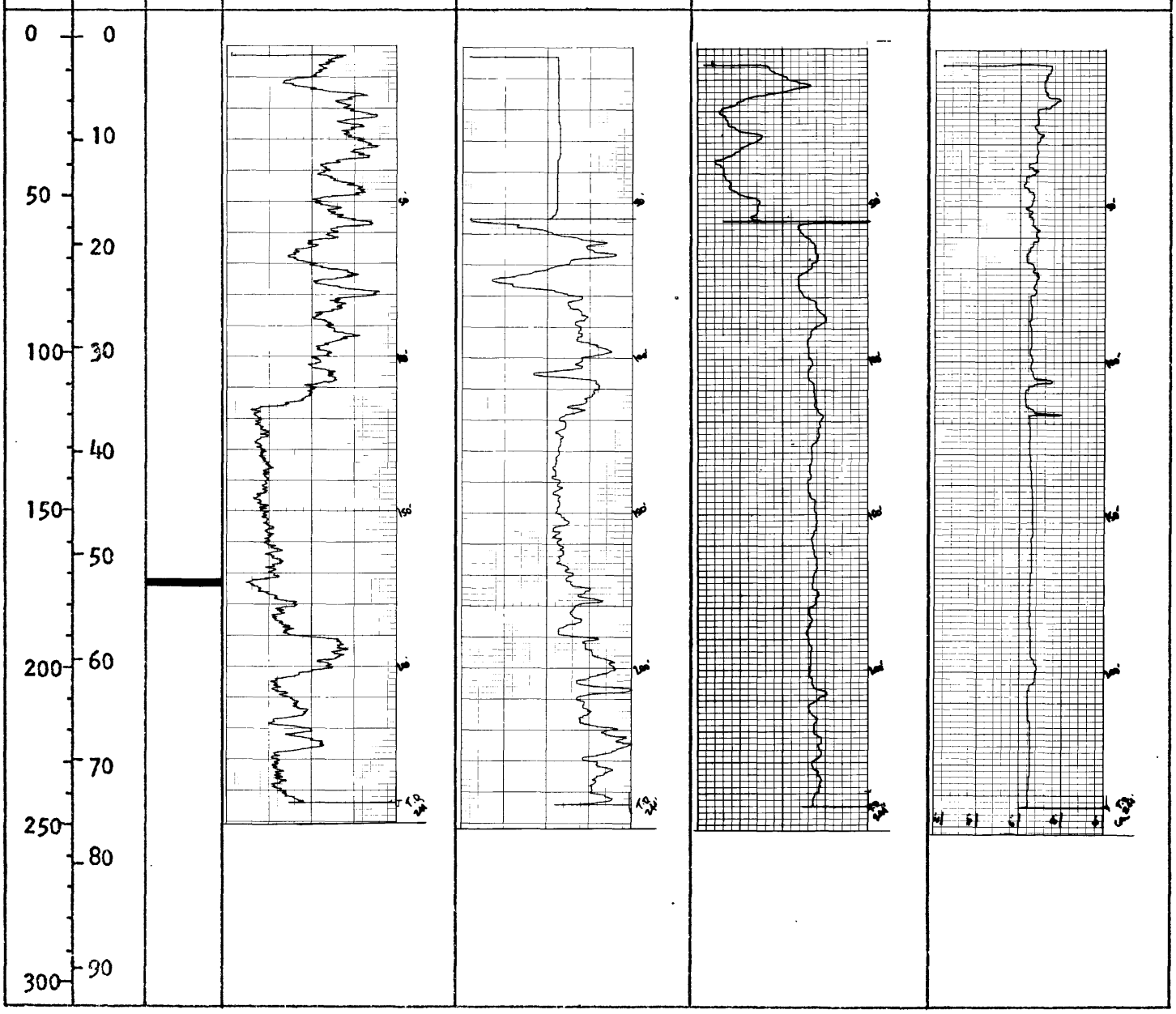
LOCATION: T. 22 N., R. 81 W., SEC. 22 ; 2600 FSL; 400 FEL; DATE DRILLED 11/2/77

DRILLED DEPTH 250′ LOGGED DEPTH 244′ DRILLING MEDIUM water FLUID LEVEL 55′

HOLE SIZE 5-1/8"

REMARKS:

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/100 CPS SUPP. 3.0/3.3 SENS. 9.0/6.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/500 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. H-3 STATE Wyoming COUNTY Carbon DATE LOGGED 10/28/77 ELEV. 6940 ft.

