UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOPHYSICAL LOGS OF 14 TEST HOLES DRILLED DURING 1977 IN THE KOLOB COAL FIELD, KANE COUNTY, SOUTH-CENTRAL UTAH

By W. E. Bowers

and

P. M. Strickland

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INTRODUCTION

Under Contract No. 14-08-0001-15793, awarded by the U.S. Geological Survey, Geck, Inc., of Rock Springs, Wyoming, drilled and geophysically logged 14 drill holes in the eastern Kolob area of Kane County, Utah. The purpose of the drilling was to obtain information on the depth, thickness, and quality of coal beds in parts of the Kolob coal field where no information was avilable.

Natural-gamma, density, spontaneous-potential, and single-point resistance logs were run in completed holes. A complete set of logs was not run for some of the first six holes because of technical problems with the logging equipment. Four holes were cored at selected intervals and samples have been submitted for analyses. (A fifteenth hole, test-hole KB-2-CB, was not completed to the depth of the major coal zone, because of drilling problems, and is not included in this report.)

Seven holes were drilled on lands administered by the Bureau of Land Management (BLM). One hole was drilled on State land and six holes were drilled on private surface rights where coal is reserved to the United States. Drilling sites were selected in cooperation with the Bureau of Land Management and reclaimed according to standards set by BLM.

Drill-hole locations are shown on the index map (fig. 1). Table 1 lists drill-hole locations, surface ownership rights, surface elevations, depths drilled and logged, cored intervals, coal intervals, and thicknesses of coal beds.

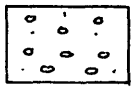
STRATIGRAPHIC UNITS

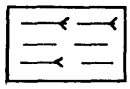
STRAIGHT CLIFFS FORMATION (UPPER CRETACEOUS)--Light-brown, tan, and gray, fine- to coarse-grained fluvial sandstone and gray to tan mudstone; light-gray, fine- to medium-grained marine sandstone and shale in lower part

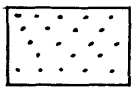
TROPIC FORMATION (UPPER CRETACEOUS)--Gray marine shale and mudstone with some fluvial tan to gray mudstone and sandy mudstone; contains tongues or lenses of littoral sandstone, including the Sugarledge sandstone west of Meadow Creek. Sugarledge sandstone is light-gray to white, porous, fine- to coarse-grained littoral sandstone

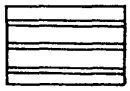
DAKOTA FORMATION (LOWER(?) CRETACEOUS)--Light-brown, tan, or gray fluvial sandstone and mudstone with some lagoonal-paludal sandstone, mudstone, carbonaceous mudstone, and coal. The two major coal zones in the region, the upper and lower coal zones, occur at the top and near the base of the formation

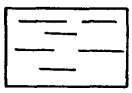
LITHOLOGIC SYMBOLS

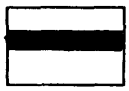

Gravel or conglomerate


Bentonitic mudstone or bentonite

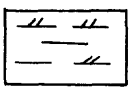

Sandstone


Carbonaceous mudstone or shale


Mudstone or shale



Coal bed, showing thickness in feet


Gypsiferous mudstone

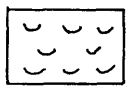

Mollusk shells or shell fragments

Figure 1.--Drill-hole locations in the Kolob coal field, Kane County, Utah. (Base from Cedar City 2° sheet)

Table 1.--Summary of drill-hole information, Kolob coal field, Utah

[Measurements are in feet; to convert to meters, multiply by 0.3048]

Drill-hole No.	Location (Salt Lake Meridian) Sec.	T. S.	R. W.	Surface rights	Surface elevation	Total depth drilled	Total depth logged	Cored interval (driller)	Coal interval* (logged)		Estimated coal bed thickness (descending order)
KB-1-OR	33	40	8	Federal	6,520	665	575		U	377- 384	7.0
KB-2-OR	26	40	8	Federal	6,160	720	720		U	400- 407	7.0
KB-3-OR	16	40	8	Federal	6,870	1,280	1,283		U	880- 891	11.0
									L	1,200-1,221	2.0, 3.5, 2.0, 1.5
KB-4-OR	24	40	8	Private	5,900	720	720	360-390	U	377- 383.8	6.6
								680-720	L	702- 712	2.0, 2.1, 1.5, 2.8, 2+
KB-5-OR	13	40	8	Federal	6,080	980	980		U	632- 643	11.0
									L	950- 962	6.0, 3.0, 2.0, 2.0
KB-6-OR	31	40	7	State	5,800	480	460		U	85- 95	2.0, 6.0
									L	384- 398	8.0, 2.0
KB-7-OR	25	40	8	Private	5,850	580	579		U	230- 237	7.0
									L	532- 553	2.0, 3.0, 2.5, 1.5
KB-1-OC	28	40	8	Private	6,520	650	652	275-295	U	281- 289	8.0
								300-310			
								580-650	L	628- 646	1.9, 1.7, 1.7, 1.0, 0.9
KB-2-OC	23	40	9	Private	7,500	800	800		U	795- 801	6.0
KB-3-OC	1	40	9	Federal	6,850	550	548		U	476- 484	8.0
KB-4-OC	6	40	8	Federal	6,820	1,120	1,111	680-700	U	670- 679	9.0
									L	1,042-1,058	4.0, 1.5, 3.5
KB-5-OC	24	39	9	Federal	6,290	560	495	160-190	U	169- 176	7.0
								500-560			
KB-6-OC	21	40	8	Private	6,730	1,060	1,064		U	653- 665	7.0, 1.5
									L	1,000-1,020	3.0, 1.5, 1.5, 2.0, 1.5
KB-7-OC	6	39	8	Private	6,900	1,160	1,160		U	1,130-1,138	8.0

*U, Upper coal zone; L, Lower coal zone

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-1-OR Date logged 8/10/77 Surface elevation (ft) 6,520'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 8 W, Sec. 33, SESENE

Drilled depth (ft) 665' Logged depth (ft) 575' Water level (ft) 293'

Drilling fluid: X Air X Water __ Foam X Mud X Fiber

Geophysical Logs:

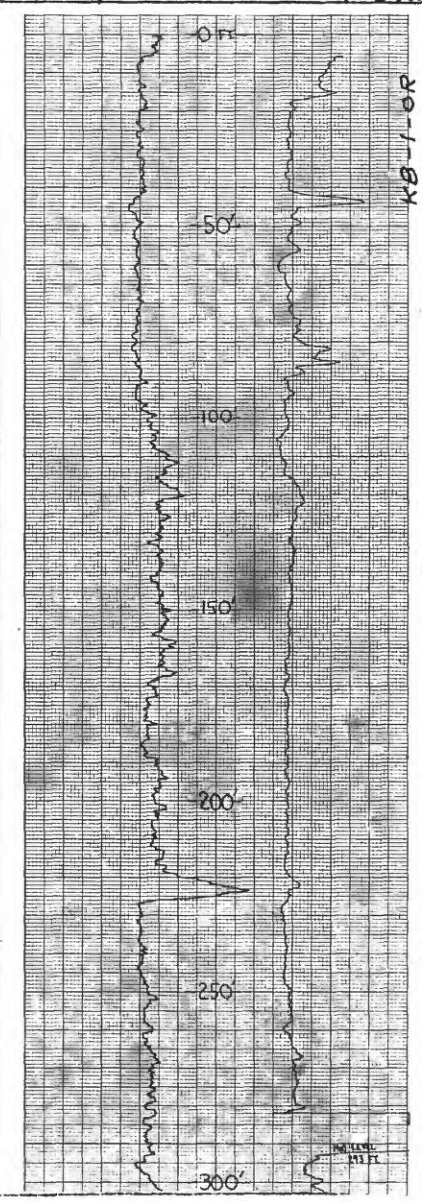
Spontaneous potential: Scale _____ Logging speed _____ fpm

Resistance: Scale _____ Logging speed _____ fpm

Gamma: T.C. 1 Sec. Scale 25 CPS/inch Logging speed 25 fpm

Gamma dens: T.C. 1 Sec. Scale 5000 CPS/inch Logging speed 25 fpm

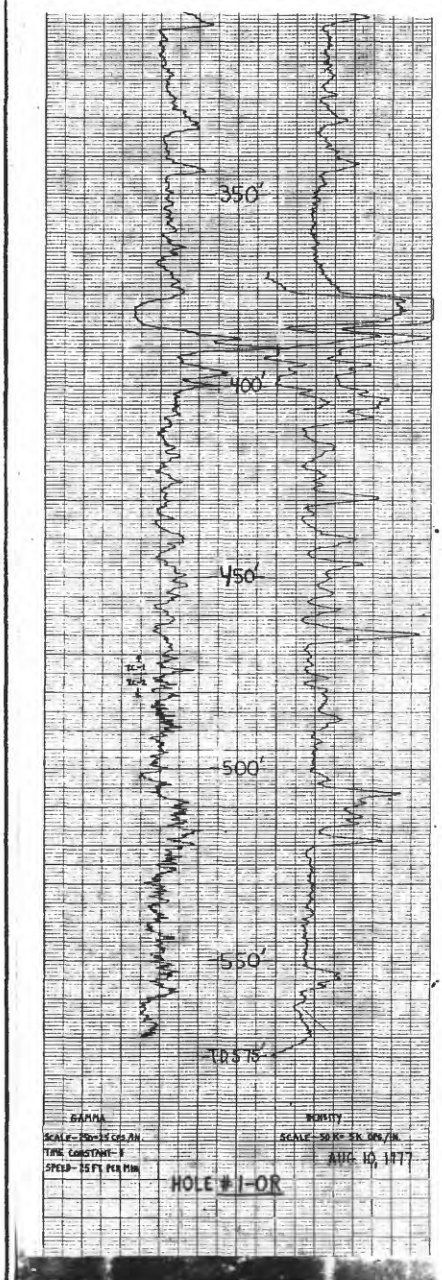
LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma	Den
ALLUVIUM		0	0		
		50	10		
			20		
TROPIC FM		100	30		
			40		
		150			
			50		
		200	60		
			70		
		250			
			80		
		300	90		



Drill-hole no. KB-1-OR (continued)

Cored interval

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma	Geophysical logs Den
		310	100		
		350	110		
7.0					
DAKOTA FM		400	120		
			130		
		450	140		
			150		
		500	160		
		550	170		
Bottom of logged interval →			180		
		600			
No sample recovery			190		
Possible top, lower coal zone → (Driller's estimate)		650	200		
	TD 665'				



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-2-OR Date logged 8/21/77 Surface elevation (ft) 6,160'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 8 W, Sec. 26, NWNESW

Drilled depth (ft) 720' Logged depth (ft) 720' Water level (ft) 86'

Drilling fluid: __ Air X Water X Foam __ Mud __ Fiber

Geophysical Logs:

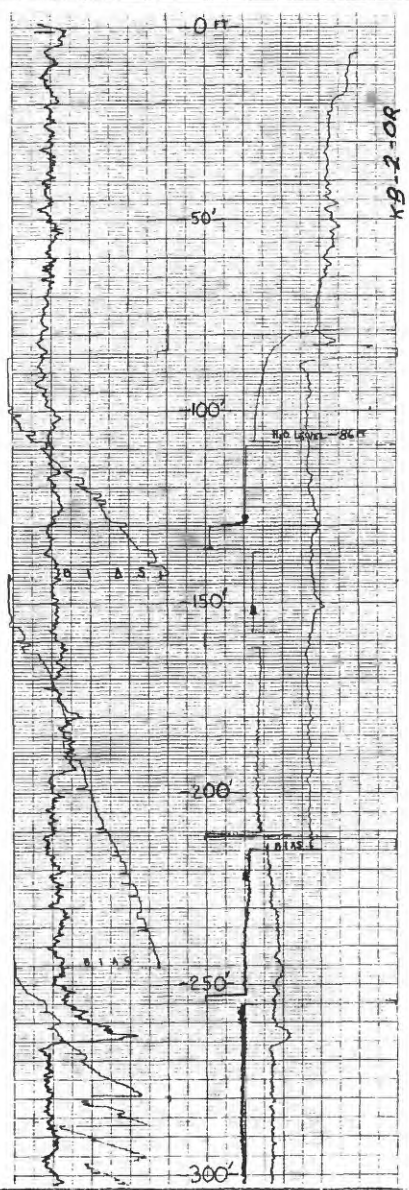
Spontaneous potential: Scale 100 MV/inch Logging speed 25 fpm

Resistance: Scale 100 Ohms/inch Logging speed 25 fpm

Gamma: T.C. 1 Sec. Scale 25 CPS/inch Logging speed 25 fpm

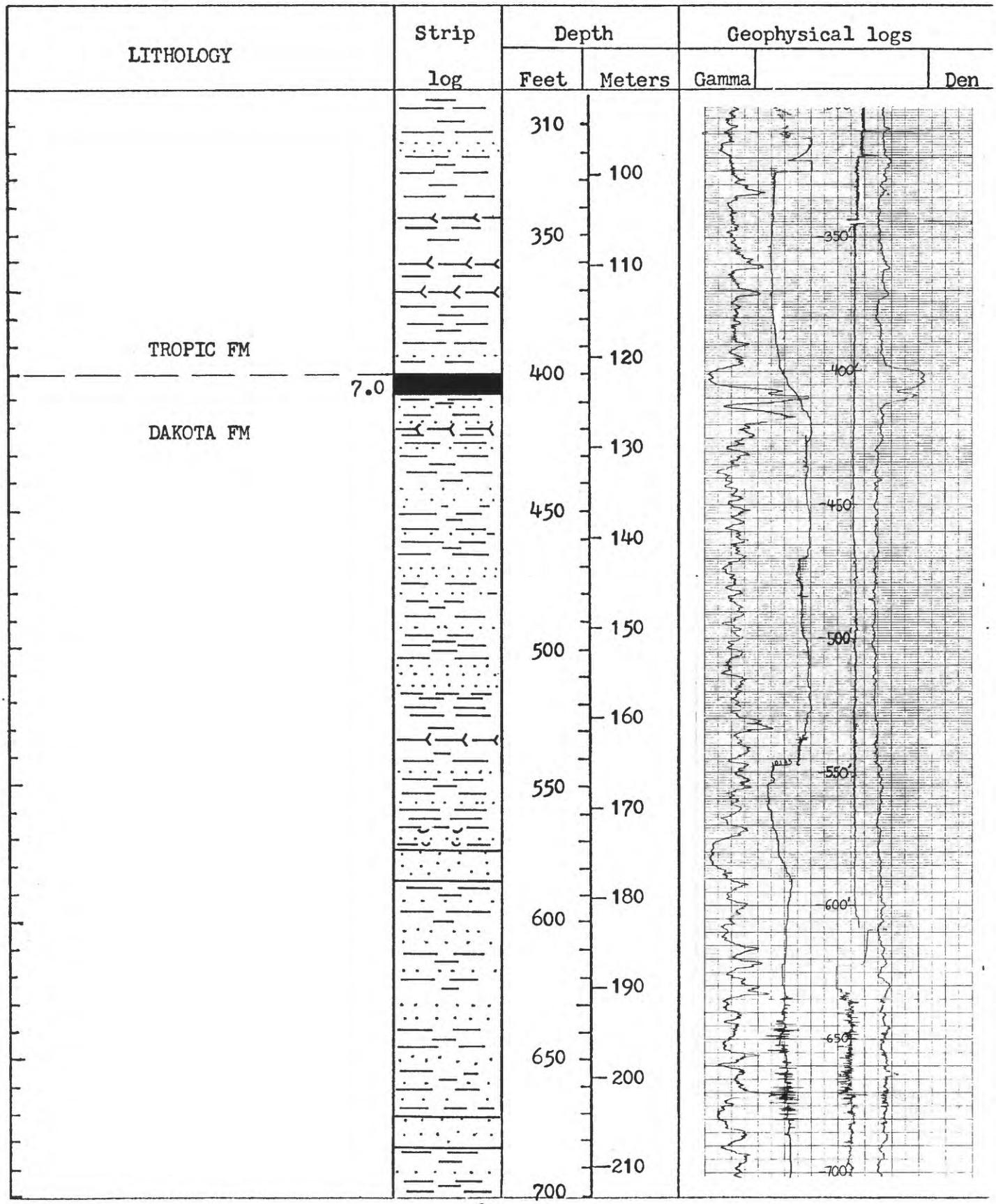
Gamma dens: T.C. 1 Sec. Scale 5000 CPS/inch Logging speed 25 fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma	Den
ALLUVIUM		0	0		
		50	10		
			20		
TROPIC FM		100	30		
			40		
		150	50		
			60		
		200	70		
		250	80		
		300	90		



