

UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOPHYSICAL AND LITHOLOGIC LOGS FOR 1979 COAL DRILLING,  
THREE RIVER AREA, STARK, BILLINGS, AND DUNN COUNTIES, NORTH DAKOTA

By

Michael L. Menge

Open-File Report 80-860

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

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### Abbreviations

blk - black
brn - brown
calc - calcareous
cbncl - carbonaceous
clayst - claystone
consol - consolidated
cps - counts per second
dk - dark
grn - green
gy - gray
lt - light
med - medium
mod - moderate, moderately
MV - millivolts
sandst - sandstone
sec - second
siltst - siltstone
sli - slightly
TD - total depth
T.C. - time constant
unconsol - unconsolidated

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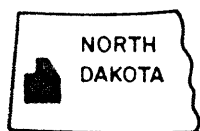
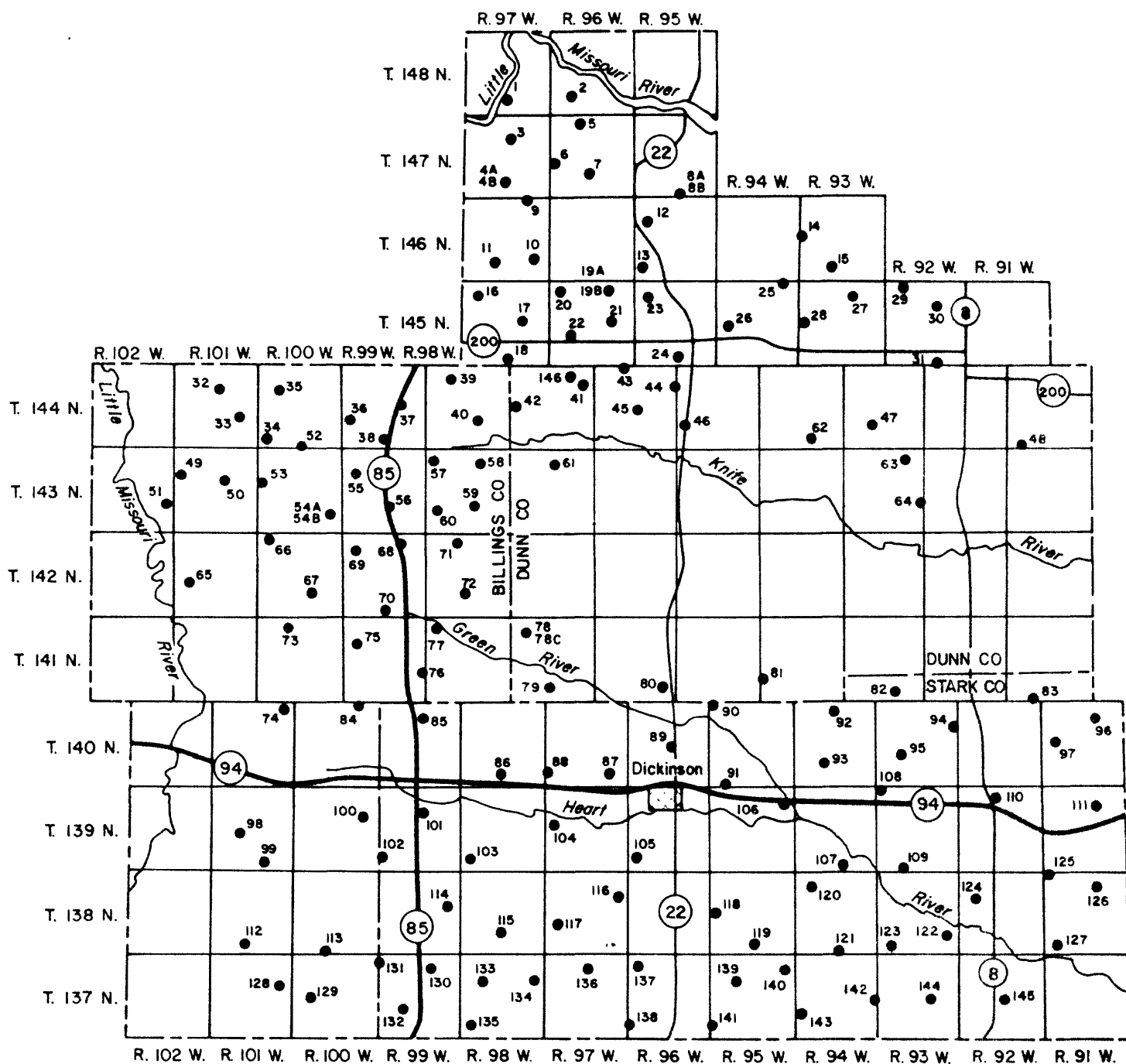
INTRODUCTION AND ACKNOWLEDGMENTS

During July and August 1979 the U.S. Geological Survey personnel supervised the drilling of 151 test holes, for a total of 68,236 ft (including three reruns), in Stark, Billings, and Dunn Counties, N. Dak. The hole locations are shown on figure 1. Drilling and geophysical logging for each of these holes was completed by Gregory Drilling Company under contract 14-08-0001-17881.

The purpose of the drilling was to determine the extent and quality of the coal contained within several Known Recoverable Coal Resource Areas (KRCRA) and to provide data for classifying additional lands in the public domain.

U.S. Geological Survey personnel collected and described the drill cuttings that were used for lithologic control on this project. These cuttings were used in conjunction with the geophysical logs to plot the lithologic logs in this report. The lithologic logs do not (except for coal beds) show each separate stratigraphic unit in each test hole; they show only the major rock type that occurs in a given interval. All measurements are in feet; to convert to meters, multiply by 0.3048.

Fieldwork for this project was done by Michael Menge, assisted by Arthur Banet, Jr., Susan Cook, John Spencer, Mark Hudson, Scott Christensen, and Leslie Tomac.



Location of area

#### EXPLANATION

- Drill-hole location

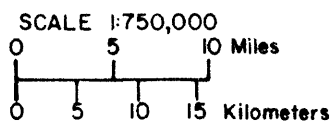


Figure 1.--Drill-hole location map, Three River area, Stark, Billings, and Dunn Counties, N. Dak.



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 1  
SHEET 1 OF 1

AREA Three River		QUAD NAME Lone Butte SE	
DATE STARTED 8-10-79	DATE COMP. 8-10-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 28 T. 148 N., R. 97 W., FOOTAGE LOC. 1605 ft		XXX FSL 30 ft	FEL XXX GROUND ELEV 2135 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 340 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOC	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 340 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 12.5 ohms
		DEPTH	
		FEET	METERS
soil, sand, silt, clay, unconsol		0 0	
clayst, dk-gy, sli silty		10	
siltst, lt-gy		50	
lignite (70.5-74)		20	
clayst, med-gy, sli silty		100	
sandst, med-gy, fine-grained		30	
lignite (109-112.5)		40	
clayst, med-gy, sli silty		150	
lignite (123-124)		50	
clayst, med-gy, sli silty		200	
sandst, med-brn, calc, well-consol, med-grained		70	
clayst, med-gy, mod silty		80	
lignite (150-156)		90	
clayst, med-gy, mod silty		100	
siltst, med-gy		350	
clayst, dk-gy			
siltst, med-gy			
clayst, med-gy, sli silty			
clayst, dk-gy to blk, very cbncls			
sandst, lt-gy, fine-grained			
clayst, lt-gy, very silty			
siltst, med-gy, very clayey			
lignite (319-327.5)			
clayst, med-gy, mod silty			
TD 340			

# UNITED STATES GEOLOGICAL SURVEY


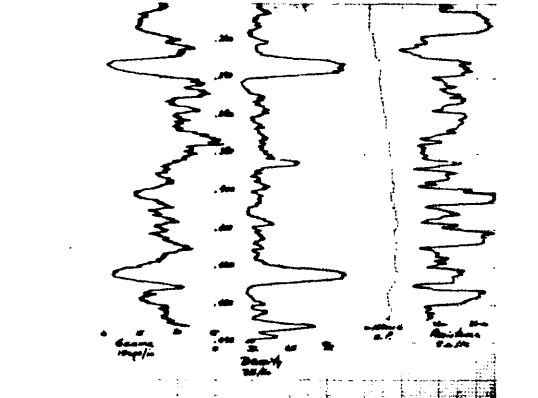



HOLE NO 2  
SHEET 1 OF 2

AREA Three River		QUAD NAME North Killdeer Mountain	
DATE STARTED 8-13-79	DATE COMP. 8-13-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 29 T.148 N., R. 96 W., FOOTAGE LOC.		2490 ft	2480 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	LOGGING DATA		DEPTH	
		Logging speed: 20 ft/min	Density range: 3 cps	FEET	METERS
soil, lt-brn, sand, silt, unconsol		Logged depth: 440 ft	Density TC: 1 sec		
clayst, med-gy, very silty		Gamma range: 15 cps	SP sensitivity: 100 mv		
siltst, med-gy; high clay content		Gamma TC: 3 sec	Resistance sensitivity: 12.5 ohms		
clayst, med-gy, mod silty				0	0
siltst, lt-gy; high clay content				10	
sandst, med-gy, calc, well-consol, med-grained				50	
sandst, med-gy, fine-grained lignite (114.5-115.5)				20	
siltst, med-gy lignite (138.5-140)				100	30
alternate layers of clayst, med-gy, and siltst, med-gy lignite (159-163)				40	
siltst, lt-gy; high clay content				150	50
sandst, med-gy, fine-grained				50	
siltst, dk-gy lignite (212-217)				200	60
clayst, med-gy lignite (218-219)				70	
sandst, med-gy, fine-grained				250	80
siltst, med-gy				80	
sandst, med-brn, calc, well-consol, med-grained				300	90
siltst, med-gy				90	
lignite (308-309)				350	100
clayst, lt-gy, very silty					
siltst, med-gy					

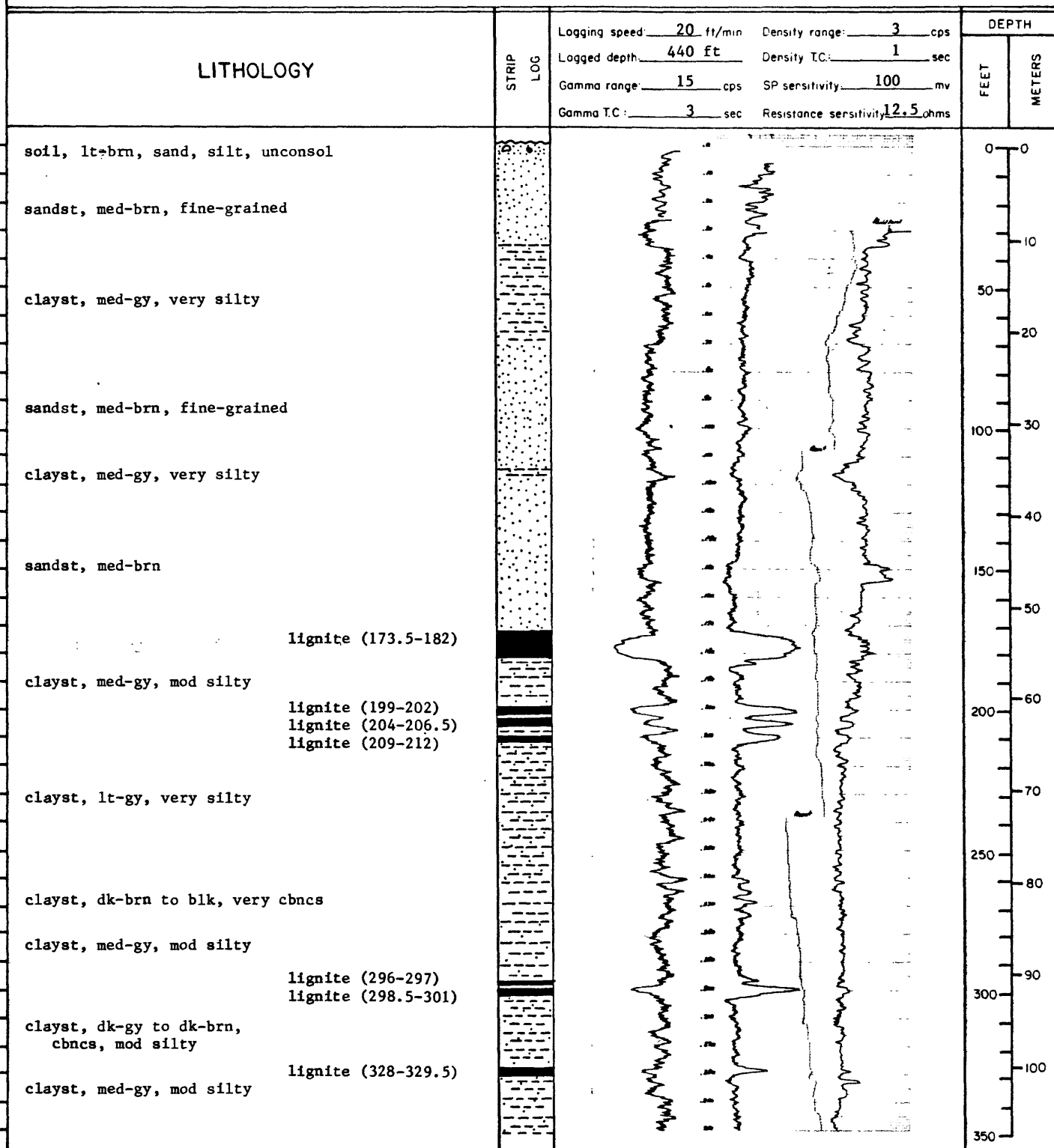
## REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>440</u> ft    Density T.C.: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C.: <u>3</u> sec    Resistance sensitivity <u>12.5</u> ohms		DEPTH	
		FEET	METERS	FEET	METERS
siltst, med-gy clayst, blk, very cbnca      lignite (365-369)				350	110
clayst, med-gy, mod silty lignite (391.5-393)				400	120
sandst, med-gy, calc, well-consol, fine-grained siltst, lt-gy; high clay content lignite (420-424)				450	130
clayst, dk-gy                      lignite (435-436.5)				500	140
	TD 440			550	150
				600	160
				650	170
				700	180
				750	190
					200
					210
					220

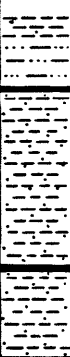
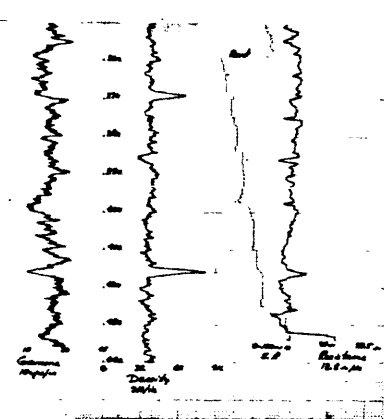
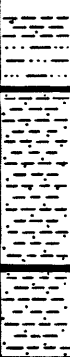
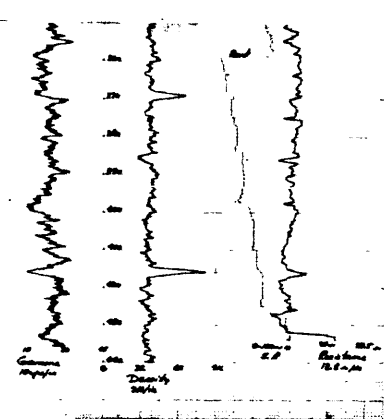
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 3  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lone Butte SE			
DATE STARTED 8-10-79	DATE COMP 8-10-79	COUNTY Dunn	STATE North Dakota		
LOCATION: SEC. 10 T147 N., R. 97 W., FOOTAGE LOC. 40 ft		RMK FSL 18 ft	XXX FWL	GROUND ELEV 2495 ft	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft CORING ---		TOTAL DEPTH 440 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 30 ft	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					



## REMARKS:


LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>440</u> ft    Density T.C.: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>12.5</u> ohms	DEPTH	
			FEET	METERS
clayst, med-gy, mod silty			350	
siltst, med-gy; high clay content			110	
lignite (368.5-369.5)			120	
clayst, med-gy, very silty			400	
lignite (415.5-417)			130	
clayst, dk-gy, very silty			140	
	TD 440		450	
			500	
			150	
			160	
			550	
			170	
			180	
			600	
			190	
			650	
			200	
			210	
			700	
			220	
			750	

# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 4A  
SHEET 1 OF 1

AREA <b>Three River</b>		QUAD NAME <b>Lone Butte SE</b>	
DATE STARTED <b>8-9-79</b>	DATE COMP. <b>8-9-79</b>	COUNTY <b>Dunn</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 28 T.147 N., R. 97 W., FOOTAGE LOC. <b>625 ft</b> <del>XXXL</del> <b>110 ft</b> <del>FEL</del> <del>XXXL</del>		GROUND ELEV <b>2480 ft</b>	
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>60 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	
LITHOLOGY RECORDED BY <b>L. Tomac</b>		GEOPHYSICAL LOGS RECORDED BY <b>---</b>	
REMARKS: <b>Hole abandoned at 60 ft due to complete loss of circulation No geophysical log run on this hole</b>			

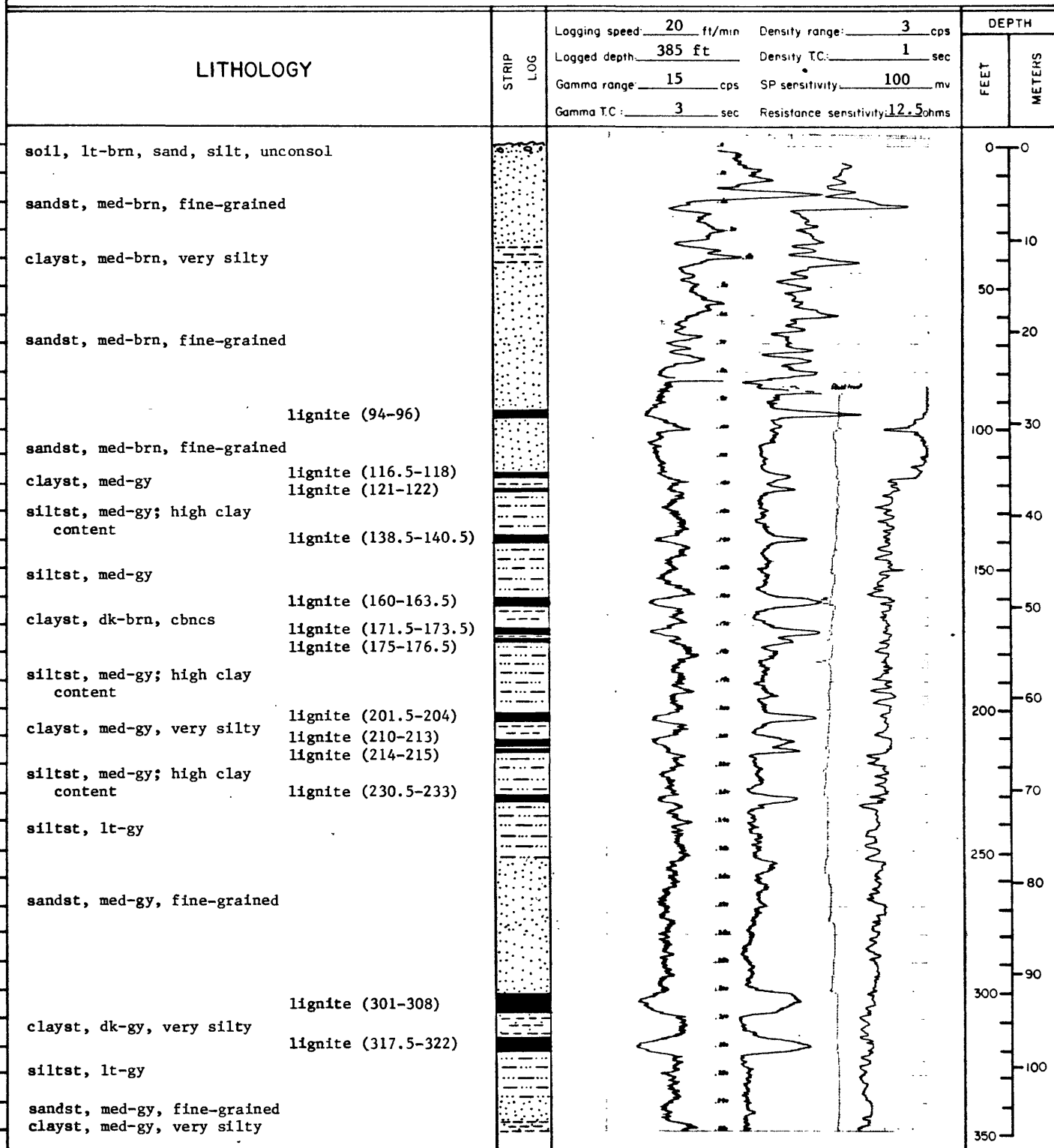
  

LITHOLOGY	STRIP	LOG	DEPTH	
			FEET	METERS
soil, lt-brn, sand, unconsol		TD 60	0	0
sandst, med-brn, fine-grained			10	10
			50	50
			20	20
			100	30
			40	40
			150	50
			60	60
			70	70
			250	80
			80	80
			90	90
			300	100
			100	100
			350	350

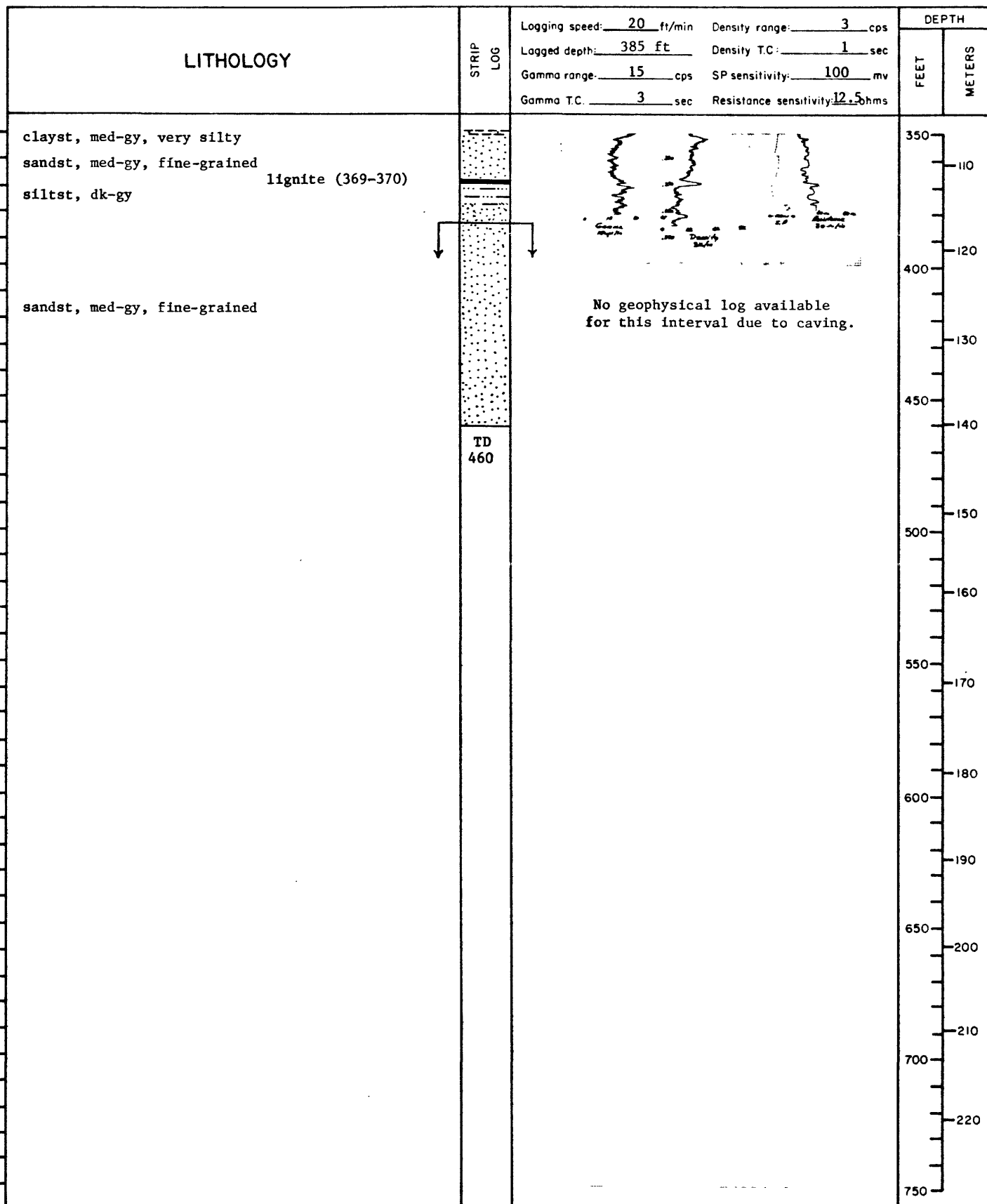
# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 4B  
SHEET 1 OF 2

<b>AREA</b> Three River		<b>QUAD NAME</b> Lone Butte SE	
<b>DATE STARTED</b> 8-9-79	<b>DATE COMP.</b> 8-9-79	<b>COUNTY</b> Dunn	<b>STATE</b> North Dakota
<b>LOCATION: SEC.</b> 28 T.147 N., R.97 W., <b>FOOTAGE LOC.</b> 805 ft		<b>KMX FSL</b> 55 ft	<b>FEL KMX</b> GROUND ELEV 2492 ft
<b>SIZE AND BIT TYPE:</b> 4-3/4 inch drag		<b>FOOTAGE</b> ROTARY 460 ft	<b>CORING</b> ---
<b>DRILLING AGENCY:</b> Gregory Drilling Company		<b>DRILL TYPE:</b> Rotary	<b>TOTAL DEPTH</b> 460 ft
<b>LITHOLOGY RECORDED BY</b> L. Tomac		<b>GEOPHYSICAL LOGS RECORDED BY</b> J. Wald	
<b>REMARKS:</b> Hole drilled with air to 460 ft. Due to caving, geophysical log available only for upper 385 ft of hole.			



REMARKS:



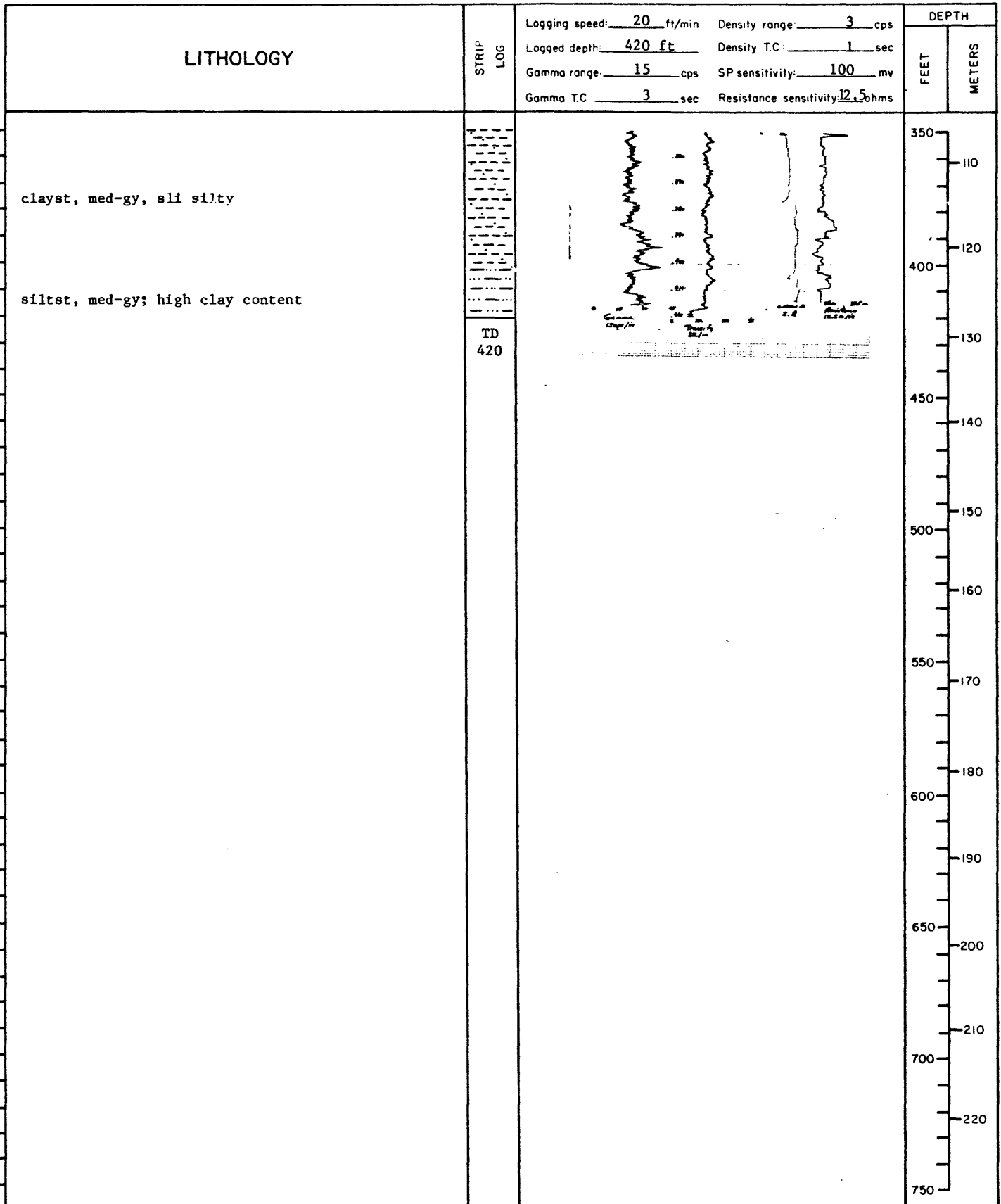


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 5  
SHEET 1 OF 2

AREA Three River		QUAD NAME North Killdeer Mountain			
DATE STARTED 8-13-79	DATE COMP. 8-13-79	COUNTY Dunn	STATE North Dakota		
LOCATION: SEC. 4 T. 147 N., R. 96 W., FOOTAGE LOC.		60 ft <del>XXX</del> FSL 210 ft <del>XXX</del> FWL	GROUND ELEV 2280 ft		
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 420 ft CORING ---	TOTAL DEPTH 420 ft		
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 9 ft		
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps	DEPTH	
		Logged depth: 420 ft	Density TC: 1 sec	FEET	METERS
		Gamma range: 15 cps	SP sensitivity: 100 mv		
		Gamma TC: 3 sec	Resistance sensitivity: 12.5 ohms		
soil, lt-brn, sand, silt, unconsol				0	0
siltst, med-gy				10	
clayst, med-gy, mod silty				50	
lignite (52.5-56)				20	
clayst, med-gy, sli silty				100	30
sandst, lt-gy, med-grained				40	
siltst, lt-grn; mod clay content				150	50
lignite (128-131)				50	
clayst, med-gy, very silty				200	60
lignite (170-171)				70	
clayst, med-gy, sli silty				250	80
lignite (204-205.5)				80	
clayst, dk-gy				300	90
lignite (208-210)				100	
lignite (220-221)				350	
siltst, med-gy					
clayst, dk-gy, mod silty					
lignite (236-237)					
clayst, dk-gy, mod silty					
lignite (248-250)					
clayst, med-gy, sli silty					
lignite (264-265.5)					
clayst, med-gy					
lignite (300.5-302)					
clayst, med-gy, sli silty					
lignite (329-331)					
lignite (332.5-337)					
lignite (338-340)					
clayst, med-gy, sli silty					

REMARKS:

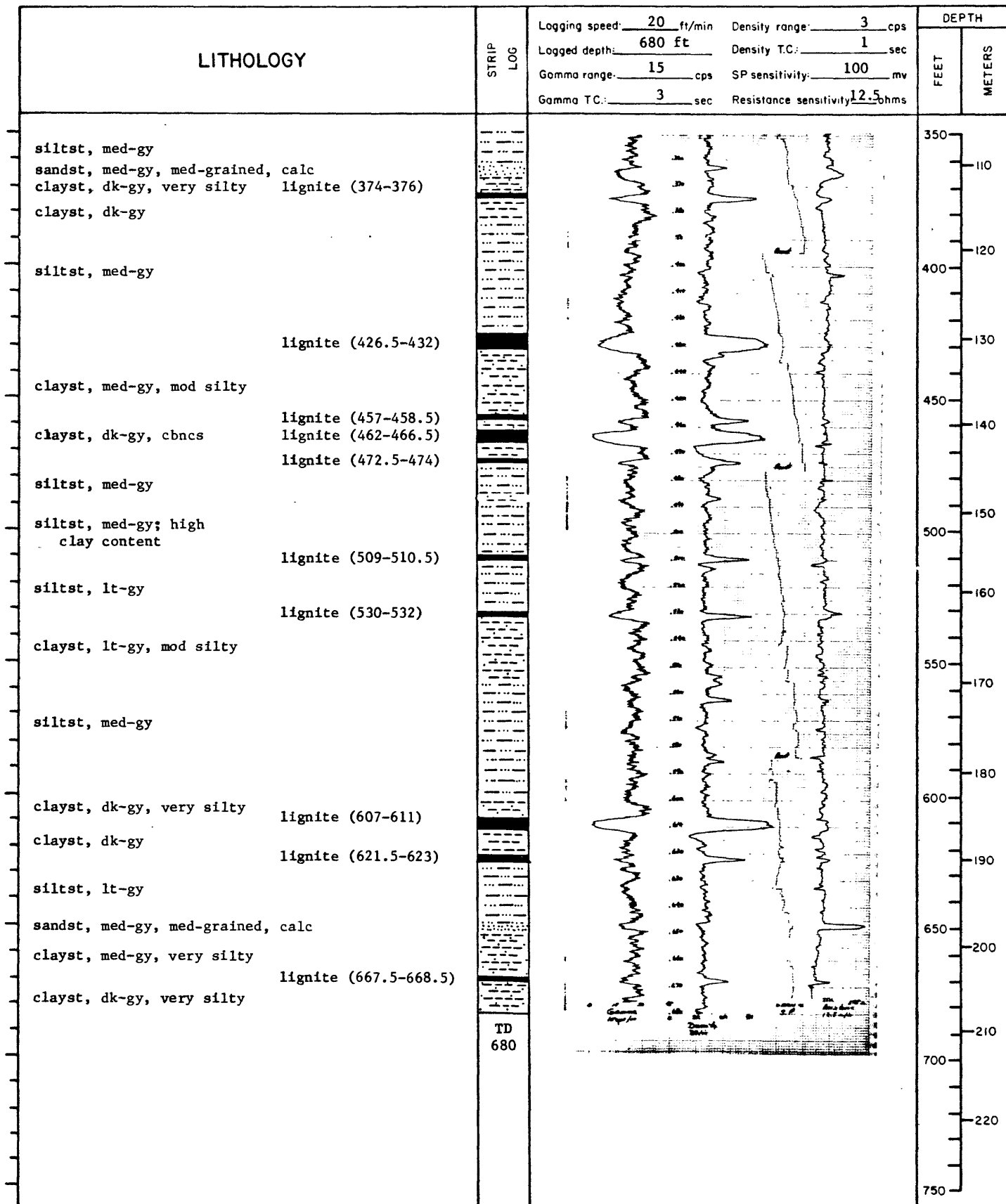


# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 6  
SHEET 1 OF 2

AREA Three River		QUAD NAME North Killdeer Mountain	
DATE STARTED 8-10-79	DATE COMP. 8-10-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 19 T. 147 N., R. 96 W., FOOTAGE LOC.		2435 ft FNL <del>XXX</del>	2540 ft FEL <del>XXX</del>
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV. 2518 ft	
		FOOTAGE ROTARY 680 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		DEPTH TO FLUID LEVEL 4 ft	
GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 680 ft	Density T.C.: 1 sec
		Gammo range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 12.5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, sand, silt, unconsol			0
sandst, lt-brn, fine-grained			10
clayst, lt-gy, very silty			50
lignite (60.5-64.5)			20
lignite (67.5-72)			
clayst, dk-gy, very silty			100
lignite (85.5-87.5)			30
lignite (102-104)			
siltst, lt-gy; high clay content			40
clayst, med-gy, very silty			150
sandst, lt-gy, fine-grained			50
clayst, lt-gy to lt-grn, very silty			200
			60
sandst, med-gy, fine-grained			70
siltst, med-gy; high clay content			250
lignite (274.5-277)			80
siltst, med-gy			300
lignite (308-311)			90
clayst, dk-gy to blk, cbnccs, very silty			100
lignite (328-331.5)			
siltst, dk-gy			350
lignite (340-341.5)			
siltst, med-gy			