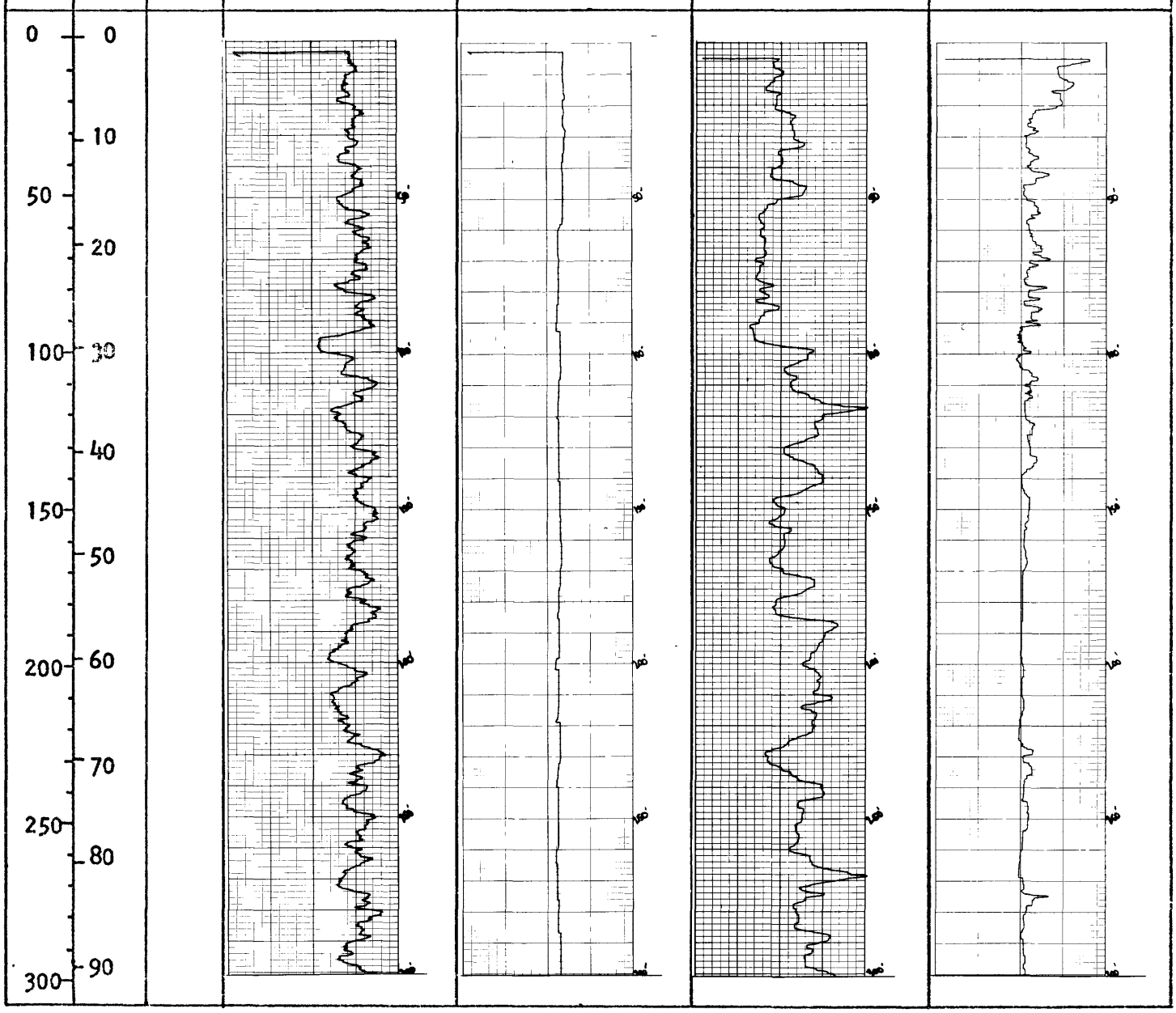
LOCATION: T. 22 N., R. 81 W., SEC. 28 ; 1700 FNL; 700 FEL; DATE DRILLED 10/28/77