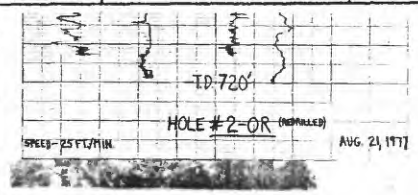
Drill-hole no. KB-2-OR (continued)

Cored interval



Drill-hole no. KB-2-OR (continued)

Cored interval

LITHOLOGY	Strip log	Depth		Geophysical logs		
		Feet	Meters	Gamma		Den
	TD 720'	710 720				

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-3-OR Date logged 8/26/77 Surface elevation (ft) 6,870'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 8 W, Sec. 16, NESWNE

Drilled depth (ft) 1,280' Logged depth (ft) 1,283' Water level (ft) 32'

Drilling fluid: __ Air X Water __ Foam X Mud __ Fiber

Geophysical Logs:

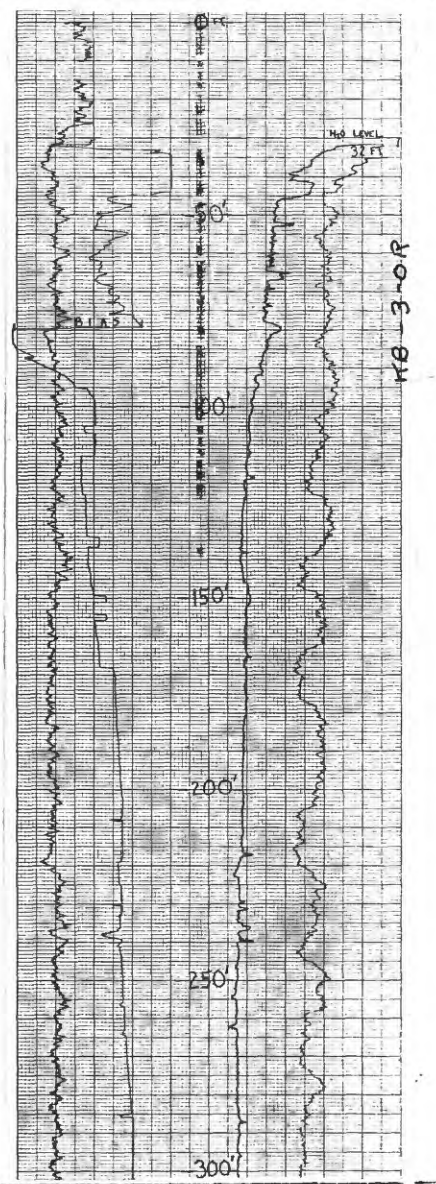
Spontaneous potential: Scale 50 MV/inch Logging speed 20 fpm

Resistance: Scale 100 Ohms/inch Logging speed 20 fpm

Gamma: T.C. 1 Sec. Scale 50 CPS/inch Logging speed 20 fpm

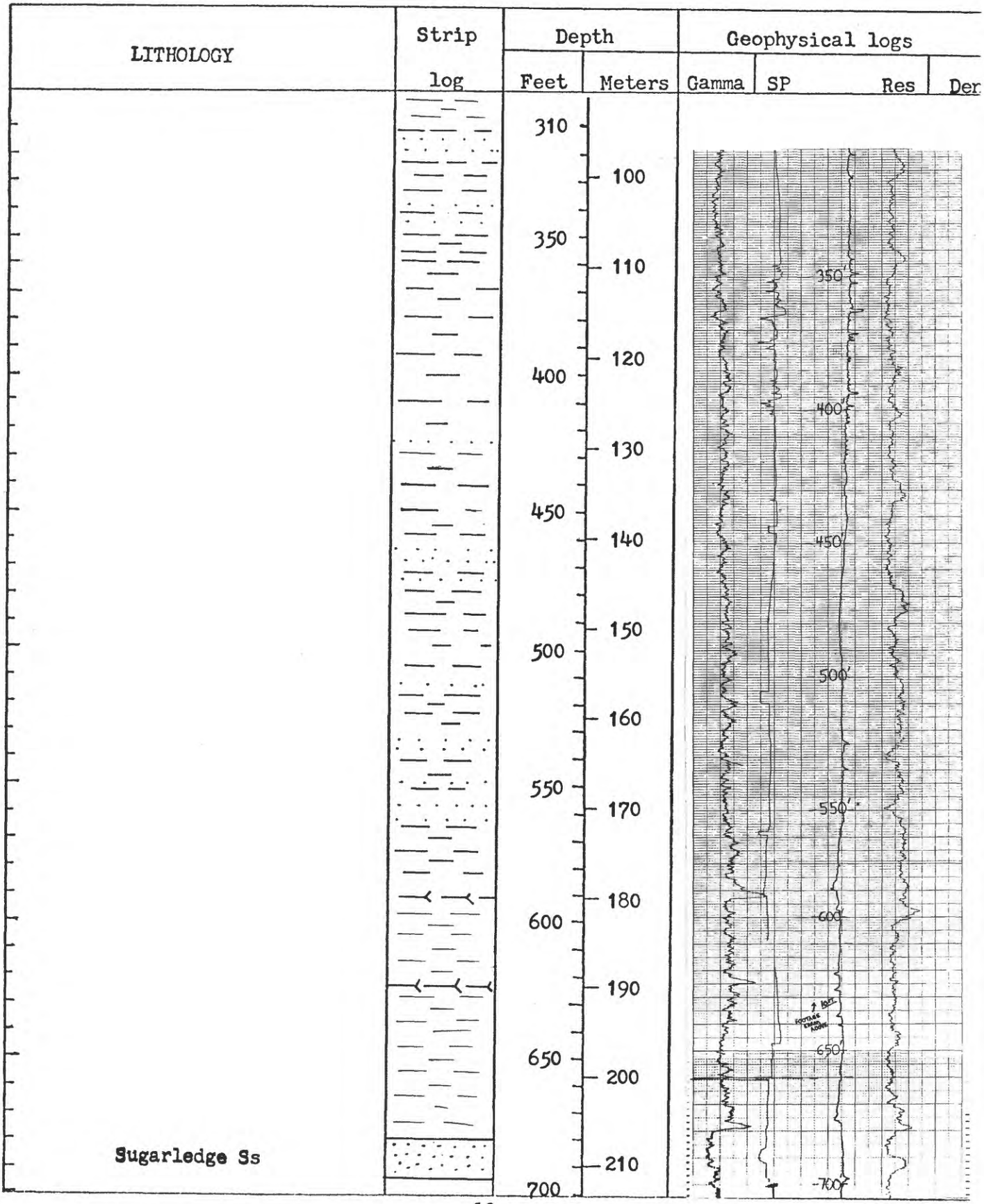
Gamma dens: T.C. 1 Sec. Scale 2,500 CPS/inch Logging speed 20 fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma SP Res Den
ALLUVIUM		0	0	
			10	
		50		
STRAIGHT CLIFFS FM			20	
		100	30	
			40	
		150		
			50	
		200	60	
TROPIC FM			70	
		250		
			80	
		300	90	



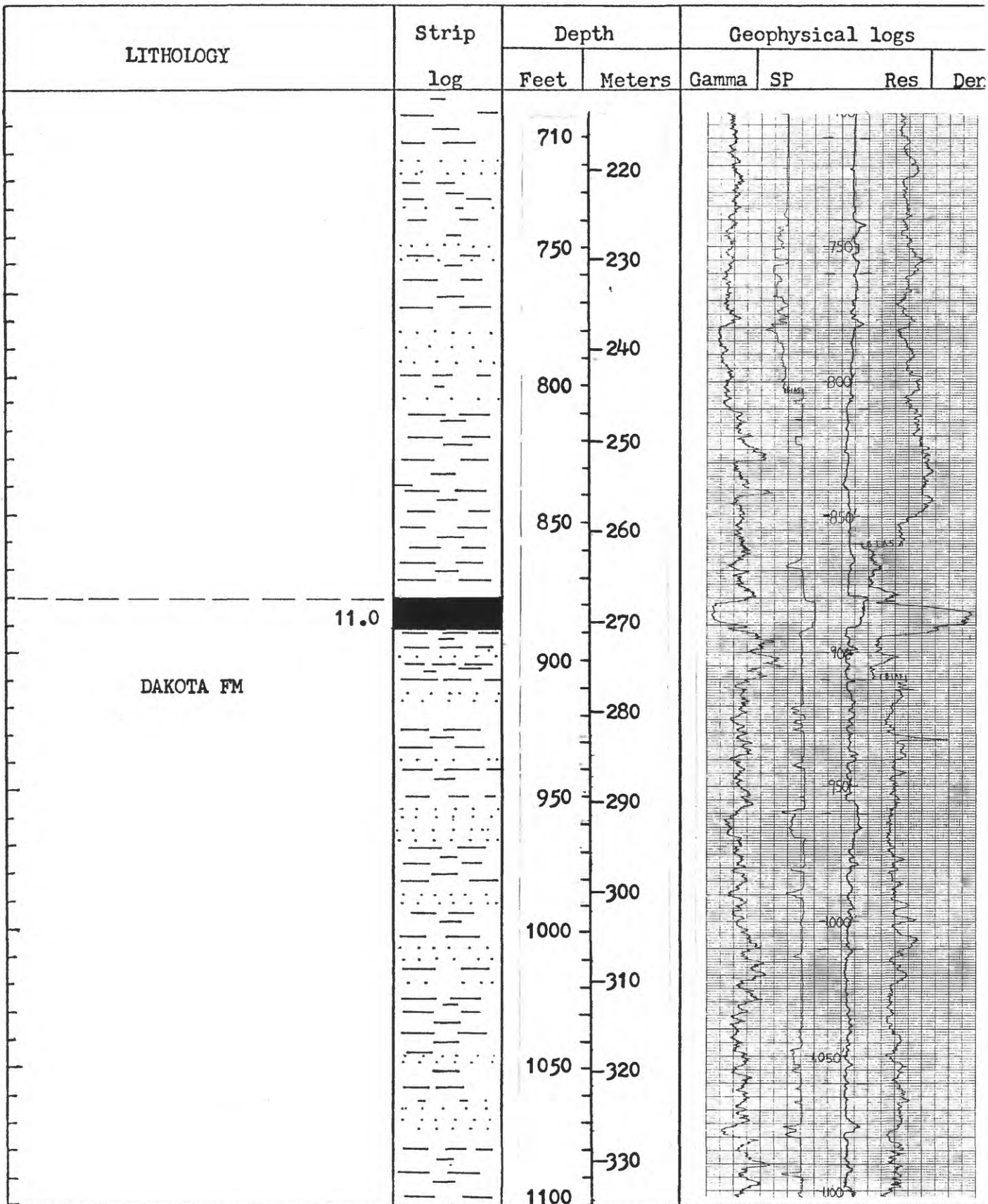
Drill-hole no. KB-3-OR (continued)

Cored interval



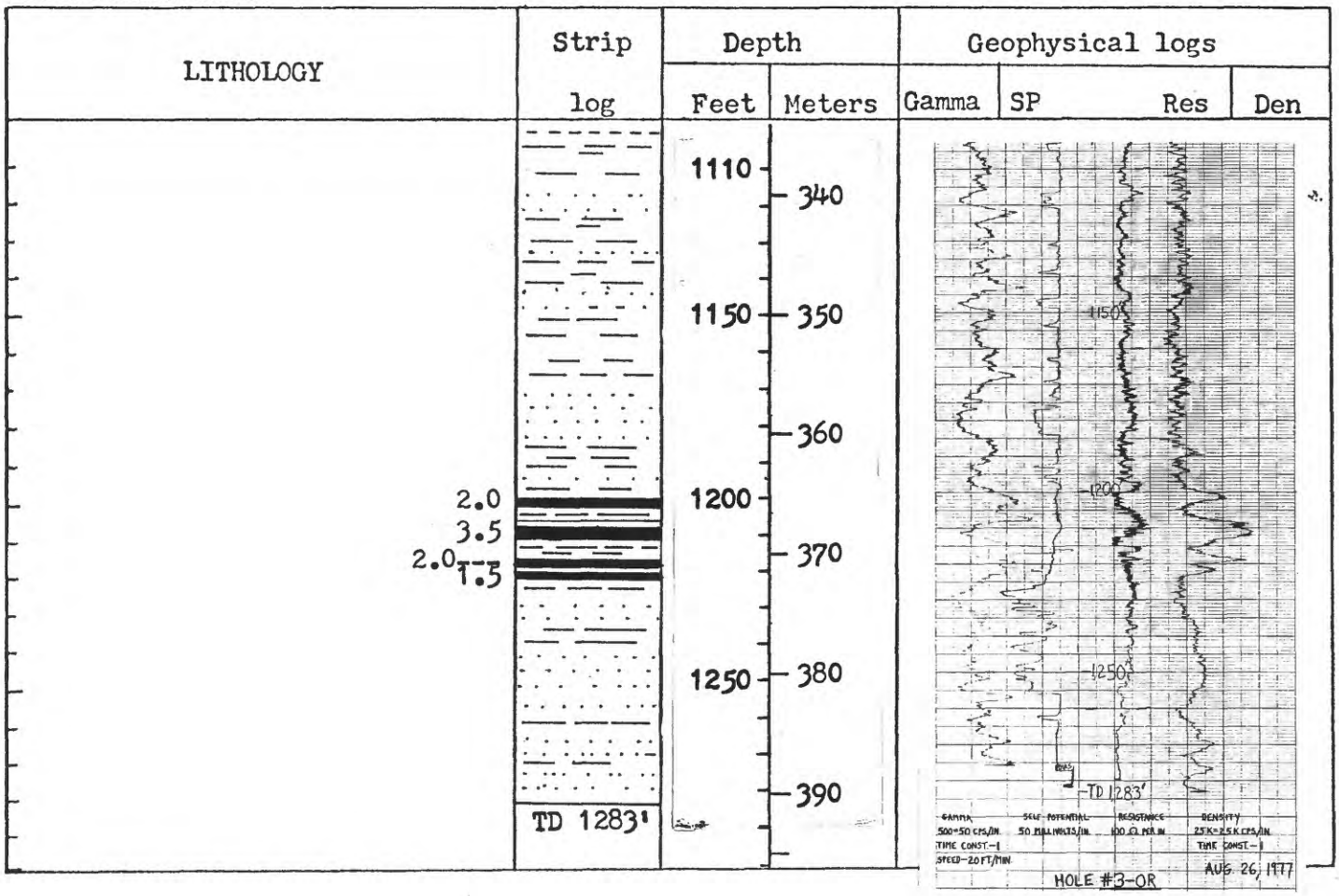
Drill-hole no. KB-3-OR (continued)

Cored interval



Drill-hole no. KB-3-OR (continued)

Cored interval



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-4-OR Date logged 9/16/77 Surface elevation (ft) 5,900'

Loc.: State UTAH Cnty. KANE T. 40 S , R. 8 W , Sec. 24 , SENE

Drilled depth (ft) 720' Logged depth (ft) 720' Water level (ft) 84.5'

Drilling fluid: __ Air X Water __ Foam X Mud X Fiber

Geophysical Logs:

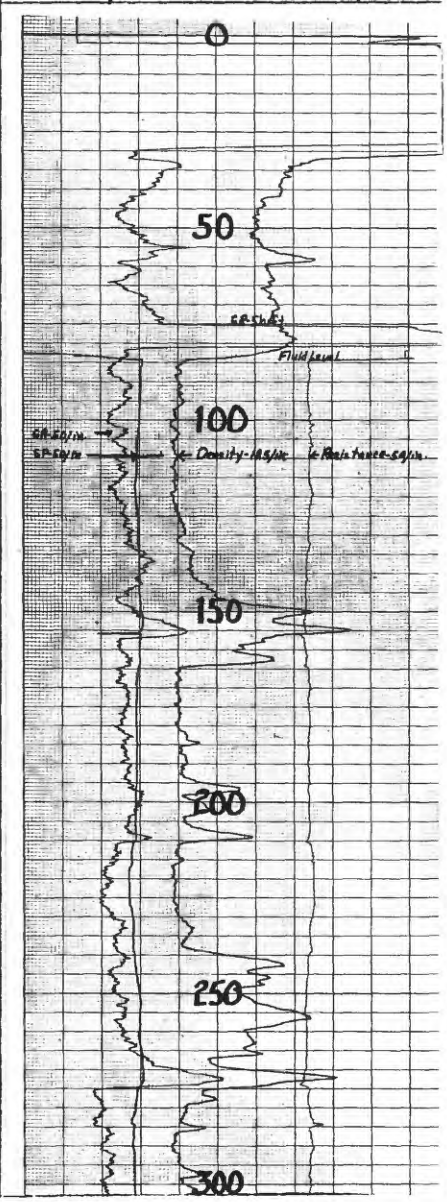
Spontaneous potential: Scale 50 MV/inch Logging speed 20 fpm

Resistance: Scale 50 Ohms/inch Logging speed 20 fpm

Gamma: T.C. 3 Sec. Scale 50 CPS/inch Logging speed 20 fpm

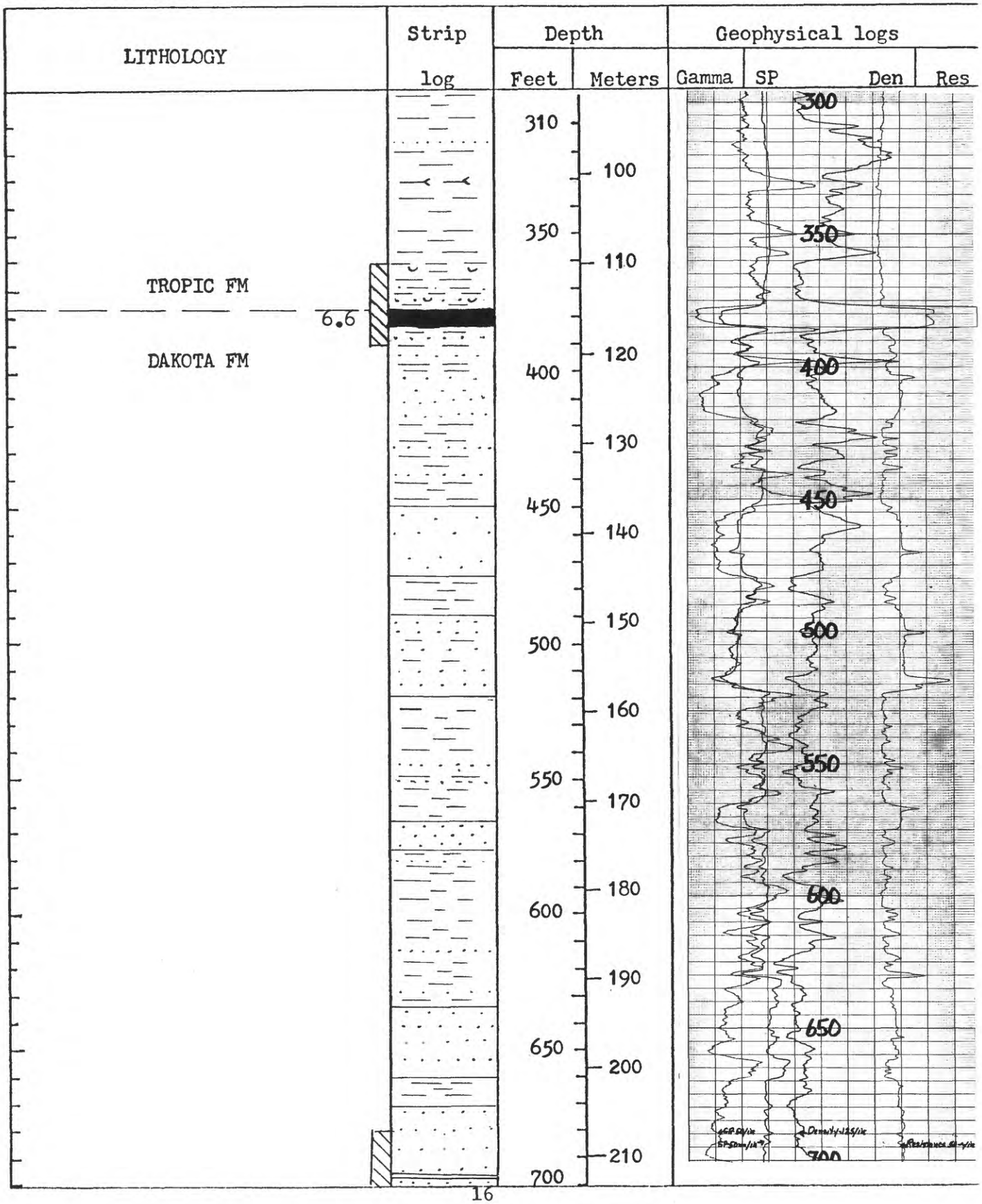
Gamma dens: T.C. 3 Sec. Scale 125 CPS/inch Logging speed 20 fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma SP Den Res
ALLUVIUM		0	0	
			10	
		50		
TROPIC FM			20	
		100	30	
			40	
		150		
			50	
		200	60	
			70	
		250		
			80	
		300	90	



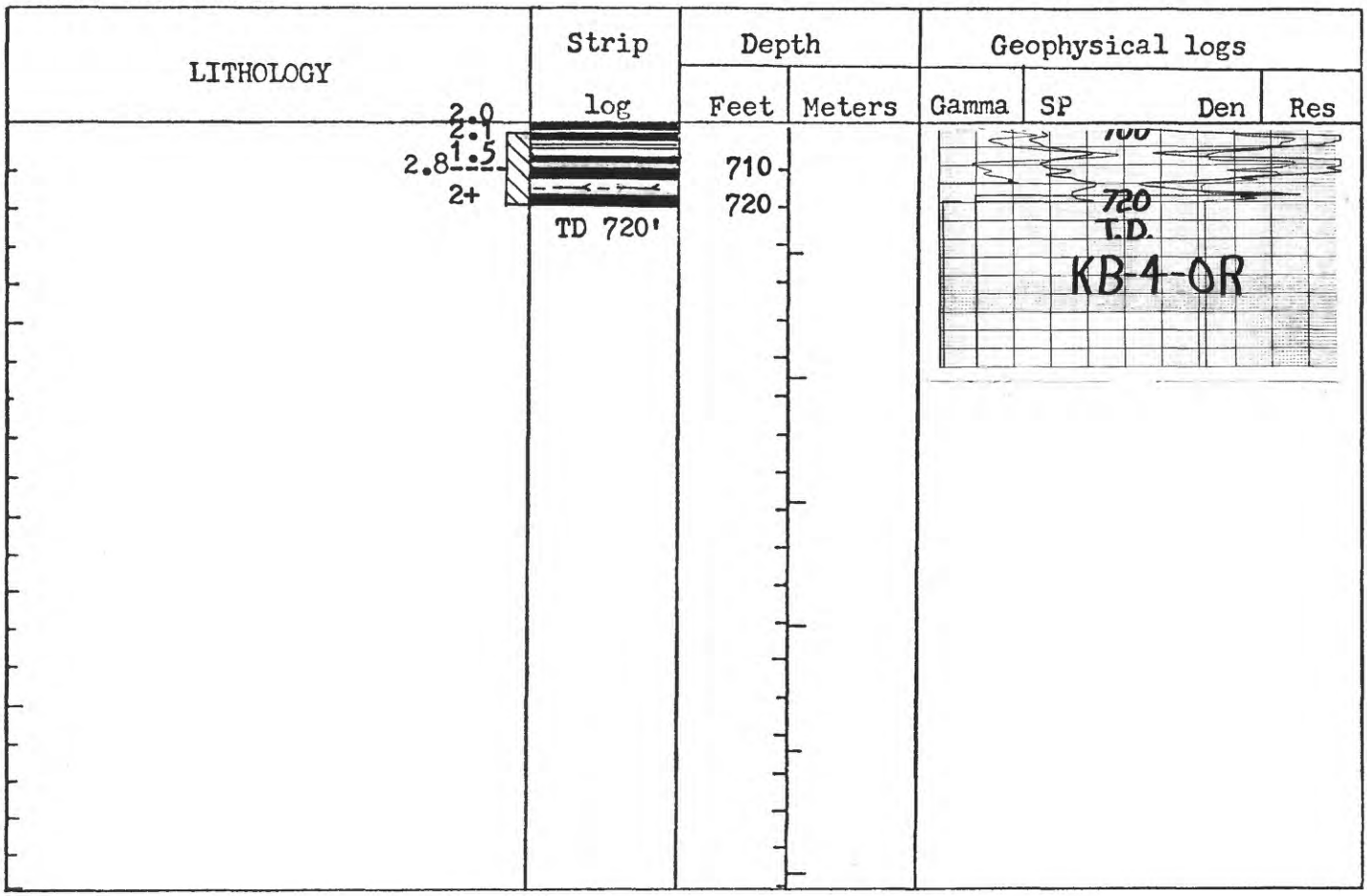
Drill-hole no. KB-4-OR (continued)

Cored interval



Drill-hole no. KB-4-OR (continued)

Cored interval



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-5-OR Date logged 9/16/77 Surface elevation (ft) 6,080'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 8 W, Sec. 13, SENENW

Drilled depth (ft) 980' Logged depth (ft) 980' Water level (ft) 49'

Drilling fluid: __ Air X Water __ Foam X Mud X Fiber

Geophysical Logs:

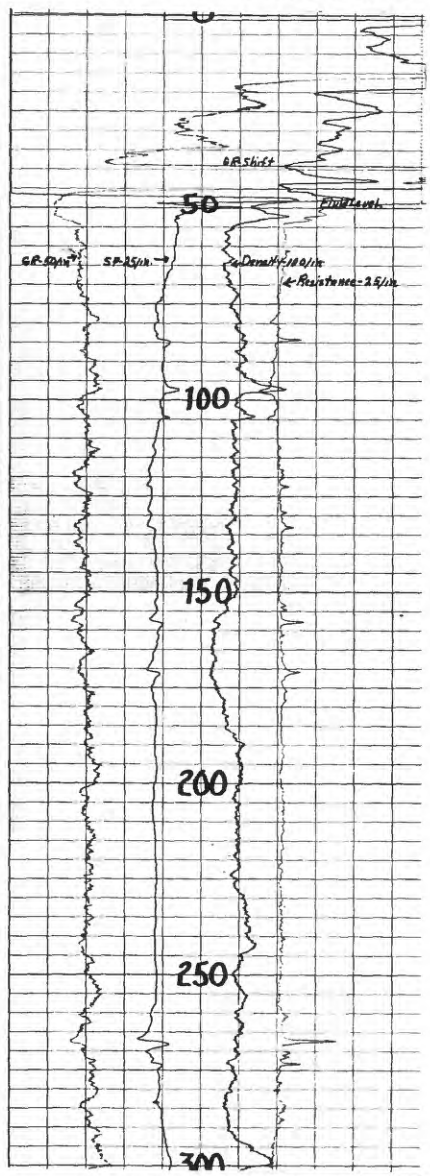
Spontaneous potential: Scale 25 MV/inch Logging speed 20 fpm

Resistance: Scale 25 Ohms/inch Logging speed 20 fpm

Gamma: T.C. 3 Sec. Scale 50 CPS/inch Logging speed 20 fpm

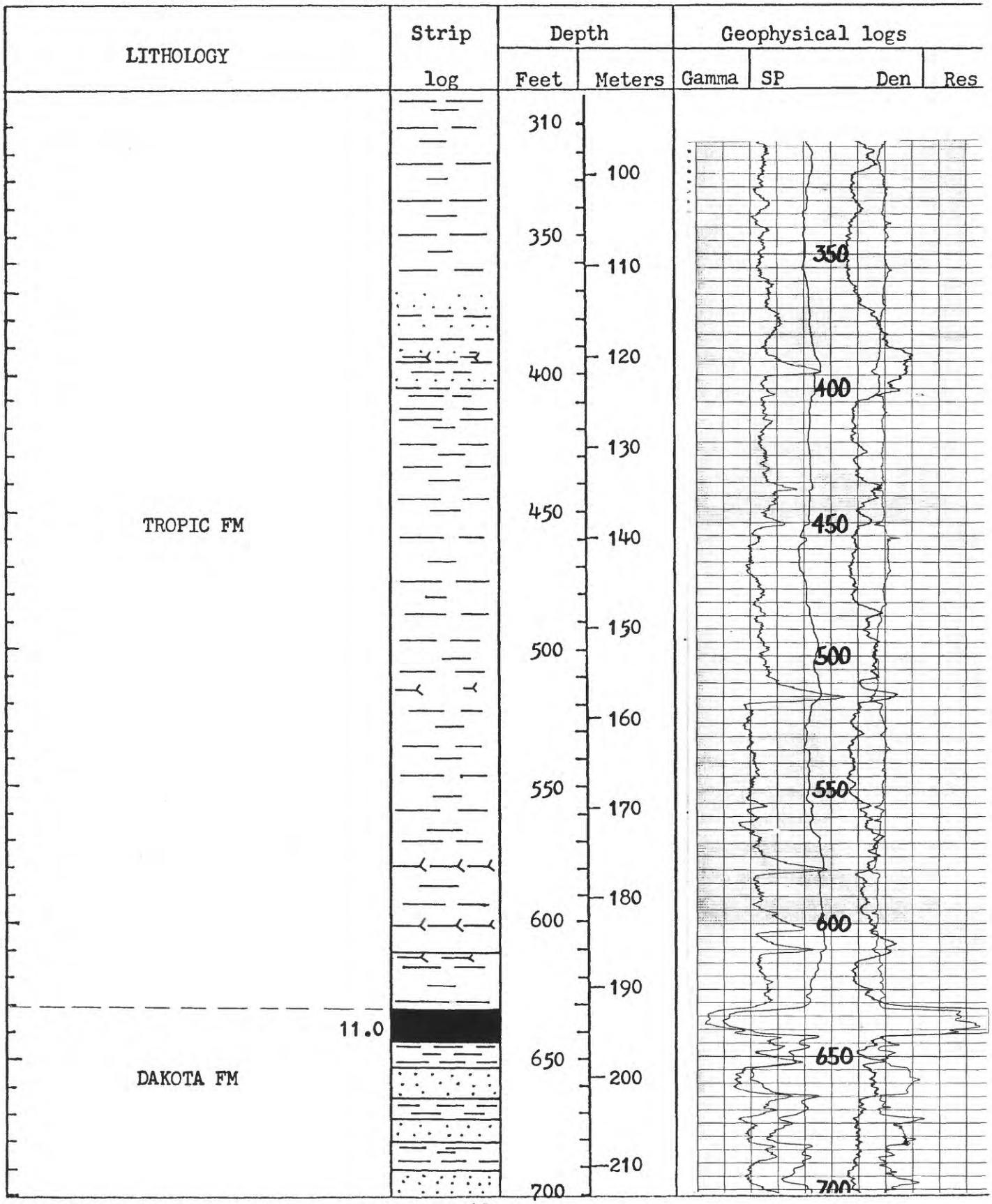
Gamma dens: T.C. 3 Sec. Scale 100 CPS/inch Logging speed 20 fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs
ALLUVIUM		0	0	Gamma SP Den Res
			10	
		50		
			20	
TROPIC FM		100	30	
			40	
		150		
			50	
		200	60	
			70	
		250		
			80	
		300	90	