## REMARKS:

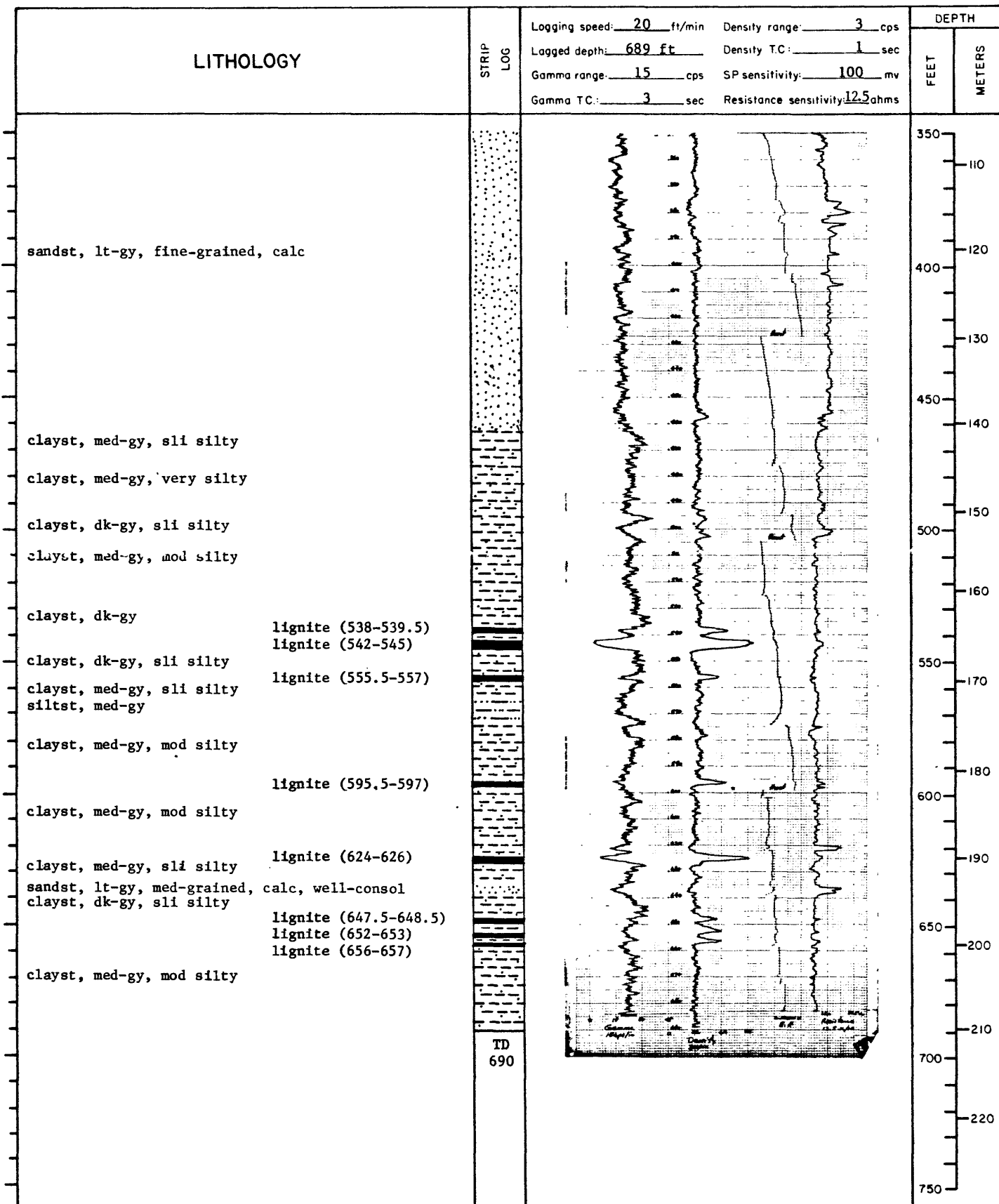


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 7  
SHEET 1 OF 2

AREA Three River		QUAD NAME North Killdeer Mountain	
DATE STARTED 8-10-79	DATE COMP. 8-10-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 28 T.147 N., R. 96 W., FOOTAGE LOC.		15 ft FNL XKXL 180 ft FEL XKXL	GROUND ELEV 2600 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 690 ft CORING ---	TOTAL DEPTH 690 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 7 ft
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 689 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 12.5 ohms
		DEPTH	
		FEET	METERS
soil, lt-brn, sand, silt, clay, unconsol			0
clayst, med-brn, very silty			10
			50
sandst, med-brn, fine-grained			20
			100
clayst, dk-gy, sli silty			30
clayst, med-gy, mod silty			40
siltst, med-gy			150
clayst, med-gy, mod silty			50
clayst, dk-gy			60
lignite (157-160)			200
clayst, dk-gy, mod silty			70
sandst, lt-gy, calc, fine-grained, well-consol			80
clayst, med-gy, mod silty			90
clayst, dk-gy, sli silty			100
			350
siltst, med-gy; high clay content			
clayst, dk-gy, sli silty			
clayst, dk-brn			
lignite (245.5-249)			
siltst, med-gy			
clayst, med-gy, very silty			
siltst, med-gy			
sandst, lt-gy, fine-grained, calc			

## REMARKS:



HOLE NO 8A  
SHEET 1 OF 1

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## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 8B  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lost Bridge			
DATE STARTED 8-13-79		DATE COMP. 8-13-79		COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 34 T. 147 N., R. 95 W.,		FOOTAGE LOC. 140 ft		820 ft	GROUND ELEV 2405 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 560 ft		CORING ---	TOTAL DEPTH 560 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 5 ft	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					

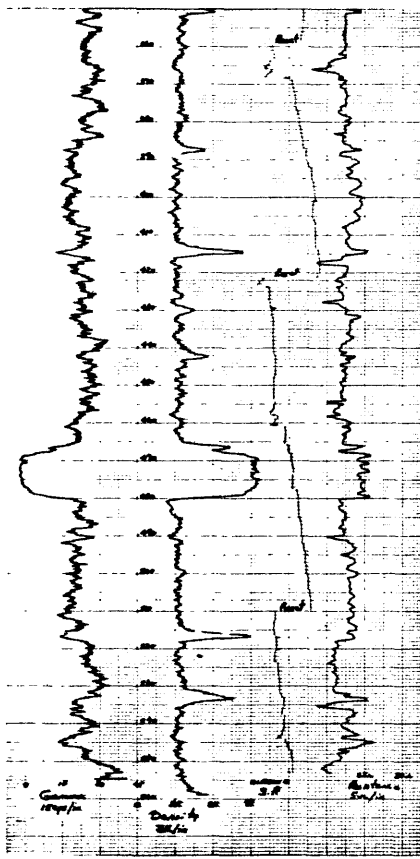
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range 3 cps		DEPTH	
		Logged depth 559 ft	Density TC 1 sec	Gamma range 15 cps	SP sensitivity 100 mv	FEET	METERS
soil, lt-brn, silt, clay, unconsol						0	0
clayst, med-brn, very silty lignite (14-15)							
clayst, med-brn, very silty							
sandst, med-brn, fine-grained						10	
clayst, med-gy, mod silty						50	
siltst, med-gy						20	
sandst, med-gy, fine-grained						100	30
clayst, dk-brn to blk, cbncc						40	
siltst, dk-gy; high clay content						150	50
clayst, dk-brn lignite (205.5-215.5)						200	60
clayst, dk-gy, sli silty lignite (219.5-220.5)						70	
sandst, med-gy, fine-grained lignite (235-237.5)						250	80
clayst, dk-brn lignite (264-265.5)						80	
siltst, med-gy; high clay content						90	
clayst, med-gy, very silty lignite (297.5-304.5)						300	90
clayst, dk-gy lignite (305.5-307)						100	
clayst, dk-gy, mod silty lignite (329-333)						350	



## REMARKS:

LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS

Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>559</u> ft    Density T.C.: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms			
clayst, med-gy, mod silty		350	110
clayst, med-gy, very silty		400	120
lignite (414-415)		415	126
clayst, lt-gy, mod silty		450	137
lignite (466-467)		467	143
lignite (468-480)		480	146
clayst, dk-brn, sli silty		500	152
siltst, lt-gy; high clay content		515	157
lignite (515.5-517.5)		517.5	158
clayst, dk-gy, sli silty		533	163
lignite (533-534)		534	163
clayst, dk-gy, very silty		550	168
clayst, med-gy, mod silty		600	183
		650	198
		700	213
		750	229

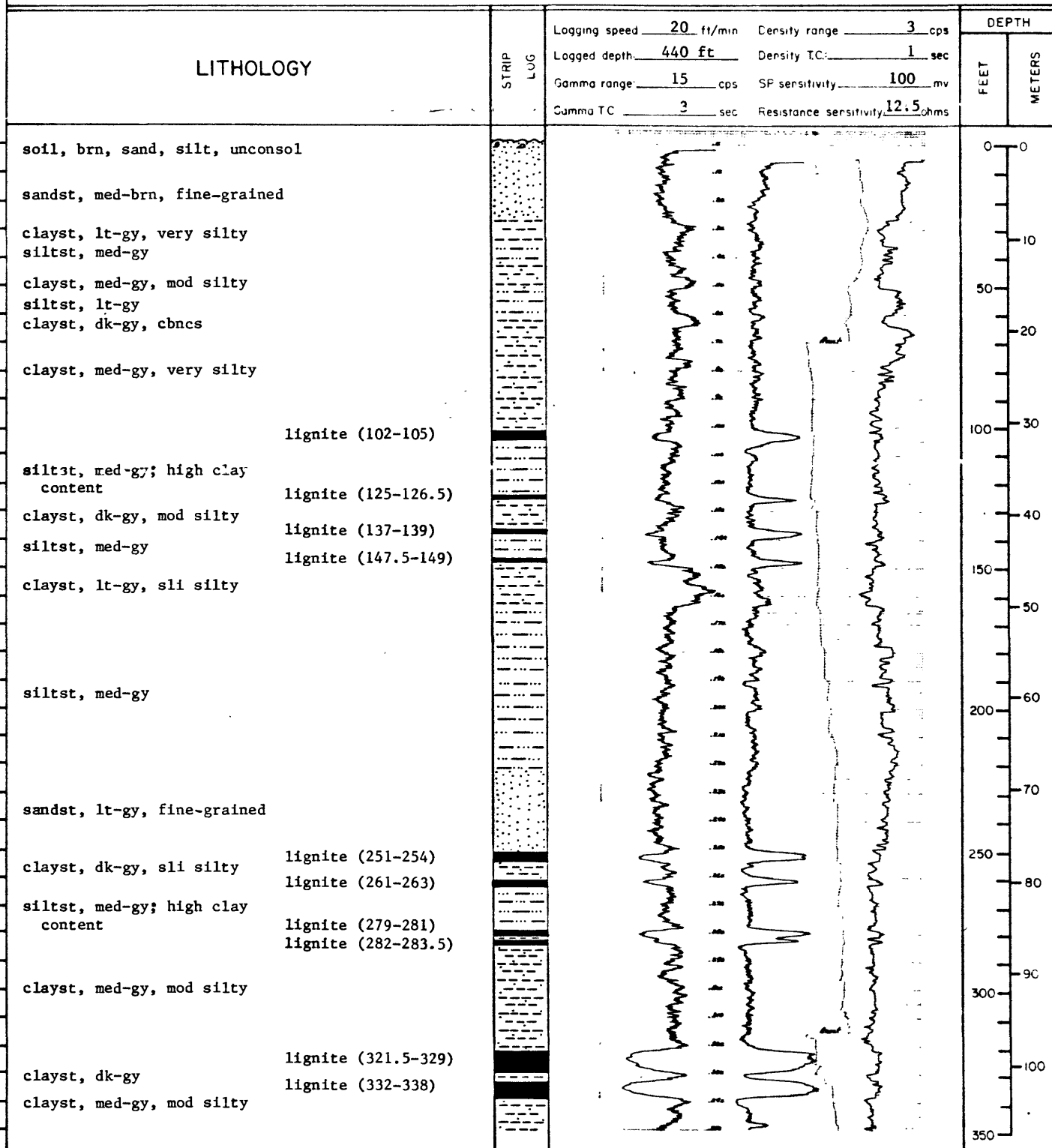
  

TD 560
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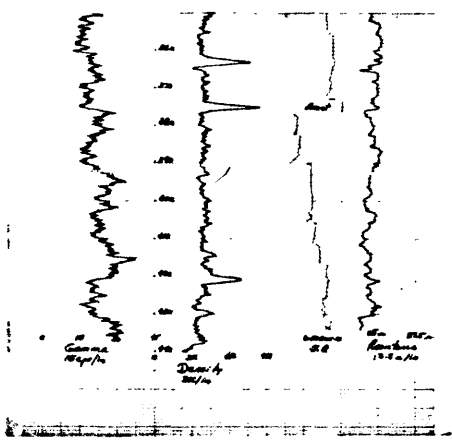
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 9  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lone Butte SE	
DATE STARTED 8-9-79	DATE COMP 8-9-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 2 T.146 N., R. 97 W., FOOTAGE LOC.		30 ft FNL XXX	2375 ft FEL XXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft	CORING ---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	GROUND ELEV 2490 ft
LITHOLOGY RECORDED BY M. Hudson		DEPTH TO FLUID LEVEL 6 ft	
GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:			



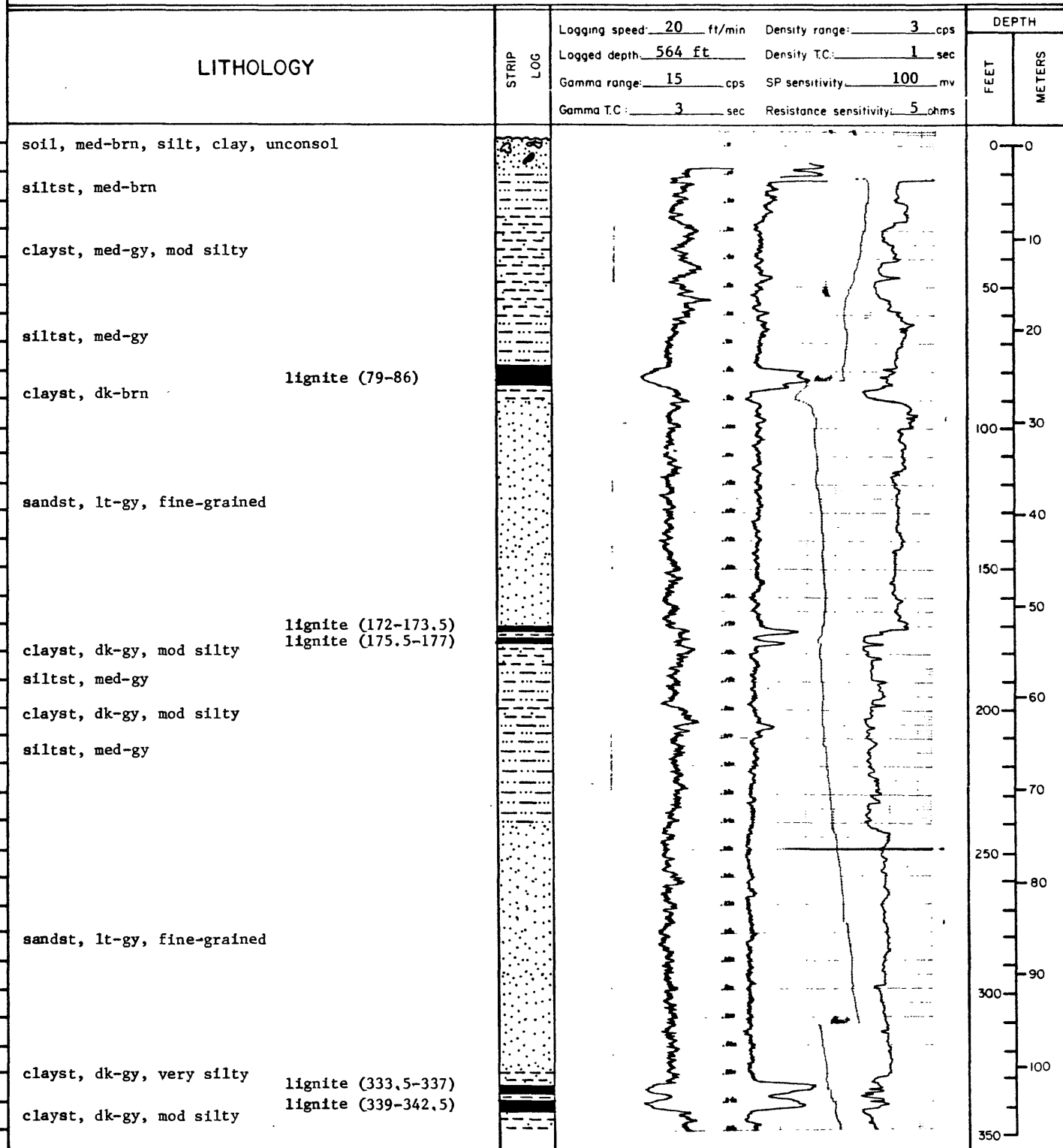
## REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>440</u> ft    Density T.C.: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv			
		Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>12.5</u> ohms			
clayst, med-gy, mod silty				350	
siltst, med-gy				400	
sandst, med-gy, fine-grained				450	
lignite (362.5-363.5)				400	120
lignite (374.5-376)				420	126
clayst, med-gy, sli silty				440	134
lignite (430-431)				460	140
siltst, dk-gy; high clay content				480	146
clayst, lt-grn, very silty				500	152
	TD 440			550	167
				600	183
				650	198
				700	213
				750	228


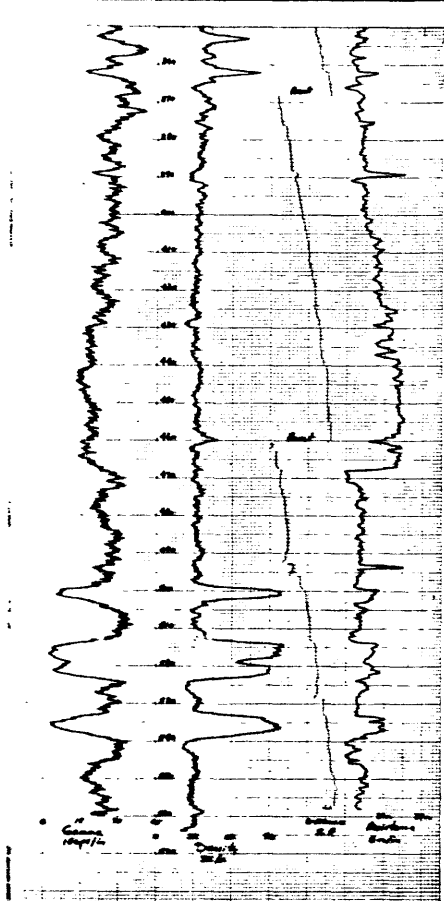
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 10  
SHEET 1 OF 2

AREA Three River		QUAD NAME Killdeer Mountains			
DATE STARTED 8-9-79	DATE COMP. 8-9-79	COUNTY Dunn	STATE North Dakota		
LOCATION: SEC. 26 T.146 N., R. 97 W., FOOTAGE LOC.		1175 ft	FNL <del>XXX</del>	168 ft	FEL <del>XXX</del>
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 565 ft		CORING	---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 12 ft	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					



## REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps	DEPTH	
		Logged depth: 564 ft	Density T.C.: 1 sec	FEET	METERS
		Gamma range: 15 cps	SP sensitivity: 100 mv		
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms		
clayst, dk-gy, mod silty					350
clayst, dk-gy, sli silty					110
clayst, med-gy, sli silty					120
					400
siltst, med-gy					130
					450
sandst, med-gy, fine-grained					140
					500
clayst, med-gy, mod silty					150
					550
clayst, dk-gy, sli silty	160				
	600				
clayst, dk-gy, sli silty	170				
clayst, dk-brn	180				
clayst, med-gy, mod silty	190				
	200				
	210				
	220				
	700				
	750				

## UNITED STATES GEOLOGICAL SURVEY

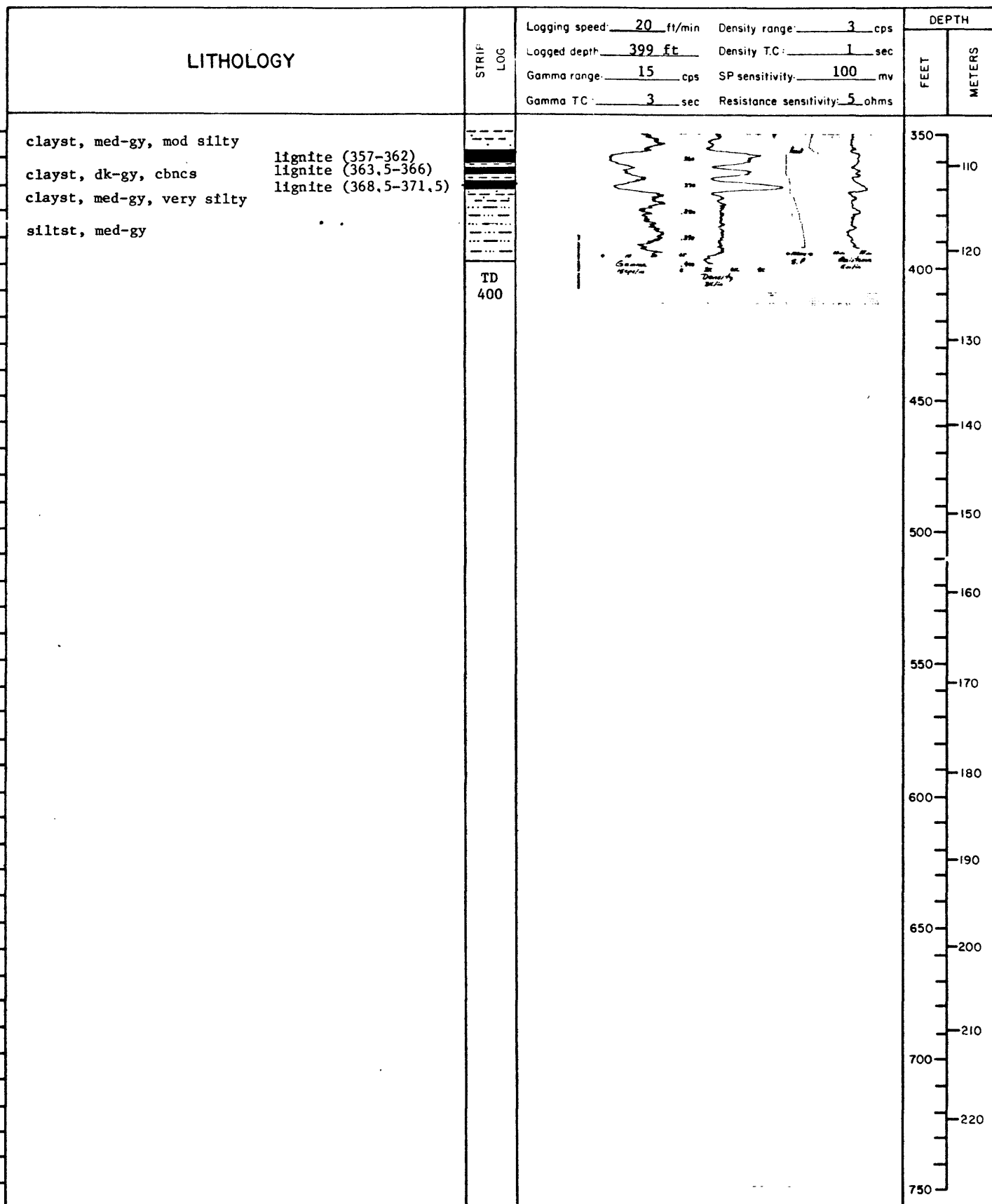
HOLE NO 11  
SHEET 1 OF 2

AREA Three River		QUAD NAME Pete's Creek	
DATE STARTED 8-4-79	DATE COMP. 8-4-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 28 T.146 N., R.97 W., FOOTAGE LOC. 2415 ft		XXX FSL 1790 ft	XXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 400 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Logged depth 399 ft Gamma range 15 cps Gamma TC: 3 sec	Density range 3 cps Density TC 1 sec SP sensitivity 100 mv Resistance sensitivity 5 ohms	DEPTH	
				FEET	METERS
soil, med-brn, sand, silt, unconsol				0	0
siltst, med-brn				10	
sandst, med-brn, fine-grained				50	
lignite (56-61.5)				20	
siltst, med-brn; high clay content				100	30
clayst, dk-gy, mod silty				40	
lignite (112.5-113.5)				150	50
clayst, med-gy, very silty				200	60
sandst, med-gy, fine-grained				210	
lignite (194-195.5)				220	
clayst, med-brn, very silty				230	
clayst, dk-gy, cbnccs				240	
lignite (215-218.5)				250	
lignite (221-225)				260	
clayst, med-gy, mod silty				270	
lignite (249-250.5)				280	
clayst, lt-gy, very silty				290	
sandst, med-gy, fine-grained				300	
clayst, med-gy, mod silty				310	
sandst, dk-gy, fine-grained				320	
lignite (289-294)				330	
clayst, dk-gy				340	
lignite (301.5-303)				350	
siltst, med-gy					
clayst, dk-brn, cbnccs					
lignite (333-335)					
clayst, med-gy, mod silty					
lignite (338-341)					

REMARKS:

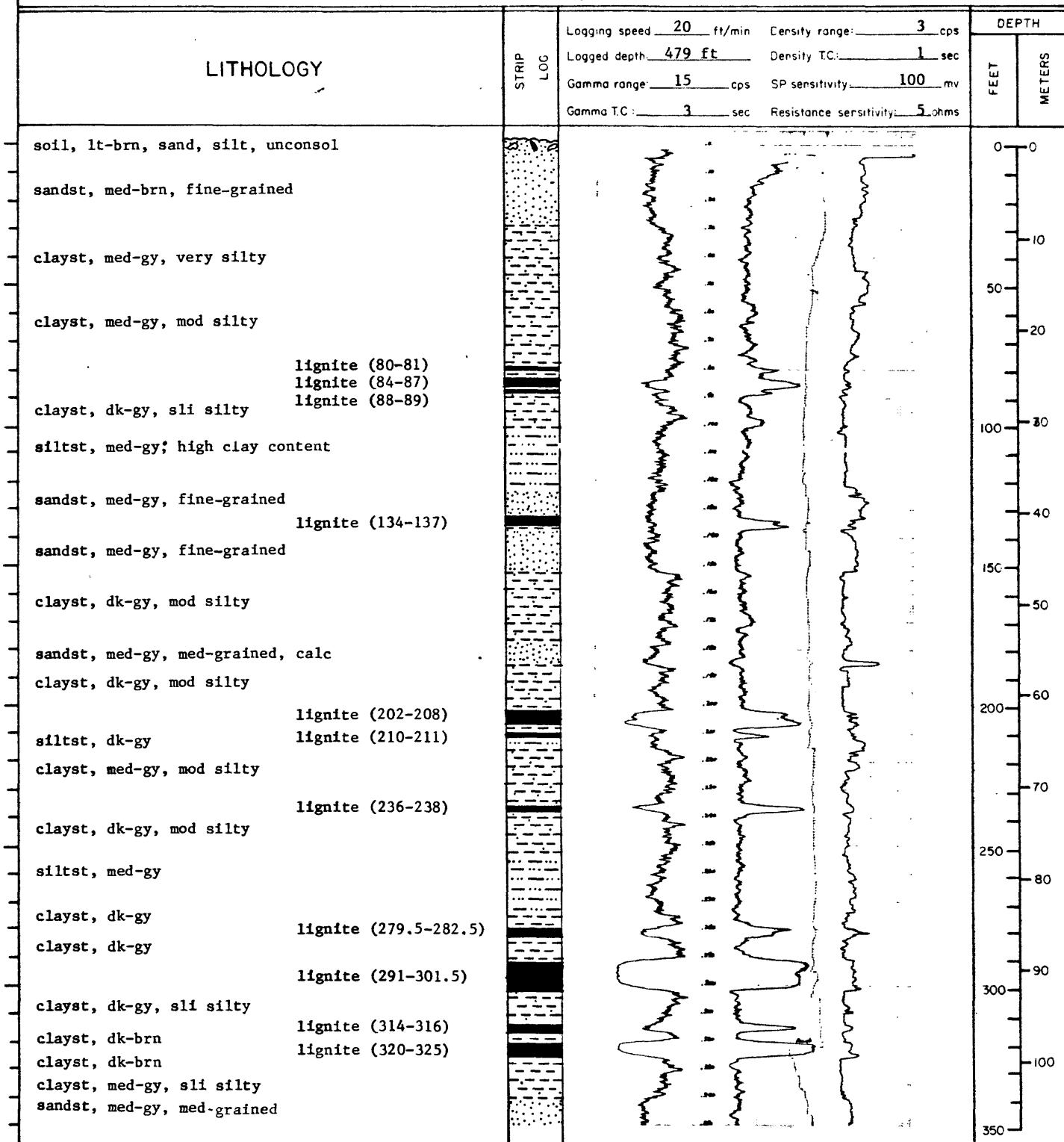


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 12  
SHEET 1 OF 2

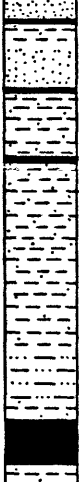
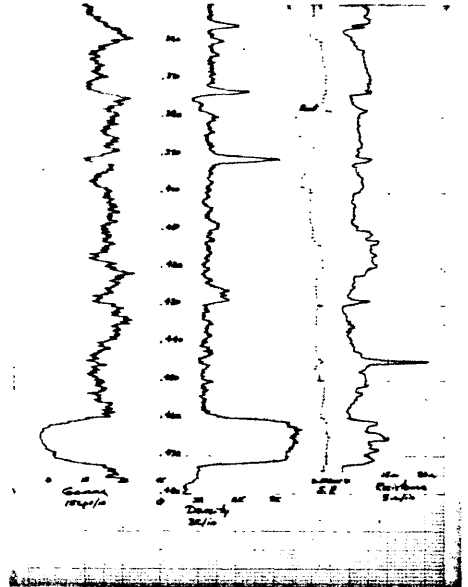
AREA Three River		QUAD NAME Oakdale	
DATE STARTED 8-9-79	DATE COMP. 8-9-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 8 T.146 N., R. 95 W., FOOTAGE LOC.		120 ft <del>XXX</del> FSL	10 ft <del>XXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE	
		ROTARY 480 ft	CORING ---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	

REMARKS:





## REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps		DEPTH		
		Logged depth: <u>479</u> ft    Density T.C.: <u>1</u> sec		FEET	METERS	
		Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv				
		Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms				
sandst, med-gy, med-grained clayst, dk-brn, sli silty				350		
sandst, med-gy, fine-grained clayst, med-gy, mod silty				110		
clayst, lt-gy, very silty				120		
clayst, dk-gy, sli silty				130		
siltst, med-gy clayst, dk-gy, mod silty				140		
lignite (355-356) lignite (373-374) lignite (390.5-392)				150		
lignite (460.5-472)				160		
clayst, dk-gy, sli silty				TD 480	170	
					180	
					190	
					200	
					210	
					220	
					230	
					240	
					250	
					260	
					270	
			280			
			290			
			300			
			310			
			320			
			330			
			340			
			350			
			360			
			370			
			380			
			390			
			400			
			410			
			420			
			430			
			440			
			450			
			460			
			470			
			480			
			490			
			500			
			510			
			520			
			530			
			540			
			550			
			560			
			570			
			580			
			590			
			600			
			610			
			620			
			630			
			640			
			650			
			660			
			670			
			680			
			690			
			700			
			710			
			720			
			730			
			740			
			750			

## UNITED STATES GEOLOGICAL SURVEY

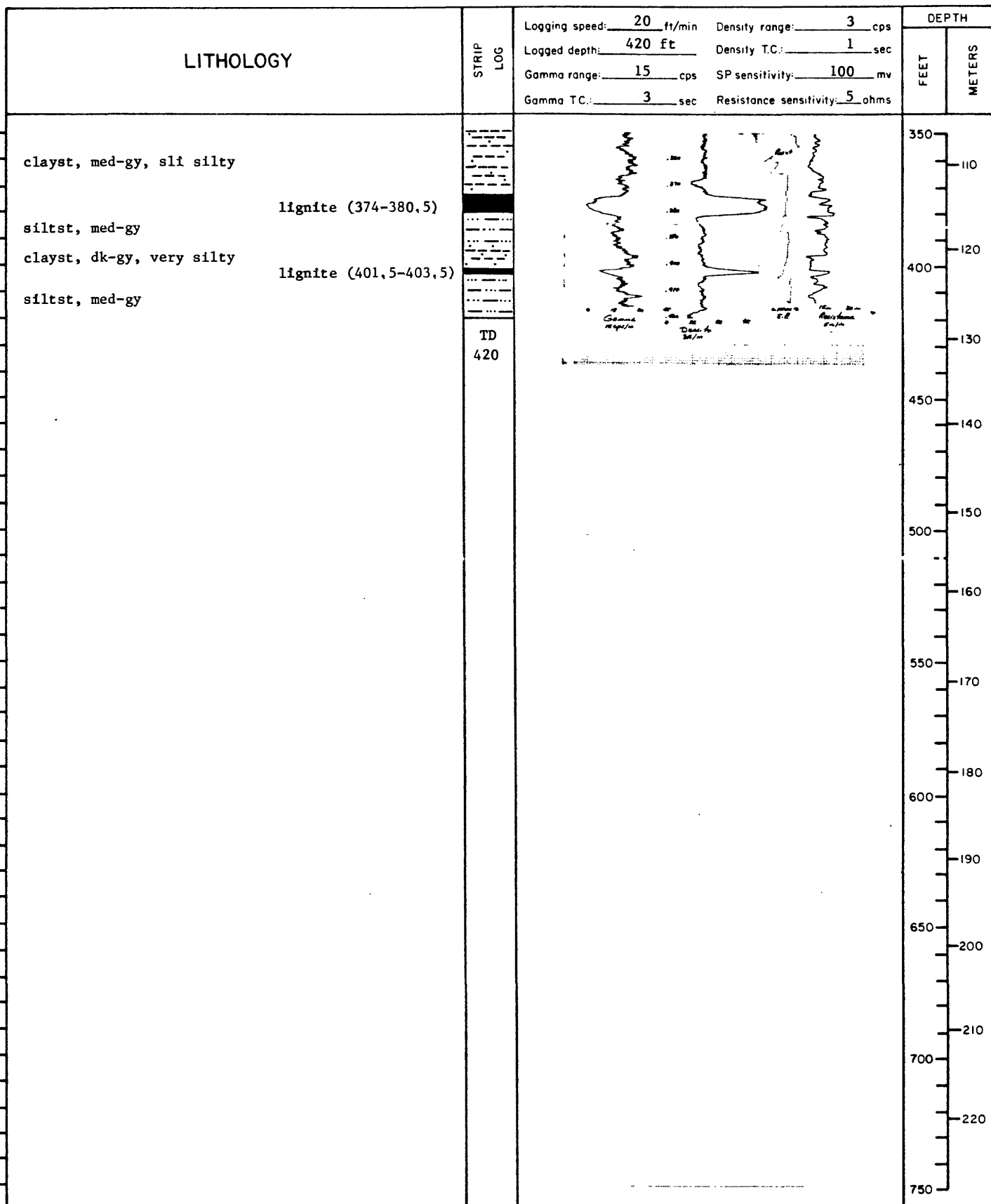
HOLE NO 13  
SHEET 1 OF 2

AREA Three River		QUAD NAME Oakdale	
DATE STARTED 8-8-79	DATE COMP. 8-8-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 30 T.146 N., R. 95 W., FOOTAGE LOC.		50 ft <del>XXX</del> FSL 200 ft <del>XXX</del> FEL	GROUND ELEV. 2305 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 420 ft CORING ---	TOTAL DEPTH 420 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 6 ft
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range 3 cps		DEPTH	
		Logged depth 420 ft	Density TC 1 sec	Gamma range 15 cps	SP sensitivity 100 mv	FEET	METERS
soil, lt-brn, sand, silt, unconsol						0	0
siltst, med-gy						10	
sandst, lt-grn, calc, fine-grained						50	
siltst, dk-gy, cbncc						20	
clayst, brn, cbncc							
						100	30
clayst, med-gy, sli silty							
						120	30
clayst, dk-gy, sli silty							
						140	40
clayst, med-gy, very silty							
						160	50
clayst, med-gy, sli silty							
						200	60
siltst, lt-gy							
clayst, dk-gy, very silty						220	70
						260	80
clayst, med-gy, sli silty							
						280	90
clayst, dk-gy, very silty, cbncc							
						300	100
siltst, lt-gy; high clay content							
clayst, med-gy, mod silty							
						340	
clayst, med-gy, sli silty						350	