DRILLED DEPTH 410' LOGGED DEPTH 404' DRILLING MEDIUM water FLUID LEVEL 342'

HOLE SIZE 5-1/8"

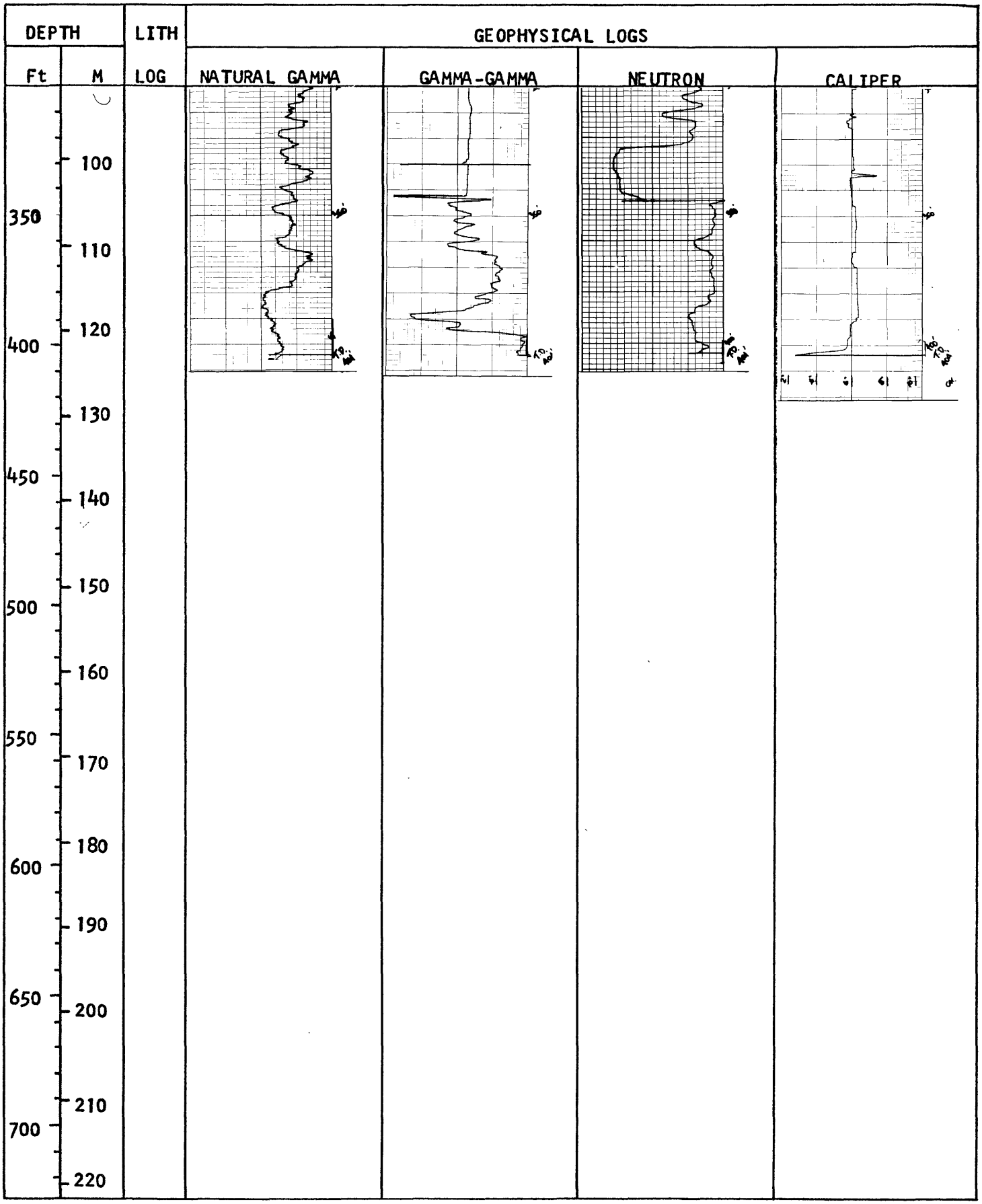
REMARKS: Logged through steel. Caliper run after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 7.0 SENS. 8.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 10/100 CPS SUPP. 3.0/3.3 SENS. 9.0/6.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY

HOLE No. H-3 continued



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. H-4 STATE Wyoming COUNTY Carbon DATE LOGGED 11/2/77 ELEV. 6860 ft.

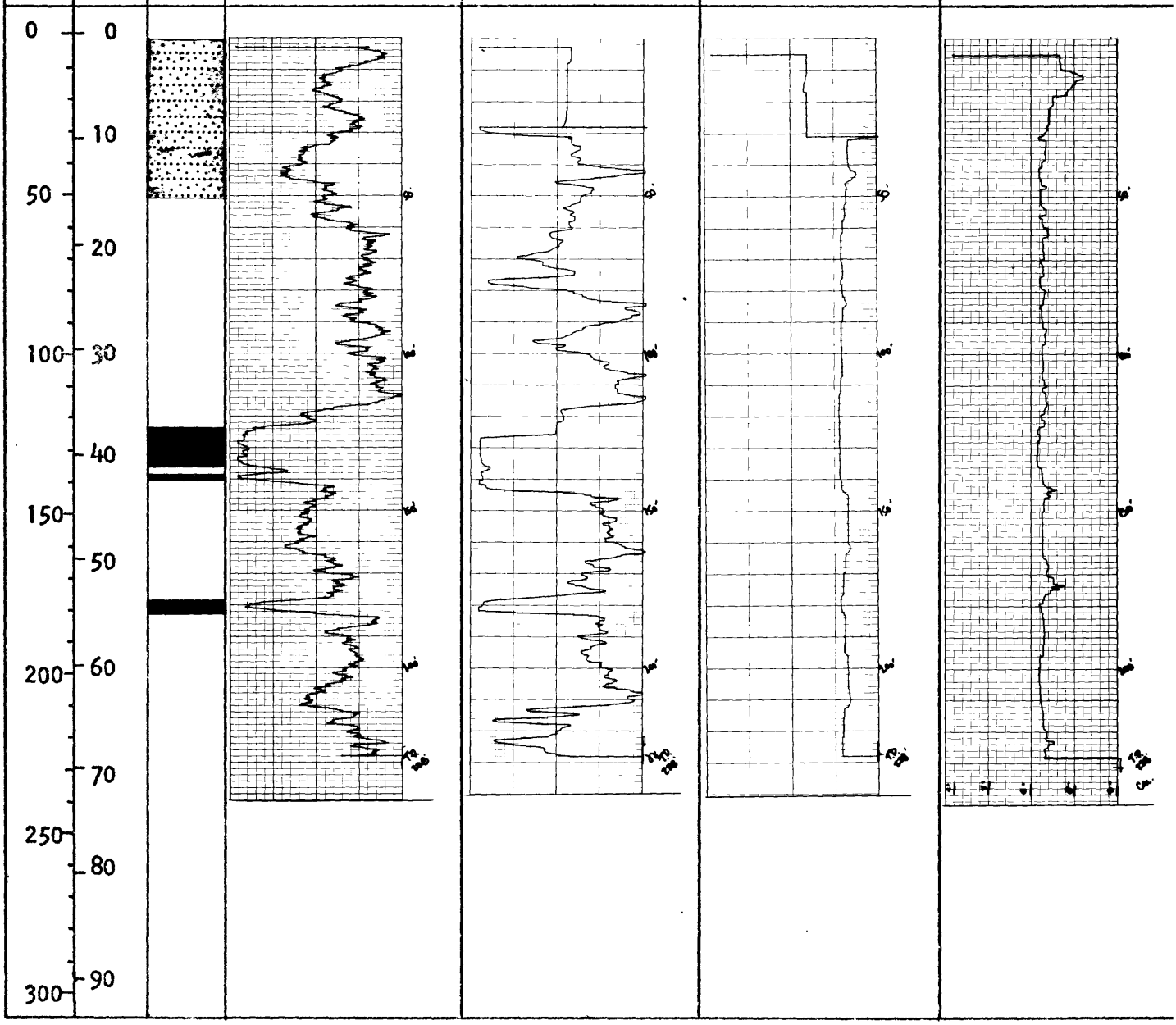
LOCATION: T. 22 N., R. 81 W., SEC. 28 ; 2625 FNL; 1400 FWL; DATE DRILLED 11/1/77