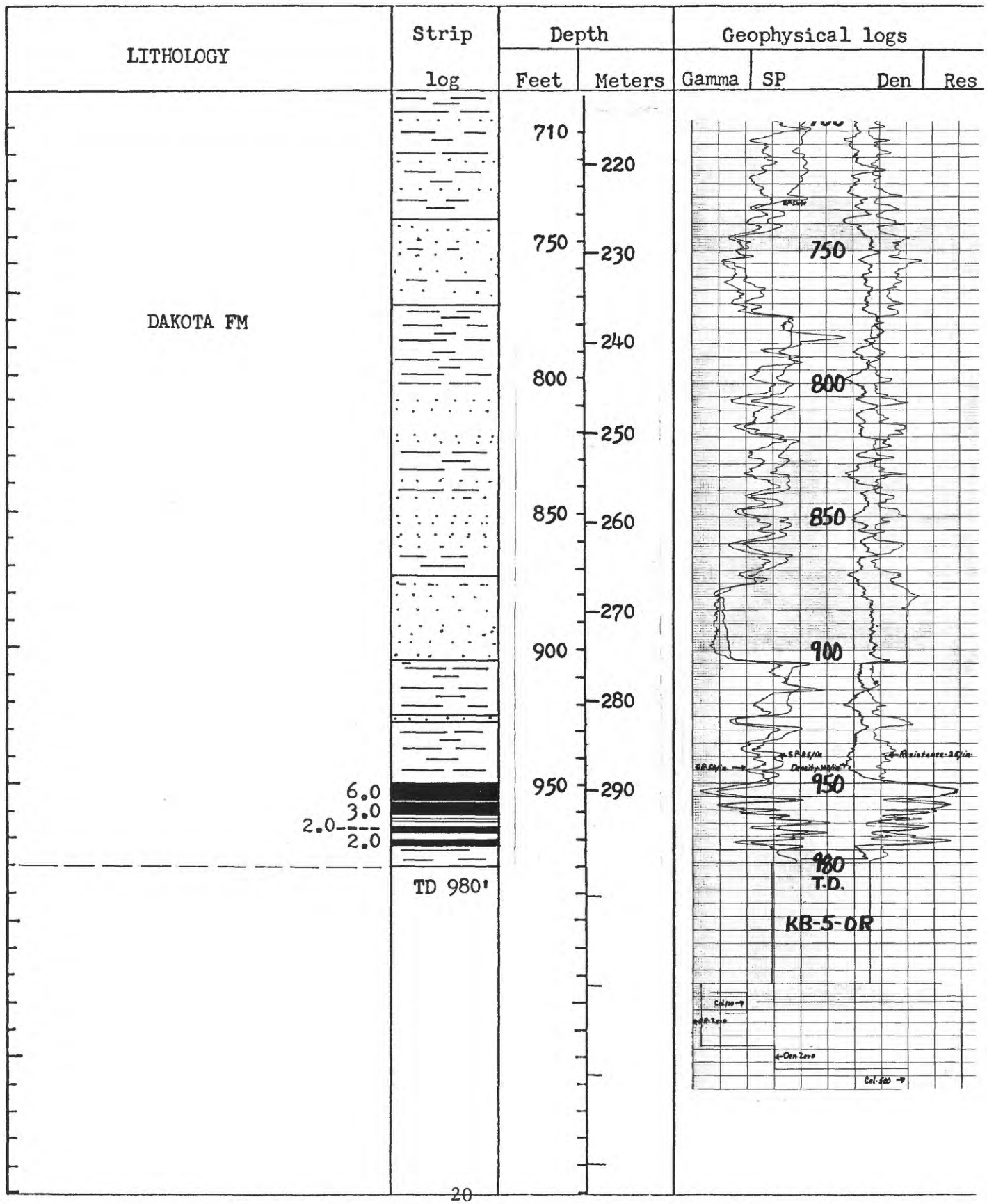
Drill-hole no. KB-5-OR (continued)

Cored interval



Drill-hole no. KB-5-OR (continued)

Cored interval



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-6-OR Date logged 9/11/77 Surface elevation (ft) 5,800'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 7 W, Sec. 31, NWSW

Drilled depth (ft) 480' Logged depth (ft) 460' Water level (ft) 166.2'

Drilling fluid: X Air X Water __ Foam __ Mud __ Fiber

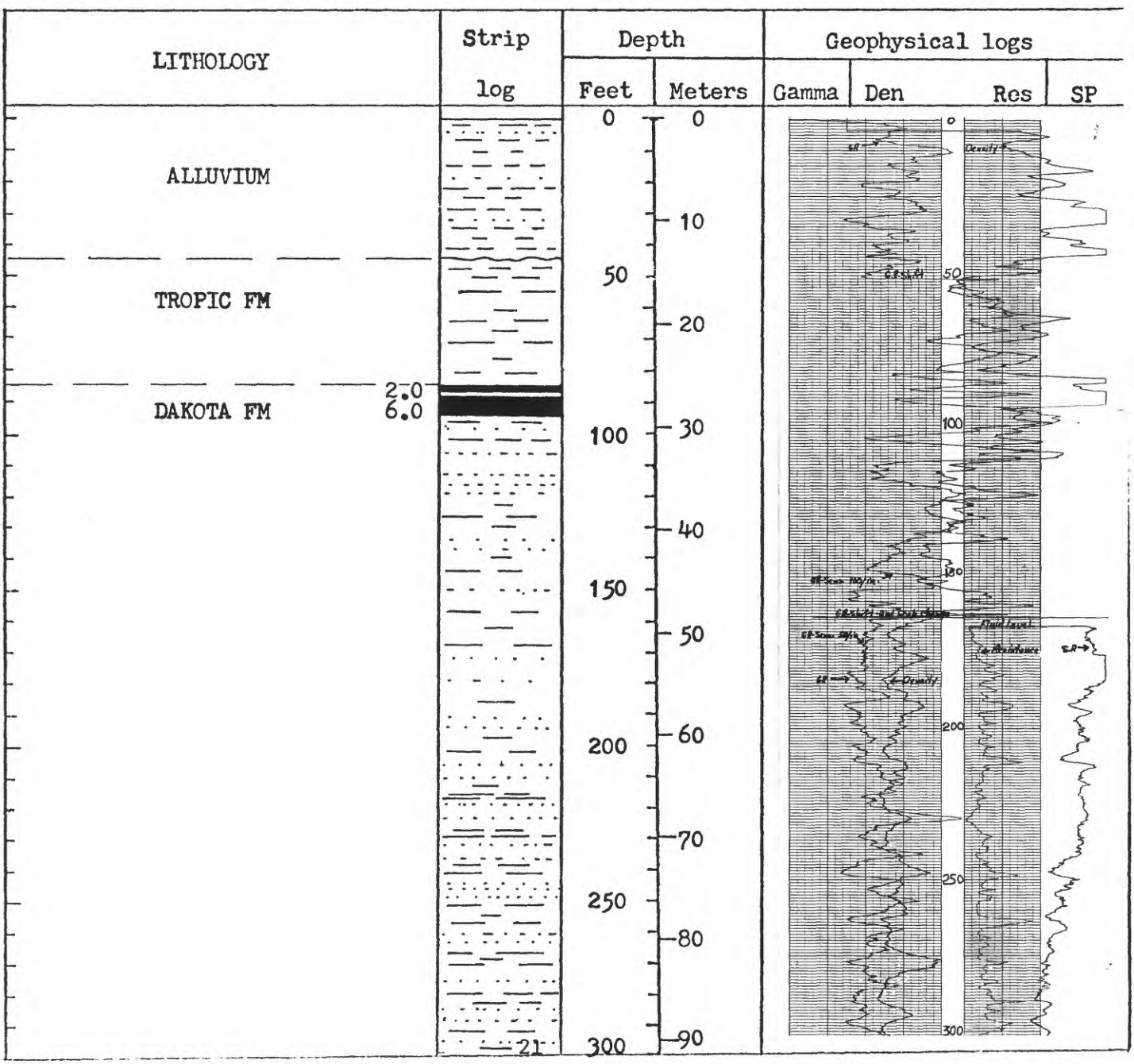
Geophysical Logs:

Spontaneous potential: Scale 50 MV/inch Logging speed 20 fpm

Resistance: Scale 20 Ohms/inch Logging speed 20 fpm

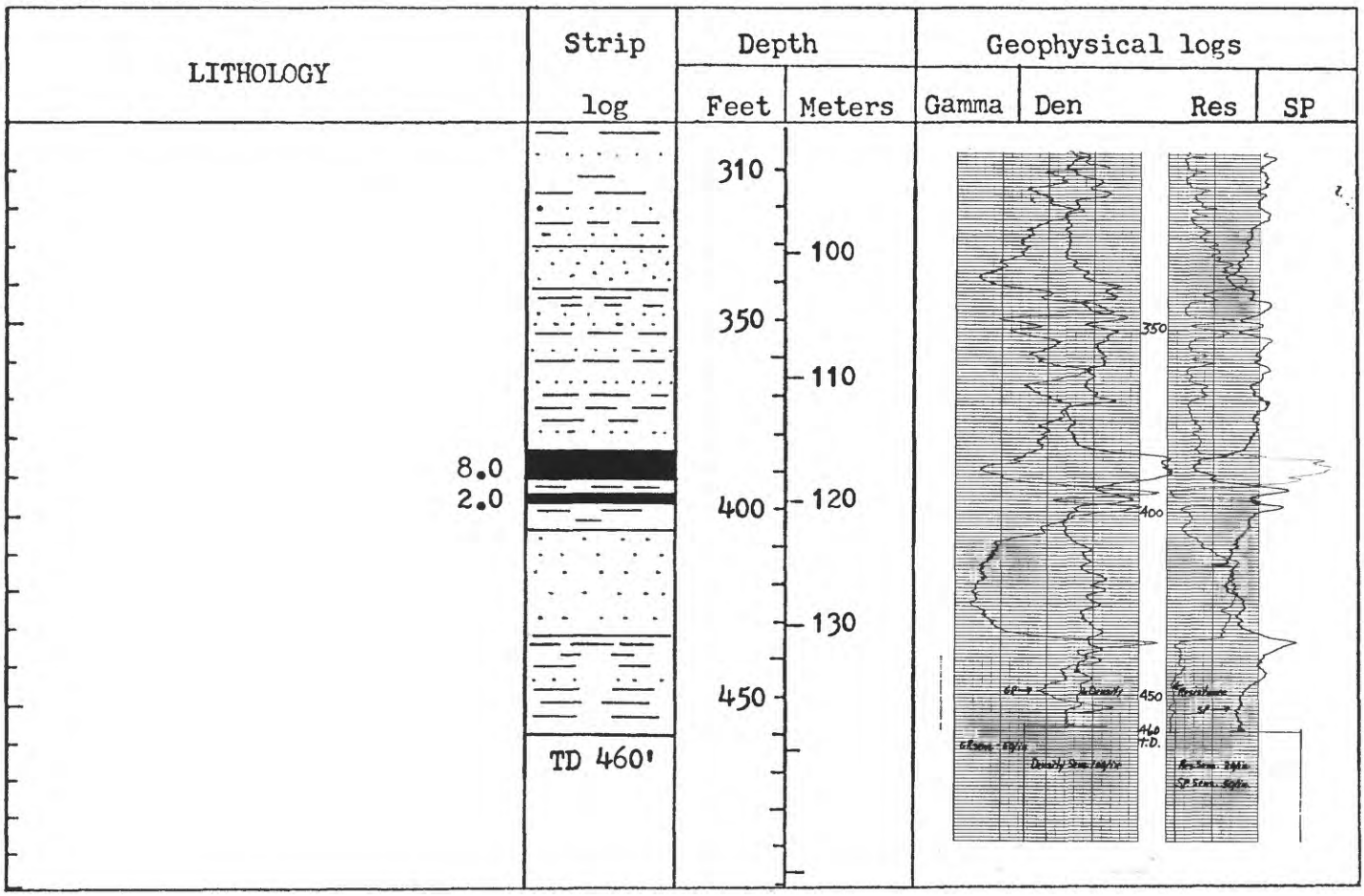
Gamma: T.C. 2 Sec. Scale 50 CPS/inch Logging speed 20 fpm

Gamma dens: T.C. 2 Sec. Scale 100 CPS/inch Logging speed 20 fpm



Drill-hole no. KB-6-OR (continued)

Cored interval



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-7-OR Date logged 8/5/77 Surface elevation (ft) 5,850'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 8 W, Sec. 25, NE

Drilled depth (ft) 580' Logged depth (ft) 579' Water level (ft) 76'

Drilling fluid: X Air X Water __ Foam X Mud __ Fiber

Geophysical Logs:

Spontaneous potential: Scale _____ Logging speed _____ fpm

Resistance: Scale _____ Logging speed _____ fpm

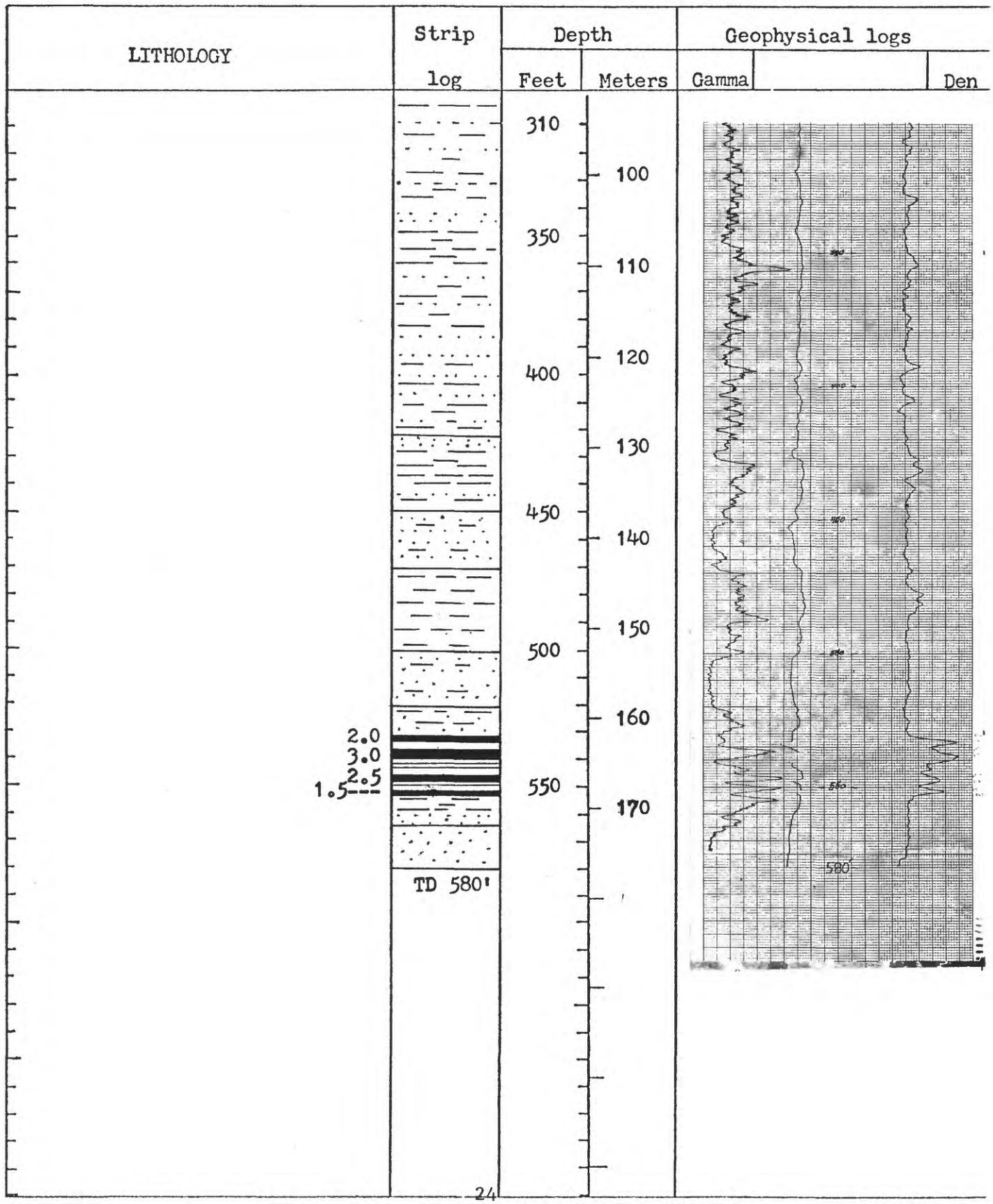
Gamma: T.C. 1 Sec. Scale 25 CPS/inch Logging speed _____ fpm