## REMARKS:

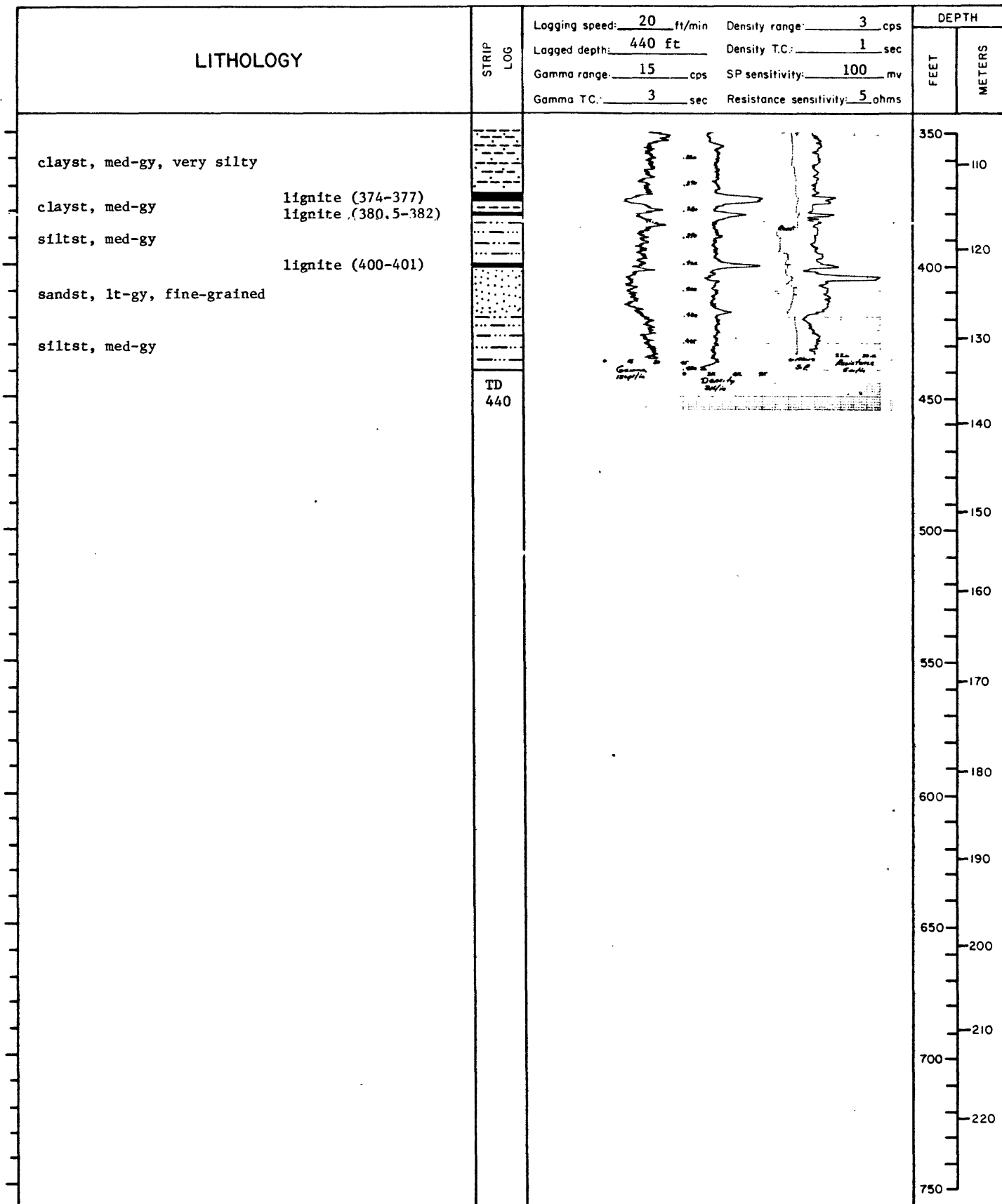


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 14  
SHEET 1 OF 2

AREA Three River		QUAD NAME Dunn Center NE	
DATE STARTED 8-14-79	DATE COMP. 8-14-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 18 T.146 N., R. 93 W., FOOTAGE LOC. 28 ft		XXX FSL 30 ft	XXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Lagged depth 440 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
soil, lt-brn, sand, unconsol siltst, med-gy; high clay content		DEPTH FEET METERS	
			0 0
			10
sandst, med-gy, calc, med-grained			50
			20
siltst, med-gy			100
			30
lignite (121-128)			40
clayst, dk-gy, mod silty			150
			50
siltst, med-gy			200
			60
sandst, med-gy, fine-grained			70
clayst, dk-gy, cbncs			250
lignite (185-190.5) lignite (194-197)			80
			90
siltst, med-gy			300
			100
clayst, dk-gy, very silty			350
lignite (248-251) lignite (254-259)			
clayst, med-gy, mod silty			
sandst, med-gy, fine-grained			
clayst, lt-gy, mod silty			
siltst, med-gy			
clayst, med-brn, cbncs			
lignite (334.5-337) lignite (340.5-349.5)			

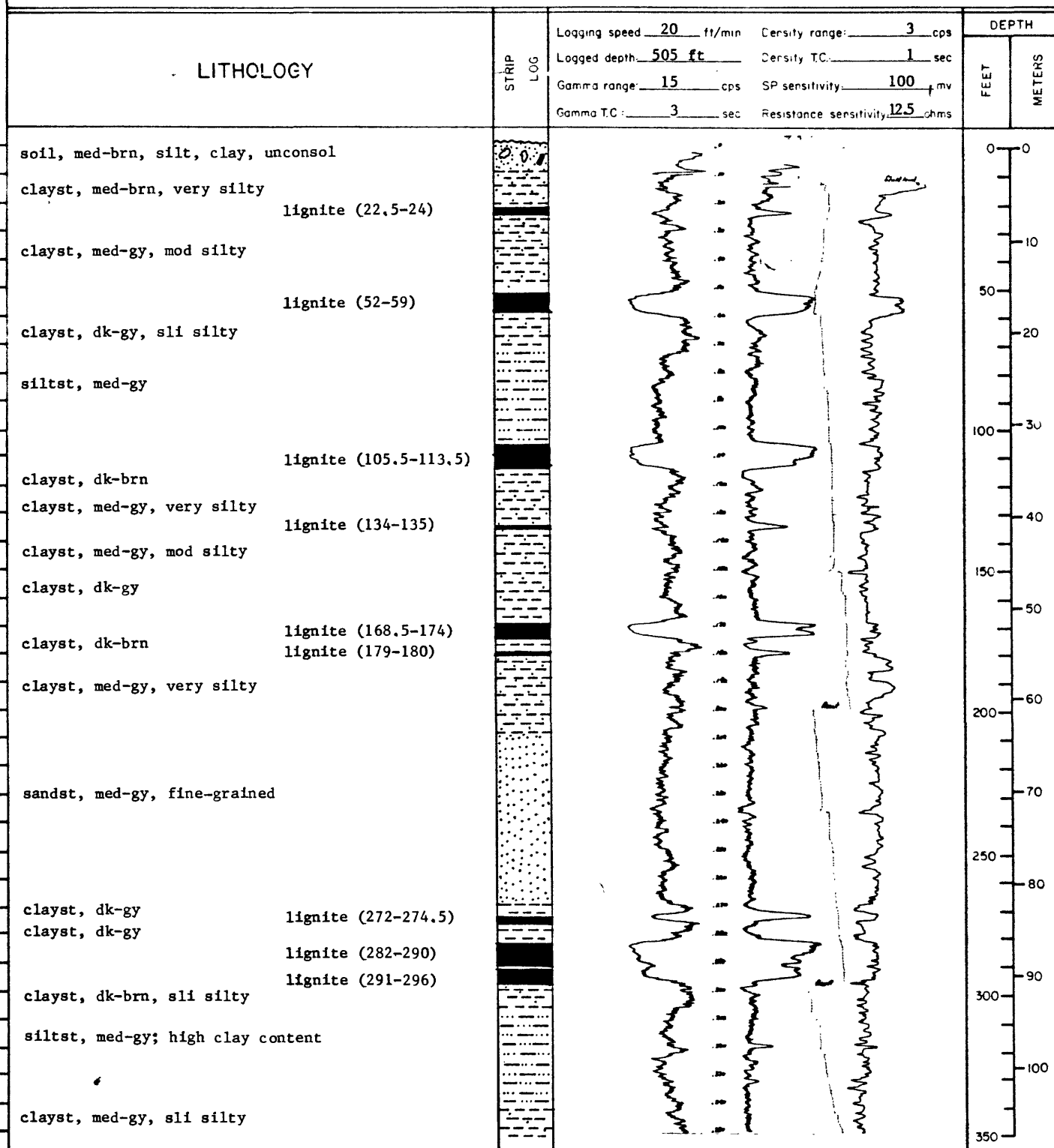
## REMARKS:



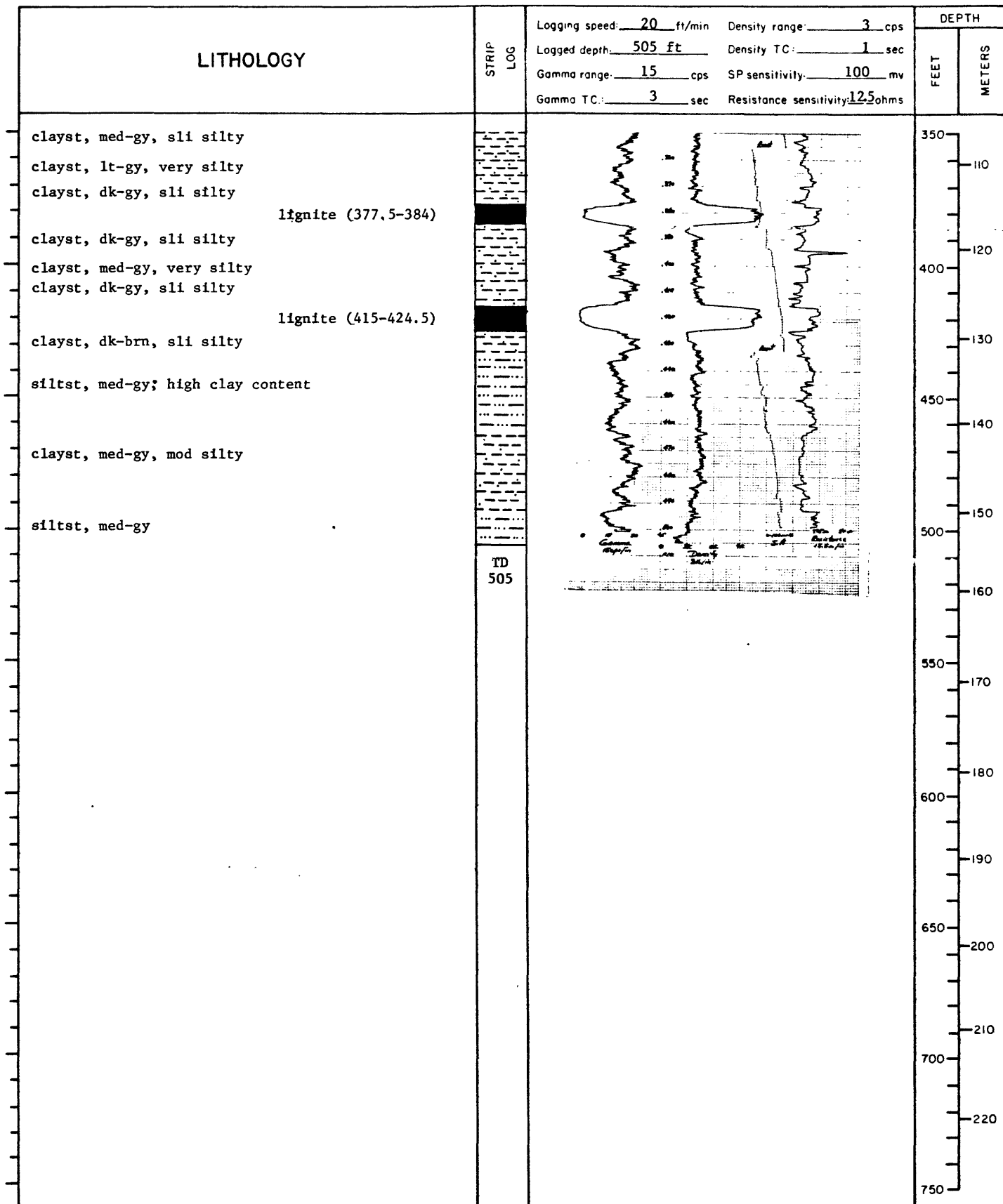
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 15  
SHEET 1 OF 2

AREA Three River		QUAD NAME Dunn Center NE	
DATE STARTED 8-14-79	DATE COMP. 8-14-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 28 T.146 N., R. 93 W., FOOTAGE LOC.		72 ft	1360 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 505 ft	CORING ---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



## REMARKS:

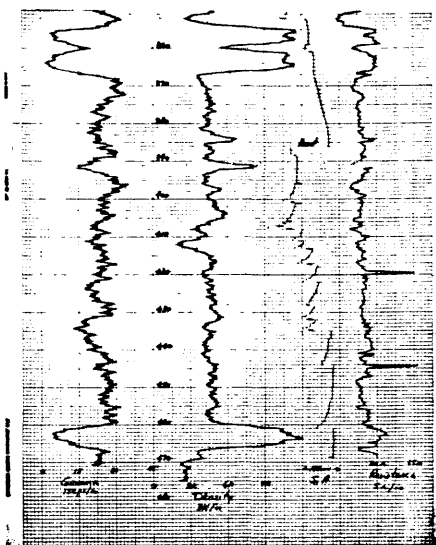


HOLE NO 16  
SHEET 1 OF 2

34



## REMARKS:

LITHOLOGY	STRIP LOG	Loggng speed: <u>20</u> ft/min    Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>475</u> ft    Density T.C.: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv			
		Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms			
clayst, dk-gy				350	
					110
lignite (354,5-359)					120
clayst, dk-brn				400	
clayst, med-gy, very silty					130
clayst, dk-brn				450	
clayst, med-gy, mod silty					140
clayst, med-gy, very silty				500	
clayst, med-gy, mod silty					150
lignite (460,5-466)				550	
clayst, dk-gy, sli silty					160
	TD 476			600	
					170
				650	
					180
				700	
					190
					200
					210
					220
				750	

## UNITED STATES GEOLOGICAL SURVEY

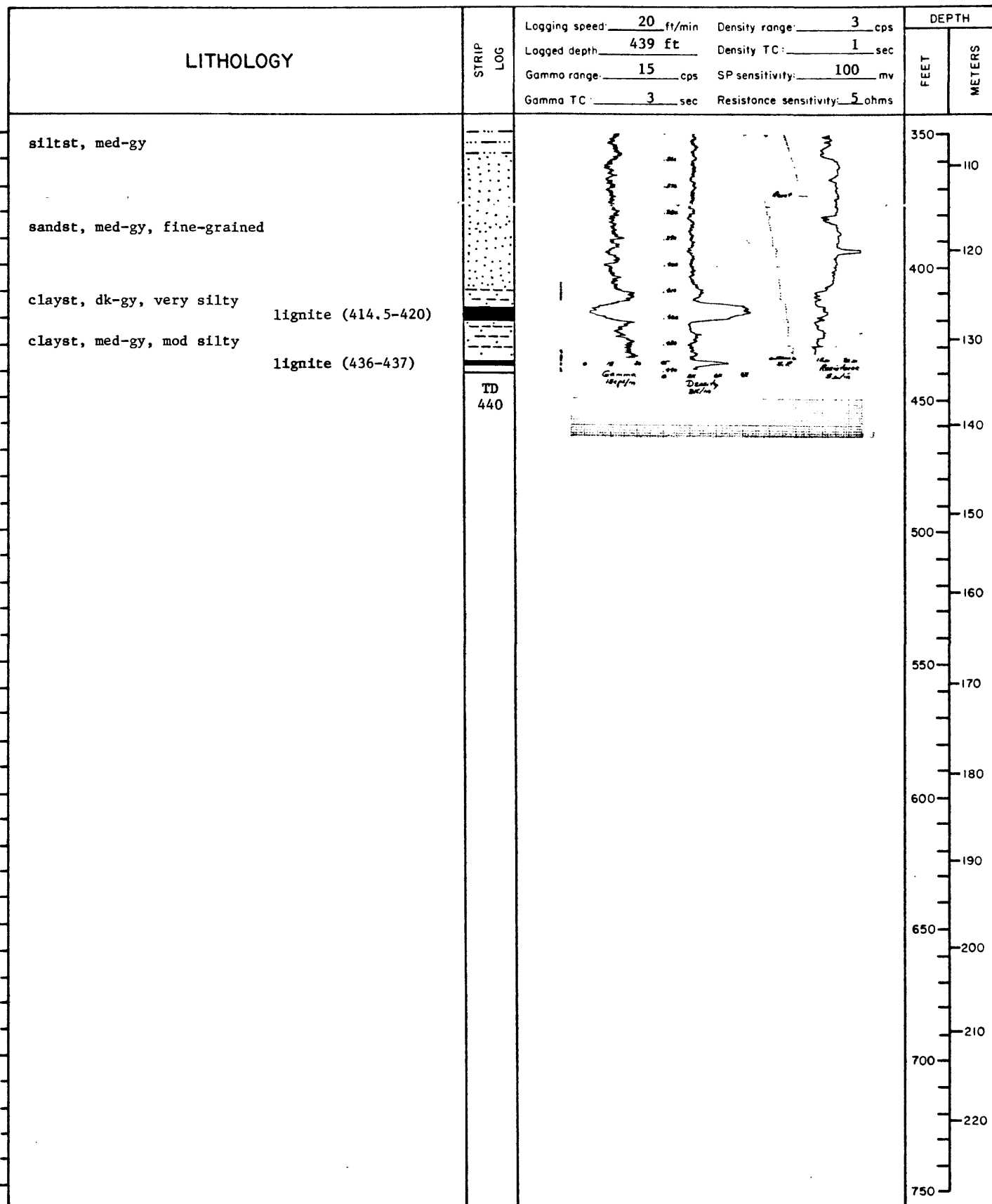
HOLE NO 17  
SHEET 1 OF 2

AREA Three River		QUAD NAME Grassy Butte SE	
DATE STARTED 8-4-79	DATE COMP. 8-4-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 14 T. 145 N., R. 97 W., FOOTAGE LOC.		105 ft <del>XXXX</del> FSL 10 ft <del>XXXX</del> FWL	GROUND ELEV 2520 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft CORING ---	TOTAL DEPTH 440 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 9 ft
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min		Density range: 3 cps		DEPTH	
		Lagged depth: 439 ft	Density TC: 1 sec	FEET	METERS		
soil, med-brn, sand, unconsol				0	0		
sandst, med-brn, fine-grained				10			
siltst, med-gy; high clay content				50			
clayst, med-gy, mod silty				20			
lignite (77-78)				100	30		
clayst, med-gy, very silty				40			
lignite (125.5-128)				150	50		
clayst, dk-gy, sli silty				70			
lignite (146.5-153)				200	60		
clayst, med-gy, very silty				250	80		
sandst, med-gy, calc, fine-grained				300	90		
clayst, med-gy, very silty				330			
lignite (293-296)				350	100		
lignite (298-304)							
lignite (307-308)							
clayst, lt-gy, mod silty							
lignite (336-337.5)							
siltst, med-gy							

REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 18  
SHEET 1 OF 1

AREA Three River		QUAD NAME Grassy Butte SE	
DATE STARTED 8-4-79	DATE COMP. 8-4-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 34 T. 145 N., R. 97 W., FOOTAGE LOC. 2633 ft		FNL <del>XXXX</del> 240 ft	GROUND ELEV 2448 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 300 ft CORING ---	TOTAL DEPTH 300 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 2 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth: 300 ft		Density T.C. 1 sec		FEET	METERS
		Gamma range: 15 cps		SP sensitivity: 100 mv			
		Gamma T.C.: 3 sec		Resistance sensitivity: 5 ohms			
soil, med-brn, sand, silt, clay, unconsol clayst, lt-gy						0	0
siltst, med-gy; high clay content						10	
clayst, med-gy, mod silty sandst, med-gy, fine-grained lignite (53-55)						50	
clayst, med-gy, very silty sandst, lt-gy, calc, well-consol, med grained clayst, med-gy, very silty lignite (86-89)						20	
clayst, med-gy, sli silty lignite (100-105)						100	30
clayst, med-gy, very silty lignite (131.5-133)							
clayst, lt-gy, mod silty						150	40
siltst, med-gy lignite (179-181.5)							
clayst, med-gy, very silty lignite (212.5-221.5)						200	60
clayst, med-brn, cbnccs lignite (230-231.5)							
clayst, med-gy, mod silty lignite (265-267.5)						250	80
clayst, med-gy, very silty							
siltst, med-gy						300	90
	TD 300					350	100

# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 19A  
SHEET 1 OF 1

AREA Three River		QUAD NAME Killdeer Mountains	
DATE STARTED 8-9-79	DATE COMP. 8-9-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 2 T. 145 N., R. 96 W., FOOTAGE LOC.		1056 ft <del>XXX</del> FSL	2630 ft <del>XXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 150 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY ---	
REMARKS: Hole abandoned at 150 ft owing to complete loss of circulation No geophysical log run on this hole			

LITHOLOGY	STRIP LOG	GEOPHYSICAL DATA		DEPTH	
		Logging speed: --- ft/min	Density range: --- cps	FEET	METERS
soil, lt-brn, sand, silt, unconsol	5-8	Logged depth: ---	Density TC: --- sec	0	0
sandst, med-brn, fine-grained	•••••	Gamma range: --- cps	SP sensitivity: --- mv	10	
	•••••	Gamma TC: --- sec	Resistance sensitivity: --- ohms	50	
no return, probably sandst	X			100	30
	X			150	50
	TD 150			200	60
				250	80
				300	90
				350	100

# UNITED STATES GEOLOGICAL SURVEY

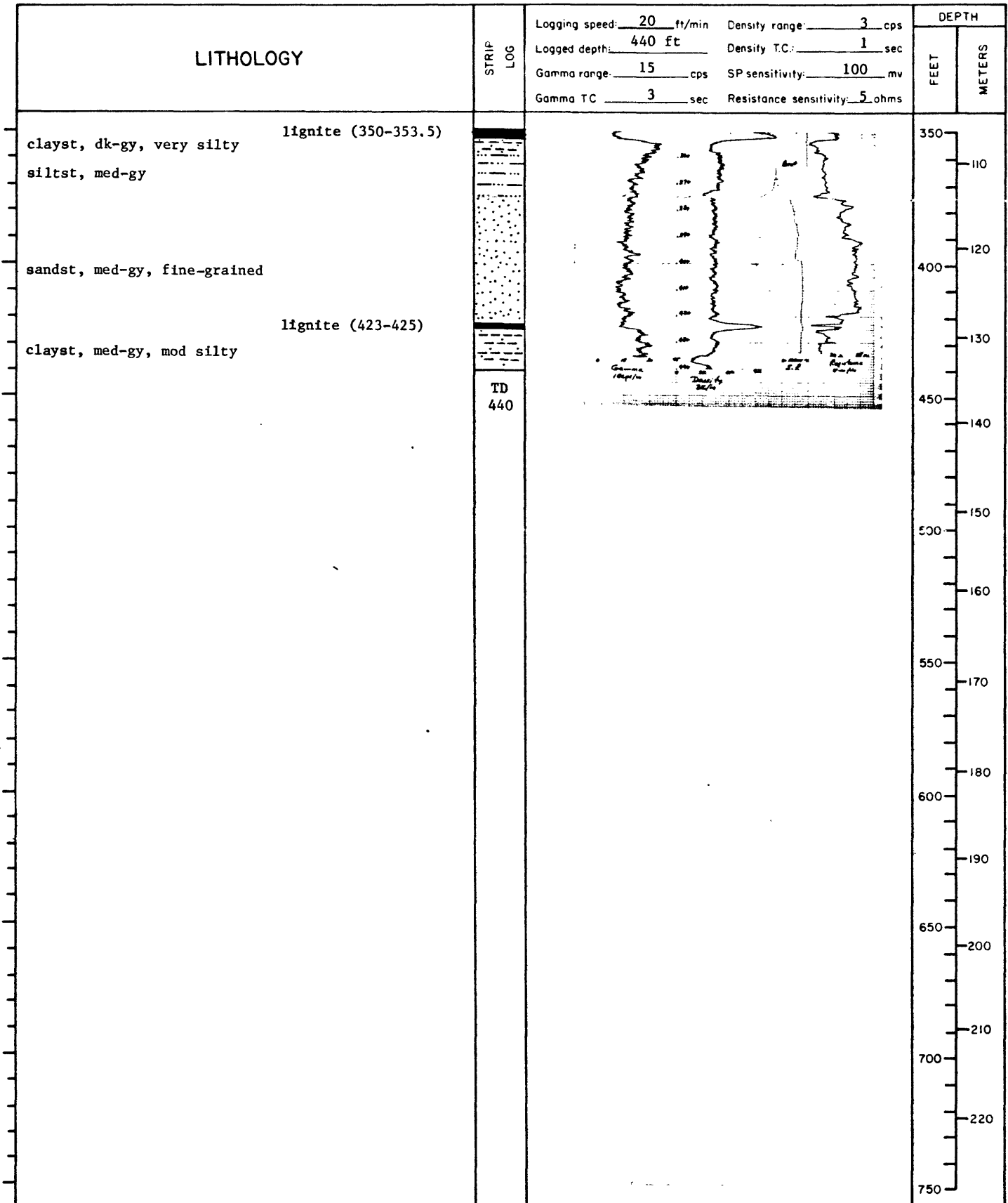
HOLE NO 19B  
SHEET 1 OF 2

AREA Three River		QUAD NAME Killdeer Mountains	
DATE STARTED 8-9-79	DATE COMP. 8-9-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 2 T.145 N., R. 96 W., FOOTAGE LOC.		75 ft <del>XXXL</del> FSL	25 ft <del>XXXL</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP	LOG	GEOPHYSICAL DATA		DEPTH	
			Logging speed: 20 ft/min	Density range: 3 cps	FEET	METERS
soil, med-brn, sand, unconsol			Logged depth: 440 ft	Density TC: 1 sec		
			Gamma range: 15 cps	SP sensitivity: 100 mv		
			Gamma TC: 3 sec	Resistance sensitivity: 5 ohms		
sandst, med-brn, fine-grained					0	0
					10	
					50	
clayst, med-gy, very silty					20	
siltst, med-gy; high clay content					100	30
					40	
clayst, med-gy, mod silty					150	50
					50	
lignite (180.5-183)					200	60
siltst, lt-gy					70	
					250	80
lignite (215-217)					80	
clayst, med-gy, very silty					90	
					300	90
siltst, med-gy					100	
					350	100
lignite (264-265)						
lignite (266.5-269.5)						
lignite (270.5-271.5)						
sandst, lt-gy, calc, fine-grained, well-consol						
clayst, med-gy, very silty						
siltst, med-gy						
lignite (333-335)						
lignite (336.5-337.5)						
lignite (341-348)						
clayst, dk-brn, cbnccs						

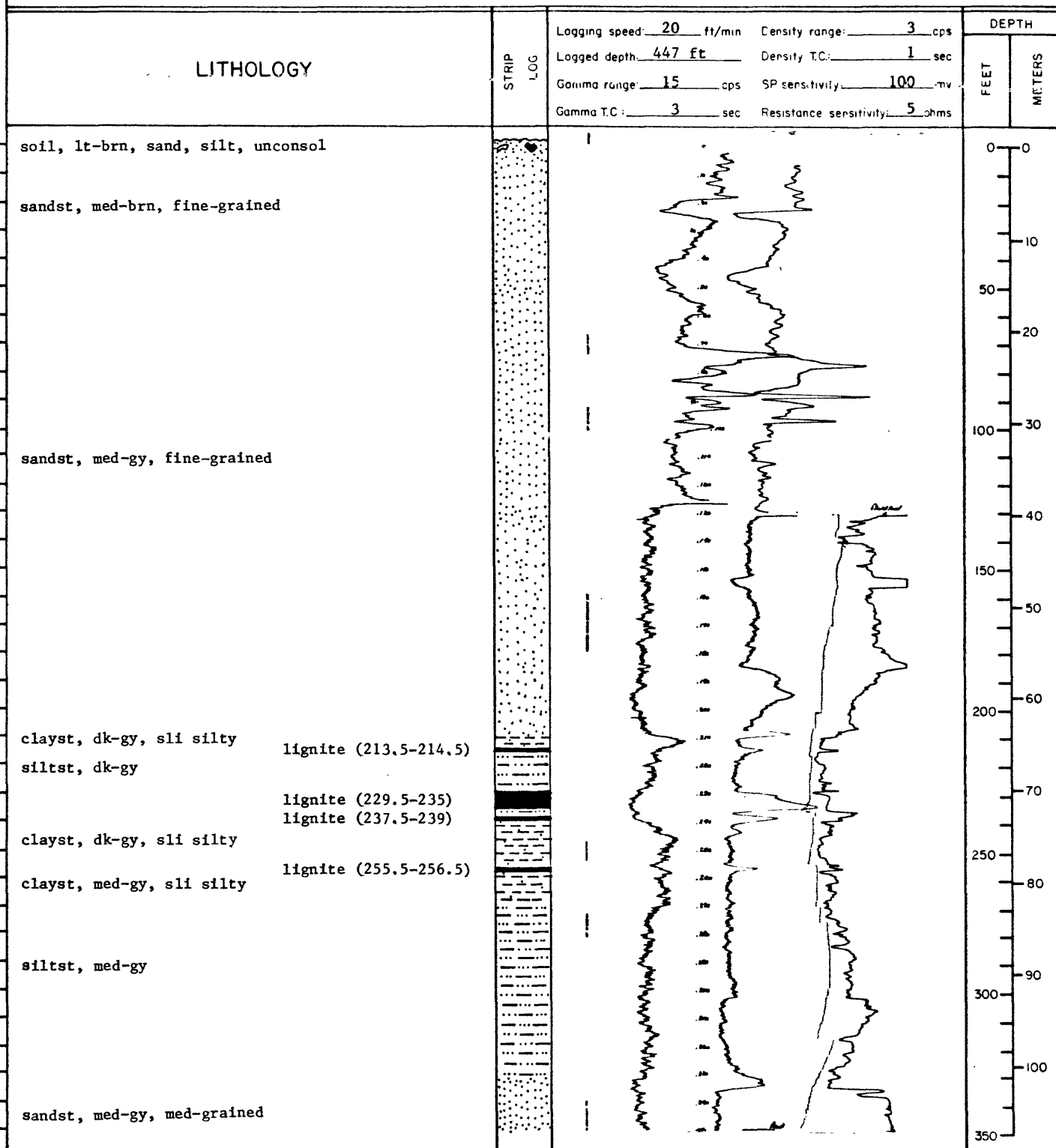
## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

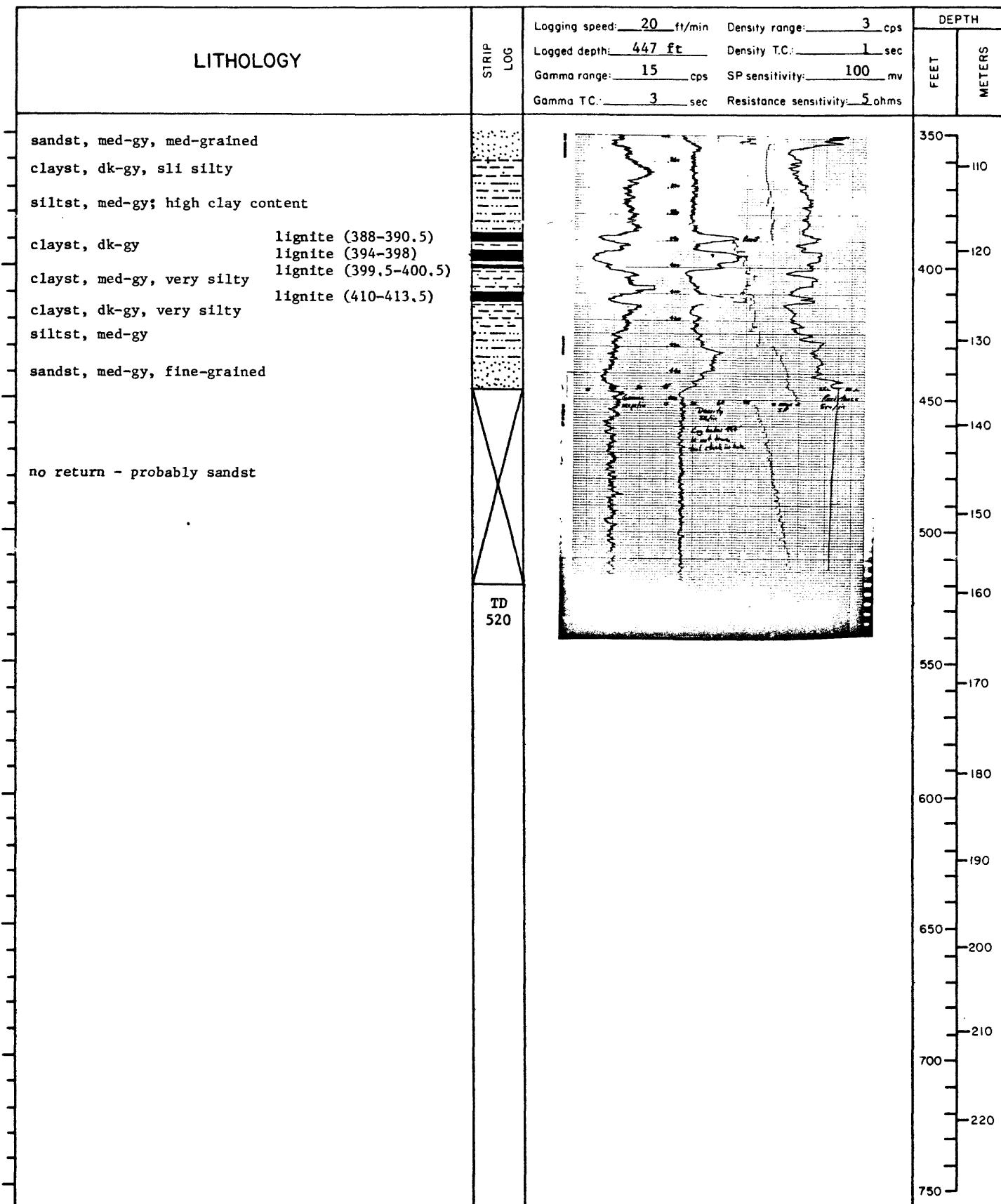
HOLE NO 20  
SHEET 1 OF 2

AREA Three River		QUAD NAME Killdeer Mountains	
DATE STARTED 8-20-79	DATE COMP. 8-20-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 6 T.14S N., R. 96 W., FOOTAGE LOC. 85 ft		XXX FSL 45 ft	FEL XXXL GROUND ELEV 2565 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 520 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	TOTAL DEPTH 520 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS: Hole was drilled to 520 ft. Because of poor hole condition geophysical log was run only from 447 ft to surface.			