DRILLED DEPTH 240′ LOGGED DEPTH 228′ DRILLING MEDIUM water FLUID LEVEL 27′

HOLE SIZE 5-1/8"

REMARKS:

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 100 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 500/100 CPS SUPP. 3.0/3.3 SENS. 9.0/6.9 LOG SPEED 17 fpm	T.C. 4 sec SCALE 500/100 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 20 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. TER-5 STATE Wyoming COUNTY Carbon DATE LOGGED 10/5/77 ELEV. 6540 ft.

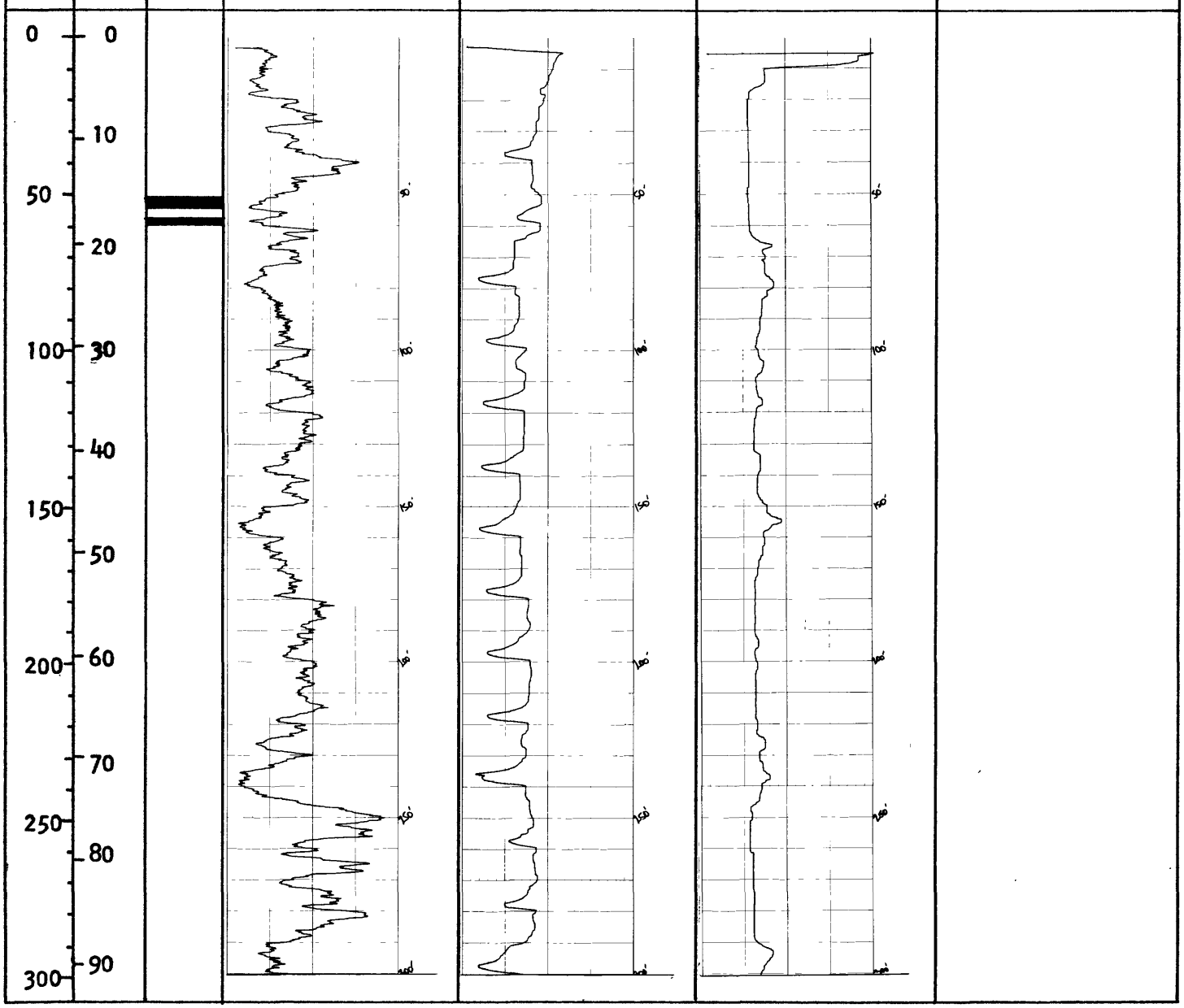
LOCATION: T. 24 N., R. 81 W., SEC. 34 ; 2500 FNL; 2350 FEL; DATE DRILLED 10/5/77