Gamma dens: T.C. 1 Sec. Scale 5000 CPS/inch Logging speed _____ fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma	Den
ALLUVIUM		0	0		
			10		
		50			
			20		
		100	30		
			40		
		150			
			50		
		200	60		
TROPIC FM					
			70		
7.0					
DAKOTA FM		250			
			80		
		300	90		

Drill-hole no. KB-7-OR (continued)

Cored interval



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-1-OC Date logged 8/30/77 Surface elevation (ft) 6,520'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 8 W, Sec. 28, SWSENW

Drilled depth (ft) 650' Logged depth (ft) 652' Water level (ft) 41'

Drilling fluid: __ Air X Water __ Foam __ Mud X Fiber

Geophysical Logs:

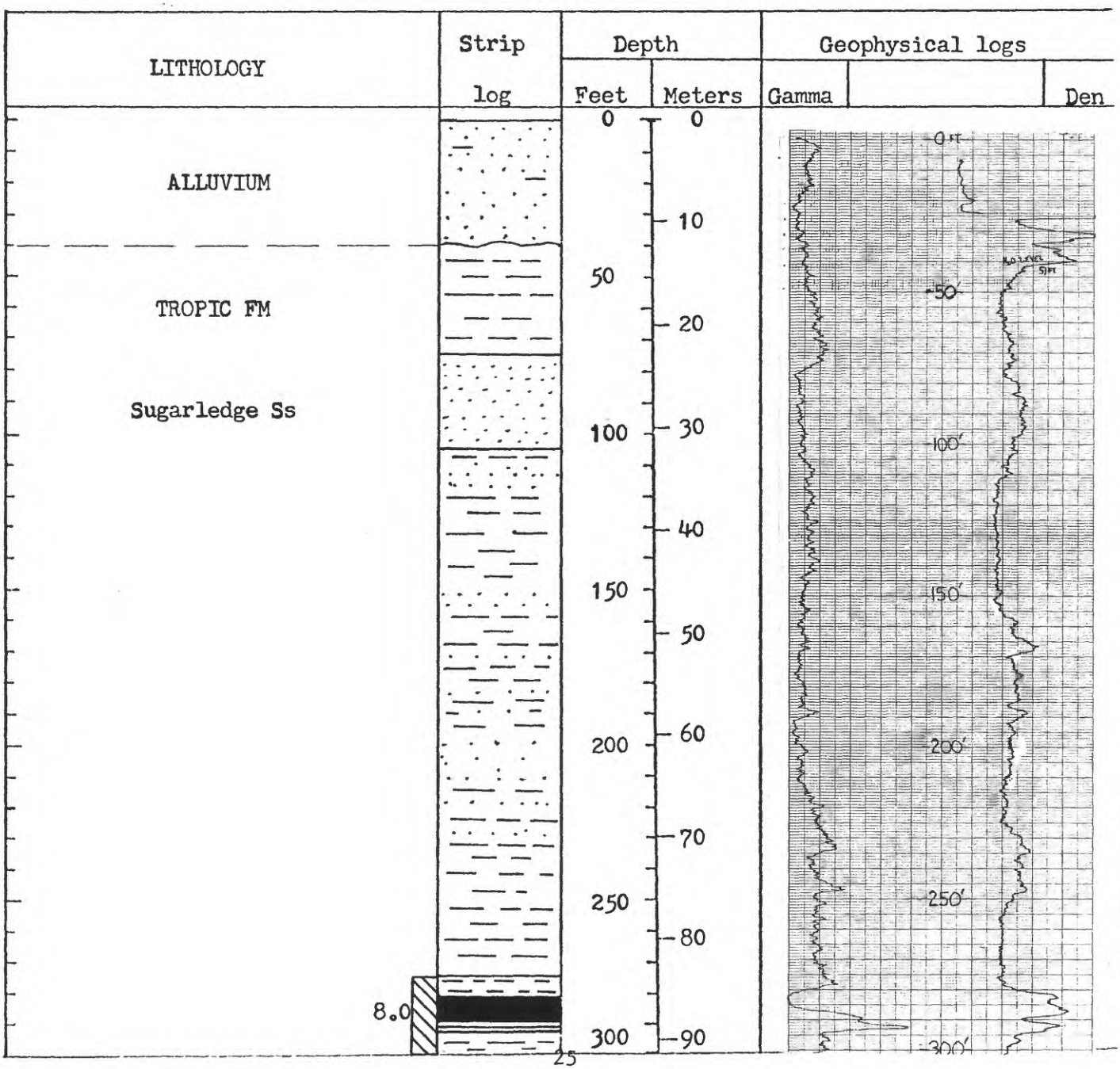
▨ Cored interval

Spontaneous potential: Scale _____ Logging speed _____ fpm

Resistance: Scale _____ Logging speed _____ fpm

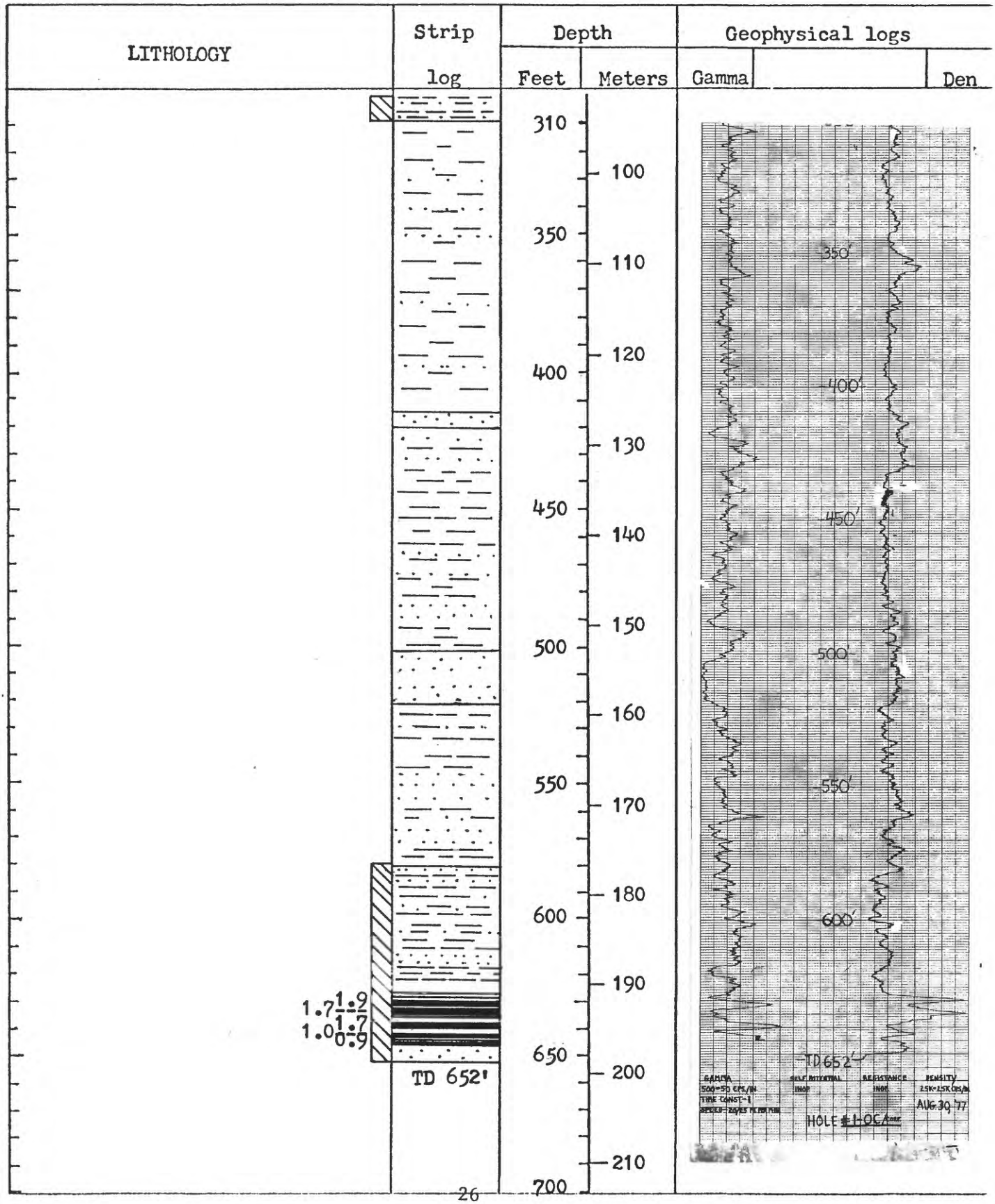
Gamma: T.C. 1 Sec. Scale 50 CPS/inch Logging speed 20/25 fpm

Gamma dens: T.C. 1 Sec. Scale 2500 CPS/inch Logging speed 20/25 fpm



Drill-hole no. KB-1-OC (continued)

Cored interval



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-2-OC Date logged 9/11/77 Surface elevation (ft) 7,500'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 9 W, Sec. 23, NESESE

Drilled depth (ft) 800' Logged depth (ft) 800' Water level (ft) 359'

Drilling fluid: __ Air X Water __ Foam X Mud X Fiber

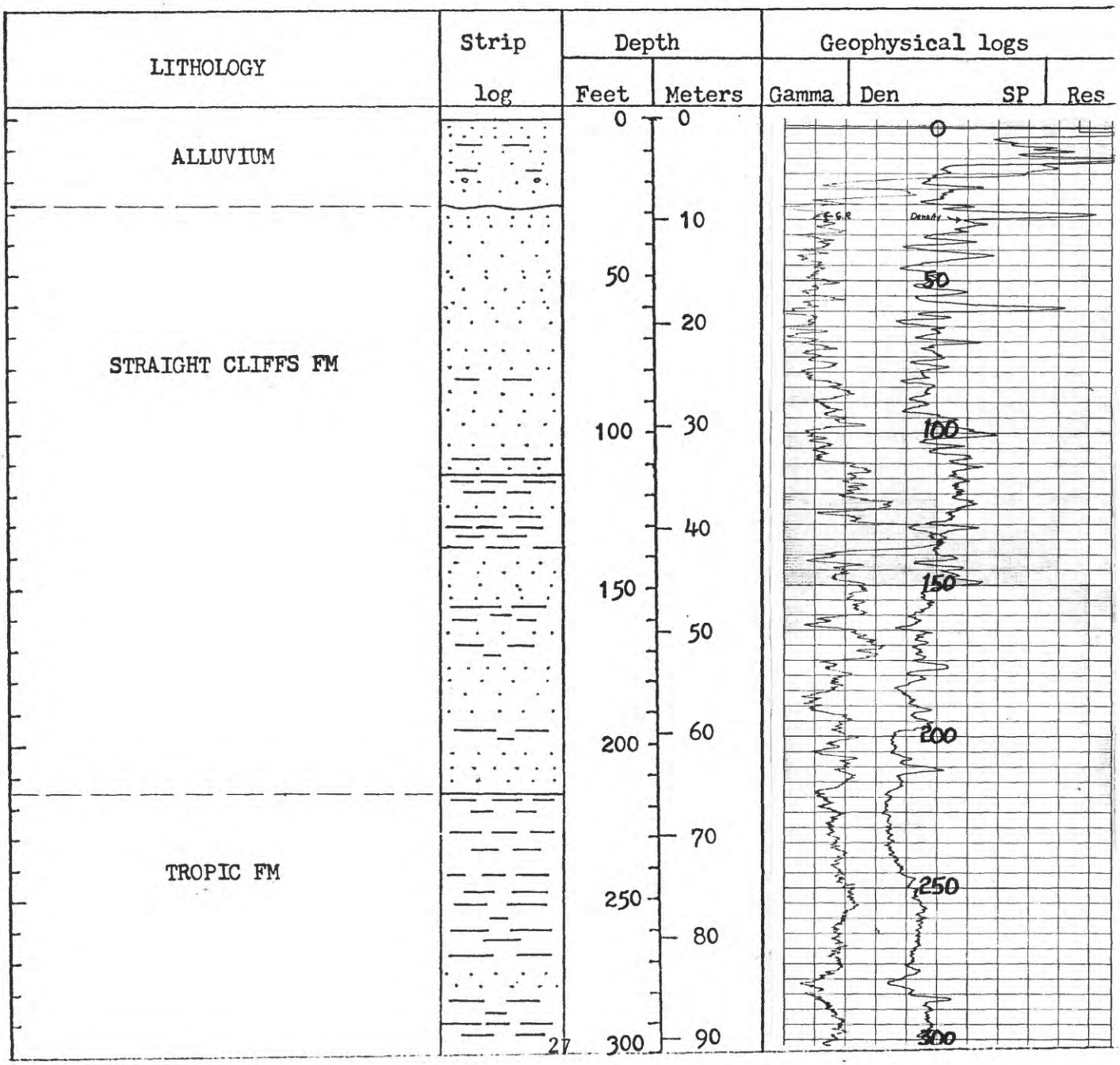
Geophysical Logs:

Spontaneous potential: Scale 50 MV/inch Logging speed 20 fpm

Resistance: Scale 20 Ohms/inch Logging speed 20 fpm

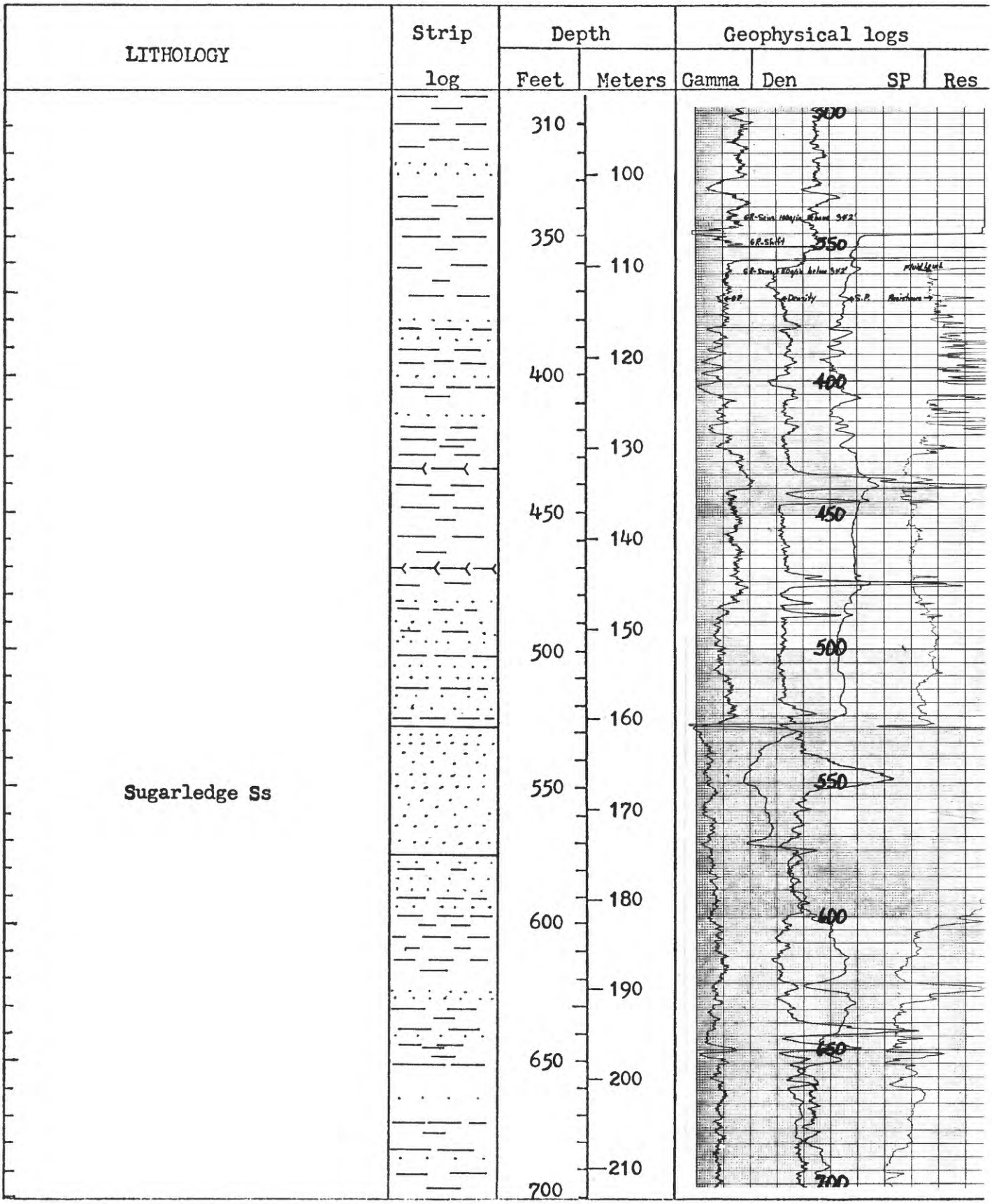
Gamma: T.C. 2 Sec. Scale 50 CPS/inch Logging speed 20 fpm