## REMARKS:

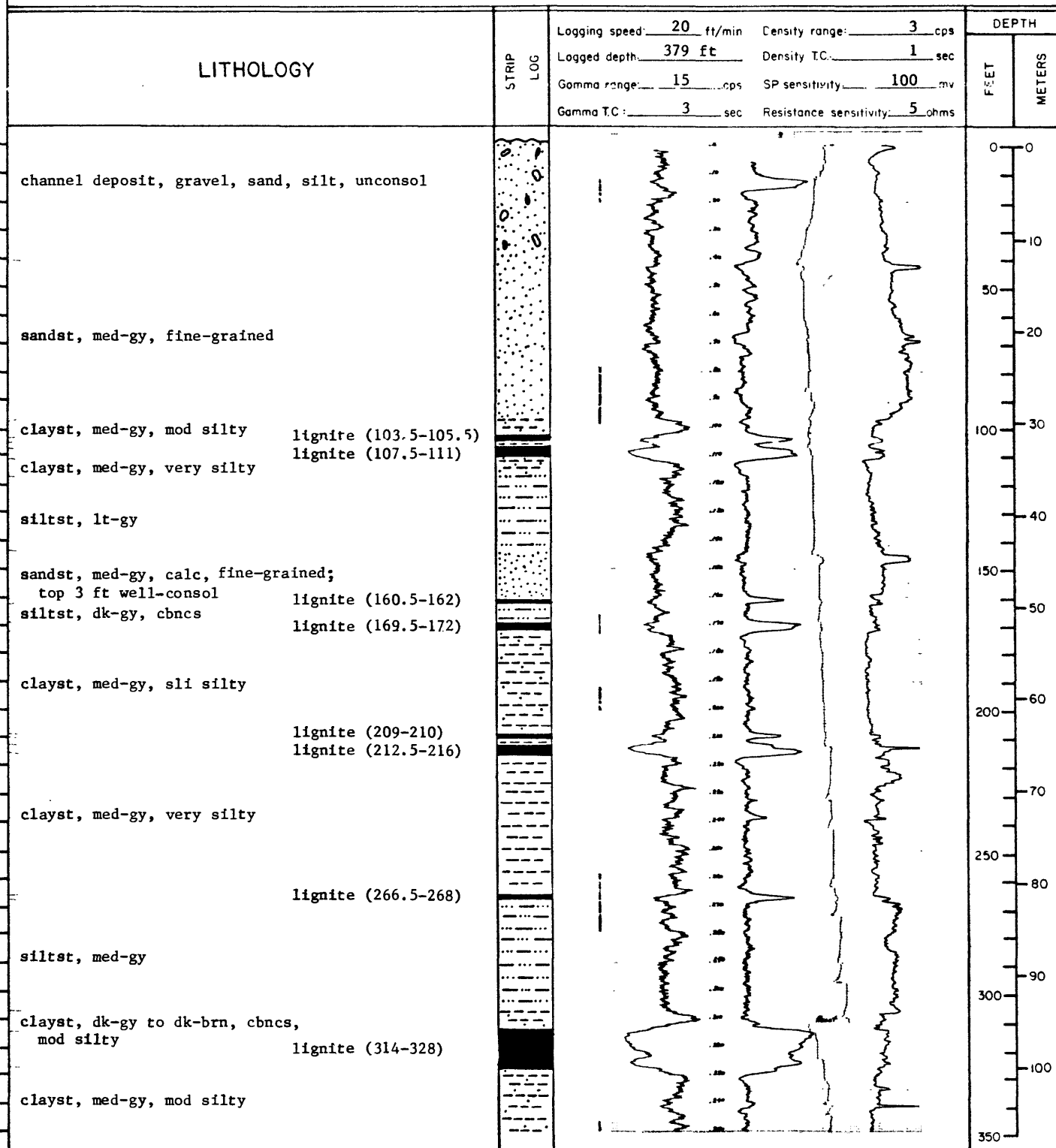


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 21  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fayette	
DATE STARTED 8-6-79	DATE COMP. 8-6-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 14 T. 145 N., R. 96 W., FOOTAGE LOC.		40 ft <del>XXX</del> FSL 1210 ft <del>XXX</del> FWL	GROUND ELEV 2358 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	TOTAL DEPTH 380 ft
LITHOLOGY RECORDED BY S. Christensen		DEPTH TO FLUID LEVEL 1 ft	
GEOPHYSICAL LOGS RECORDED BY J. Wald			

REMARKS:



REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range <u>3</u> cps		DEPTH	
		Logged depth: <u>379</u> ft		Density T.C.: <u>1</u> sec		FEET	METERS
clayst, med-gy, mod silty		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv		350	
clayst, med-gy, very silty		Gamma TC <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms		110	
	TD 380					120	
						130	
						140	
						150	
						160	
						170	
						180	
						190	
						200	
						210	
						220	
						230	
						240	
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						630	
						640	
						650	
						660	
						670	
						680	
						690	
						700	
						710	
						720	
						730	
						740	
						750	

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 22  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fayette	
DATE STARTED 8-5-79	DATE COMP. 8-5-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 20 T. 145 N, R. 96 W, FOOTAGE LOC. 1520 ft		2620 ft	GROUND ELEV. 2518 ft
SIZE AND BIT TYPE: 4 3/4 inch drag		FOOTAGE ROTARY 360 ft CORING ---	TOTAL DEPTH 360 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 6 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth 357	Density TC: 1 sec	FEET	METERS		
soil, lt-brn, sand, silt, unconsol				0	0		
sandst, med-brn, fine-grained				10			
clayst, dk-gy, cbnecs, very silty				50			
sandst, med-brn, fine-grained				20			
lignite (117.5-119)				100	30		
sandst, med-gy, fine-grained				40			
lignite (213-214)				150	50		
lignite (218.5-221.5)				200	60		
lignite (223-224.5)				250	80		
clayst, med-gy, very silty				70			
lignite (256-257)				280	90		
lignite (259-261.5)				300	100		
clayst, med-gy, mod silty				350			
lignite (285.5-288.5)							
lignite (291-293.5)							
lignite (295-296)							
siltst, med-gy; high clay content							
sandst, med-gy, fine-grained, calc, well-consol							
clayst, lt-gy, mod silty							

REMARKS:

LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
clayst, lt-gy, mod silty		350	
	TD 360	360	
		370	
		380	
		390	
		400	
		410	
		420	
		430	
		440	
		450	
		460	
		470	
		480	
		490	
		500	
		510	
		520	
		530	
		540	
		550	
		560	
		570	
		580	
		590	
		600	
		610	
		620	
		630	
		640	
		650	
		660	
		670	
		680	
		690	
		700	
		710	
		720	
		730	
		740	
		750	

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 23  
SHEET 1 OF 1

AREA Three River		QUAD NAME Oakdale	
DATE STARTED 8-8-79	DATE COMP. 8-8-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 8 T.145 N., R. 95 W., FOOTAGE LOC.		FNL <del>XXX</del> 250 ft	<del>XXX</del> 12 ft FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV 2316 ft	
		TOTAL DEPTH 320 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		DEPTH TO FLUID LEVEL 8 ft	
GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 319 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, sand, silt, unconsol			0
clayst, lt-brn, sli silty			10
clayst, med-gy, sli silty			50
lignite (35.5-36.5)			20
lignite (38.5-40)			30
clayst, med-gy, very silty			100
clayst, dk-brn, cbncs			30
clayst, med-gy, sli silty			40
lignite (104.5-106)			50
siltst, lt-grn			60
lignite (125.5-126.5)			70
siltst, med-gy			80
sandst, med-gy, fine-grained, calc			90
clayst, med-gy, very silty			100
clayst, lt-gy, mod silty			110
clayst, dk-brn, cbncs			120
lignite (205.5-216.5)			130
lignite (219-221)			140
clayst, med-gy, sli silty			150
lignite (255-257)			160
siltst, med-gy			170
lignite (269-270)			180
clayst, med-gy, very silty			190
siltst, lt-gy			200
	TD 320		350

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 24  
SHEET 1 OF 2

AREA Three River		QUAD NAME Killdeer	
DATE STARTED 8-8-79	DATE COMP. 8-8-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 34 T. 145 N., R. 95 W., FOOTAGE LOC.		100 ft FNL <del>500</del>	45 ft <del>FWL</del> XCEL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 360 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

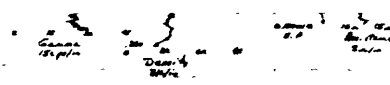
  

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth: 360 ft	Density TC: 1 sec	FEET	METERS		
soil, med-brn, silt, clay, unconsol				0	0		
clayst, med-gy, sli silty				10			
lignite (40.5-42)				50			
clayst, med-gy, very silty				20			
siltst, med-gy				30			
sandst, lt-gy, fine-grained				100			
clayst, dk-gy, very silty lignite (103.5-105.5)				30			
sandst, med-gy, med-grained, calc, well-consol				40			
clayst, med-gy, mod silty				150			
siltst, med-gy				50			
clayst, med-gy, sli silty				200			
lignite (217-220)				60			
lignite (222-226)				70			
lignite (227-229)				250			
clayst, med-gy, mod silty				80			
lignite (265.5-269)				90			
clayst, dk-gy, very silty				300			
siltst, med-gy; high clay content				100			
clayst, med-gy, mod silty				350			
lignite (319.5-321)							
clayst, lt-gy, sli silty							

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 24  
SHEET 2 OF 2

REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>360</u> ft		Density T.C.: <u>1</u> sec		FEET	METERS
clayst, lt-gy, sli silty		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv		350	110
		Gamma T.C.: <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms			
	TD 360					450	130
						500	140
						550	150
						600	160
						650	170
						700	180
						750	190
							200
							210
							220
							230
							240
							250
							260
							270
							280
							290
							300
							310
							320
							330
							340
							350



# UNITED STATES GEOLOGICAL SURVEY

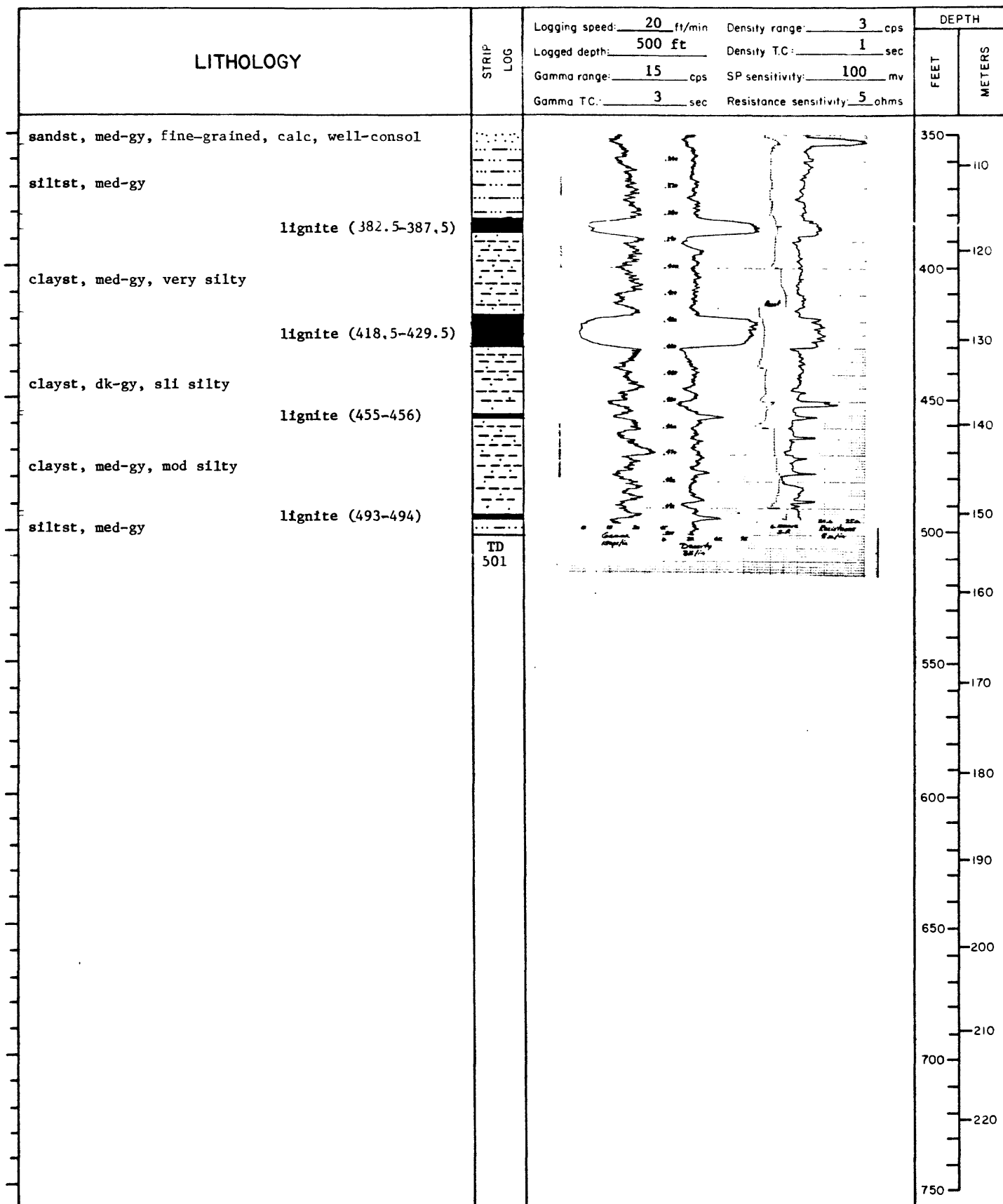
HOLE NO 25  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Dunn Center NE</b>	
DATE STARTED <b>8-14-79</b>	DATE COMP. <b>8-14-79</b>	COUNTY <b>Dunn</b>	STATE <b>North Dakota</b>
LOCATION: SEC. <b>2 T.145 N., R. 94 W.,</b> FOOTAGE LOC. <b>60 ft</b>		FNL <del>XXX</del> <b>60 ft</b>	FEL <del>XXX</del> <b>60 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>501 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	
LITHOLOGY RECORDED BY <b>M. Hudson</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS:			

LITHOLOGY	STRIP LOG	LOGGING DATA		DEPTH	
		Logging speed <b>20</b> ft/min Logged depth <b>500</b> ft Gamma range: <b>15</b> cps Gamma T.C.: <b>3</b> sec	Density range: <b>3</b> cps Density T.C.: <b>1</b> sec SP sensitivity: <b>100</b> mv Resistance sensitivity: <b>5</b> ohms	FEET	METERS
soil, med-brn, sand, silt, unconsol				0	0
sandst, lt-brn, fine-grained				10	
siltst, lt-brn				20	
lignite (83-86.5) lignite (89-93)				30	
clayst, med-gy, mod silty				40	
siltst, med-gy				50	
sandst, med-gy, fine-grained, calc, well-consol clayst, dk-gy, very silty				60	
lignite (152.5-160)				70	
siltst, med-gy; high clay content				80	
clayst, dk-gy to dk-brn, cbncls, very silty				90	
siltst, med-gy, calc				100	
lignite (235.5-245)				110	
siltst, med-gy				120	
lignite (255.5-257)				130	
siltst, dk-gy; high clay content				140	
lignite (274-277)				150	
clayst, med-gy, very silty				160	
lignite (308-309)				170	
clayst, lt-gy, sli silty				180	
siltst, med-gy; high clay content				190	

REMARKS:



# UNITED STATES GEOLOGICAL SURVEY


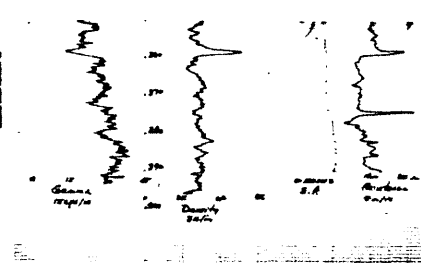
HOLE NO 26  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lake Ilo	
DATE STARTED 8-8-79	DATE COMP. 8-8-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 20 T.145 N., R. 94 W., FOOTAGE LOC. 1190 ft		FNL 15 ft	GROUND ELEV 2224 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 397 ft	TOTAL DEPTH 397 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 6 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min Logged depth: 396 ft Gamma range: 15 cps Gamma T.C.: 3 sec	Density range: 3 cps Density T.C.: 1 sec SP sensitivity: 100 mv Resistance sensitivity: 5 ohms	DEPTH	
				FEET	METERS
soil, med-brn, silt, clay, unconsol				0	0
clayst, med-gy, very silty				10	
siltst, lt-gy				50	
lignite (65-68)				20	
clayst, dk-gy, mod silty				100	
lignite (87-88.5)				30	
clayst, med-gy, sli silty				40	
lignite (122.5-124)				150	
clayst, dk-gy				50	
lignite (125-132)				200	
lignite (138.5-139.5)				60	
lignite (141-145)				70	
siltst, med-gy				250	
sandst, lt-gy, fine-grained				80	
clayst, med-gy, sli silty				90	
lignite (212.5-214)				300	
siltst, dk-gy				100	
lignite (221-222)				350	
clayst, med-gy, very silty					
siltst, med-gy					
clayst, med-gy, very silty					
lignite (272-274)					
clayst, med-gy, sli silty					
siltst, med-gy					
lignite (331.5-333.5)					
lignite (335-343.5)					
clayst, med-gy, very silty					

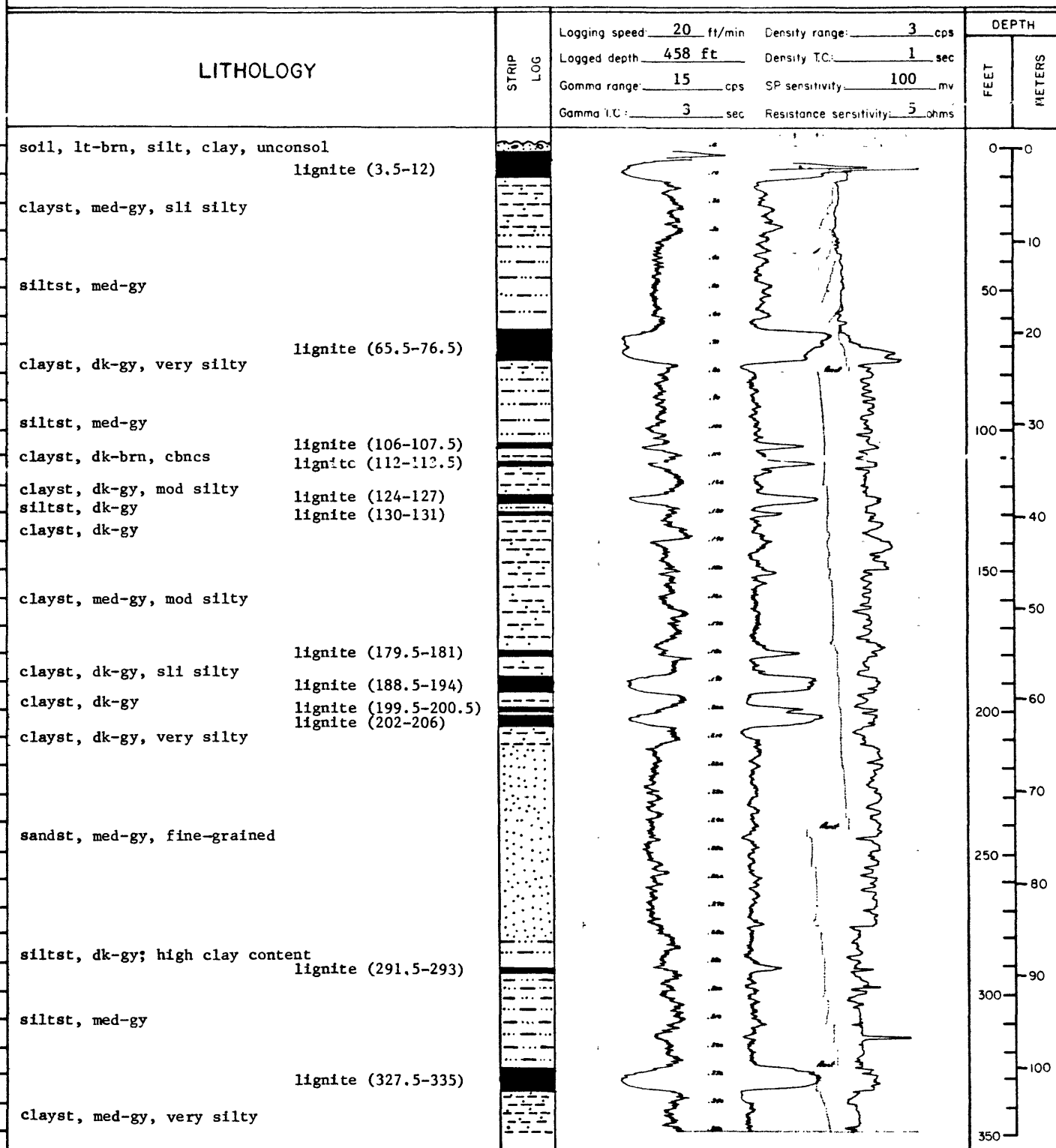
REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range: <u>3</u> cps		DEPTH	
		Lagged depth: <u>396</u> ft		Density T.C.: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv			
		Gamma T.C.: <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms			
clayst, med-gy, very silty						350	
lignite (358-359)						110	
clayst, lt-gy, sli silty	TD 397					120	
						130	
						140	
						150	
						160	
						170	
						180	
						190	
						200	
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						220	
						230	
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						750	

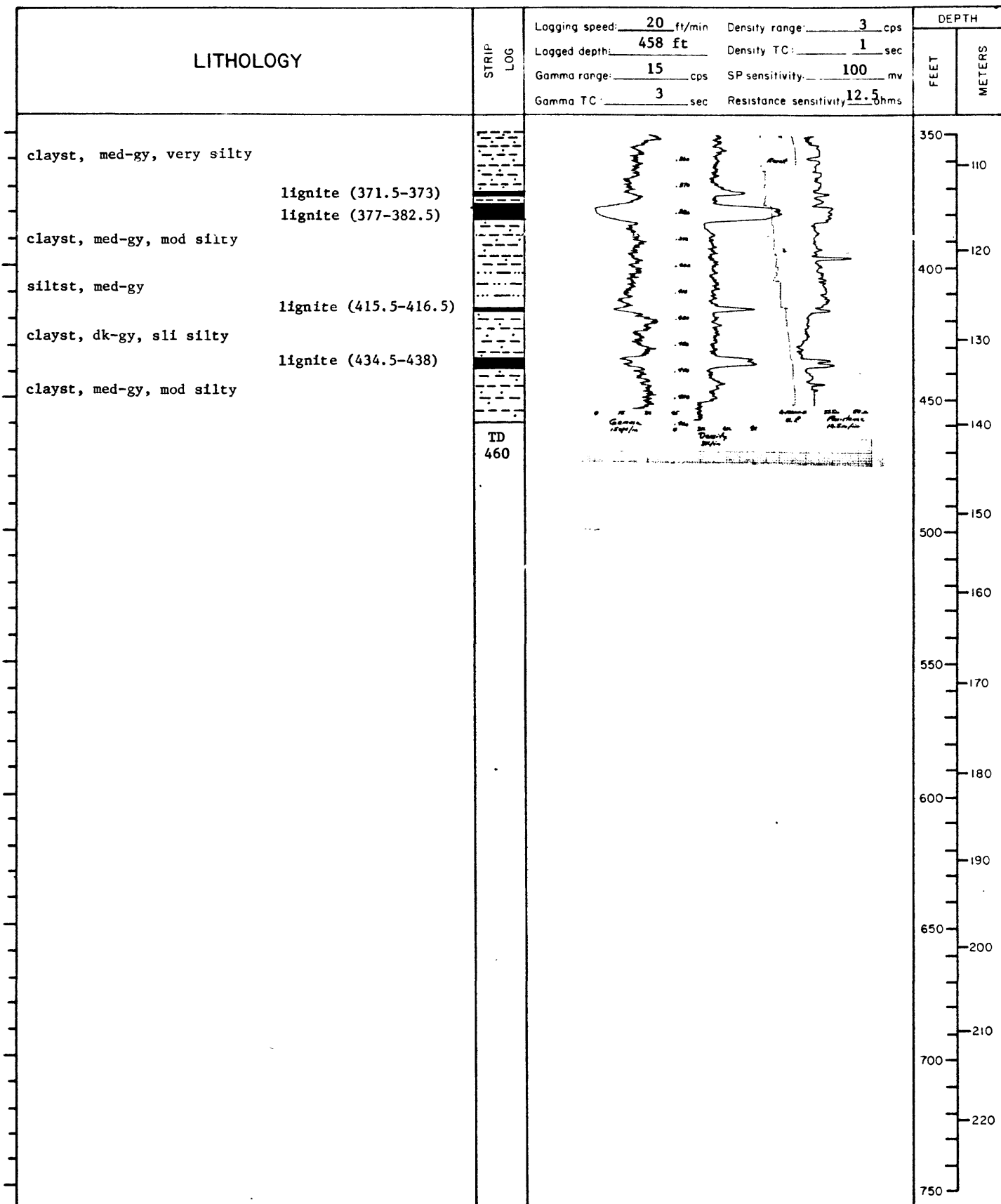
HOLE NO 27  
SHEET 1 OF 2

AREA		Three River		QUAD NAME		Dunn Center NE	
DATE STARTED		8-14-79		DATE COMP.		8-14-79	
COUNTY		Dunn		STATE		North Dakota	
LOCATION: SEC. 10		T. 14S N., R. 93 W.,		FOOTAGE LOC.		180 ft	
FNL		20 ft		FEL		GROUND ELEV	
XXX		XXX		XXX		2188 ft	
SIZE AND BIT TYPE:		4-3/4 inch drag		FOOTAGE		TOTAL	
ROTARY		460 ft		CORING		DEPTH	
---		---		---		460 ft	
DRILLING AGENCY:		Gregory Drilling Company		DRILL TYPE:		Rotary	
DEPTH TO FLUID LEVEL		4 ft		LITHOLOGY RECORDED BY		M. Hudson	
GEOPHYSICAL LOGS RECORDED BY		J. Wald					

REMARKS:



## REMARKS:

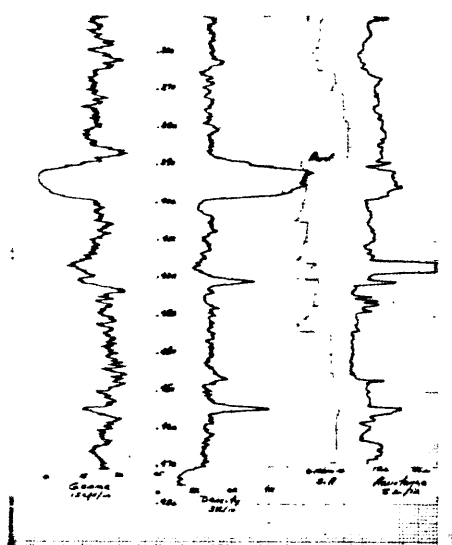


AREA Three River		QUAD NAME Dunn Center	
DATE STARTED 8-13-79	DATE COMP. 8-13-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 18 T.14S N., R. 93 W., FOOTAGE LOC.		100 ft <del>XXX</del> FSL 2610 ft <del>XXX</del> FEL <del>XXX</del>	GROUND ELEV 2221 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 476 ft CORING ---	TOTAL DEPTH 476 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth: 475 ft	Density T.C.: 1 sec	Gamma range: 15 cps	SP sensitivity: 100 mv	FEET	METERS
soil, med-brn, sand, silt, unconsol						0	0
sandst, med-brn, fine-grained						10	
siltst, med-gy						50	
lignite (60-70.5)						20	
clayst, lt-gy, very silty						100	30
siltst, med-gy						40	
clayst, dk-gy, mod silty						150	50
clayst, dk-gy						200	60
lignite (200.5-211)						70	
siltst, dk-gy; high clay content						250	80
lignite (230-236)						300	90
clayst, med-gy, mod silty						100	
lignite (267-268)						350	100
clayst, lt-gy, silty							
lignite (305.5-306.5)							
clayst, med-gy, mod silty							
siltst, med-gy							
siltst, med-gy; high clay content							
lignite (342-345.5)							

## REMARKS:

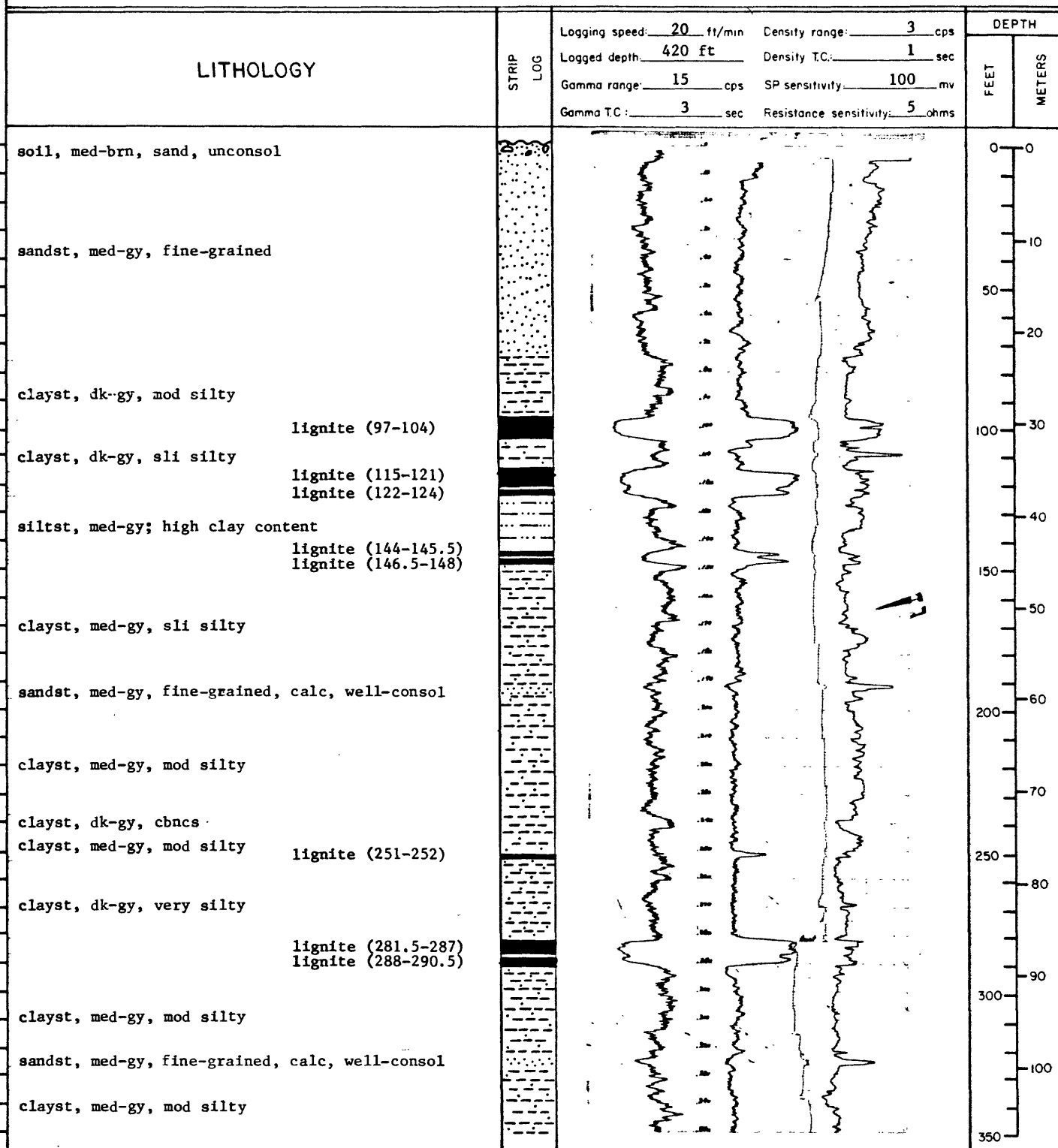
LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range <u>3</u> cps		DEPTH	
		Logged depth: <u>475</u> ft	Density TC: <u>1</u> sec	FEET	METERS
		Gamma range: <u>15</u> cps	SP sensitivity: <u>100</u> mv		
		Gamma TC: <u>3</u> sec	Resistance sensitivity: <u>5</u> ohms		
siltst, med-gy; high clay content				350	
clayst, dk-gy, cbncs				110	
lignite (390-398.5)				120	
siltst, med-gy				400	
lignite (420-421)				130	
clayst, lt-gy, sli silty				450	
lignite (454-455)				140	
clayst, med-gy, very silty				500	
				150	
				160	
				550	
				170	
				180	
				600	
				190	
				650	
				200	
				210	
				700	
				220	
				750	



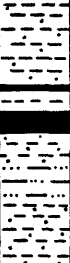
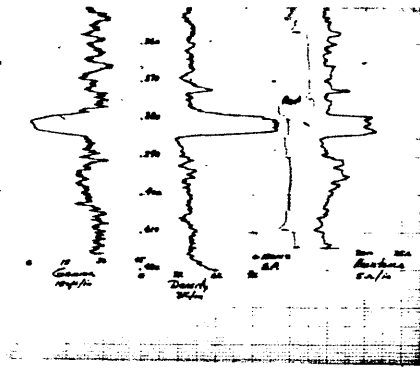
# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 29  
SHEET 1 OF 2

AREA Three River		QUAD NAME Halliday NW	
DATE STARTED 8-15-79	DATE COMP. 8-15-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 6 T. 145 N., R. 92 W., FOOTAGE LOC. 70 ft		FNL 15 ft	FEL 2240 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE	
		ROTARY 421 ft	CORING ---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



## REMARKS:

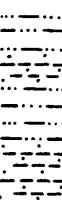
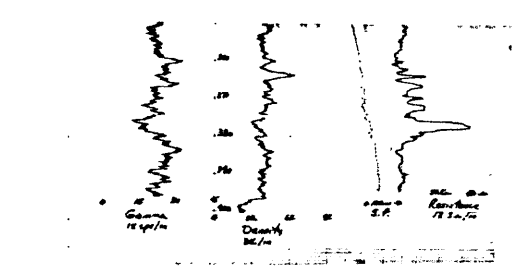
LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range <u>3</u> cps Logged depth: <u>420</u> ft    Density TC <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity <u>100</u> mv Gamma TC <u>3</u> sec    Resistance sensitivity <u>5</u> ohms		DEPTH	
				FEET	METERS
clayst, med-gy, mod silty  clayst, dk-gy                      lignite (372-373) lignite (379-384) clayst, med-gy, very silty siltst, lt-gy clayst, med-gy, very silty				350 400 450 500 550 600 650 700 750	
	TD 421				

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 30  
SHEET 1 OF 2

AREA Three River		QUAD NAME Halliday NW	
DATE STARTED 8-15-79	DATE COMP. 8-15-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 10 T.145 N., R.92 W., FOOTAGE LOC.		25 ft <del>XXX</del> FSL 145 ft <del>XXX</del> FEL <del>XXX</del>	GROUND ELEV 2158 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 401 ft CORING ---	TOTAL DEPTH 401 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 17 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 400 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 12.5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol		0 0	
siltst, med-gy; high clay content		10	
lignite (26.5-32)		50	
siltst, dk-gy		20	
lignite (43-45)		100	
siltst, med-gy		30	
sandst, med-gy, fine-grained		40	
clayst, med-gy, very silty		50	
lignite (119-120)		60	
siltst, med-gy; high clay content		70	
lignite (170-176.5)		80	
clayst, dk-gy, very silty		90	
siltst, med-gy, calc		100	
sandst, lt-gy, calc, fine-grained		110	
siltst, med-gy; high clay content		120	
lignite (284.5-285.5)		130	
clayst, med-gy, very silty		140	
siltst, dk-gy		150	
lignite (296-297)		160	
lignite (301.5-304.5)		170	
siltst, dk-gy; high clay content		180	
lignite (324-326)		190	
siltst, med-gy		200	
		210	
		220	
		230	
		240	
		250	
		260	
		270	
		280	
		290	
		300	
		310	
		320	
		330	
		340	
		350	

REMARKS:

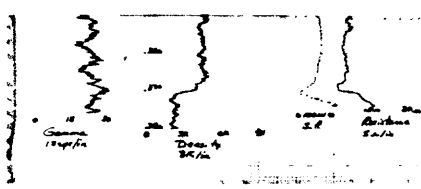
LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>400</u> ft    Density T.C.: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>12.5</u> ohms	DEPTH	
			FEET	METERS
siltst, med-gy clayst, dk-gy, very silty siltst, med-gy clayst, med-gy, very silty			350 400 450 500 550 600 650 700 750	110 120 130 140 150 160 170 180 190 200 210 220
	TD 401			

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 31  
SHEET 1 OF 2

AREA Three River		QUAD NAME Werner	
DATE STARTED 8-15-79	DATE COMP. 8-15-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 34 T.145 N., R. 92 W., FOOTAGE LOC. 372 ft		YBM FSL 12 ft	FEL RMX GROUND ELEV 2190 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 380 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol			0 0
clayst, med-brn, very silty			
lignite (17-20)			
clayst, med-gy, mod silty			10
			50
clayst, dk-brn, cbncc			20
lignite (57.5-59)			
lignite (66-67)			
clayst, med-gy, mod silty			
lignite (88-93.5)			
clayst, med gy, very silty			100 30
siltst, med-gy			40
			150
sandst, med-gy, fine-grained			50
			200 60
clayst, lt-gy, mod silty			
			70
siltst, med-gy			
lignite (217-220.5)			
lignite (225-227)			
clayst, med-gy, very silty			250 80
limest, dk-gy			
clayst, lt-gy, mod silty			
siltst, med-gy			
lignite (277-279)			
siltst, dk-gy; high clay content			300 90
clayst, med-gy, sli silty			
			100
siltst, med-gy; high clay content			350

REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range <u>3</u> cps		DEPTH	
		Logged depth: <u>380</u> ft		Density T.C.: <u>1</u> sec		FEET	METERS
siltst, med-gy; high clay content		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv		350	110
		Gamma T.C.: <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms			
	TD 380					450	130
						500	140
						550	150
						600	160
						650	170
						700	180
						750	190
							200
							210
							220
							230
							240
							250
							260
							270
							280
							290
							300
							310
							320
							330
							340
							350