DRILLED DEPTH 370 LOGGED DEPTH 338 DRILLING MEDIUM _____ FLUID LEVEL _____

HOLE SIZE 5-1/8"

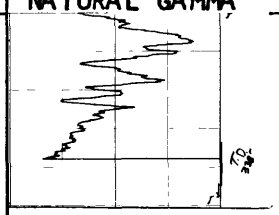
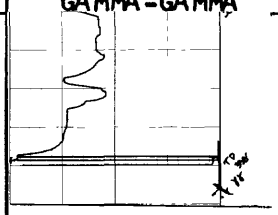
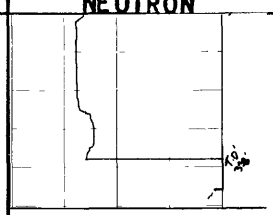
REMARKS: Logged through Steel.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 500 CPS SUPP. 4.0 SENS. 8.0 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100 CPS SUPP. 3.5 SENS. 8.0 LOG SPEED 17 fpm	



U.S. GEOLOGICAL SURVEY

HOLE No. TER-5 continued

DEPTH		LITH	GEOPHYSICAL LOGS			
Ft	M	LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	
						

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG

HOLE No. TER-9 STATE Wyoming COUNTY Carbon DATE LOGGED 9/27/77 ELEV. 6680 ft.