Gamma dens: T.C. 2 Sec. Scale 100 CPS/inch Logging speed 20 fpm



Drill-hole no. KB-2-OC (continued)

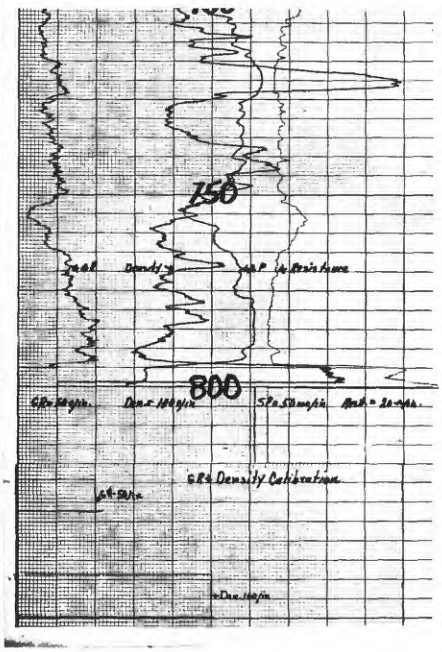
Cored interval



Drill-hole no. KB-2-OC (continued)

Cored interval

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs: Gamma / Den / SP / Res
TROPIC FM		710	220	
		750	230	
			240	
6.0	TD 800'	800		
DAKOTA FM				



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-3-OC Date logged 9/24/77 Surface elevation (ft) 6,850'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 9 W, Sec. 1, NESESE

Drilled depth (ft) 550' Logged depth (ft) 548' Water level (ft) 104'

Drilling fluid: __ Air X Water X Foam X Mud X Fiber

Geophysical Logs:

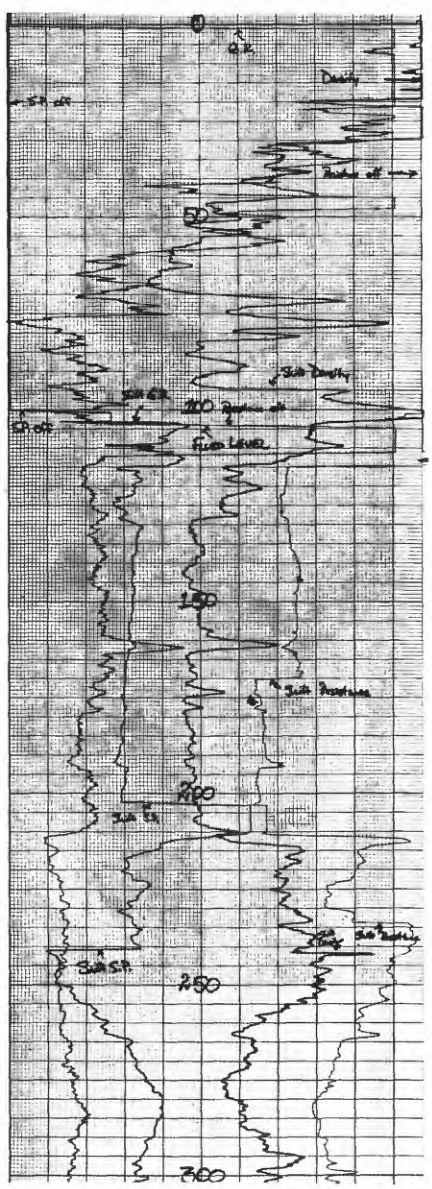
Spontaneous potential: Scale 25 MV/inch Logging speed 20 fpm

Resistance: Scale 25 Ohms/inch Logging speed 20 fpm

Gamma: T.C. 3 Sec. Scale 50 CPS/inch Logging speed 20 fpm

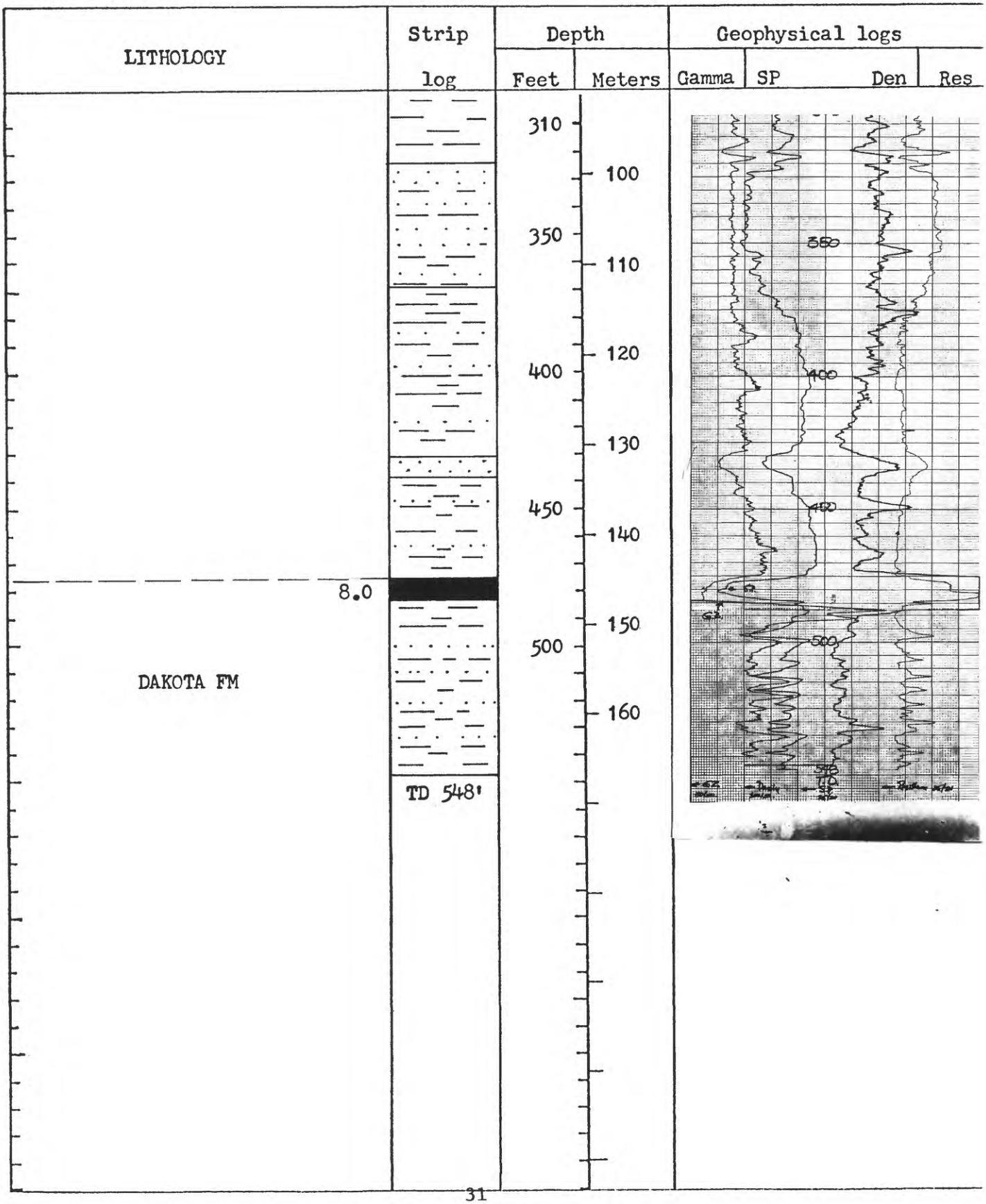
Gamma dens: T.C. 3 Sec. Scale 100 CPS/inch Logging speed 20 fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs
ALLUVIUM		0	0	Gamma SP Den Res
		50	10	
		100	20	
TROPIC FM		150	30	
		200	40	
Sugarledge Ss		250	50	
		300	60	
			70	
			80	
			90	



Drill-hole no. KB-3-OC (continued)

Cored interval



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-4-OC Date logged 9/22/77 Surface elevation (ft) 6,820'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 8 W, Sec. 6, NENWNE

Drilled depth (ft) 1,120' Logged depth (ft) 1,111' Water level (ft) 124'

Drilling fluid: __ Air X Water X Foam X Mud X Fiber

Geophysical Logs:

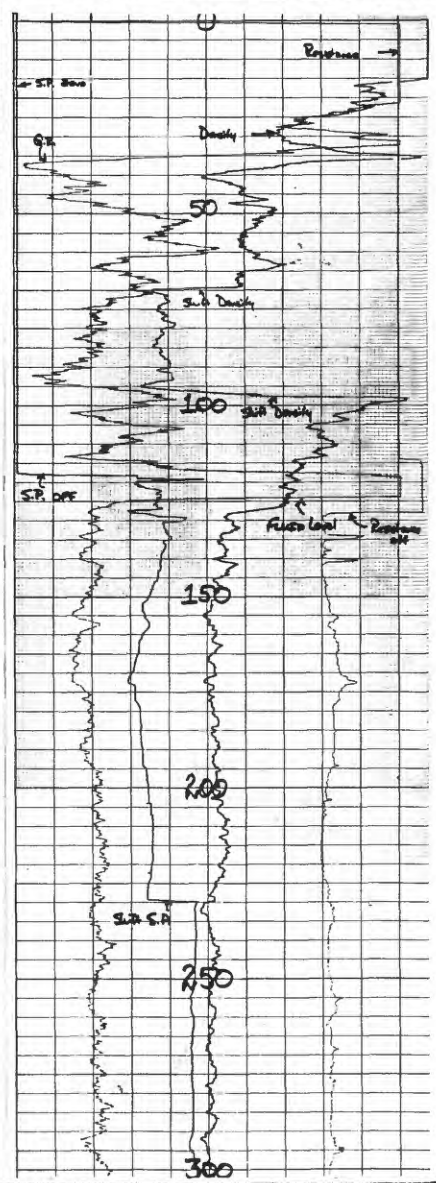
Spontaneous potential: Scale 25 MV/inch Logging speed 20 fpm

Resistance: Scale 25 Ohms/inch Logging speed 20 fpm

Gamma: T.C. 3 Sec. Scale 50 CPS/inch Logging speed 20 fpm

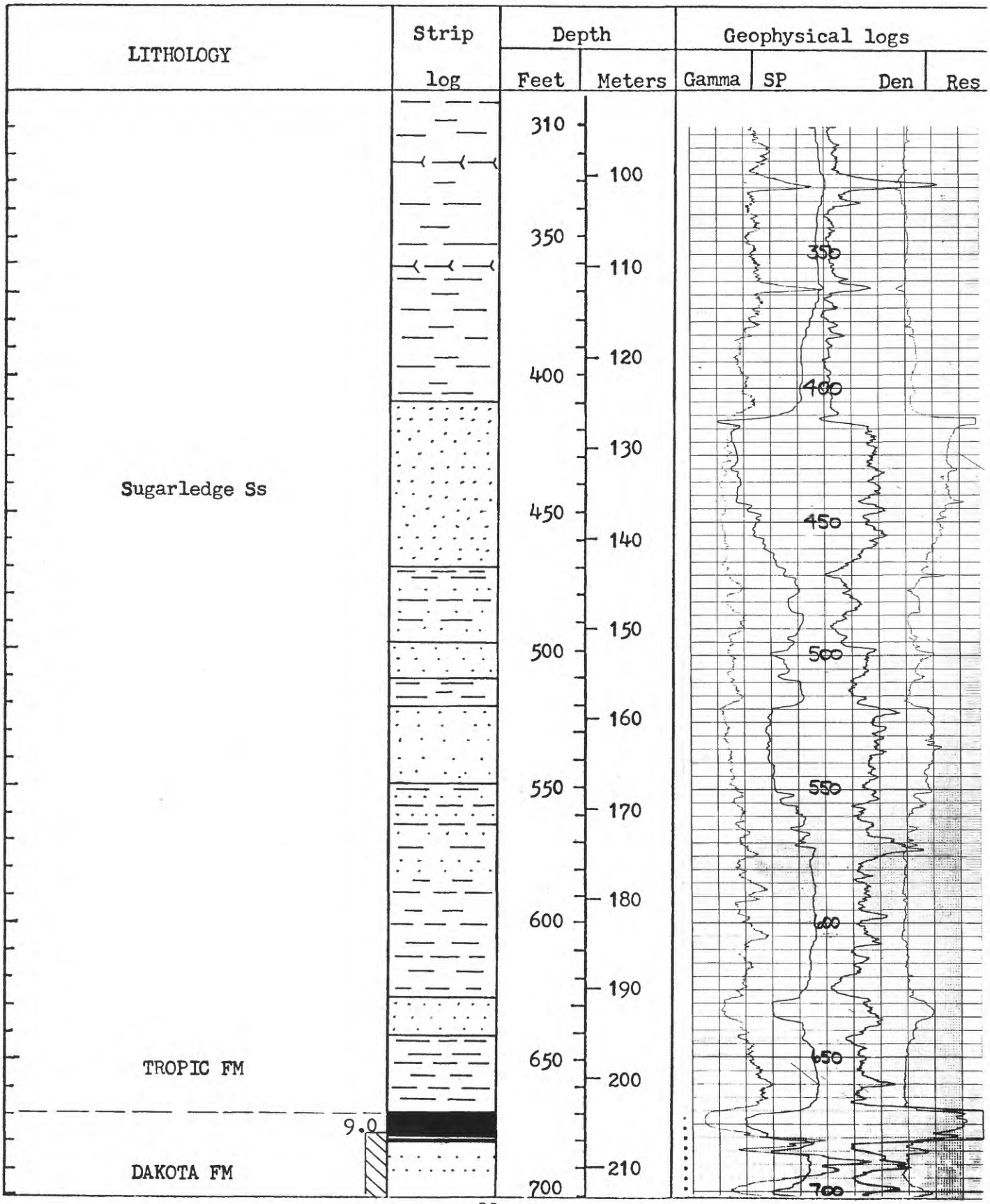
Gamma dens: T.C. 3 Sec. Scale 100 CPS/inch Logging speed 20 fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma SP Den Res
ALLUVIUM		0	0	
		50	10	
			20	
STRAIGHT CLIFFS FM		100	30	
			40	
		150	50	
			60	
TROPIC FM		200	70	
		250	80	
		300	90	