## UNITED STATES GEOLOGICAL SURVEY

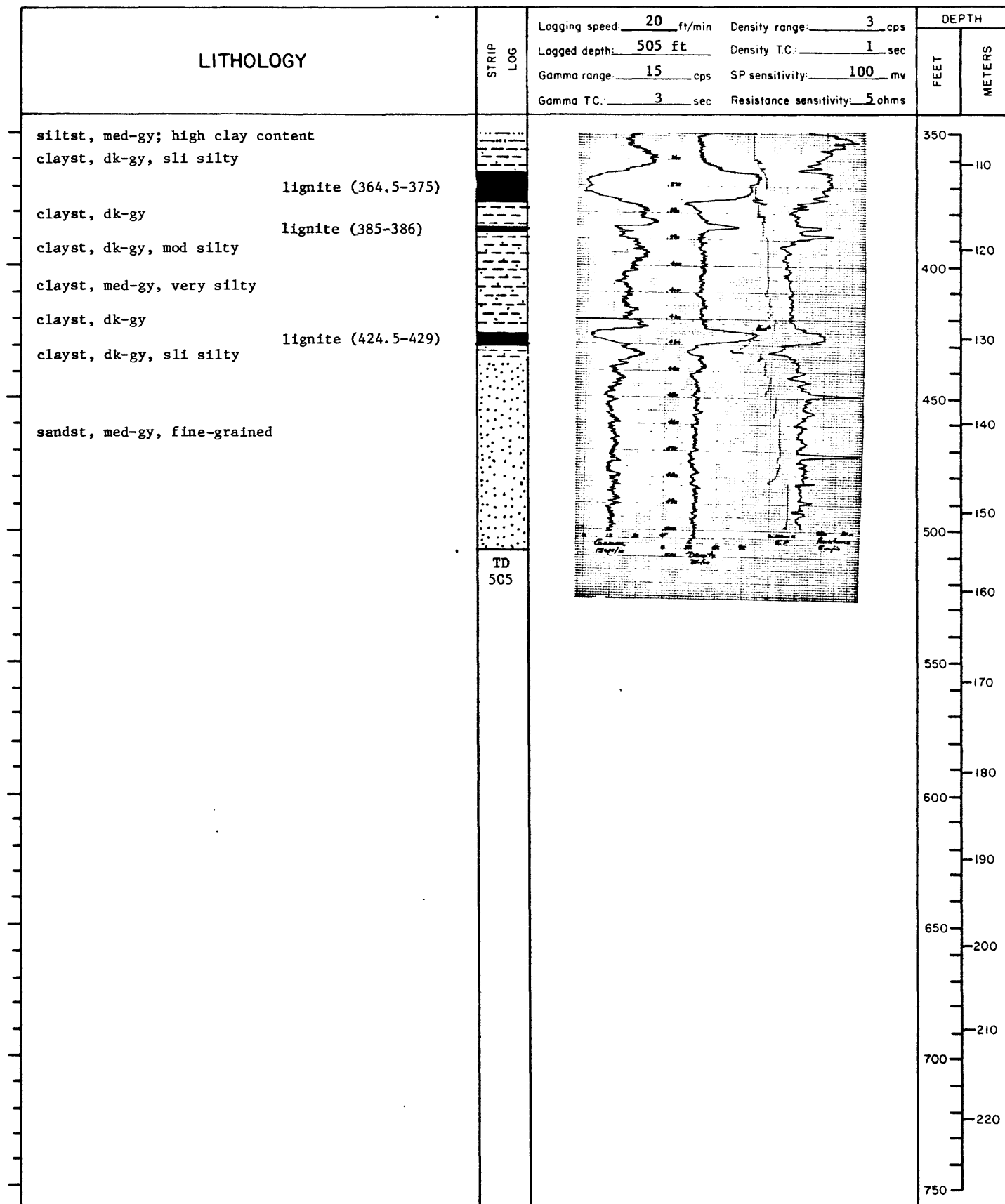
HOLE NO 32  
SHEET 1 OF 2

AREA Three River		QUAD NAME Squaretop Butte	
DATE STARTED 8-1-79	DATE COMP. 8-1-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 10 T. 144 N, R. 101 W., FOOTAGE LOC. 695 ft		KKK FSL 580 ft KKK FWL	GROUND ELEV 2315 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 505 ft CORING ---	TOTAL DEPTH 505 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 40 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min Density range: 3 cps		DEPTH	
		Lagged depth: 505 ft	Density TC: 1 sec	FEET	METERS
soil, lt-brn, silt, clay, unconsol				0	0
clayst, med-brn, very silty				10	
siltst, med-gy; high clay content				50	
clayst, dk-gy, sli silty lignite (66.5-68)				20	
clayst, med-gy, very silty lignite (84-85)				30	
clayst, dk-gy, mod silty				40	
siltst, med-gy				50	
clayst, med-gy, mod silty				60	
lignite (139-141.5)				70	
clayst, med-gy, mod silty				80	
siltst, dk-gy; high clay content				90	
clayst, dk-gy, very silty lignite (180.5-183)				100	
clayst, dk-gy, very silty lignite (191.5-192.5)				110	
siltst, med-gy				120	
clayst, dk-gy, mod silty				130	
siltst, med-gy				140	
clayst, med-gy, mod silty				150	
clayst, med-gy, very silty				160	
clayst, dk-gy, sli silty				170	
siltst, med-gy				180	
clayst, dk-brn lignite (291.5-293.5)				190	
siltst, med-gy				200	
sandst, med-gy, fine-grained				210	
clayst, dk-gy, sli silty				220	
siltst, med-gy				230	

## REMARKS:



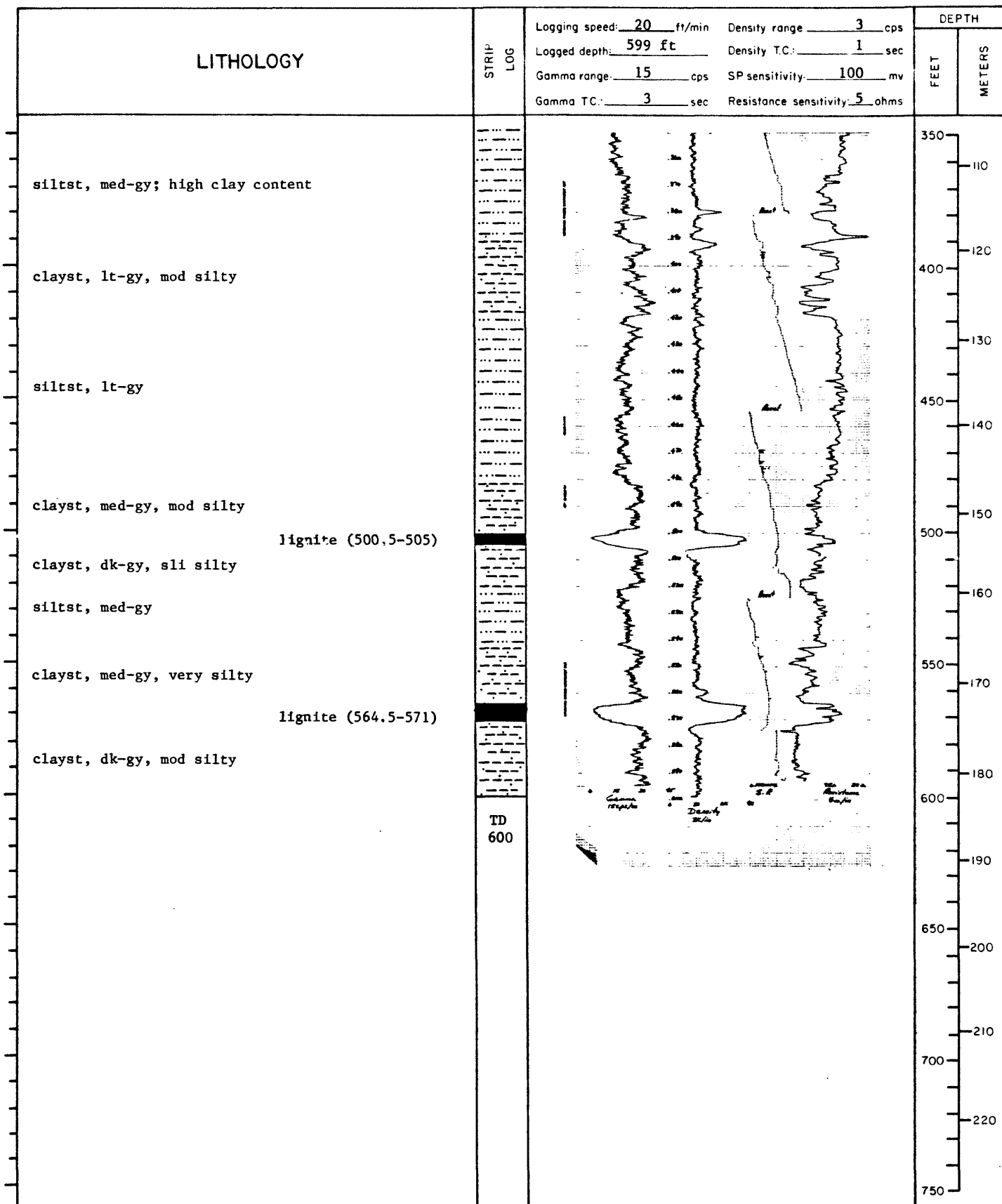


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 33  
SHEET 1 OF 2

AREA Three River		QUAD NAME Squaretop Butte	
DATE STARTED 8-1-79	DATE COMP. 8-1-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 23 T.144 N., R. 101 W., FOOTAGE LOC. 1640 ft		KXX FSL 2270 ft	FEL KXX GROUND ELEV 2422 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 600 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	TOTAL DEPTH 600 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 599 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
soil, med-brn, silt, clay, unconsol			DEPTH FEET METERS
clayst, med-brn, very silty			0 0
clayst, med-gy, sli silty			10
lignite (54-55) lignite (56.5-58)			50
clayst, lt-gy, mod silty			20
lignite (99-100)			100 30
clayst, med-gy, mod silty			40
siltst, dk-gy; high clay content lignite (165.5-168.5) lignite (171.5-172.5)			150 50
clayst, med-gy, mod silty			200 60
siltst, med-gy			250 70
clayst, med-gy, sli silty			300 80
siltst, med-gy; high clay content			350 90
			100
			350

## REMARKS:

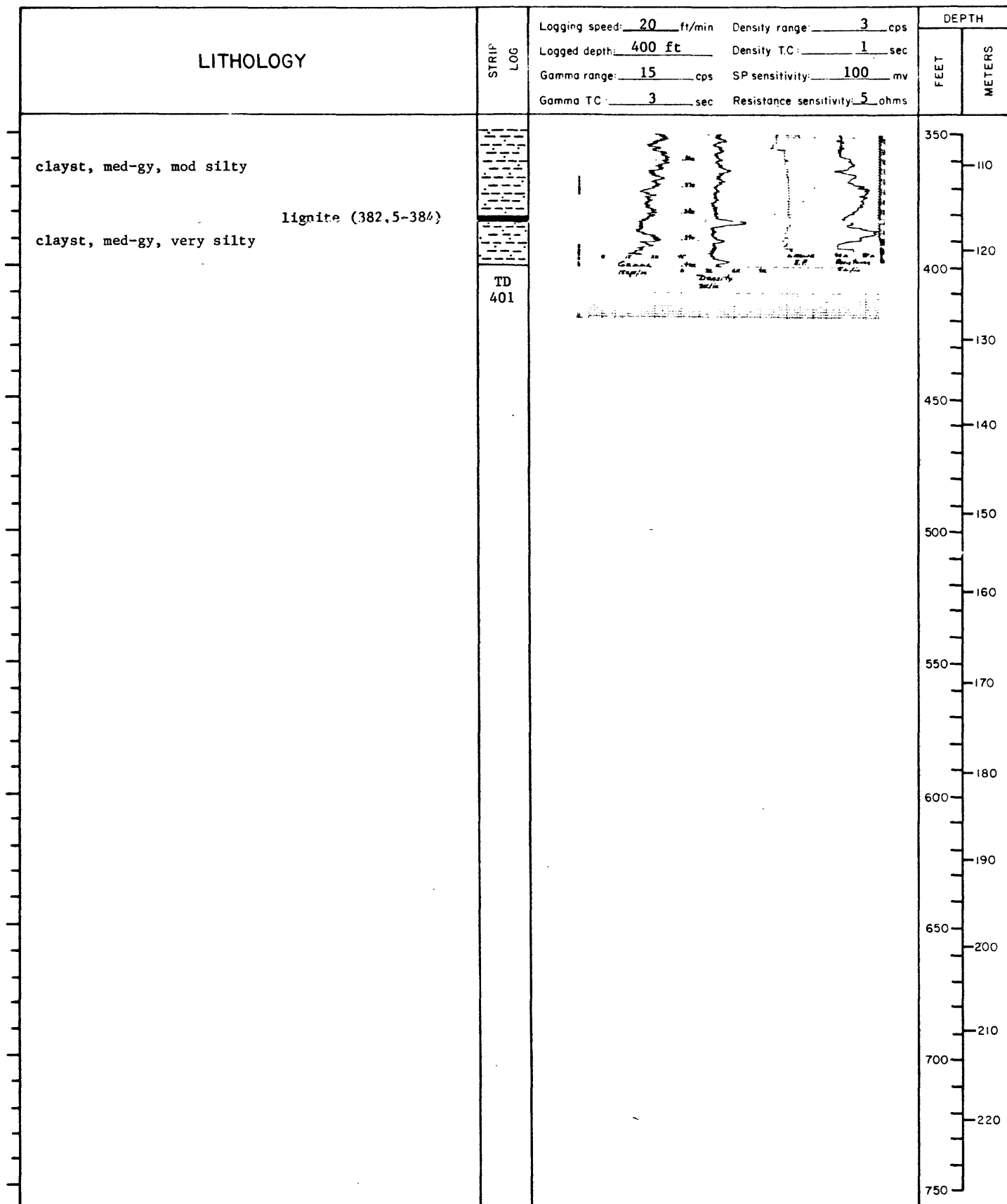


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 34  
SHEET 1 OF 2

AREA Three River		QUAD NAME Squaretop Butte	
DATE STARTED 8-1-79	DATE COMP 8-1-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 31 T.144 N., R.100 W., FOOTAGE LOC. 144 ft		FNL <del>XXX</del> 66 ft	FEL <del>XXX</del> GROUND ELEV 2595 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 401 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	TOTAL DEPTH 401 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 400 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FET	METERS
soil, med-brn, silt, clay, unconsol			0
clayst, med-gy, mod silty			10
lignite (16.5-18)			50
clayst, med-gy, very silty			20
clayst, dk-gy to dk-brn, cbnacs			100
clayst, med-gy, very silty			30
lignite (135-137)			40
clayst, lt-gy, mod silty			150
siltst, med-gy			50
clayst, med-gy, very silty			250
siltst, dk-gy			80
clayst, dk-gy			300
lignite (180-181)			90
siltst, med-gy			100
lignite (215-219)			350
siltst, dk-gy			
lignite (255.5-257)			
lignite (258-259)			
siltst, med-gy; high clay content			
clayst, med-gy, very silty			
lignite (305-306)			
siltst, med-gy			
clayst, med-gy, mod silty			

REMARKS:



# UNITED STATES GEOLOGICAL SURVEY



HOLE NO 35  
SHEET 1 OF 2

AREA      Three River		QUAD NAME      Squaretop Butte	
DATE STARTED      8-1-79	DATE COMP.      8-1-79	COUNTY      Billings	STATE      North Dakota
LOCATION: SEC.    8    T.144 N., R. 100 W., FOOTAGE LOC.    70 ft <del>XXX</del> FSL    1520 ft    FEL <del>XXX</del>		GROUND ELEV.    .. 2592 ft	
SIZE AND BIT TYPE:    4-3/4 inch drag		FOOTAGE ROTARY    401 ft    CORING    ---	
DRILLING AGENCY:    Gregory Drilling Company		DRILL TYPE:      Rotary	
LITHOLOGY RECORDED BY    M. Hudson		GEOPHYSICAL LOGS RECORDED BY    J. Wald	
REMARKS:			

LITHOLOGY	STRIP	LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>400</u> ft    Density TC: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma TC: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms		DEPTH	
			FEET	METERS		
soil, med-brn, silt, unconsol clayst, lt-brn, mod silty siltst, lt-brn					0	0
					10	3
clayst, med-gy, sli silty					20	6
					30	9
siltst, med-gy; high clay content					40	12
					50	15
sandst, lt-gy, fine-grained					60	18
clayst, med-gy, very silty					70	21
lignite (215.5-219)					80	24
clayst, med-gy, mod silty					90	27
lignite (287-289)					100	30
siltst, dk-gy; high clay content					110	33
clayst, med-gy, mod silty					120	36
sandst, lt-gy, calc, med-grained, well-consol					130	39
siltst, med-gy; high clay content			140	42		
			150	45		
			160	48		
			170	51		
			180	54		
			190	57		
			200	60		
			210	63		
			220	66		
			230	69		
			240	72		
			250	75		
			260	78		
			270	81		
			280	84		
			290	87		
			300	90		
			310	93		
			320	96		
			330	99		
			340	102		
			350	105		

HOLE NO 35  
SHEET 2 OF 2

LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
<p>Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps</p> <p>Logged depth: <u>400</u> ft    Density T.C.: <u>1</u> sec</p> <p>Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv</p> <p>Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms</p>			
<p>lignite (351-353.5)</p> <p>clayst, med-gy, very silty</p> <p>siltst, med-gy                      lignite (391-392)</p>			<p>350</p> <p>110</p> <p>120</p> <p>400</p> <p>130</p> <p>450</p> <p>140</p> <p>500</p> <p>150</p> <p>160</p> <p>550</p> <p>170</p> <p>180</p> <p>600</p> <p>190</p> <p>650</p> <p>200</p> <p>700</p> <p>210</p> <p>750</p> <p>220</p>
	TD 401		

# UNITED STATES GEOLOGICAL SURVEY

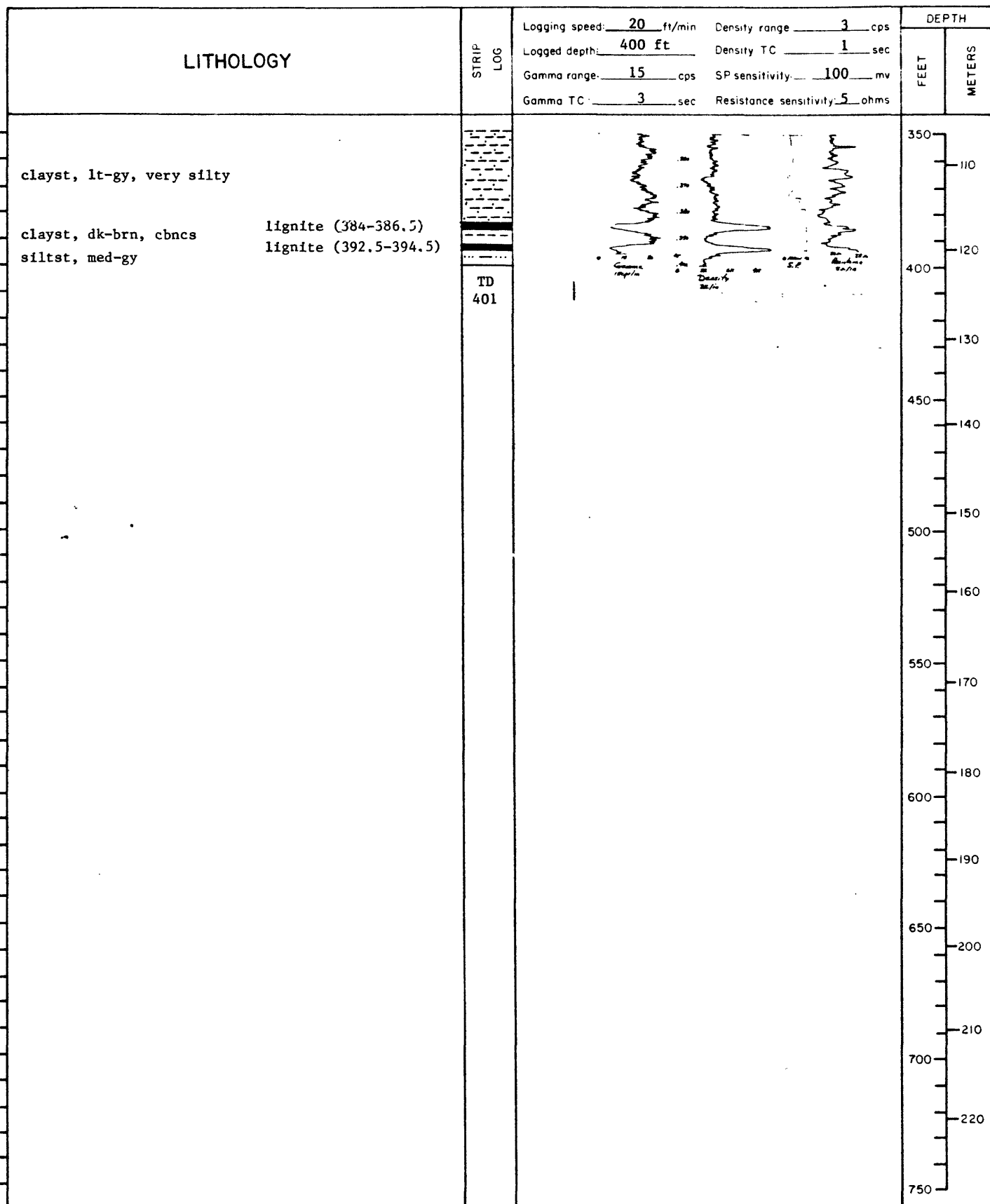
HOLE NO 36  
SHEET 1 OF 2

AREA      Three River		QUAD NAME      Scairt Woman Draw	
DATE STARTED      8-2-79	DATE COMP.      8-2-79	COUNTY      Billings	STATE      North Dakota
LOCATION: SEC. 19 T.144 N., R. 99 W., FOOTAGE LOC.      120 ft <del>XXX</del> FSL      225 ft      FEL <del>XXX</del>		GROUND ELEV      2662 ft	
SIZE AND BIT TYPE:      4-3/4 inch drag		FOOTAGE ROTARY      401 ft      CORING      ---	
DRILLING AGENCY:      Gregory Drilling Company		DRILL TYPE:      Rotary	
LITHOLOGY RECORDED BY      L. Tomac		GEOPHYSICAL LOGS RECORDED BY      J. Wald	
REMARKS:			

LITHOLOGY	STRIP	LOG	Logging speed      20 ft/min      Density range:      3 cps Logged depth      400 ft      Density T.C.      1 sec Gamma range:      15 cps      SP sensitivity:      100 mv Gamma T.C.      3 sec      Resistance sensitivity:      5 ohms		DEPTH	
			FEET	METERS		
soil, med-brn, silt, clay, unconsol clayst, med-gy, very silty      lignite (16.5-21)	1	1			0	0
clayst, med-gy, mod silty	2	2			10	10
siltst, med-gy	3	3			20	20
sandst, lt-gy, fine-grained	4	4			30	30
clayst, med-gy, very silty      lignite (156-157)	5	5			40	40
clayst, dk-gy, mod silty      lignite (180-184)	6	6			50	50
clayst, dk-gy, sli silty      lignite (205.5-207.5)	7	7			60	60
siltst, med-gy; high clay content      lignite (244.5-246)	8	8			70	70
clayst, med-gy, sli silty	9	9			80	80
siltst, med-gy	10	10			90	90
clayst, dk-gy, sli silty      lignite (286-288)	11	11			100	100
clayst, med-gy, mod silty      lignite (312-313)	12	12			110	110
clayst, lt-gy, very silty	13	13			120	120
	14	14			130	130
	15	15			140	140

REMARKS:



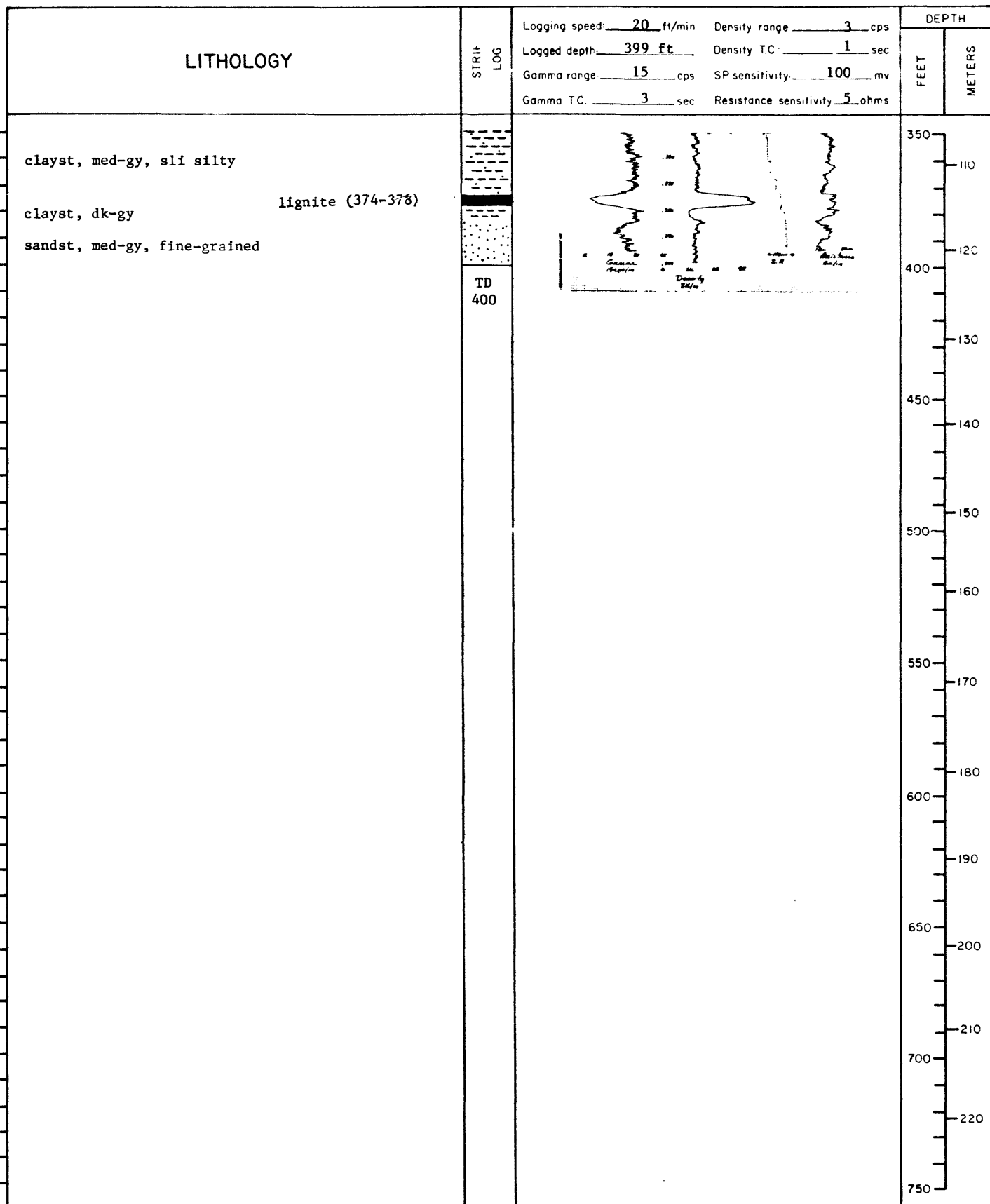


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 37  
SHEET 1 OF 2

AREA Three River		QUAD NAME Grassy Butte SW	
DATE STARTED 8-2-79	DATE COMP 8-2-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 14 T144 N., R. 99 W., FOOTAGE LOC.		930 ft <del>KKX</del> FSL 180 ft <del>KKX</del> FWL	GROUND ELEV 2732 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 400 ft CORING ---	TOTAL DEPTH 400 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 8 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range 3 cps
		Logged depth 399 ft	Density TC: 1 sec
		Gamma range 15 cps	SP sensitivity 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity 5 ohms
			DEPTH FEET METERS
soil, med-brn, silt, clay, unconsol clayst, med-brn, very silty lignite (15-18) clayst, med-gy, mod silty			0 0
siltst, med-gy; high clay content			10
clayst, dk-gy, sli silty			50
siltst, med-gy; high clay content			20
			100 30
lignite (114.5-119.5) lignite (123-126) lignite (130-131.5)			40
clayst, med-gy, mod silty			150
sandst, med-gy, fine-grained clayst, dk-gy, very silty lignite (172-176.5)			50
clayst, med-gy, mod silty			200 60
lignite (224-225)			70
clayst, med-gy, sli silty			250 80
lignite (284.5-286)			90
clayst, dk-gy, very silty			300
siltst, med-gy			100
sandst, med-gy, fine-grained lignite (324-326)			350
clayst, med-gy, very silty			
clayst, med-gy, sli silty lignite (345-346)			

REMARKS:

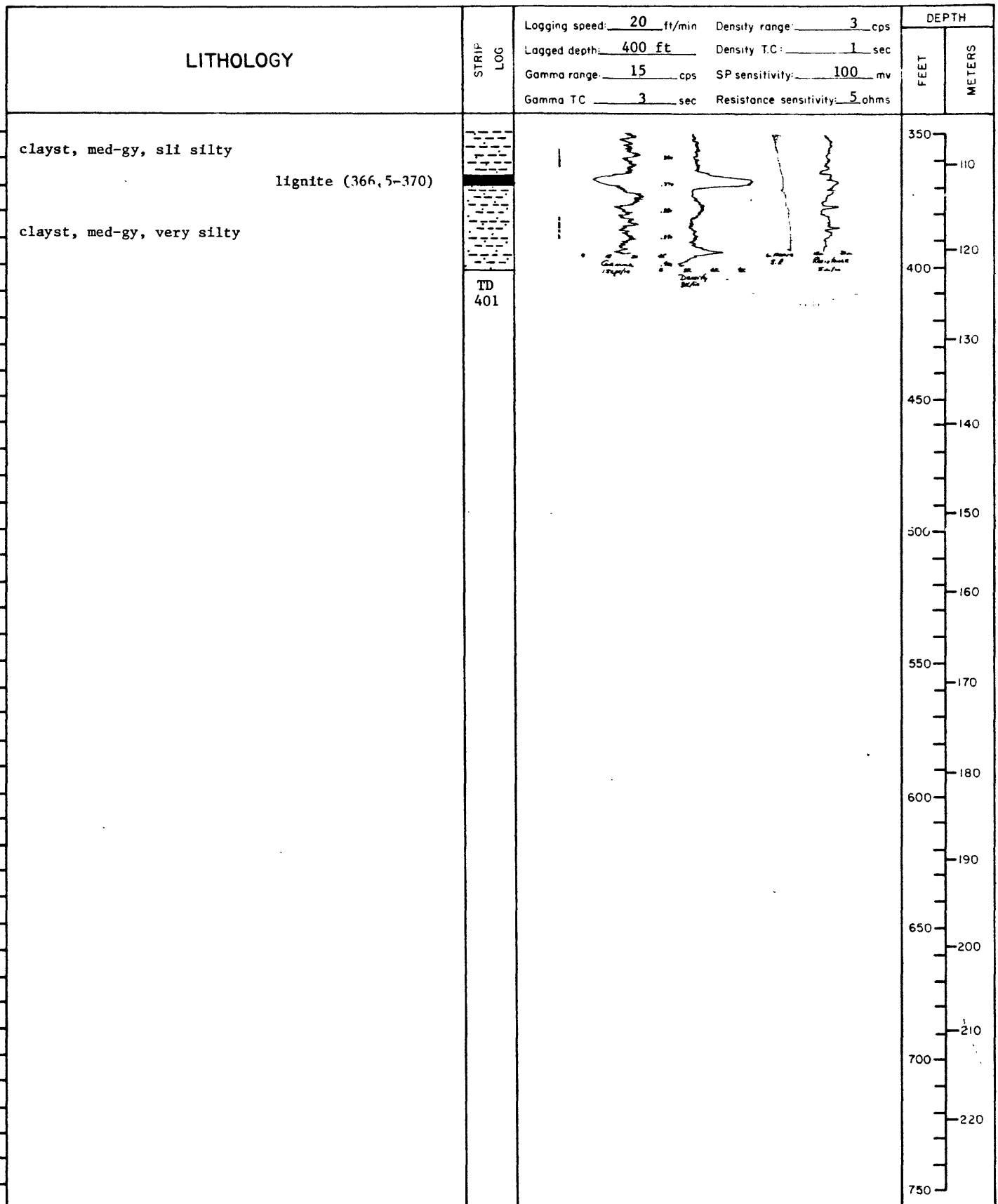


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 38  
SHEET 1 OF 2

AREA Three River		QUAD NAME Grassy Butte SW	
DATE STARTED 8-2-79	DATE COMP. 8-2-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 34 T.144 N., R. 99 W., FOOTAGE LOC.		715 ft FNL <del>XXX</del>	160 ft <del>XXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 401 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range 3 cps
		Logged depth 400 ft	Density T.C. 1 sec
		Gamma range 15 cps	SP sensitivity 100 mv
		Gamma T.C. 3 sec	Resistance sensitivity 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol			0 0
clayst, med-brn, very silty			10
siltst, med-gy			50 20
clayst, dk-gy, sli silty			100 30
clayst, med-gy, mod silty			150 40
siltst, med-gy			200 50
clayst, med-gy, very silty			250 60
siltst, med-gy			300 70
clayst, dk-gy, mod silty			350 80
siltst, lt-gy; high clay content			400 90
clayst, dk-gy, sli silty			450 100
clayst, med-gy, sli silty			500 110
clayst, dk-brn			550 120
siltst, med-gy			600 130
siltst, med-gy; high clay content			650 140
clayst, med-gy, sli silty			700 150

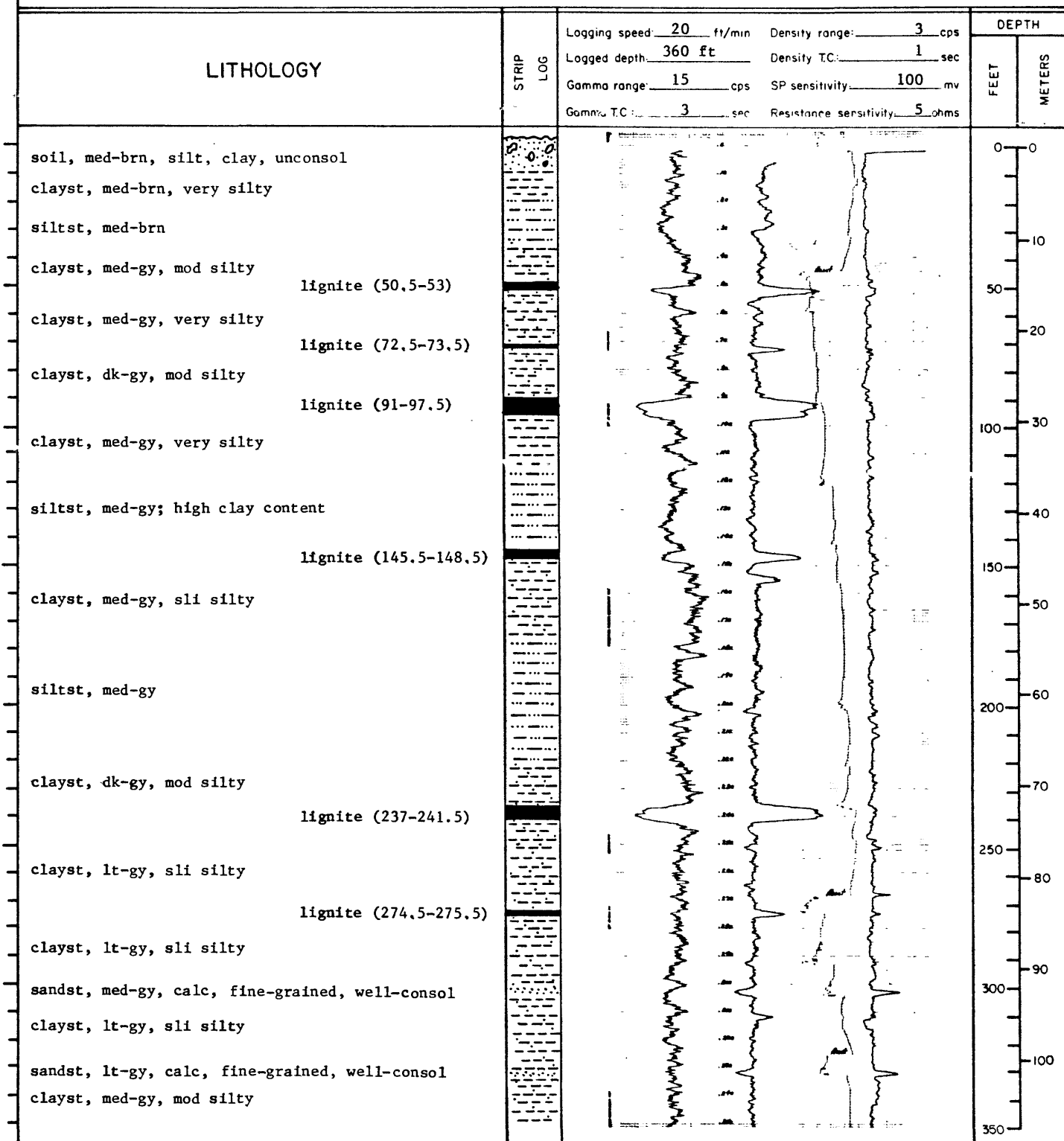
REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 39  
SHEET 1 OF 2