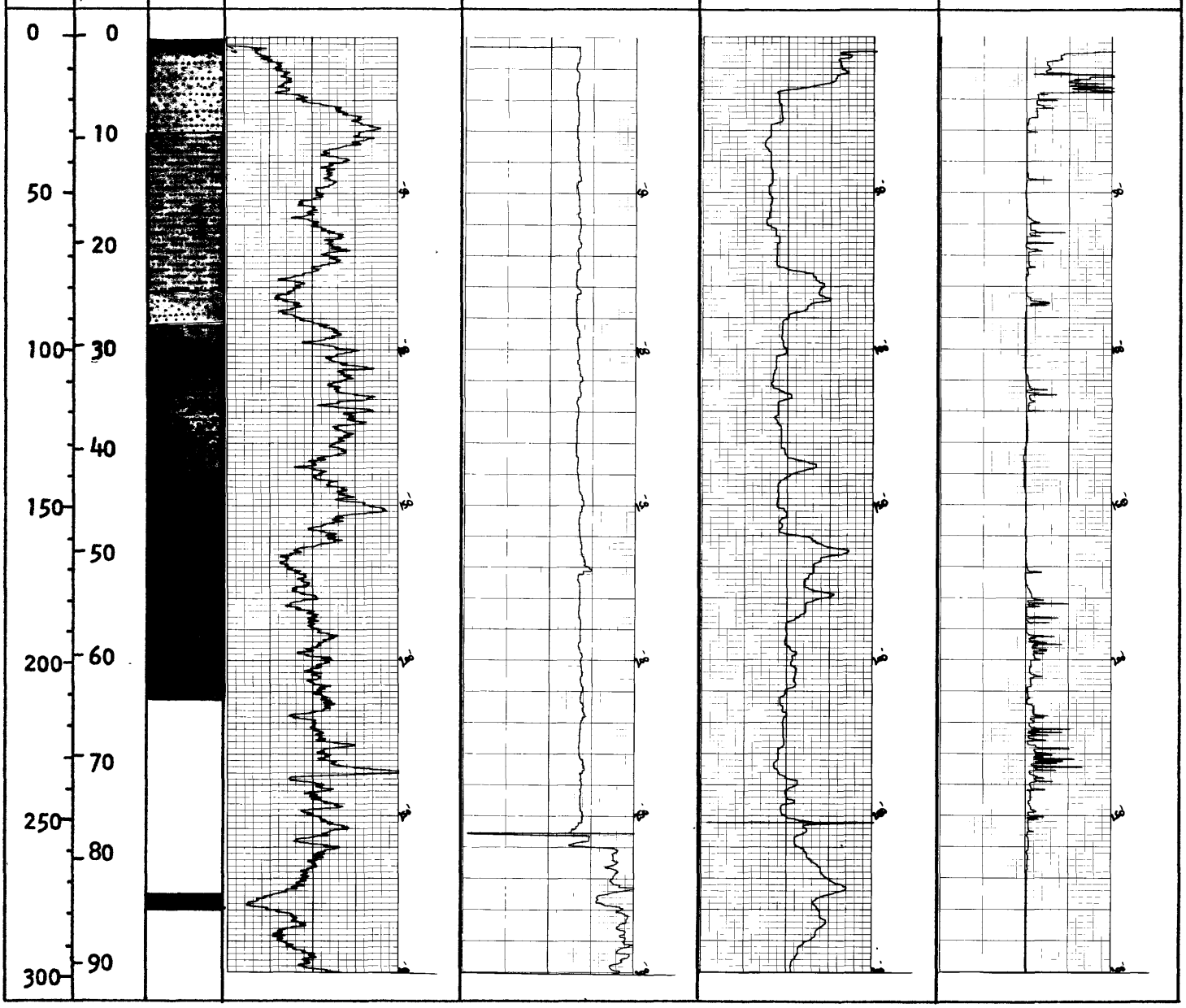
LOCATION: T. 24 N., R. 81 W., SEC. 35 ; 1480 FSL; 150 FWL; DATE DRILLED 9/27/77