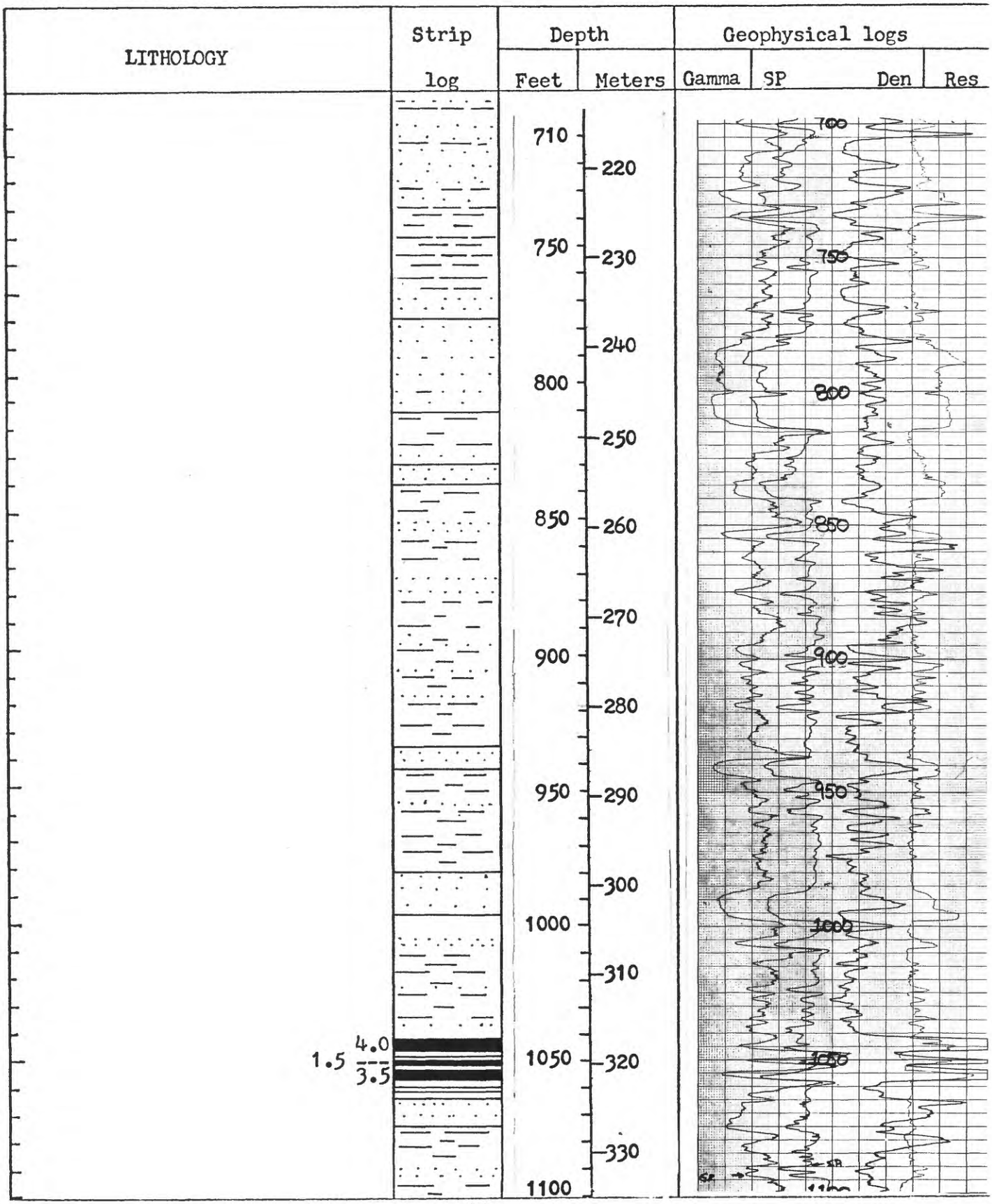


Drill-hole no. KB-4-OC (continued)

Cored interval



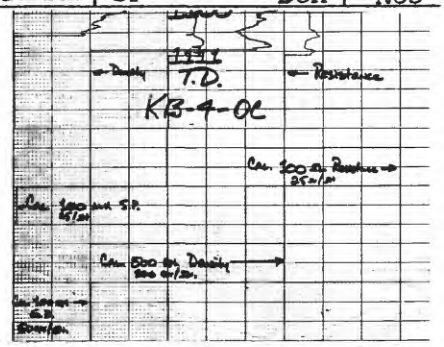
Cored interval



Drill-hole no. KB-4-OC (continued)

Cored interval

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma	SP	Den	Res
	TD 1111'	1110					



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-5-OC Date logged 9/30/77 Surface elevation (ft) 6,290'

Loc.: State UTAH Cnty. KANE T. 39 S, R. 9 W, Sec. 24, NWSENW

Drilled depth (ft) 560' Logged depth (ft) 495' Water level (ft) 17'

Drilling fluid: __ Air X Water __ Foam X Mud __ Fiber ▨ Cored interval

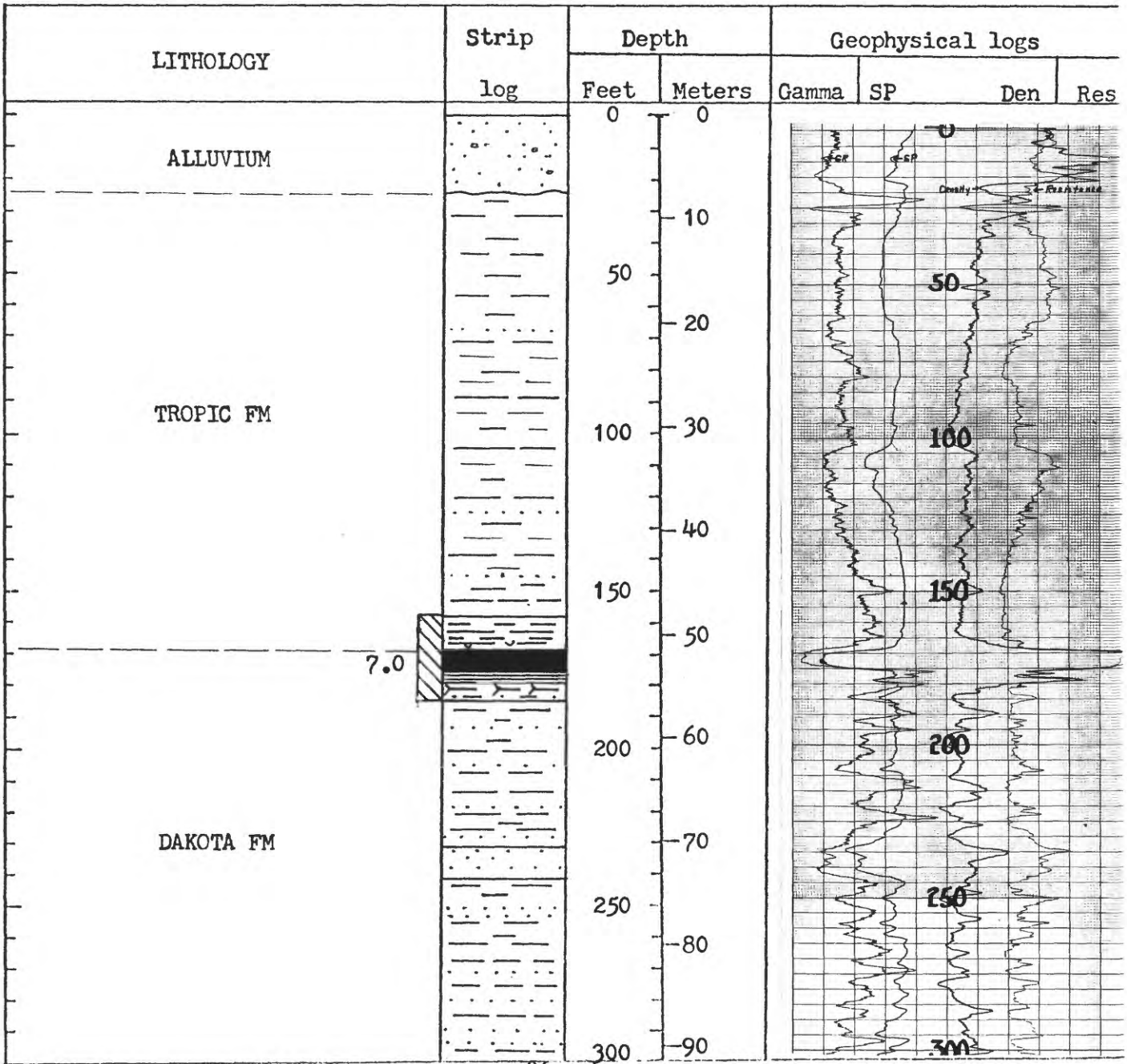
Geophysical Logs:

Spontaneous potential: Scale 25 MV/inch Logging speed 20 fpm

Resistance: Scale 25 Ohms/inch Logging speed 20 fpm

Gamma: T.C. 2 Sec. Scale 50 CPS/inch Logging speed 20 fpm

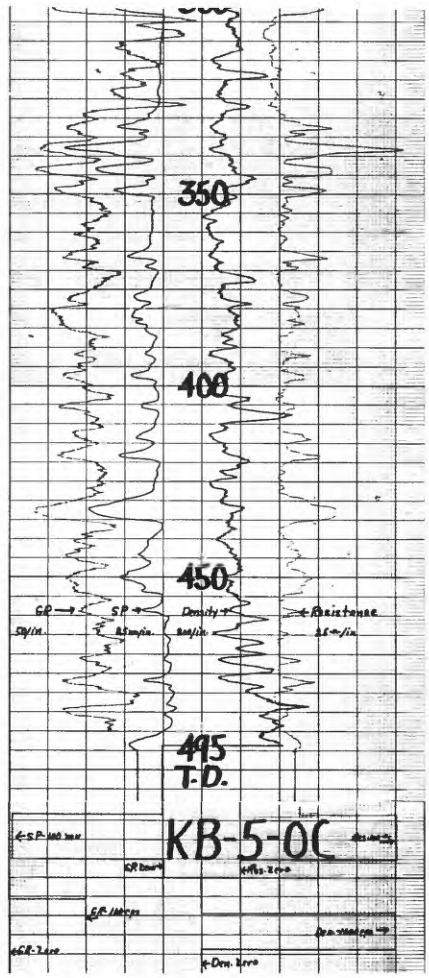
Gamma dens: T.C. 2 Sec. Scale 200 CPS/inch Logging speed 20 fpm



Drill-hole no. KB-5-OC (continued)

Cored interval

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma	SP	Den	Res
DAKOTA FM		310	100				
		350	110				
		400	120				
			130				
		450	140				
			150				
		500	160				
		550					
	TD 560'						



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-6-OC Date logged 8/28/77 Surface elevation (ft) 6,730'

Loc.: State UTAH Cnty. KANE T. 40 S, R. 8 W, Sec. 21, NENENW

Drilled depth (ft) 1,060' Logged depth (ft) 1,064' Water level (ft) 130'

Drilling fluid: __ Air X Water __ Foam X Mud X Fiber

Geophysical Logs:

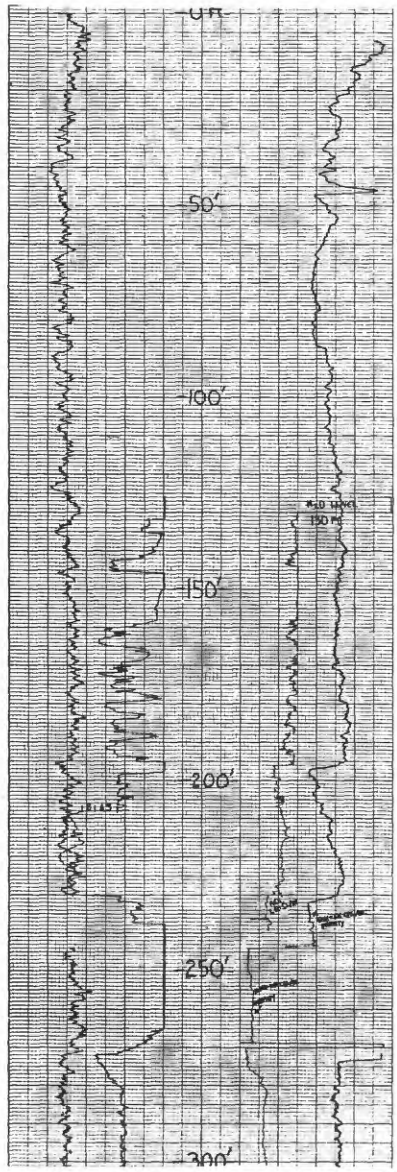
Spontaneous potential: Scale 250 MV/inch Logging speed 20/25 fpm

Resistance: Scale 50 Ohms/inch Logging speed 20/25 fpm

Gamma: T.C. 1 Sec. Scale 50 CPS/inch Logging speed 20/25 fpm

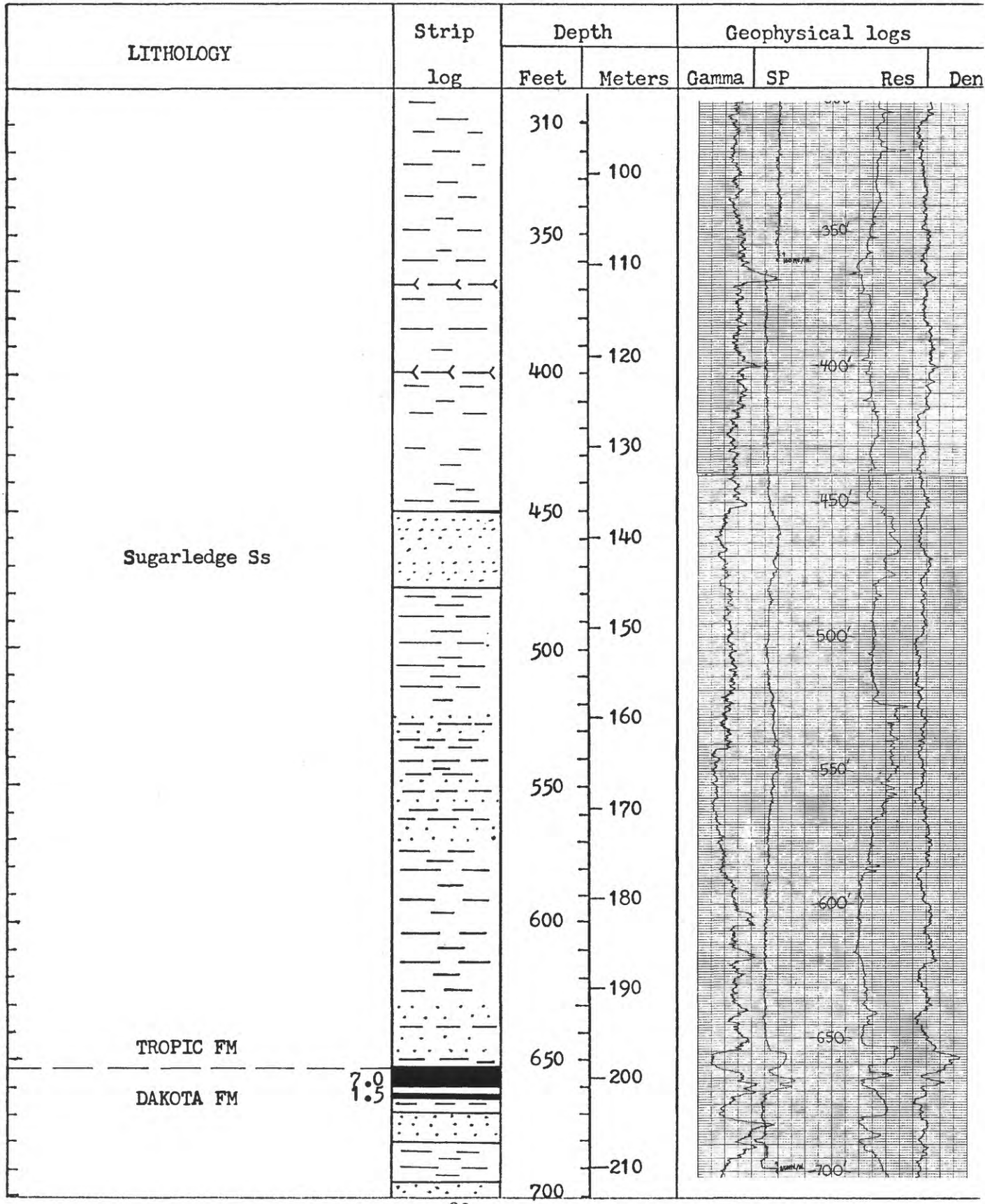
Gamma dens: T.C. 1 Sec. Scale 2500 CPS/inch Logging speed 20/25 fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma SP Res Den
ALLUVIUM		0	0	
			10	
		50		
			20	
TROPIC FM		100	30	
			40	
		150		
			50	
			60	
		200		
			70	
		250		
			80	
		300	90	