AREA Three River		QUAD NAME Grassy Butte SE			
DATE STARTED 8-3-79	DATE COMP. 8-3-79	COUNTY Billings	STATE North Dakota		
LOCATION: SEC. 8 T.144 N., R. 98 W.,		FOOTAGE LOC. 84 ft	FNL 40 ft	FEL 40 ft	GROUND ELEV 2522 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 361 ft CORING ---		TOTAL DEPTH 361 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 2 ft	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					



REMARKS:

LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
clayst, med-gy, mod silty			
	TD 361	350	
		110	
		120	
		400	
		130	
		450	
		140	
		500	
		150	
		160	
		550	
		170	
		180	
		600	
		190	
		650	
		200	
		210	
		700	
		220	
		750	

# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 40  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Grassy Butte SE</b>	
DATE STARTED <b>8-3-79</b>	DATE COMP. <b>8-3-79</b>	COUNTY <b>Billings</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 22 T144 N., R. 98 W., FOOTAGE LOC. <b>108 ft</b>		<del>XXX</del> FSL <b>1584 ft</b>	FEL <del>XXX</del> GROUND ELEV <b>2436 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>421 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	
LITHOLOGY RECORDED BY <b>M. Hudson</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS:			

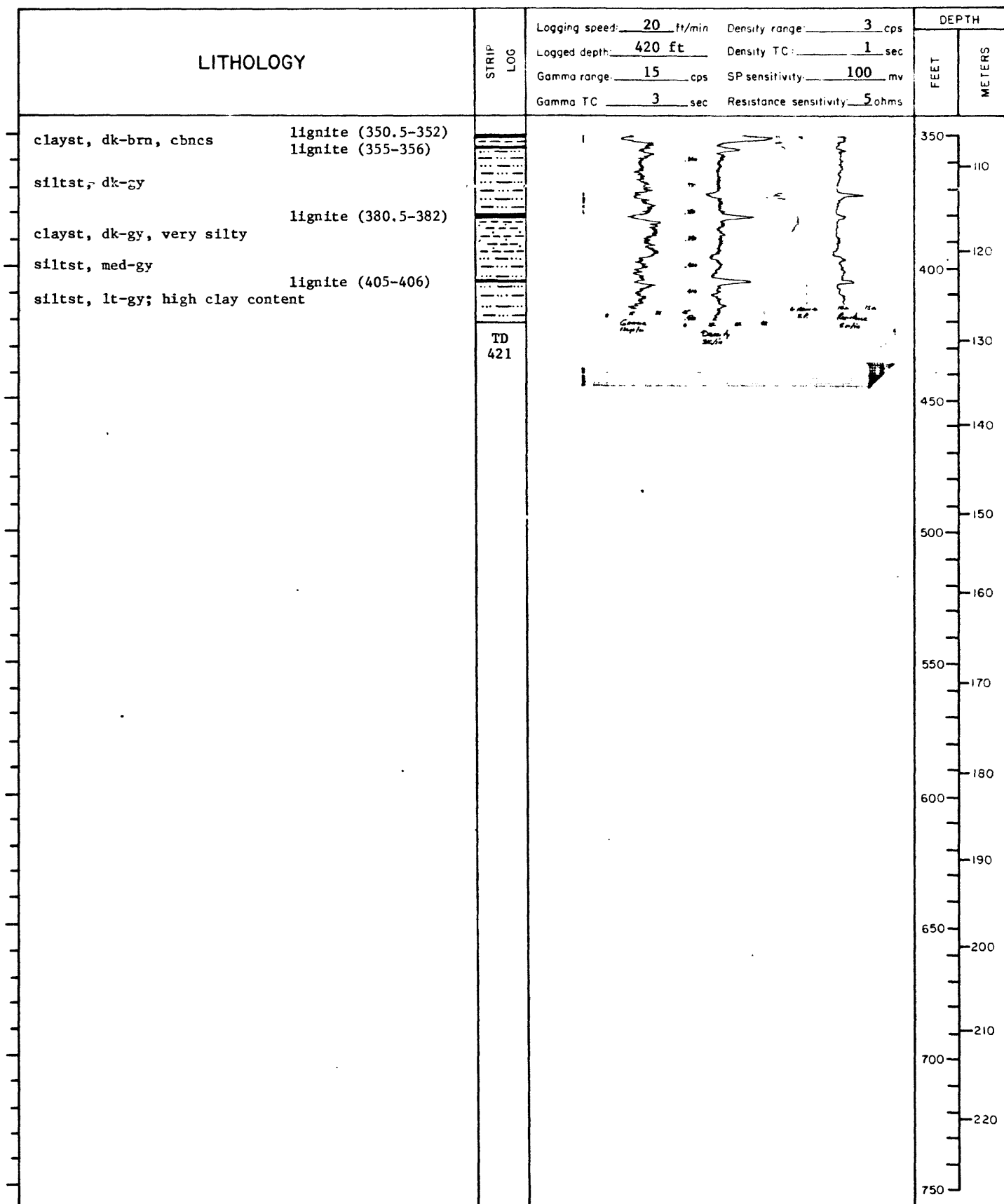
LITHOLOGY	STRIP	LOG	GEOPHYSICAL DATA	
			Logging speed: <u>20</u> ft/min Lagged depth: <u>420</u> ft Gamma range: <u>15</u> cps Gamma T.C.: <u>3</u> sec	Density range: <u>3</u> cps Density T.C.: <u>1</u> sec SP sensitivity: <u>100</u> mv Resistance sensitivity: <u>5</u> ohms
soil, med-brn, silt, clay, unconsol lignite (8.5-10)				
clayst, med-gy, sli silty				
clayst, dk-brn, cbncs lignite (26-31)				
clayst, med-gy, mod silty lignite (35-36.5)				
clayst, med-gy, mod silty lignite (38.5-41)				
siltst, med-gy lignite (68.5-70)				
clayst, med-gy, very silty lignite (85.5-86.5)				
clayst, lt-gy, mod silty				
siltst, med-gy				
clayst, dk-gy, sli silty lignite (131.5-136)				
clayst, lt-brn lignite (147.5-148.5)				
clayst, med-gv, mod silty lignite (159-160)				
clayst, med-gv, very silty				
siltst, med-gy; high clay content				
lignite (201.5-202.5)				
siltst, med-gy				
sandst, lt-gy, fine-grained				
siltst, med-gy				
lignite (291.5-294.5)				
clayst, med-gy, very silty				
siltst, med-gy				

DEPTH

FEET: 0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 350

METERS: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 221, 222, 223, 224, 225, 226, 227, 228, 229, 230, 231, 232, 233, 234, 235, 236, 237, 238, 239, 240, 241, 242, 243, 244, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350

## REMARKS:

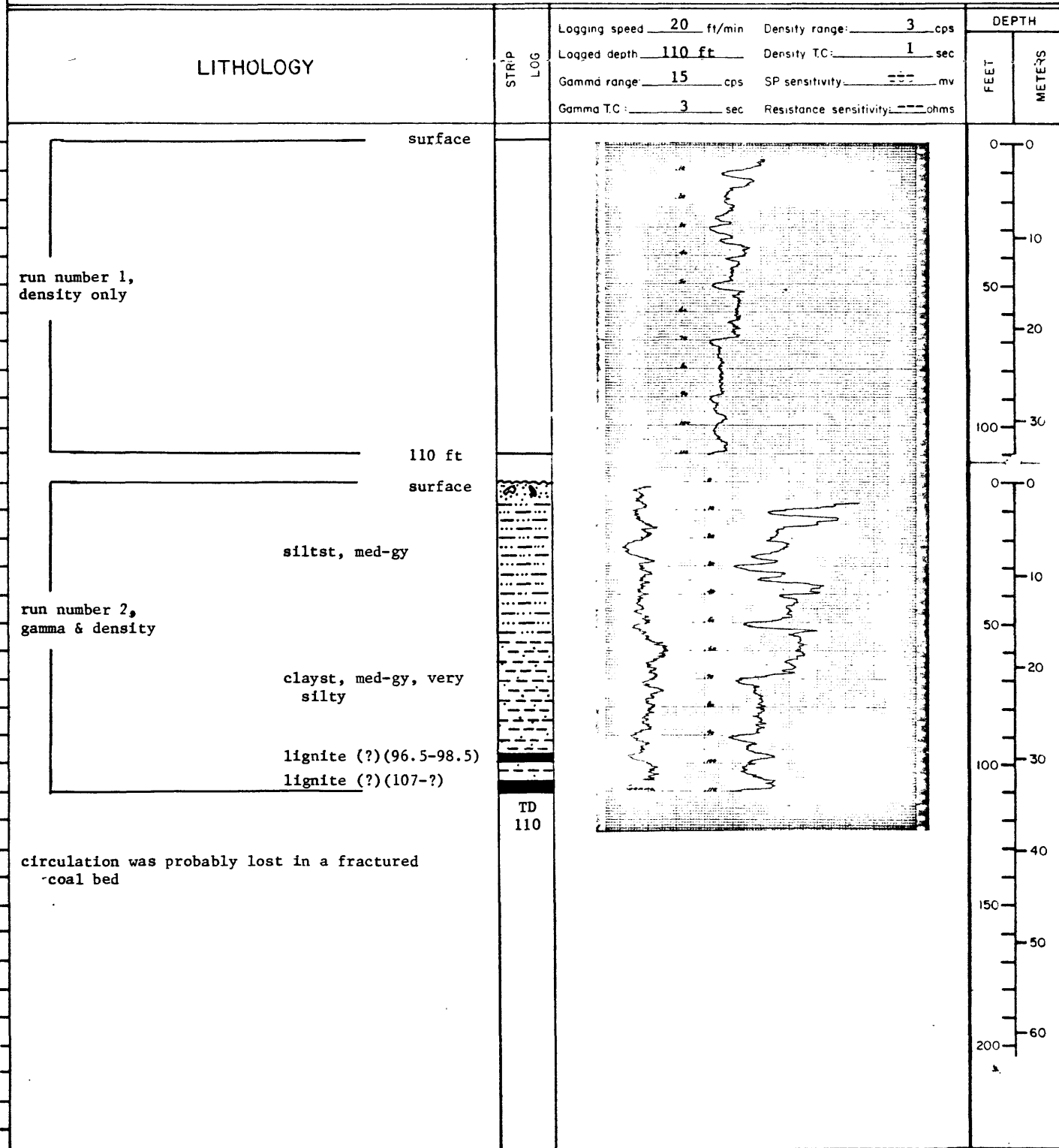




# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 41  
SHEET 1 OF 1

AREA <b>Three River</b>		QUAD NAME <b>Fayette</b>	
DATE STARTED <b>8-5-79</b>	DATE COMP. <b>8-5-79</b>	COUNTY <b>Dunn</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 12 T.144 N., R. 97 W., FOOTAGE LOC. <b>2218 ft</b>		FNL <b>810 ft</b>	GROUND ELEV <b>2422 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>110 ft</b> CORING <b>---</b>	TOTAL DEPTH <b>110 ft</b>
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	DEPTH TO FLUID LEVEL <b>---</b>
LITHOLOGY RECORDED BY <b>L. Tomac</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS: <b>Due to hole caving, geophysical log was run through the casing. Gamma and density were the only logs run on this hole.</b>			



# UNITED STATES GEOLOGICAL SURVEY

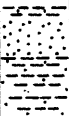
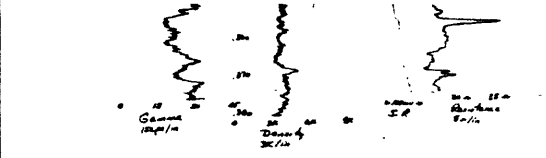
HOLE NO 42  
SHEET 1 OF 2

AREA Three River		QUAD NAME Grassy Butte SE	
DATE STARTED 8-3-79	DATE COMP. 8-3-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 18 T.144 N., R. 97 W., FOOTAGE LOC.		40 ft <b>XXX</b> FSL 2610 ft <b>XXX</b> FWL	GROUND ELEV 2424 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft CORING ---	TOTAL DEPTH 380 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 4 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min Logged depth: 380 ft		Density range: 3 cps Density TC: 1 sec		Gamma range: 15 cps Gamma TC: 3 sec		SP sensitivity: 100 mv Resistance sensitivity: 5 ohms		DEPTH	
										FEET	METERS
soil, med-brn, sand, silt, unconsol										0	0
siltst, med-gy										10	
clayst, med-gy, sli silty										50	
siltst, lt-gy										20	
										100	30
sandst, med-gy, fine-grained										40	
										150	50
siltst, med-gy										200	60
										70	
										250	80
										300	90
										350	100

REMARKS:

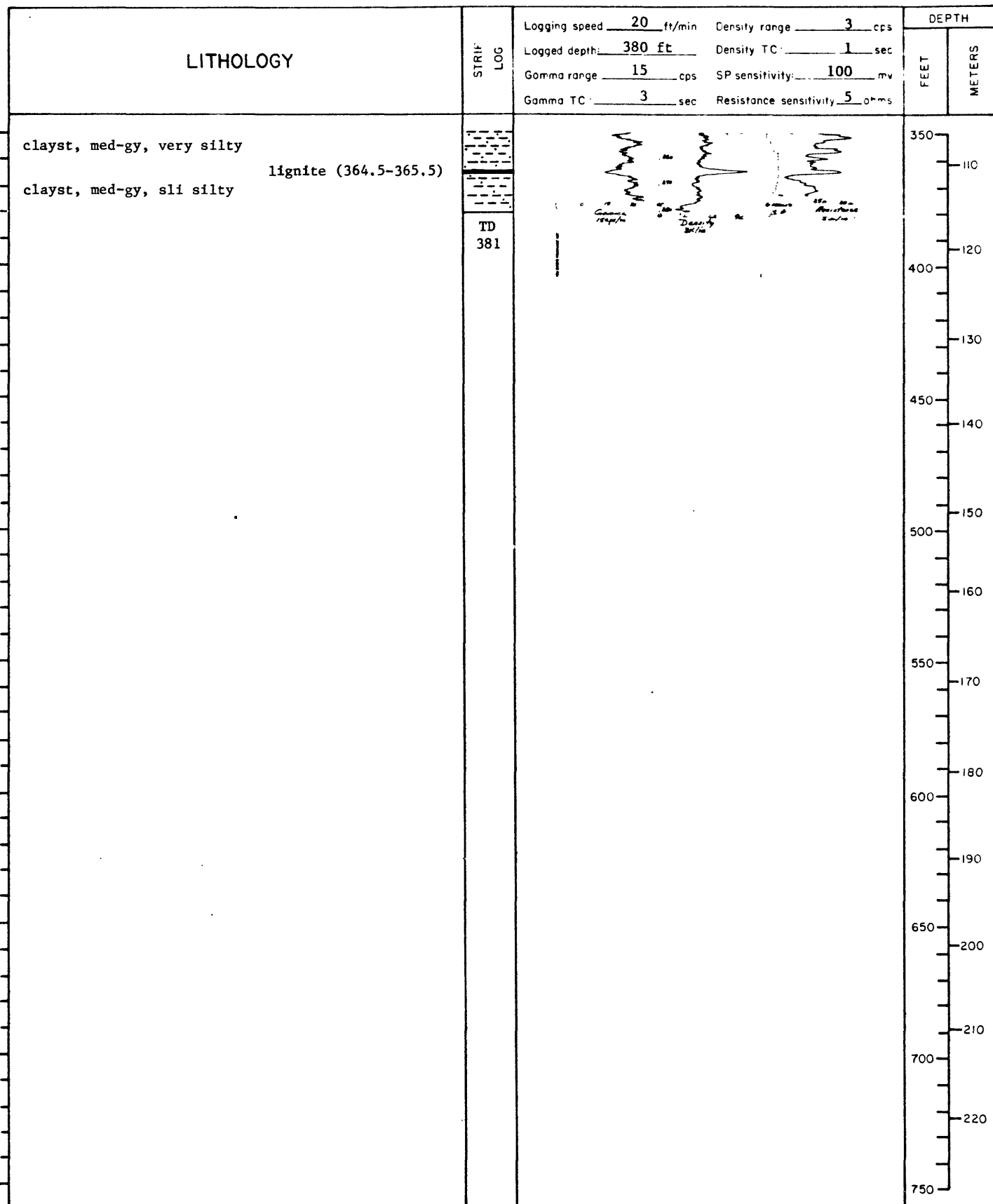
LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>380</u> ft    Density T.C.: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms		DEPTH	
				FEET	METERS
clayst, med-gy, mod silty sandst, med-gy, fine-grained  clayst, lt-gy, very silty	 TD 380			350	
				110	
				120	
				400	
				130	
				450	
				140	
				500	
				150	
				160	
				550	
				170	
				180	
				600	
				190	
				650	
				200	
				210	
				700	
				220	
				750	

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 43  
SHEET 1 OF 2

AREA Three River		QUAD NAME Killdeer	
DATE STARTED 8-5-79	DATE COMP 8-5-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 4 T.144 N., R. 96 W., FOOTAGE LOC.		536 ft FNL XXX	54 ft FWL XXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 381 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 380 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, sand, silt, unconsol			0 0
sandst, med-brn, fine-grained			10
clayst, med-gy, very silty			20
lignite (97.5-103.5)			30
clayst, dk-gy, very silty			40
lignite (118.5-120.5)			50
siltst, med-gy; high clay content			60
lignite (154-155)			70
siltst, med-gy			80
clayst, dk-gy, sli silty			90
lignite (182.5-184)			100
siltst, lt-gy			110
lignite (223.5-226)			120
clayst, med-gy, mod silty			130
lignite (276.5-277.5)			140
clayst, dk-gy, sli silty			150
lignite (290-291)			160
clayst, med-gy, mod silty			170
sandst, lt-gy, calc, med-grained, well-consol			180
siltst, med-gy			190
clayst, med-gy, very silty			200
lignite (341-344.5)			210
			220
			230
			240
			250
			260
			270
			280
			290
			300
			310
			320
			330
			340
			350

REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 44  
SHEET 1 OF 2

AREA Three River		QUAD NAME Killdeer			
DATE STARTED 8-7-79		DATE COMP. 8-7-79		COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 12 T.144 N., R. 96 W.,		FOOTAGE LOC. 2370 ft		FNL XXX	10 ft FEL XXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 360 ft		CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		TOTAL DEPTH 360 ft	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min		Density range: 3 cps	
		Logged depth: 360 ft		Density T.C.: 1 sec	
		Gamma range: 15 cps		SP sensitivity: 100 mv	
		Gamma T.C.: 3 sec		Resistance sensitivity: 5 ohms	
				DEPTH	
				FEET	METERS
soil, med-brn, sand, silt, unconsol siltst, med-brn				0	0
lignite (14.5-19)					
siltst, med-gy; high clay content				10	
clayst, dk-gy, sli silty				50	
lignite (54.5-55.5)				20	
siltst, med-gy				100	30
sandst, med-gy, fine-grained				40	
lignite (140.5-141.5)				150	50
lignite (143.5-144.5)				60	
siltst, med-gy				200	60
sandst, lt-gy, calc, fine-grained, well-consol				70	
clayst, med-gy, mod silty				250	80
sandst, lt-gy, calc, fine-grained, well-consol				80	
clayst, med-gy, mod silty				300	90
lignite (223-229)				100	
siltst, dk-gy					
lignite (250.5-252)					
clayst, dk-brn, cbnccs, mod silty					
lignite (260.5-261.5)					
lignite (266-273)					
lignite (275-279)					
siltst, med-gy; high clay content					
lignite (286.5-288)					
clayst, lt-gy, very silty					
lignite (330.5-333.5)					
siltst, med-gy					

REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min	Density range: <u>3</u> cps	DEPTH	
		Logged depth: <u>360</u> ft	Density T.C.: <u>1</u> sec	FEET	METERS
siltst, med-gy		Gamma range: <u>15</u> cps	SP sensitivity: <u>100</u> mv	350	
	TD 360	Gamma T.C.: <u>3</u> sec	Resistance sensitivity: <u>5</u> ohms	110	
				120	
				400	
				130	
				450	
				140	
				500	
				150	
				160	
				550	
				170	
				180	
				600	
				190	
				650	
				200	
				210	
				700	
				220	
				750	

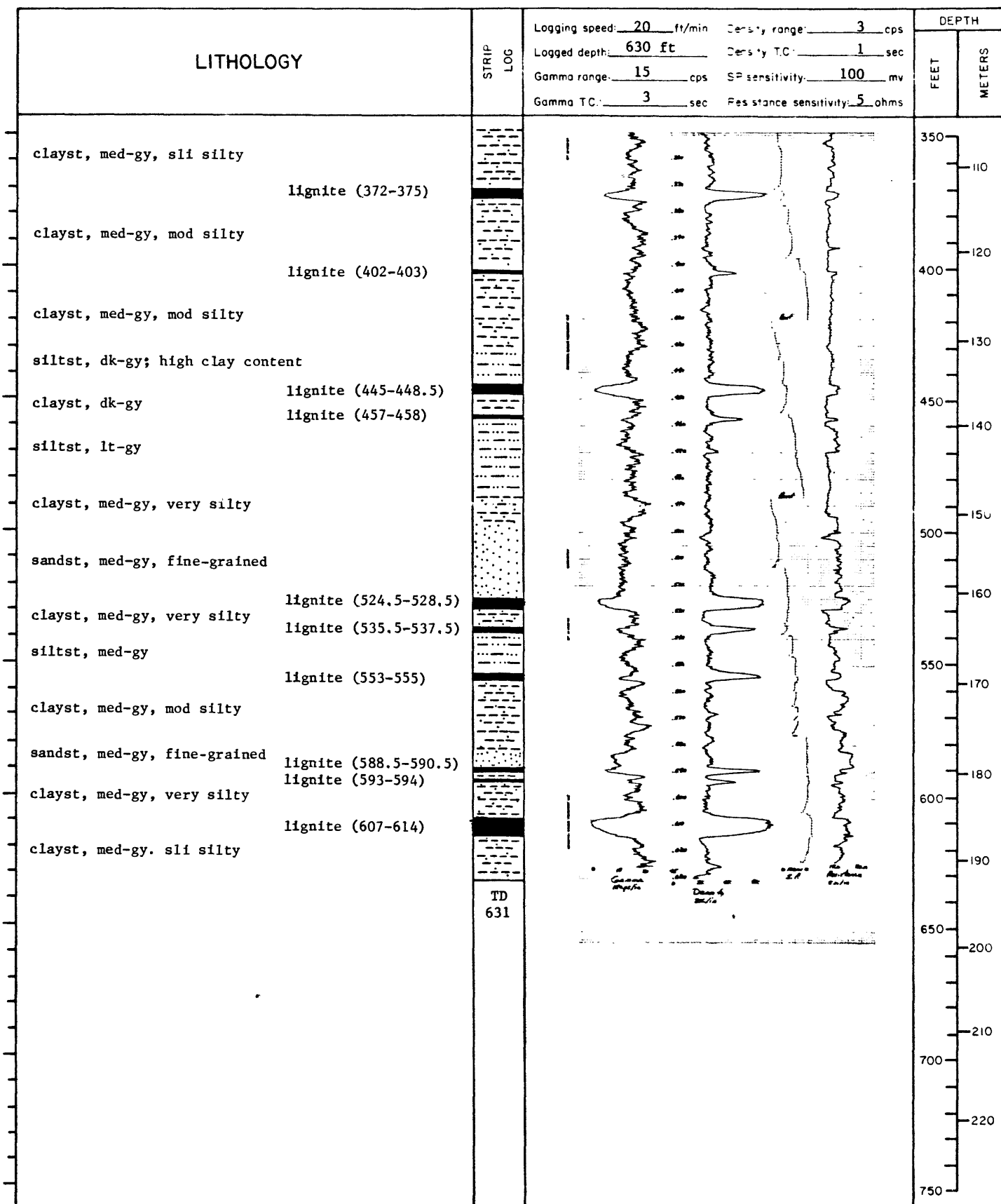
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 45  
SHEET 1 OF 2

AREA Three River		QUAD NAME Killdeer	
DATE STARTED 8-7-79	DATE COMP. 8-7-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 22 T.144 N., R. 96 W., FOOTAGE LOC.		10 ft FNL XXX	132 ft FNL XXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 631 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 630 ft	Density T.C. 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
			DEPTH FEET METERS
soil, med-brn, sand, silt, unconsol siltst, med-brn; high clay content			0 0
sandst, lt-brn, fine-grained			10
sandst, lt-brn, calc, fine-grained, well-consol sandst, med-brn, fine-grained			50 20
clayst, dk-gy lignite (114-115.5)			100 30
clayst, med-gy, very silty			40
siltst, med-gy lignite (170-171) lignite (172.5-173.5) lignite (174.5-176)			150 50
clayst, med-gy, mod silty			200 60
clayst, dk-brn lignite (216-217) lignite (218.5-220) lignite (224.5-233.5) lignite (235-239.5)			70
clayst, med-gy, very silty			250
siltst, dk-gy lignite (272-273.5)			80
clayst, med-gy, mod silty lignite (296-299)			300 90
clayst, med-gy, sli silty			350 100



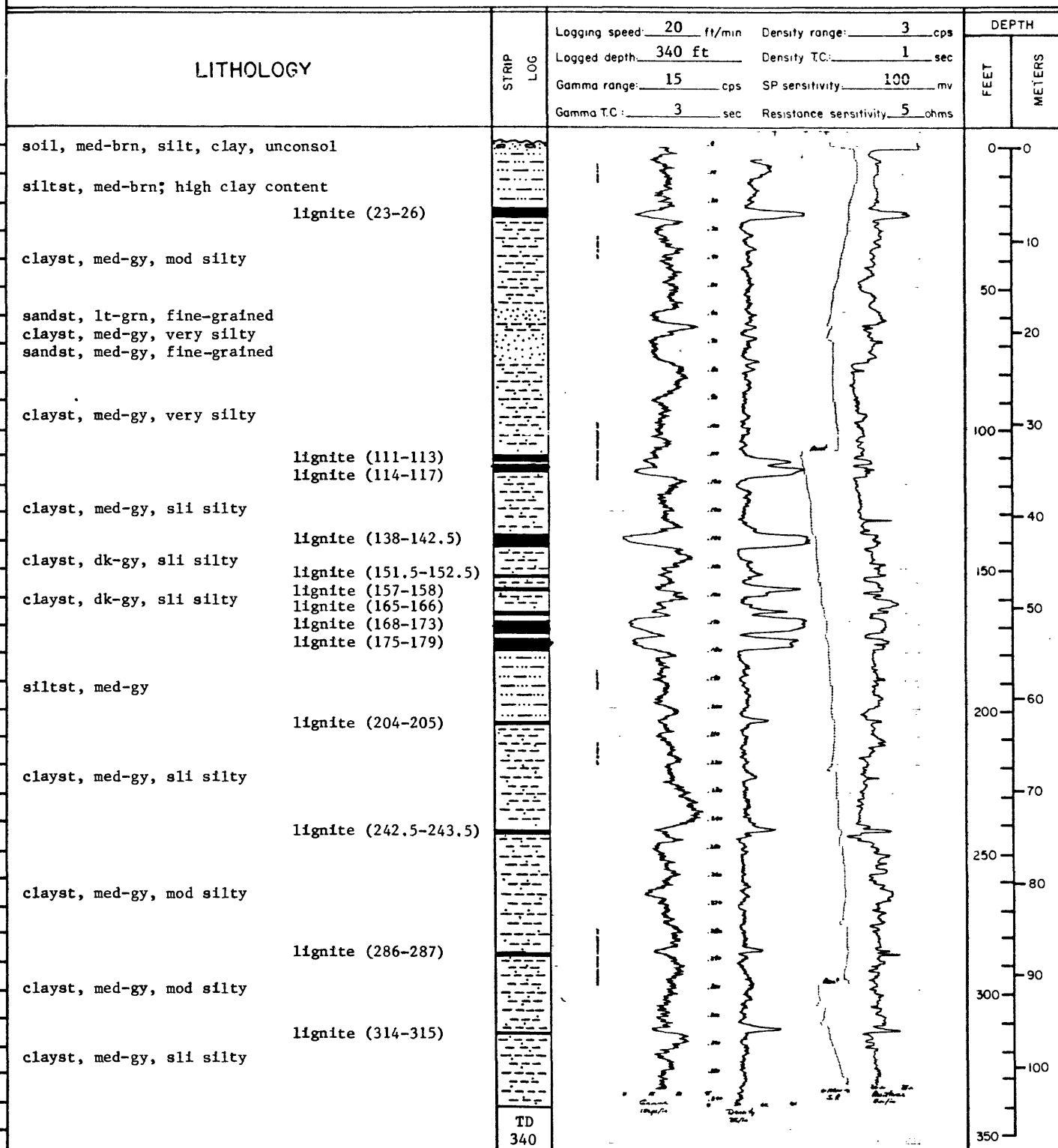
## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 46  
SHEET 1 OF 1

AREA <b>Three River</b>		QUAD NAME <b>Killdeer</b>	
DATE STARTED <b>8-7-79</b>	DATE COMP. <b>8-7-79</b>	COUNTY <b>Dunn</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 30 T.144 N., R. 95 W., FOOTAGE LOC. <b>1660 ft</b>		FNL <b>XXX</b> <b>820 ft</b>	FEL <b>XXX</b> <b>2286 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>340 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	
LITHOLOGY RECORDED BY <b>S. Christensen</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS:			

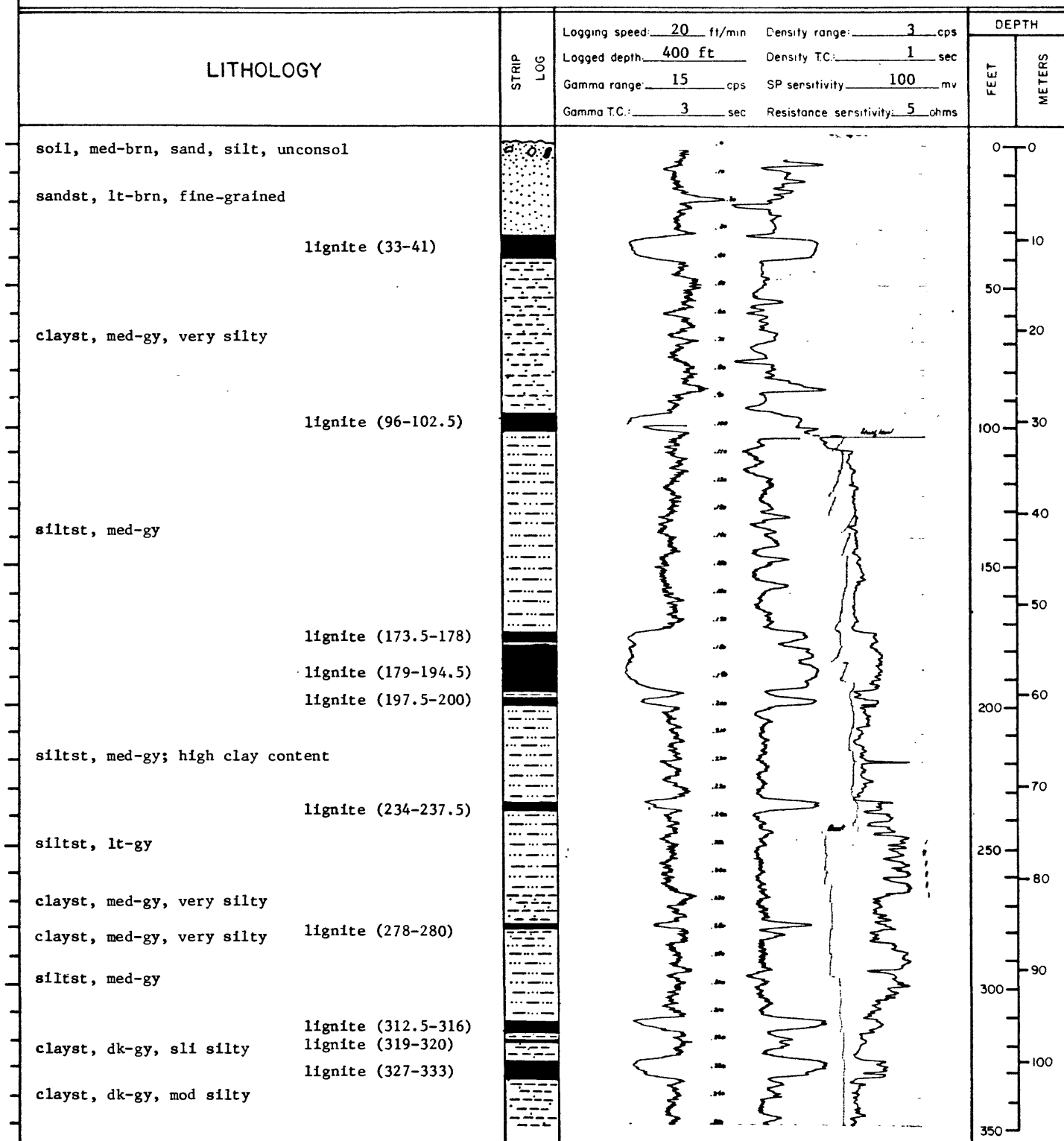


# UNITED STATES GEOLOGICAL SURVEY



HOLE NO 47  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Werner</b>	
DATE STARTED <b>8-17-79</b>	DATE COMP. <b>8-17-79</b>	COUNTY <b>Dunn</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 28 T. 144 N., R. 93 W., FOOTAGE LOC.		25 ft FNL <b>XXX</b> 480 ft <b>XXX</b> FWL	GROUND ELEV <b>2298 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>401 ft</b> CORING <b>---</b>	TOTAL DEPTH <b>401 ft</b>
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	DEPTH TO FLUID LEVEL <b>104 ft</b>
LITHOLOGY RECORDED BY <b>L. Tomac</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	

REMARKS:



HOLE NO 47  
SHEET 2 OF 2

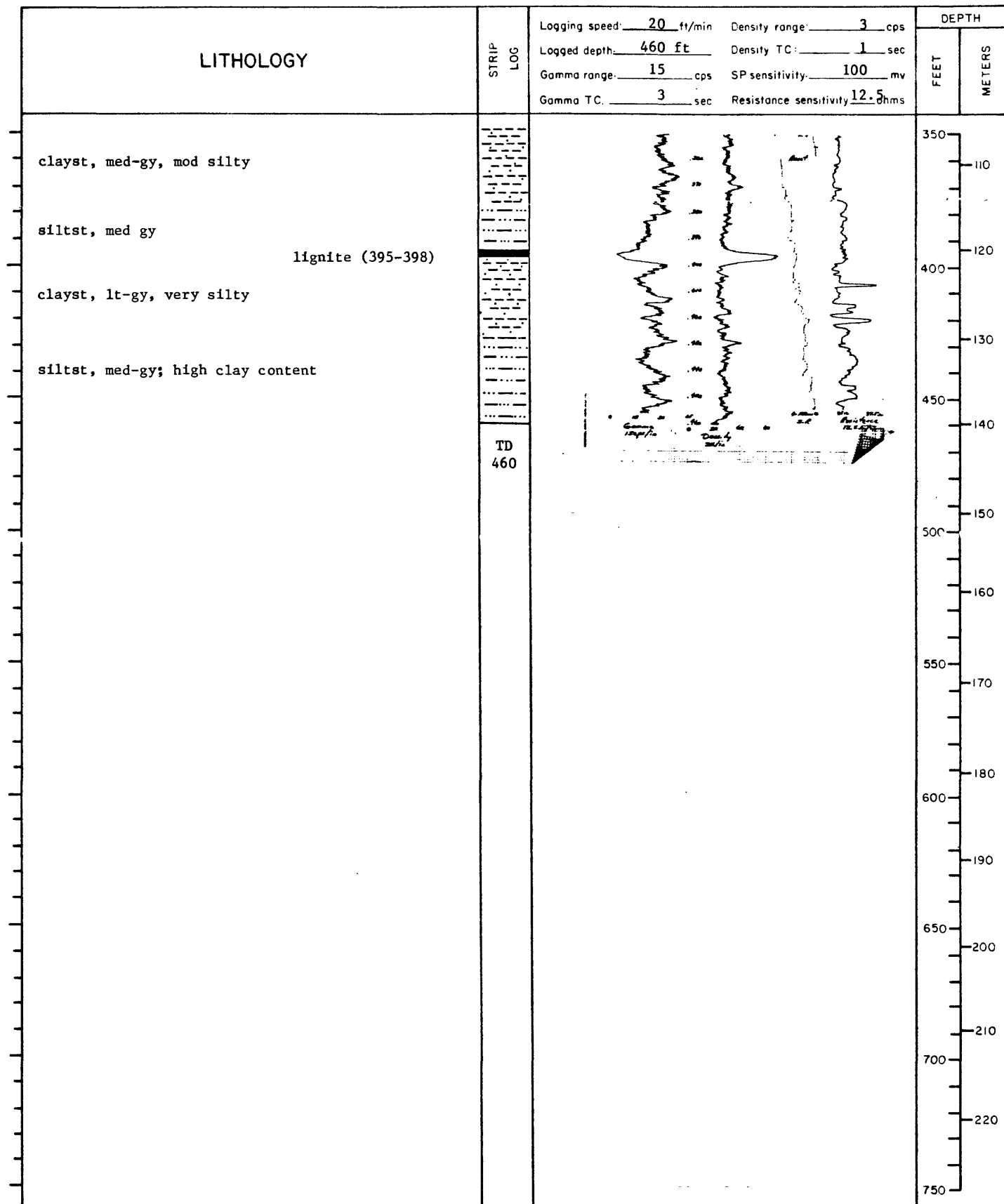
LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
clayst, dk-gy, mod silty  clayst, med-gy, very silty clayst, med-gy, very silty		Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>400</u> ft    Density T.C.: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C.: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms	
	TD 401		