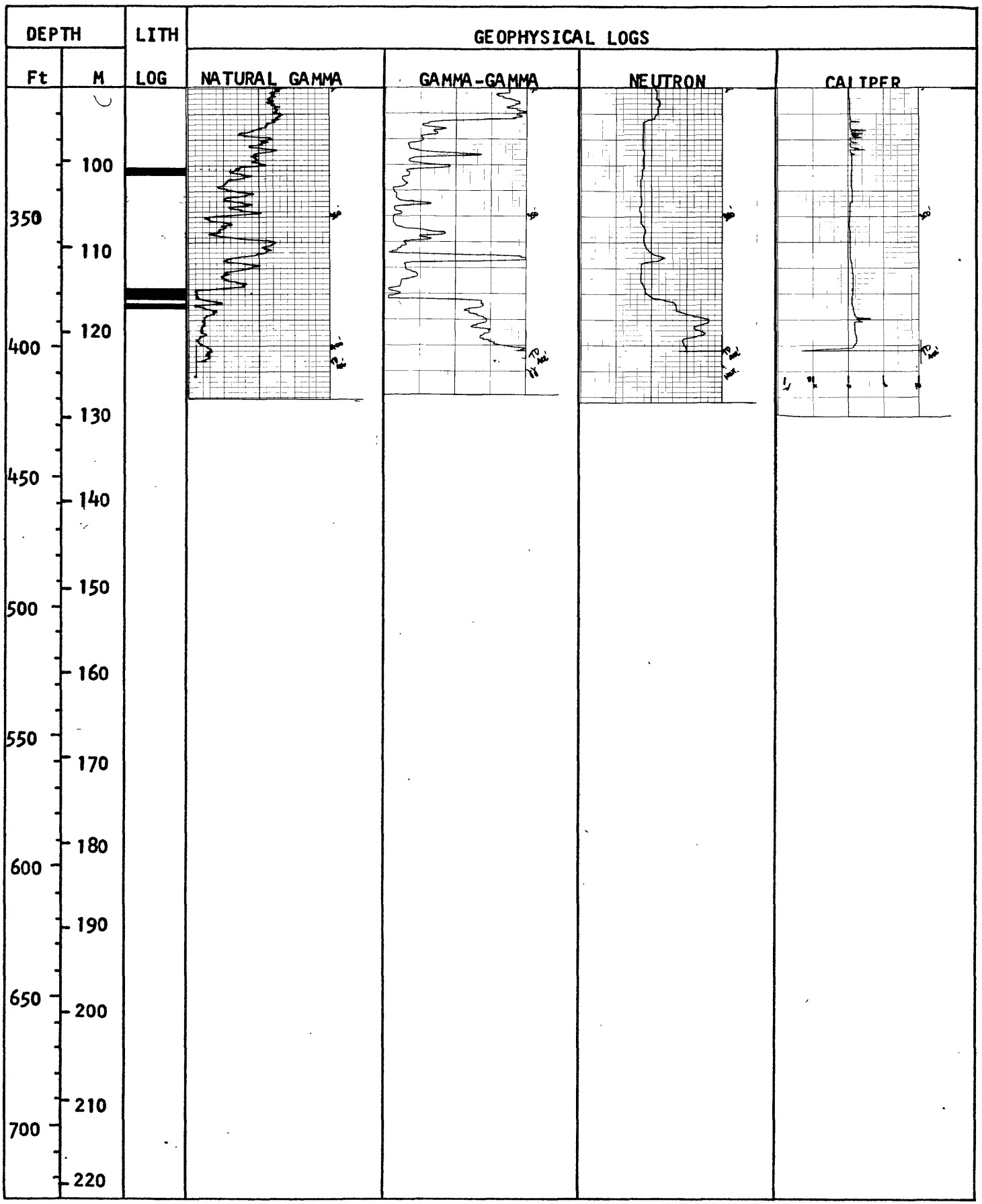
DRILLED DEPTH 410′ LOGGED DEPTH 406′ DRILLING MEDIUM water FLUID LEVEL 255′

HOLE SIZE 5-1/8"

REMARKS: Logged through steel. Caliper run after steel pulled.

DEPTH Ft	DEPTH M	LITH LOG	NATURAL GAMMA	GAMMA-GAMMA	NEUTRON	CALIPER
			T.C. 4 sec SCALE 50 CPS SUPP. 10 SENS. 10 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/500 CPS SUPP. 3.0/3.66 SENS. 9.0/3.8 LOG SPEED 17 fpm	T.C. 4 sec SCALE 100/50 CPS SUPP. 3.0/4.5 SENS. 9.0/7.8 LOG SPEED 17 fpm	SCALE 1/1 LOG SPEED 17 fpm SUPP. 1.18



U.S. GEOLOGICAL SURVEY

HOLE No. TER-9 continued