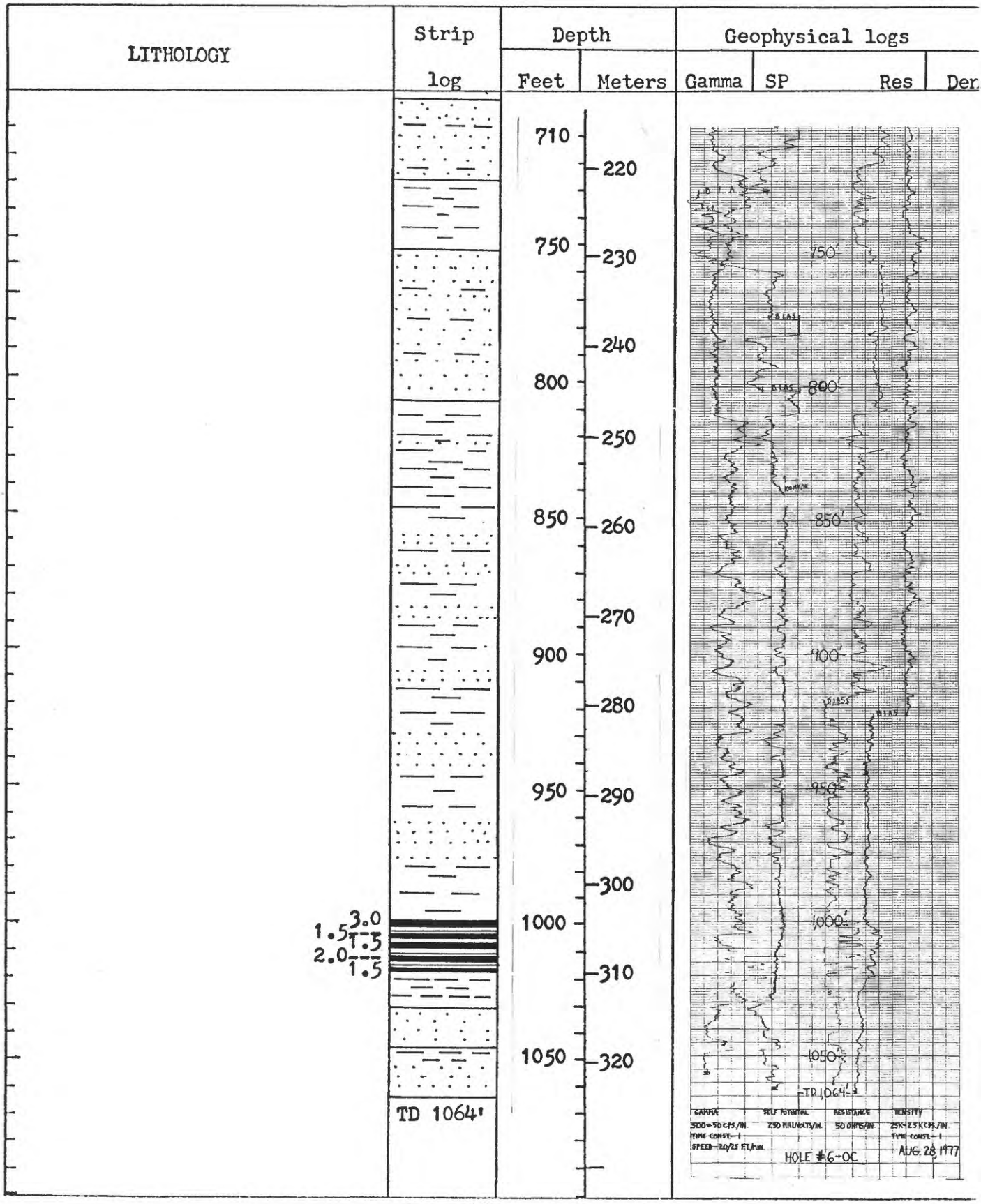
Drill-hole no. KB-6-OC (continued)

Cored interval



Drill-hole no. KB-6-OC (continued)

Cored interval



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOGS, KOLOB COAL FIELD, UTAH

Hole no. KB-7-OC Date logged 10/4/77 Surface elevation (ft) 6,900'

Loc.: State UTAH Cnty. KANE T. 39 S, R. 8 W, Sec. 6, SWSESW

Drilled depth (ft) 1,160' Logged depth (ft) 1,160' Water level (ft) 387'

Drilling fluid: __ Air X Water __ Foam X Mud X Fiber

Geophysical Logs:

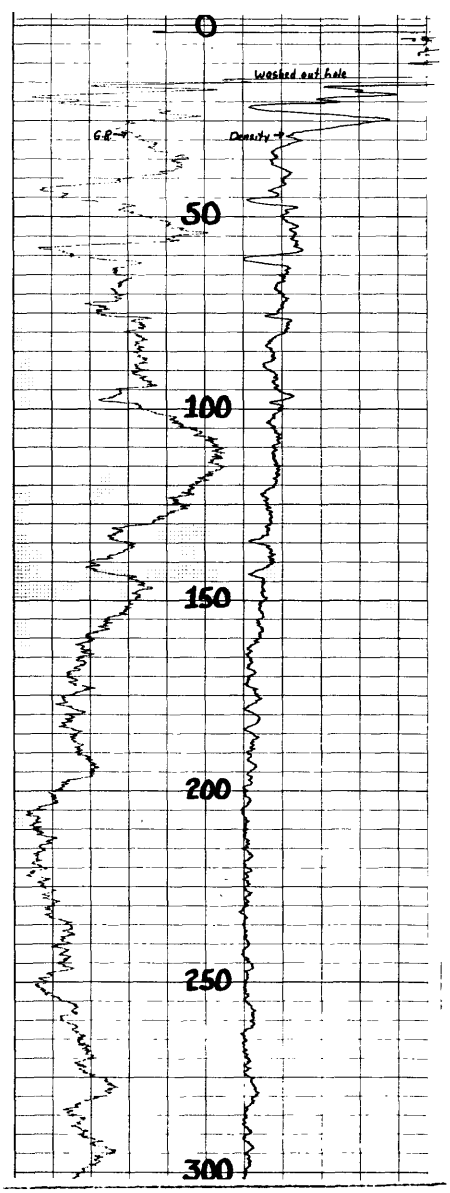
Spontaneous potential: Scale 25 MV/inch Logging speed 20 fpm

Resistance: Scale 25 Ohms/inch Logging speed 20 fpm

Gamma: T.C. 2 Sec. Scale 50 CPS/inch Logging speed 20 fpm

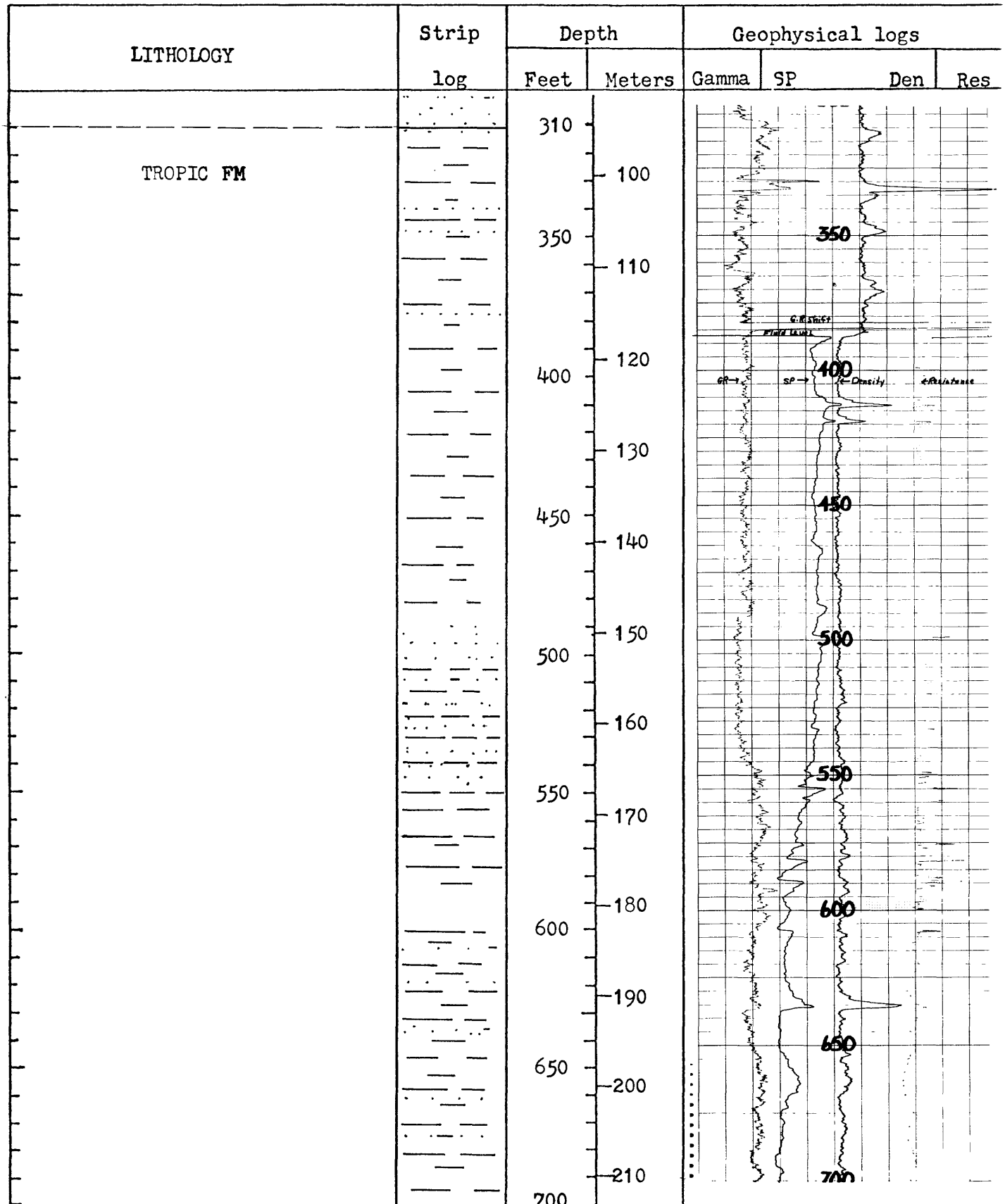
Gamma dens: T.C. 2 Sec. Scale 200 CPS/inch Logging speed 20 fpm

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma SP Den Res
ALLUVIUM		0	0	
		50	10	
			20	
STRAIGHT CLIFFS FM		100	30	
			40	
		150	50	
			60	
		200	70	
		250	80	
		300	90	



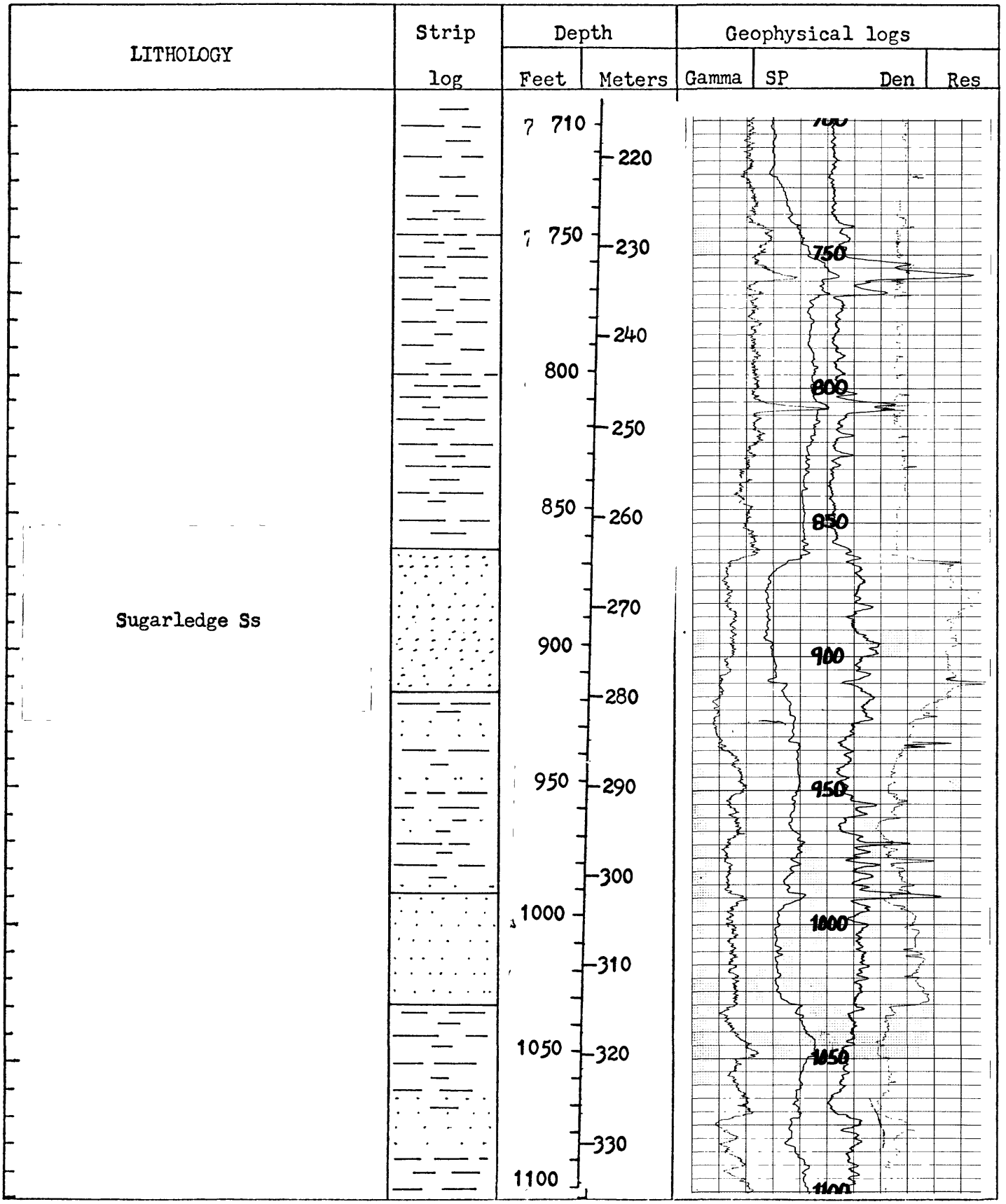
Drill-hole no. KB-7-OC (continued)

Cored interval



Drill-hole no. KB-7-OC (continued)

Cored interval



Drill-hole no. KB-7-OC (continued)

Cored interval

LITHOLOGY	Strip log	Depth Feet	Depth Meters	Geophysical logs Gamma	SP	Den	Res
TROPIC FM		1110					
8.0		1130					
DAKOTA FM		1150					
		TD 1160