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 48  
SHEET 1 OF 2

AREA Three River		QUAD NAME Marshall	
DATE STARTED 8-15-79	DATE COMP. 8-15-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 32 T.144 N., R. 91 W., FOOTAGE LOC.		1580 ft <del>XXX</del> FSL 18 ft <del>XXX</del> FWL	GROUND ELEV 2205 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 460 ft CORING ---	TOTAL DEPTH 460 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 6 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 460 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 12.5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, sand, silt, unconsol			0 0
sandst, med-brn, fine-grained			10
lignite (38-39.5)			50
clayst, med-gy, very silty			20
clayst, dk-gy, sli silty			30
lignite (87.5-89.5)			100
clayst, med-gy, mod silty			40
siltst, med-gy			150
sandst, med-gy, fine-grained			50
clayst, med-gy, sli silty			60
sandst, med-gy, med-grained, calc, well-consol			200
clayst, med-gy, sli silty			70
lignite (225-227.5)			250
siltst, dk-gy			80
lignite (237-239)			90
siltst, med-gy			300
clayst, lt-gy, very silty			100
siltst, med-gy			350
lignite (273-278)			
siltst, med-gy			
lignite (311.5-314)			
clayst, dk-gy, sli silty			
lignite (326.5-327.5)			
clayst, dk-gy, sli silty			
lignite (343-344)			
clayst, med-gy, mod silty			

REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

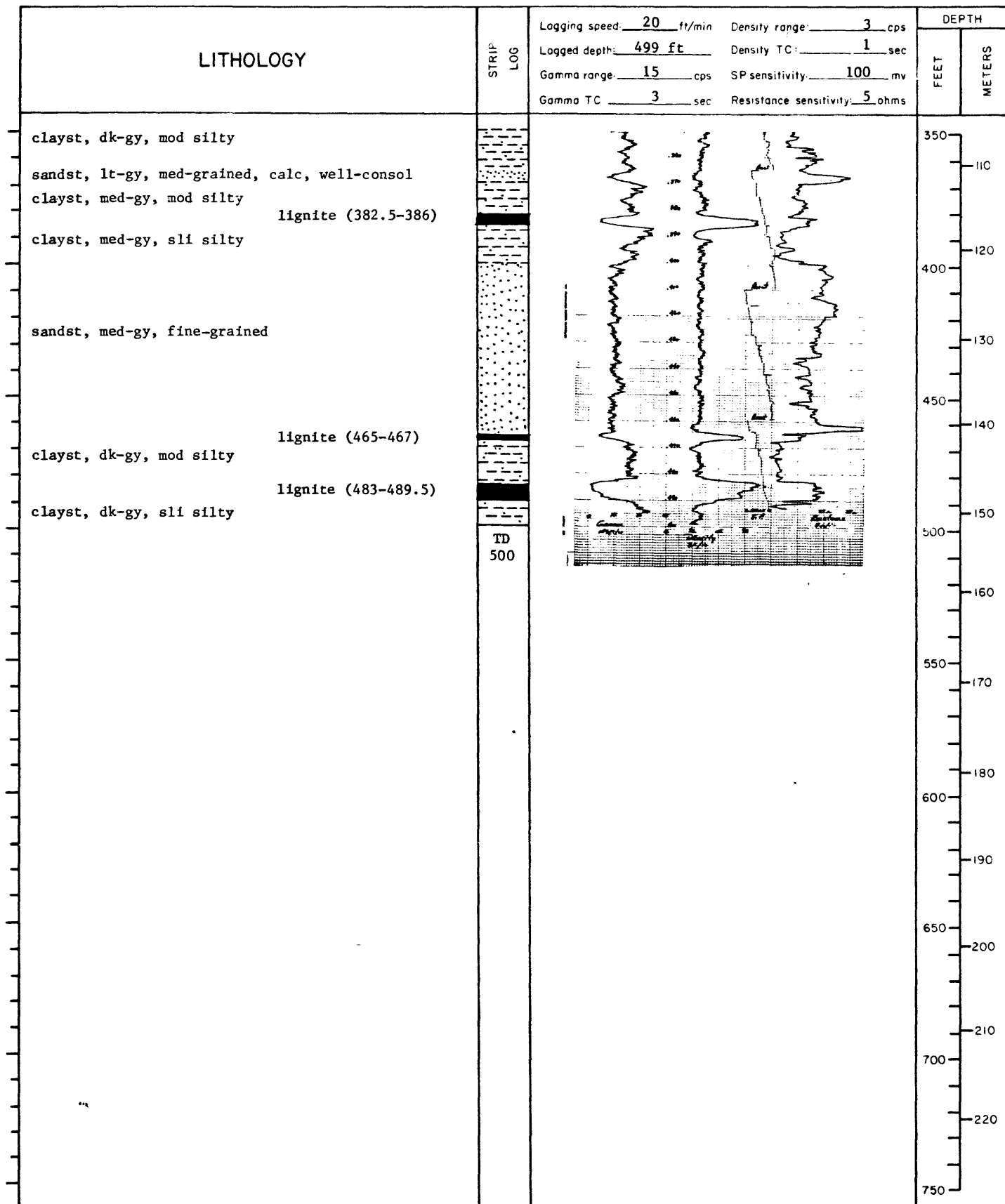
HOLE NO 49  
SHEET 1 OF 2

AREA Three River		QUAD NAME Roosevelt Creek East	
DATE STARTED 7-25-79	DATE COMP. 7-25-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 7 T.143 N., R. 101 W., FOOTAGE LOC.		30 ft XXX FSL	1120 ft FEL XXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 500 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth 499 ft	Density TC: 1 sec	Gamma range 15 cps	SP sensitivity 100 mv	FEET	METERS
soil, lt-brn, silt, clay, unconsol						0	0
siltst, med-brn						10	
clayst, med-gy, mod silty						50	
siltst, med-gy						20	
clayst, med-gy, mod silty						100	
siltst, med-gy						200	
lignite (90-94)						30	
clayst, med-gy, mod silty						40	
sandst, med-gy, med-grained, calc						50	
siltst, med-gy						60	
clayst, dk-gy, sli silty						70	
siltst, dk-gy						80	
clayst, dk-gy, mod silty						90	
siltst, lt-gy						100	
lignite (218-219.5)						110	
lignite (221-223.5)						120	
siltst, med-gy						130	
lignite (244.5-251)						140	
clayst, dk-gy, mod silty						150	
siltst, med-gy						160	
clayst, dk-gy, mod silty						170	
siltst, med-gy						180	
clayst, dk-gy, mod silty						190	
siltst, med-gy						200	
clayst, dk-gy, mod silty						210	
siltst, med-gy						220	
clayst, dk-gy, mod silty						230	
siltst, med-gy						240	
clayst, dk-gy, mod silty						250	
siltst, med-gy						260	
clayst, dk-gy, mod silty						270	
siltst, med-gy						280	
clayst, dk-gy, mod silty						290	
siltst, med-gy						300	
clayst, dk-gy, mod silty						310	
siltst, med-gy						320	
clayst, dk-gy, mod silty						330	
siltst, med-gy						340	
clayst, dk-gy, mod silty						350	

## REMARKS:

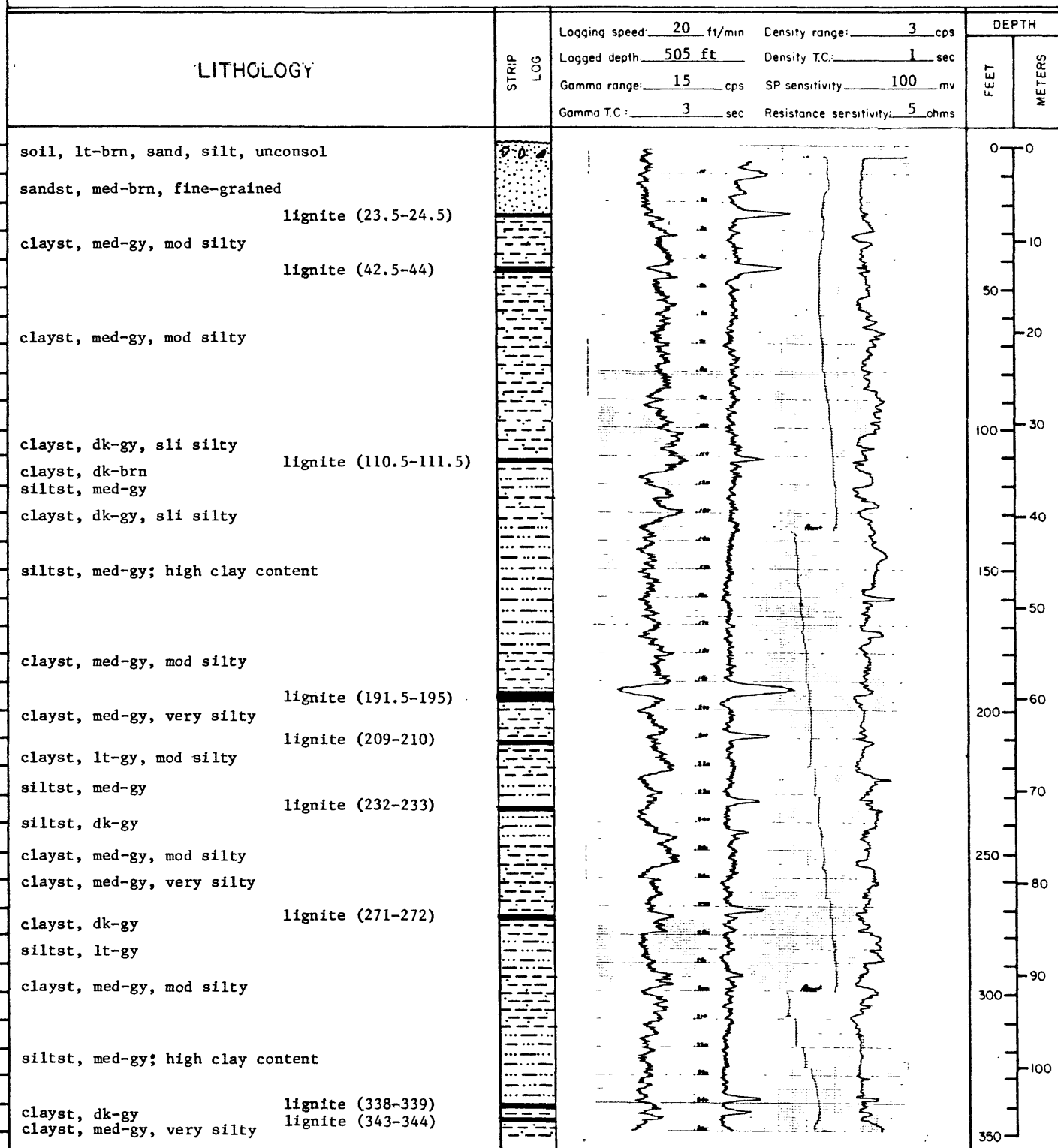





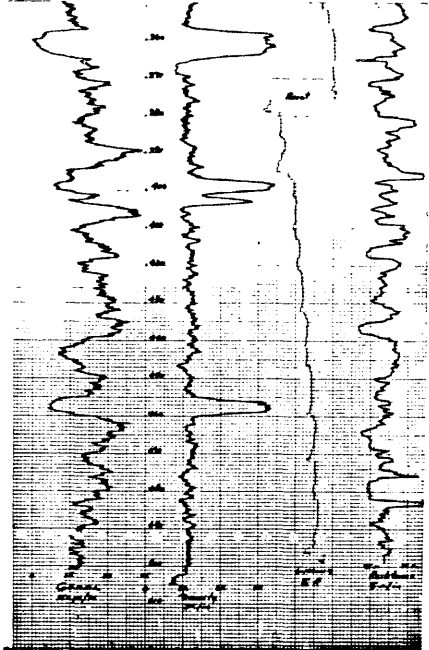


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 50  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gorham NW	
DATE STARTED 7-25-79	DATE COMP. 7-25-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 15 T.143 N., R. 101 W., FOOTAGE LOC. 630 ft		FNL 1170 ft	FEL 2425 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 505 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



## REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>505</u> ft    Density TC: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma TC: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms		DEPTH	
				FEET	METERS
clayst, med-gy, very silty				350	
lignite (357.5-364.5)				110	
clayst, med-gy, mod silty					
clayst, med-gy, sli silty				120	
sandst, med-gy, fine-grained,					
calc, well-consol    lignite (397.5-400.5)				400	
clayst, med-brn    lignite (402-403.5)					
clayst, med-gy, very silty				130	
clayst, med-gy, mod silty					
siltst, lt-gy				450	
clayst, dk-gy, mod silty				140	
lignite (455.5-459)					
clayst, lt-gy, mod silty				150	
siltst, med-gy				500	
				160	
				550	
				170	
				600	
				180	
				650	
				200	
				700	
				210	
				750	
				220	

# UNITED STATES GEOLOGICAL SURVEY

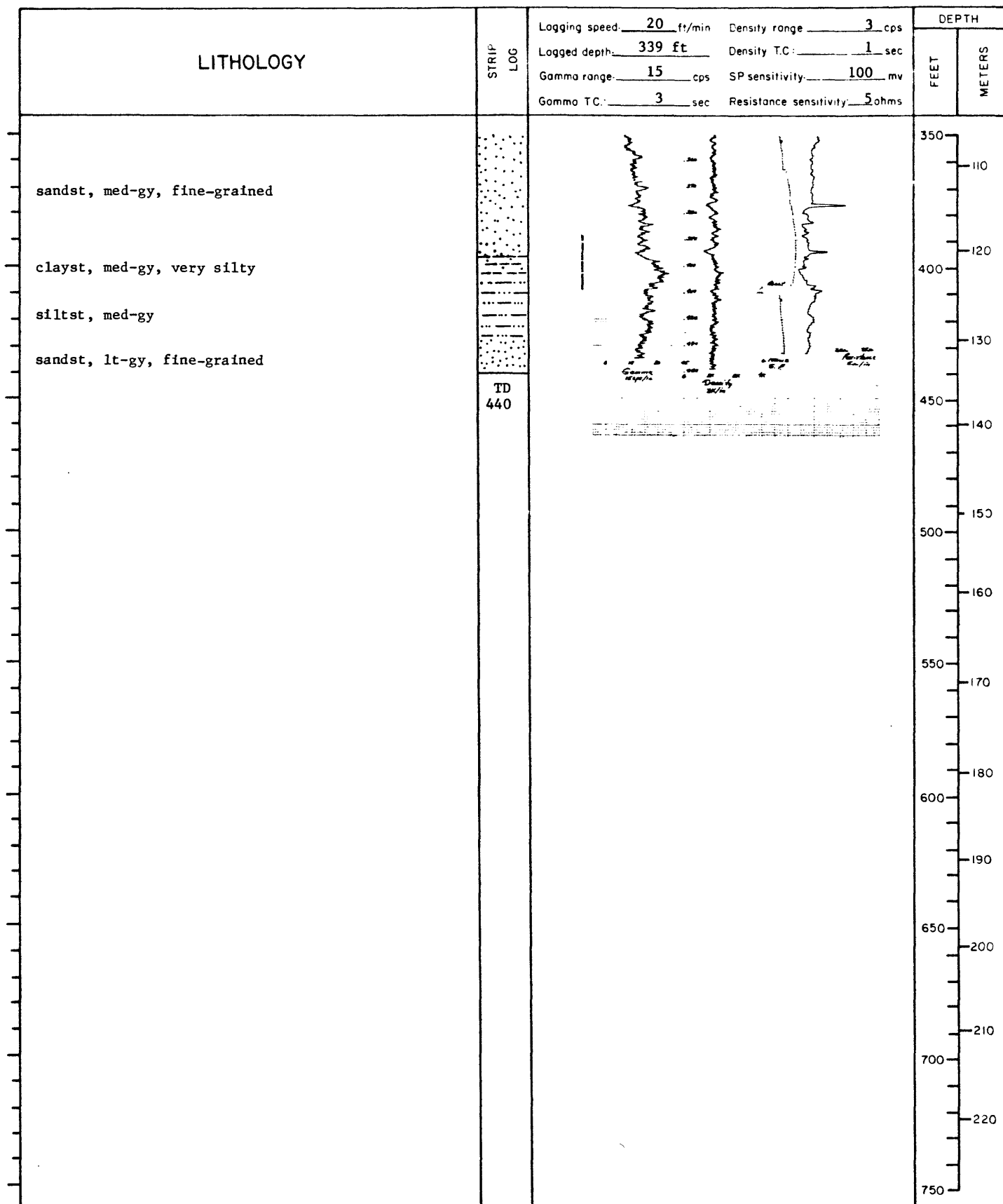
HOLE NO 51  
SHEET 1 OF 2

AREA Three River		QUAD NAME Roosevelt Creek East	
DATE STARTED 7-24-79	DATE COMP. 7-24-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 24 T. 143 N., R. 102 W., FOOTAGE LOC.		990 ft <del>RMK</del> FSL 205 ft <del>RMK</del> FWL	GROUND ELEV 2228 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	TOTAL DEPTH 440 ft
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	LOGGING DATA		DEPTH	
		Logging speed: 20 ft/min	Density range: 3 cps	FEET	METERS
soil, med-brn, sand, silt, clay, unconsol		Logged depth: 339 ft	Density T.C.: 1 sec	0	0
siltst, med-gy		Gamma range: 15 cps	SP sensitivity: 100 mv	10	
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms	20	
lignite (75.5-77.5)				30	
lignite (78.5-86.5)				40	
clayst, lt-gy, very silty				50	
sandst, lt-gy, fine-grained, calc				60	
clayst, med-gy, sli silty				70	
lignite (125-127.5)				80	
clayst, dk-gy, sli silty				90	
lignite (141-142)				100	
clayst, dk-gy, sli silty				110	
lignite (149-150)				120	
siltst, med-gy; high clay content				130	
clayst, med-gy, mod silty				140	
siltst, med-gy				150	
lignite (212.5-215)				160	
siltst, med-gy; high clay content				170	
lignite (242.5-244.5)				180	
clayst, dk-gy, very silty				190	
lignite (257-262.5)				200	
siltst, med-gy				210	
				220	
				230	
				240	
				250	
				260	
				270	
				280	
				290	
				300	
sandst, med-gy, fine-grained				310	
				320	
				330	
				340	
				350	

REMARKS:


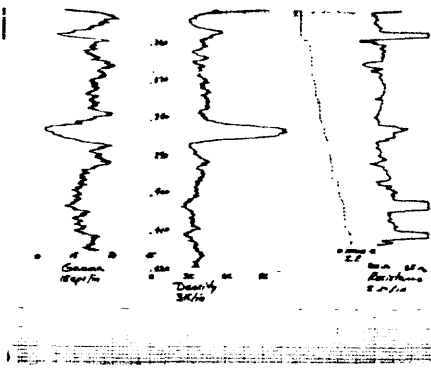


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 52  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gorham	
DATE STARTED 7-26-79	DATE COMP. 7-26-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 34 T. 144 N., R. 100 W., FOOTAGE LOC. 528 ft		RMK FSL 70 ft	XXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE	
		ROTARY 420 ft	CORING ---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 419 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol			0 0
clayst, lt-brn, silty			10
siltst, med-brn			50 20
clayst, med-gy, very silty			100 30
sandst, med-gy, med-grained, calc, well-consol			40
clayst, med-gy, mod silty			150 50
lignite (169-170.5)			50
clayst, med-gy, very silty			200 60
siltst, med-gy			70
lignite (272-274.5)			80
clayst, lt-gy, very silty			90
siltst, med-gy			100
lignite (347-351)			350

HOLE NO 52  
SHEET 2 OF 2

LITHOLOGY	STRIP LOG	DEPTH		
		FEET	METERS	
clayst, med-brn lignite (347-351) clayst, med-gy, very silty lignite (356-357.5) clayst, dk-gy, sli silty lignite (381.5-385) sandst, lt-gy, fine-grained, calc		Logging speed: 20 ft/min Density range: 3 cps Logged depth: 419 ft Density T.C.: 1 sec Gamma range: 15 cps SP sensitivity: 100 mv Gamma T.C.: 3 sec Resistance sensitivity: 5 ohms		350 110 400 120 500 150 600 180 700 210 750 220
TD 420				

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 53  
SHEET 1 OF 1

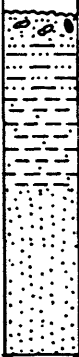
AREA Three River		QUAD NAME Gorham NW	
DATE STARTED 7-26-79	DATE COMP. 7-26-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 18 T. 143 N., R. 100 W., FOOTAGE LOC.		2530 ft FNL <del>XXX</del>	2305 ft FEL <del>XXX</del>
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV. 2735 ft	
		TOTAL DEPTH 301 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY		Logging speed: 20 ft/min Density range: 3 cps Logged depth: 300 ft Density TC: 1 sec Gamma range: 15 cps SP sensitivity: 100 mv Gamma TC: 1 sec Resistance sensitivity: 5 ohms	
		DEPTH FEET METERS	
soil, med-brn, sand, silt, clay, unconsol clayst, med-brn, very silty  sandst, lt-brn, fine-grained  siltst, med-brn  sandst, med-gy, fine-grained  clayst, med-gy, very silty lignite (92-93)  siltst, med-gy  clayst, med-gy, very silty lignite (158-159.5)  clayst, med-gy, mod silty  clayst, med-gy, very silty  clayst, med-gy, sli silty lignite (288-292) lignite (294-295)			
TD 301			

# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 54A  
SHEET 1 OF 1

AREA      Three River		QUAD NAME      Gorham	
DATE STARTED      7-26-79	DATE COMP.      7-26-79	COUNTY      Billings	STATE      North Dakota
LOCATION: SEC. 25 T.143 N., R. 100 W., FOOTAGE LOC.      405 ft		XXX FSL      140 ft	XXX FWL      GROUND ELEV      2695 ft
SIZE AND BIT TYPE:      4-3/4 inch drag		FOOTAGE ROTARY      100 ft      CORING      ---	
DRILLING AGENCY:      Gregory Drilling Company		DRILL TYPE:      Rotary	
LITHOLOGY RECORDED BY      M. Hudson		GEOPHYSICAL LOGS RECORDED BY      ---	
REMARKS:      Hole abandoned at 100 ft due to complete loss of circulation. No geophysical log run on this hole.			

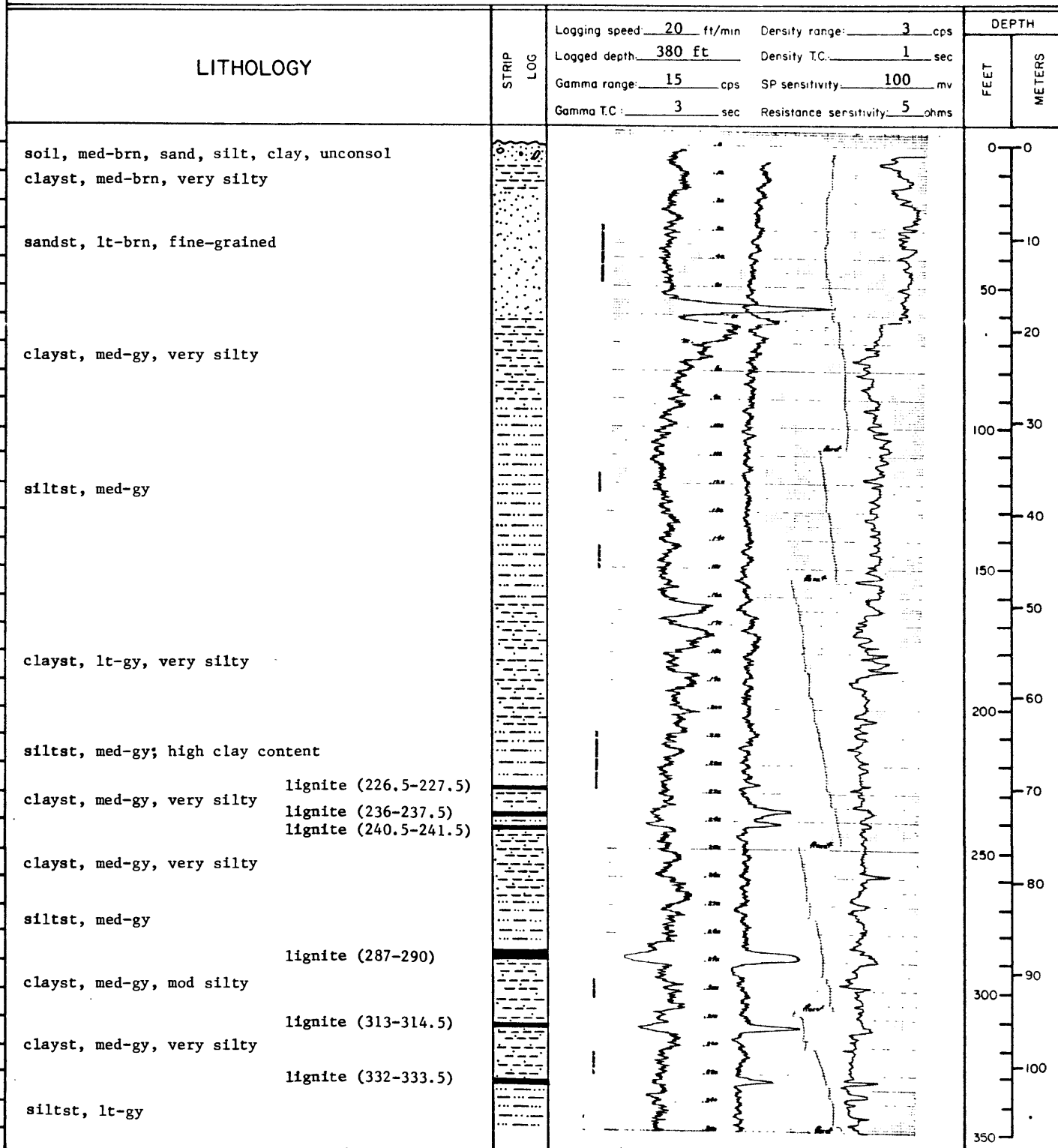
LITHOLOGY	STRIP LOG	GEOPHYSICAL DATA		DEPTH	
		Logging speed: --- ft/min	Density range: --- cps	FEET	METERS
soil, lt-brn, clay, silt, unconsol		Logged depth: ---	Density TC: --- sec	0	0
siltst, med-gy; high clay content		Gamma range: --- cps	SP sensitivity: --- mv		
clayst, med-gy, mod silty		Gamma TC: --- sec	Resistance sensitivity: --- ohms		
sandst, lt-gy, fine-grained					
no return, probably sandst	X			100	30
	TD 100				
				150	50
				200	60
				250	80
				300	90
				350	100



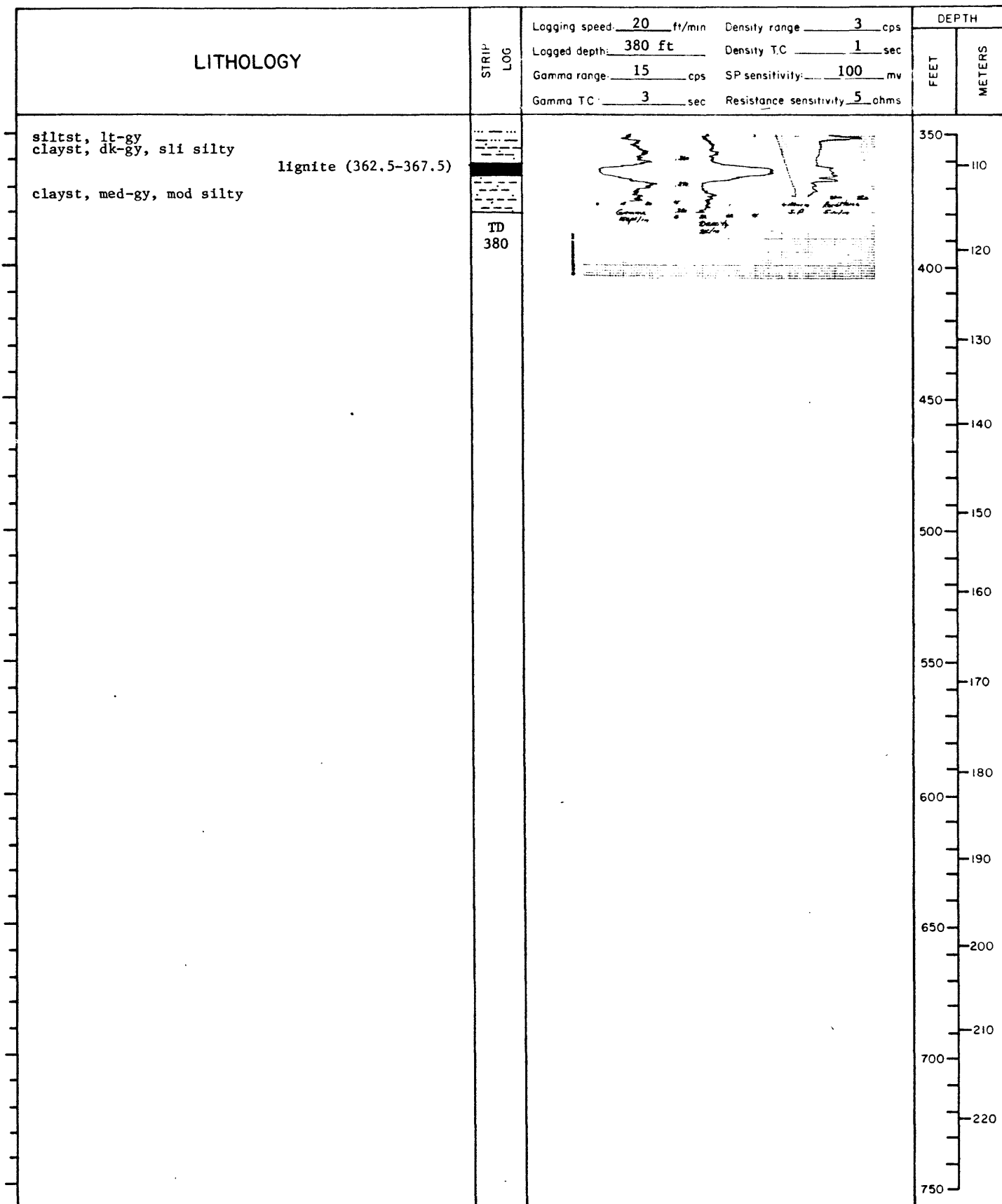
# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 54B  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gorham	
DATE STARTED 7-26-79	DATE COMP. 7-26-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 25 T.143 N., R.100 W., FOOTAGE LOC.		1000 ft KKK FSL 85 ft KKK FWL	GROUND ELEV 3672 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 3 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



REMARKS:

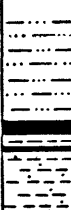
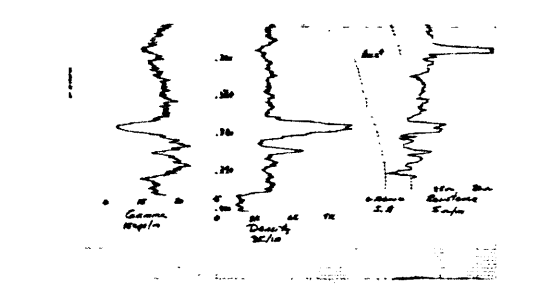


HOLE NO 55  
SHEET 1 OF 2

REMARKS:
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109

## REMARKS:

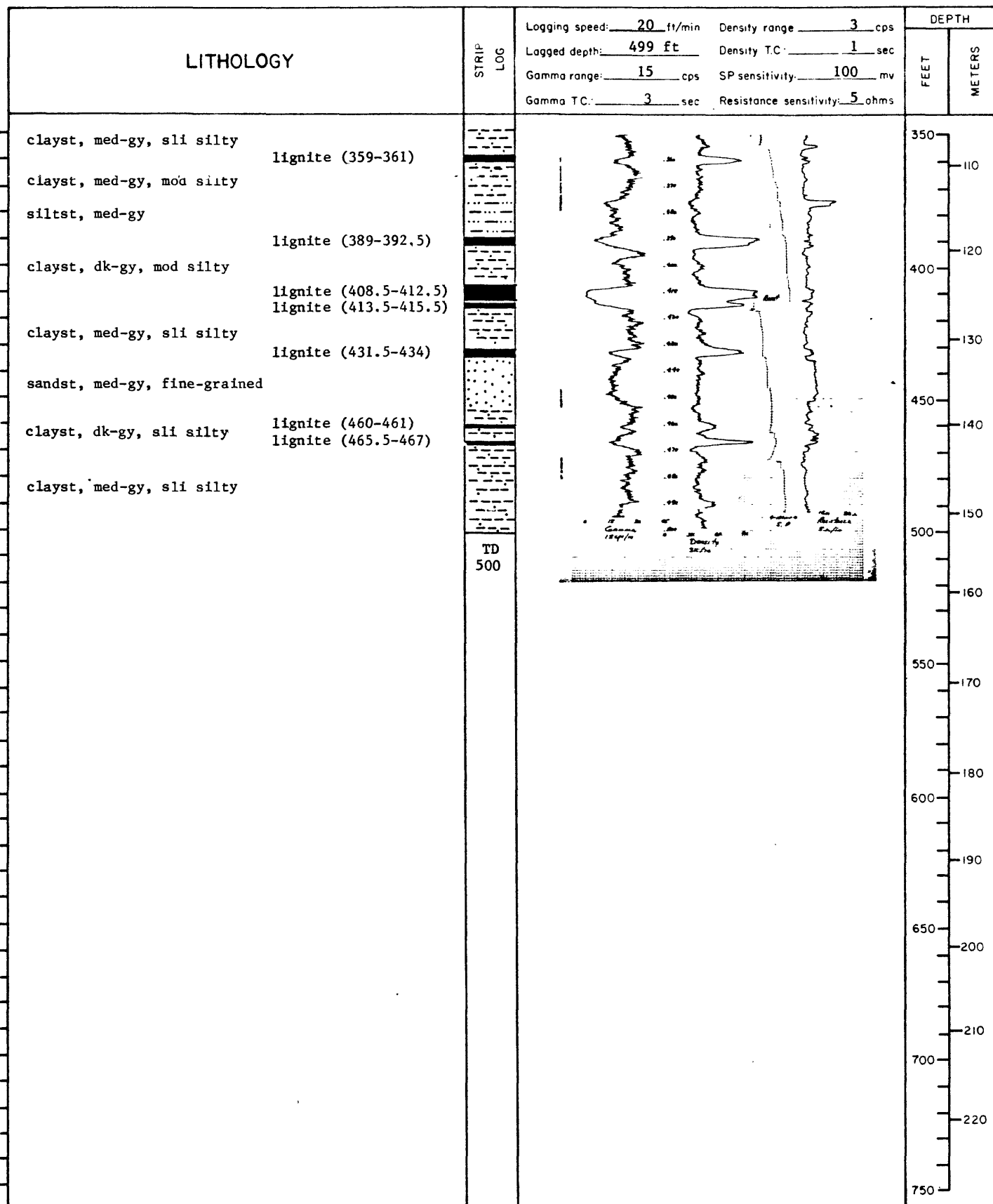
LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range <u>3</u> cps Logged depth: <u>400</u> ft    Density TC: <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity <u>100</u> mv Gamma TC: <u>3</u> sec    Resistance sensitivity <u>5</u> ohms		DEPTH	
				FEET	METERS
siltst, med-gy  clayst, dk-gy                      lignite (376.5-379.5) lignite (383.5-384.5)  clayst, med-gy, mod silty				350 110 120 400 130 450 140 500 150 550 160 600 170 650 180 700 190 750 200 210 220	
	TD 401				

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 56  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fairfield	
DATE STARTED 7-26-79	DATE COMP. 7-26-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 27 T.143 N., R. 99 W., FOOTAGE LOC.		50 ft FNL 2580 ft FWL	GROUND ELEV 2798 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 500 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Lagged depth 499 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, sand, silt, unconsol sandst, lt-gy, med-grained, calc, well-consol siltst, med-gy; high clay content		0 0	
		10	
		50	
sandst, med-brn, fine-grained		20	
		100 30	
		40	
lignite (135-137)		150	
siltst, med-gy		50	
clayst, med-gy, mod silty		60	
		200	
lignite (196.5-201.5)		70	
clayst, dk-gy, very silty		250	
lignite (229.5-231.5)		80	
clayst, med-gy, mod silty		90	
siltst, lt-gy		300	
		100	
clayst, lt-gy, sli silty		350	
sandst, med-gy, fine-grained, calc, well-consol clayst, med-gy, sli silty			

## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

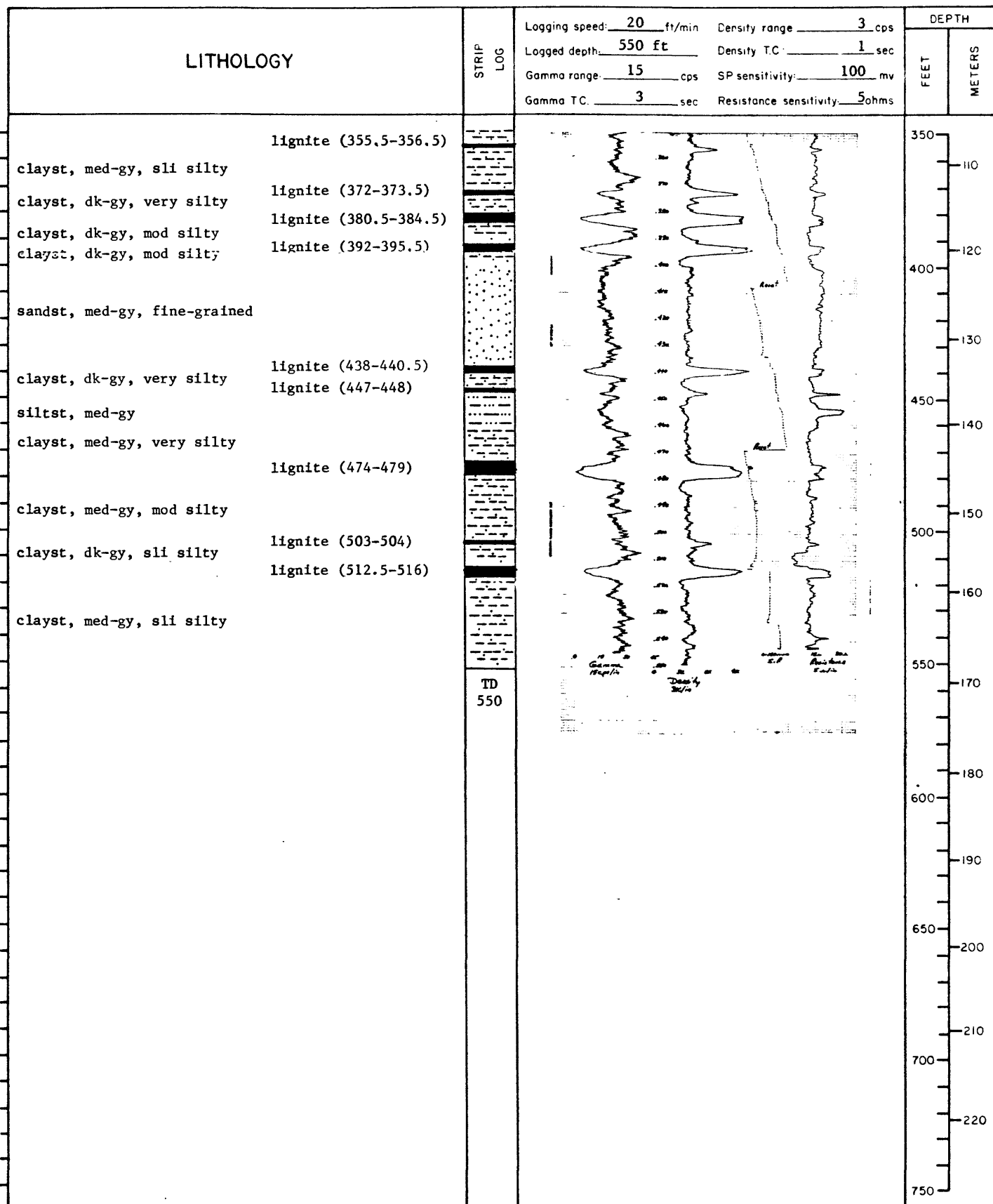
HOLE NO 57  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fairfield	
DATE STARTED 8-2-79	DATE COMP. 8-2-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 6 T.143 N., R. 98 W., FOOTAGE LOC.		90 ft <del>XXX</del> FSL	1598 ft <del>XXX</del> FEL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 550 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP	LOG	LOGGING DATA		DEPTH	
			Logging speed 20 ft/min	Density range: 3 cps	FEET	METERS
soil, med-brn, sand, silt, unconsol	LOG	LOG	Logged depth 550 ft	Density TC: 1 sec	<div style="display: flex; justify-content: space-between;"> <div> 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 </div> <div> 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 </div> </div>	<div style="display: flex; justify-content: space-between;"> <div> 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 </div> <div> 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 190 200 210 220 230 240 250 260 270 280 290 300 310 320 330 340 350 </div> </div>
clayst, med-brn, very silty			Gamma range 15 cps	SP sensitivity 100 mv		
sandst, med-gy, fine-grained			Gamma TC 3 sec	Resistance sensitivity 5 ohms		
clayst, med-gy, very silty						
lignite (108.5-109.5)						
clayst, med-gy, sli silty						
lignite (139.5-142.5)						
lignite (143.5-145)						
clayst, med-gy, mod silty						
lignite (181-185.5)						
clayst, dk-gy, sli silty						
lignite (195.5-197)						
clayst, lt-gy, sli silty						
lignite (246.5-251)						
clayst, med-gy, very silty						
siltst, med-gy						
lignite (286.5-287.5)						
clayst, lt-gy, mod silty						

## REMARKS:



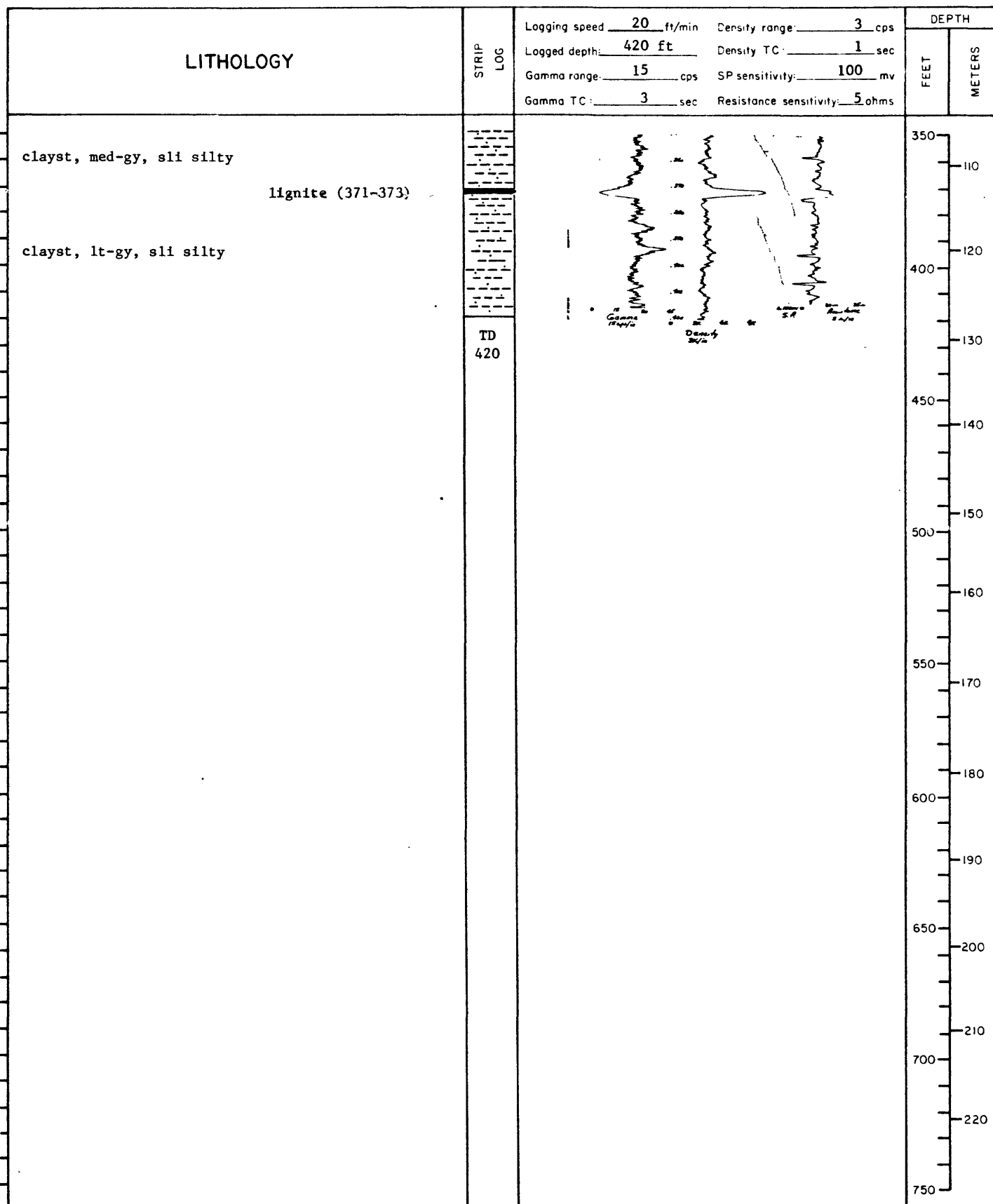


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 58  
SHEET 1 OF 2

AREA Three River		QUAD NAME Hungry Man Butte	
DATE STARTED 8-2-79	DATE COMP. 8-2-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 10 T.143 N., R.98 W., FOOTAGE LOC.		130 ft FNL KXX	20 ft FEL KXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 420 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 420 ft	Density TC: 1 sec
		Gamma range 15 cps	SF sensitivity 100 mv
		Gamma TC 3 sec	Resistance sensitivity 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol			0 0
clayst, lt-brn, very silty			
lignite (22-23)			
siltst, med-brn			10
sandst, med-gy, fine-grained, calc, well-consol			50
siltst, med-gy			20
clayst, med-gy, sli silty			
lignite (89-90.5)			100 30
clayst, lt-gy, mod silty			
siltst, med-gy			40
clayst, med-gy, mod silty			150 50
lignite (159.5-163)			
siltst, med-gy			200 60
clayst, dk-gy			
lignite (203.5-207.5)			70
lignite (212.5-214.5)			
sandst, med-gy, fine-grained			250 80
siltst, med-gy			
lignite (261-265)			300 90
clayst, dk-gy to blk, cbnccs, sli silty			
lignite (280-281)			350 100
clayst, dk-gy, sli silty			
lignite (294-295.5)			
clayst, med-gy, sli silty			
lignite (345-346)			

REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

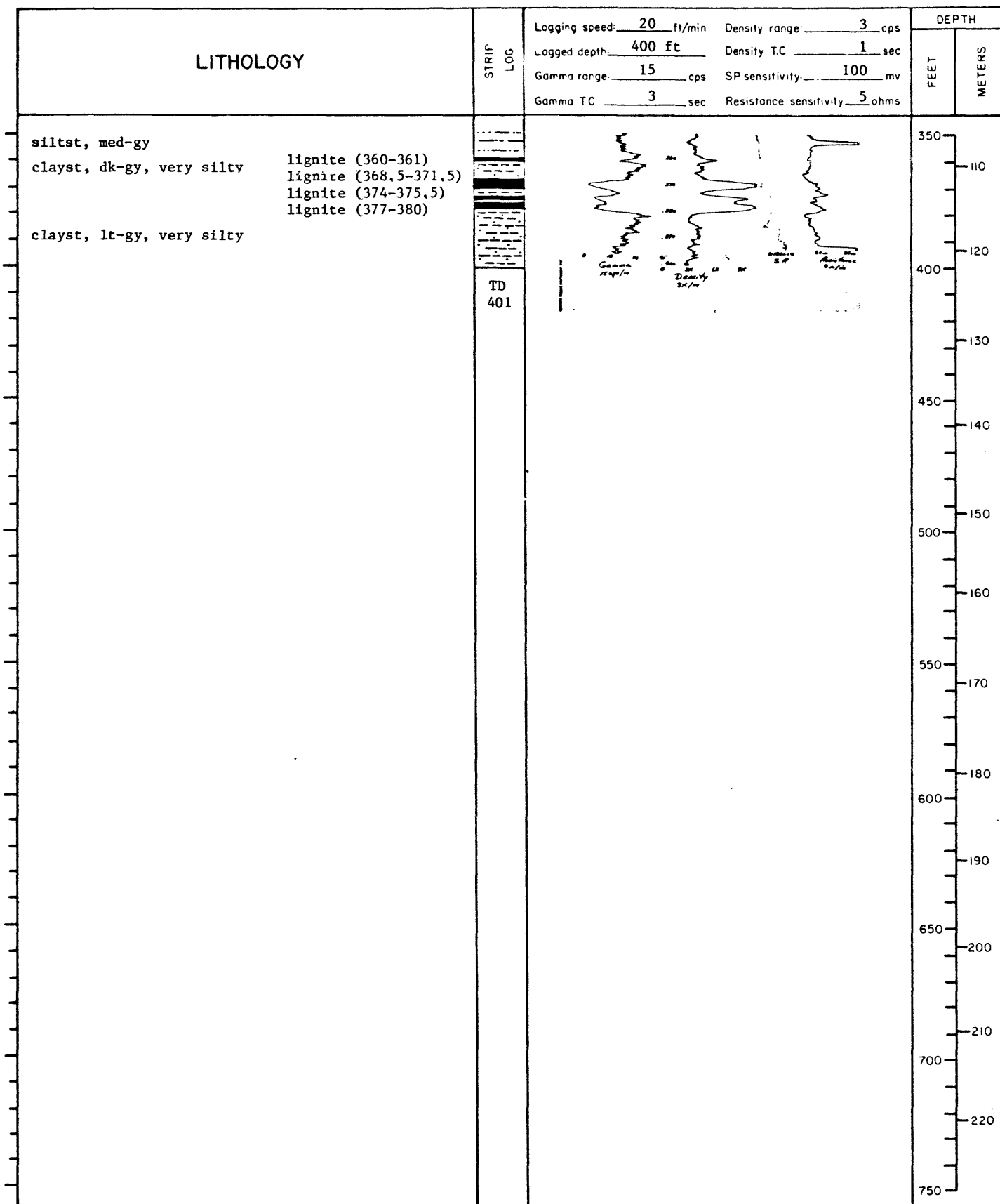
HOLE NO 59  
SHEET 1 OF 2

AREA Three River		QUAD NAME Hungry Man Butte	
DATE STARTED 8-2-79	DATE COMP. 8-2-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 22 T.143 N., R. 98 W., FOOTAGE LOC.		70 ft <del>XXX</del> FSL 2550 ft <del>XXX</del> FEL	GROUND ELEV 2681 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 401 ft CORING ---	TOTAL DEPTH 401 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 4 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range 3 cps		DEPTH	
		Logged depth 400 ft	Density T.C. 1 sec	FEET	METERS
soil, med-brn, sand, silt, unconsol				0	0
sandst, med-gy, fine-grained				10	
clayst, med-gy, very silty				20	
sandst, med-gy, fine-grained				30	
clayst, med-gy, very silty				40	
siltst, med-gy				50	
lignite (146.5-153.5)				60	
lignite (156-157)				70	
siltst, dk-gy; high clay content				80	
lignite (176-178.5)				90	
lignite (181.5-182.5)				100	
siltst, med-gy				110	
clayst, med-gy, very silty				120	
sandst, med-gy, fine-grained				130	
lignite (234.5-236)				140	
siltst, med-gy				150	
sandst, med-gy, med-grained, calc, well-consol				160	
siltst, med-gy				170	
sandst, med-gy, med-grained, calc, well-consol				180	
siltst, med-gy; high clay content				190	
lignite (313.5-316.5)				200	
lignite (318-328)				210	
siltst, med-gy				220	
				230	
				240	
				250	
				260	
				270	
				280	
				290	
				300	
				310	
				320	
				330	
				340	
				350	

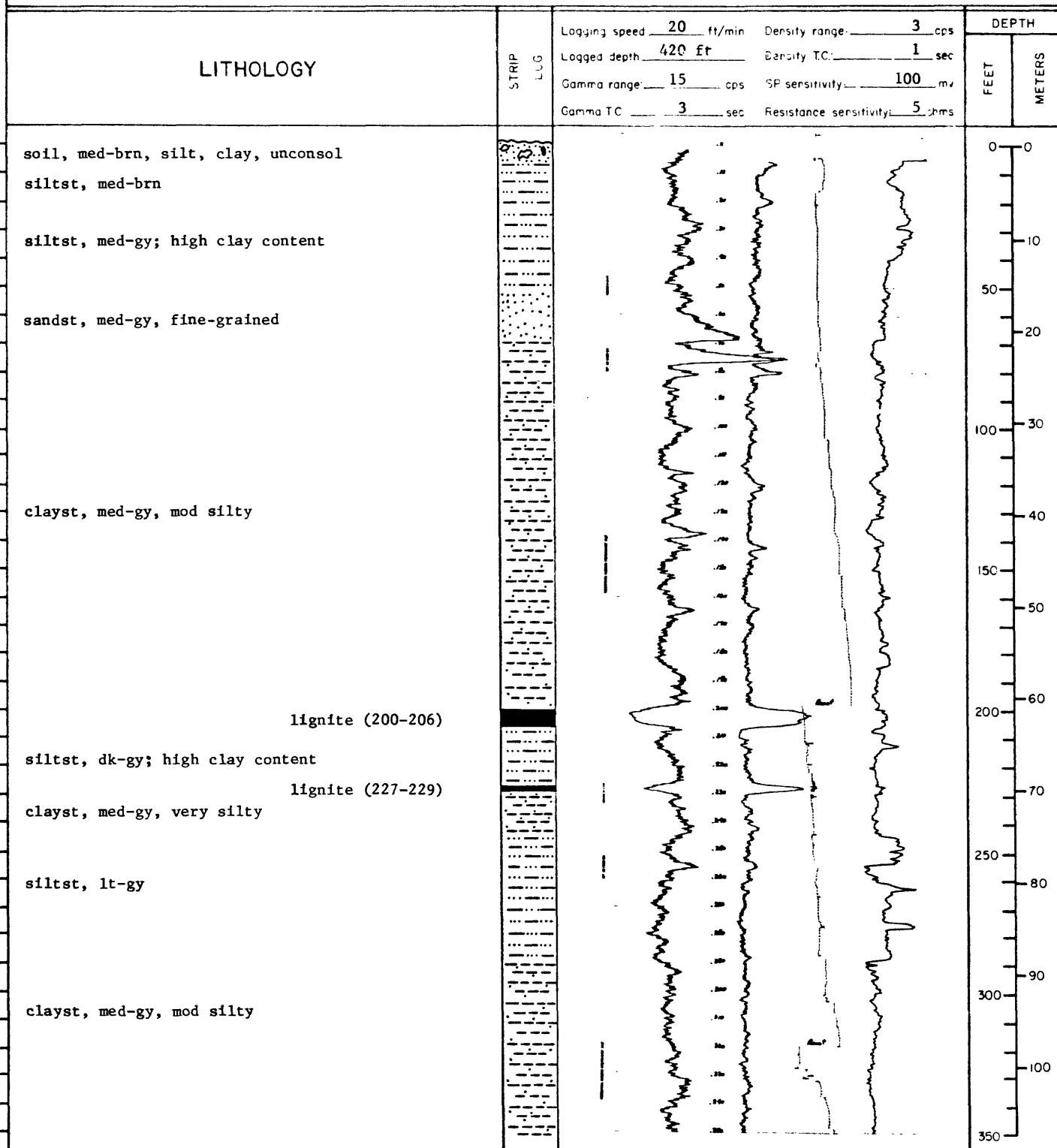
## REMARKS:



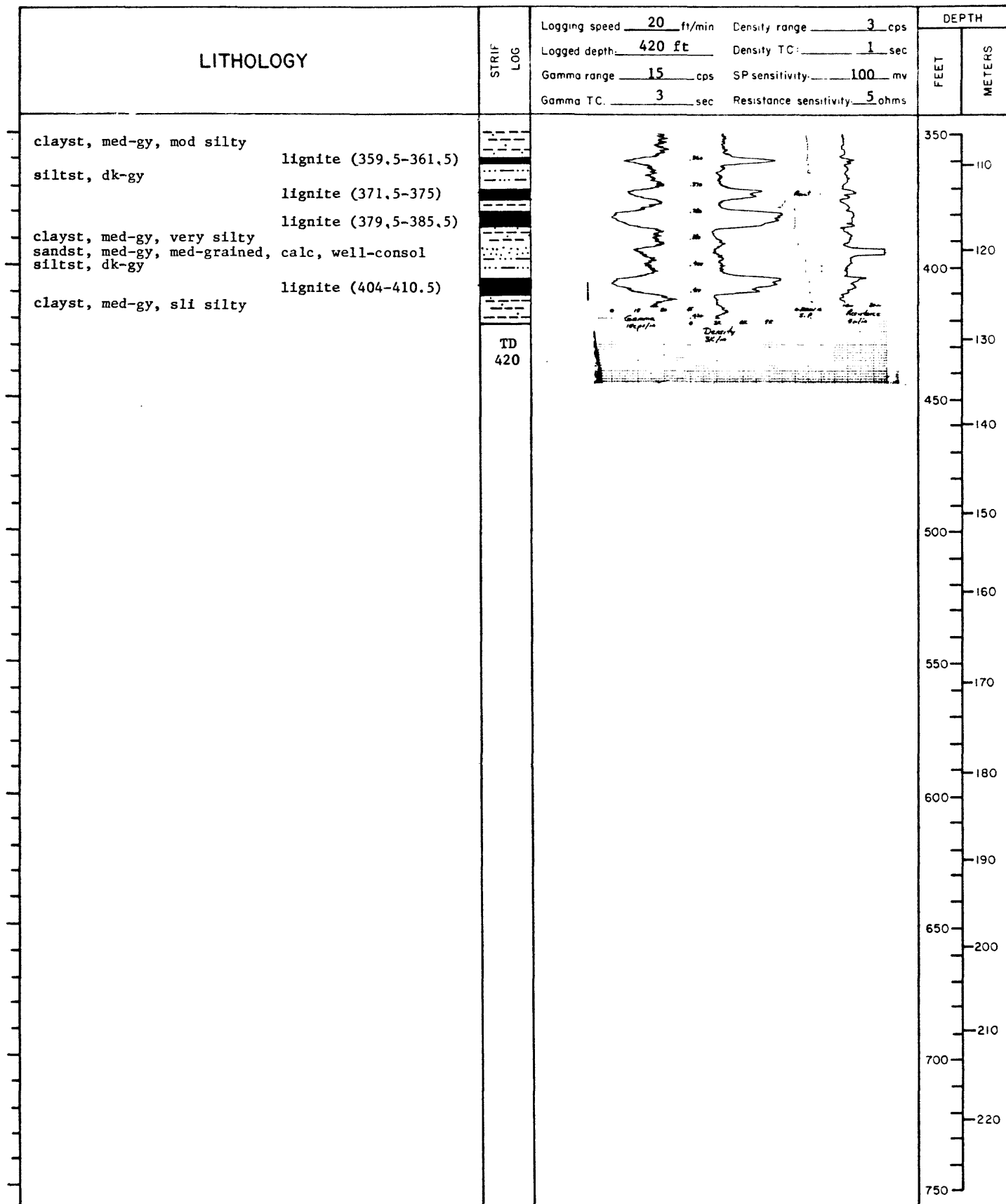
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 60  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fairfield	
DATE STARTED 8-3-79	DATE COMP. 8-3-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 30 T.143 N., R. 98 W., FOOTAGE LOC. 1585 ft		FNL <del>XXX</del> 15 ft	FEL <del>XXX</del> GROUND ELEV 2762 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 420 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

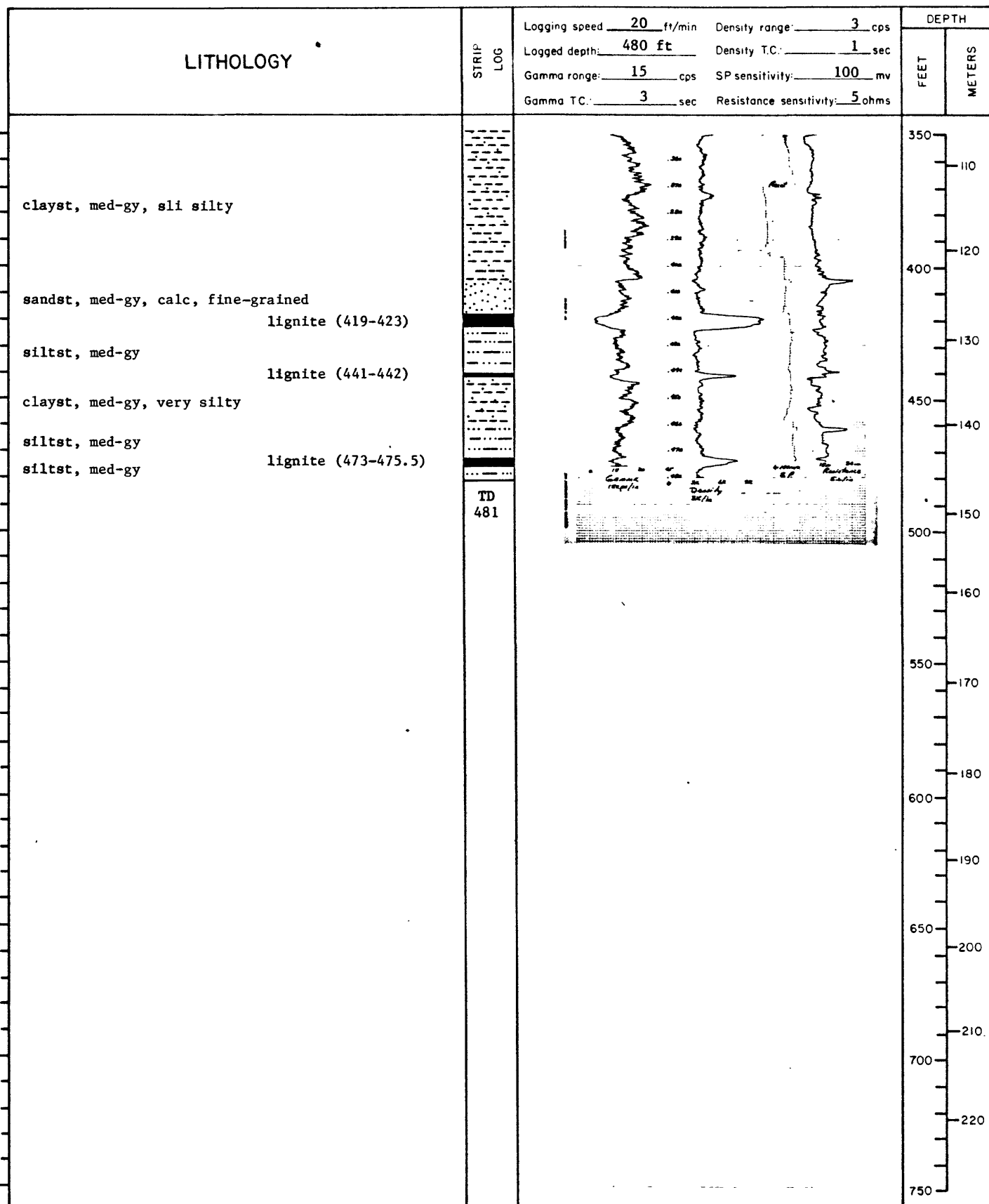
HOLE NO 61  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Manning NW</b>	
DATE STARTED <b>8-6-79</b>	DATE COMP. <b>8-6-79</b>	COUNTY <b>Dunn</b>	STATE <b>North Dakota</b>
LOCATION: SEC. <b>10 T.143 N., R. 97 W.,</b> FOOTAGE LOC. <b>120 ft</b>		FNL <b>XXX</b> <b>10 ft</b>	GROUND ELEV <b>2494 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>481 ft</b> CORING <b>---</b>	TOTAL DEPTH <b>481 ft</b>
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	DEPTH TO FLUID LEVEL <b>12 ft</b>
LITHOLOGY RECORDED BY <b>L. Tomac</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS:			

LITHOLOGY	STRIP	LOG	LOGGING DATA		DEPTH	
			Logging speed <b>20</b> ft/min Logged depth <b>480</b> ft Gamma range <b>15</b> cps Gamma T.C. <b>3</b> sec	Density range: <b>3</b> cps Density T.C. <b>1</b> sec SP sensitivity <b>100</b> mv Resistance sensitivity <b>5</b> ohms	FEET	METERS
soil, med-brn, sand, silt, unconsol					0	0
sandst, med-brn, fine-grained					10	
clayst, dk-gy, very silty					50	
lignite (40-42)					20	
clayst, med-gy, very silty					100	
lignite (77.5-85.5)					30	
clayst, med-gy, very silty					40	
sandst, lt-gy, fine-grained					150	
					50	
clayst, dk-gy, very silty					200	
lignite (204-207.5)					60	
clayst, dk-gy, mod silty					210	
lignite (218-119.5)					70	
siltst, med-gy					250	
lignite (241.5-242.5)					80	
clayst, med-gy, very silty					300	
					90	
sandst, med-gy, fine-grained					350	
lignite (349-350)						

## REMARKS:



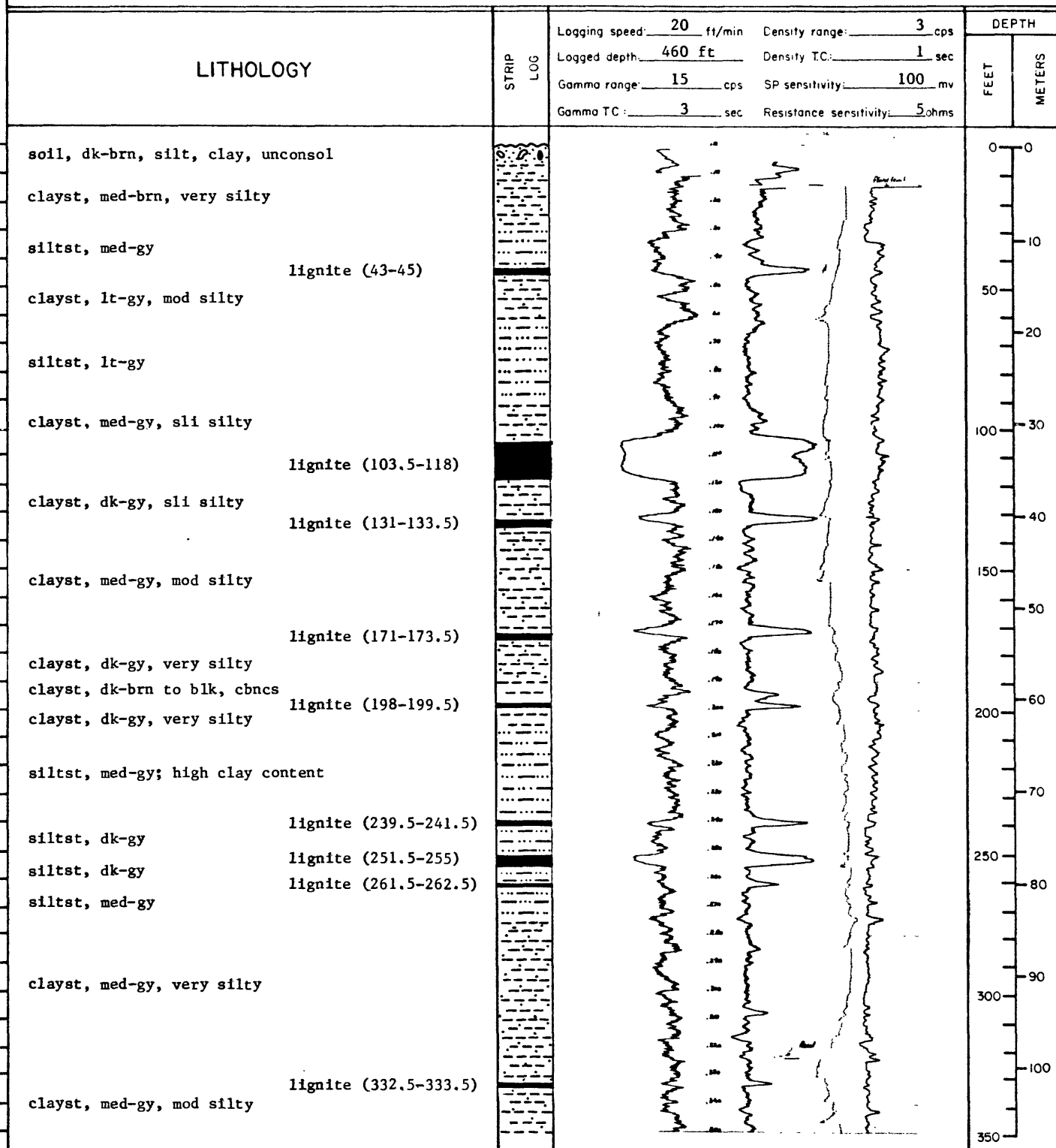


# UNITED STATES GEOLOGICAL SURVEY

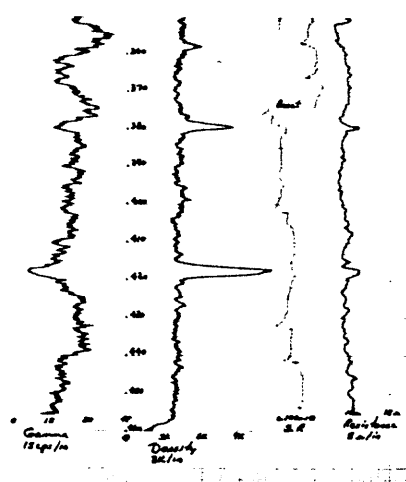
HOLE NO 62  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Ziner Butte</b>	
DATE STARTED <b>8-17-79</b>	DATE COMP. <b>8-17-79</b>	COUNTY <b>Dunn</b>	STATE <b>North Dakota</b>
LOCATION: SEC. <b>34 T.144 N., R. 94 W. ,</b>		FOOTAGE LOC. <b>2580 ft</b>	GROUND ELEV <b>2305 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>461 ft</b> CORING <b>---</b>	TOTAL DEPTH <b>461 ft</b>
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	DEPTH TO FLUID LEVEL <b>14 ft</b>
LITHOLOGY RECORDED BY <b>M. Hudson</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	

REMARKS:



## REMARKS:

LITHOLOGY	STRIK LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>460</u> ft	Density T.C.: <u>1</u> sec	FEET	METERS
		Gamma range: <u>15</u> cps	SP sensitivity: <u>100</u> mv		
		Gamma T.C.: <u>3</u> sec	Resistance sensitivity: <u>5</u> ohms		
clayst, med-gy, mod silty					
siltst, med-gy					
clayst, dk-gy, very silty					
lignite (378.5-380)					
siltst, med-gy					
lignite (416.5-418)					
clayst, med-gy, mod silty					
siltst, lt-gy					
	TD 461				

## UNITED STATES GEOLOGICAL SURVEY

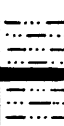
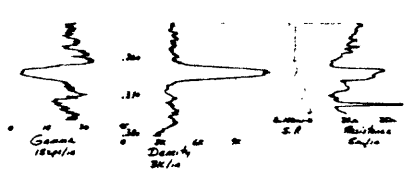
HOLE NO 63  
SHEET 1 OF 2

AREA Three River		QUAD NAME Marshall NW	
DATE STARTED 8-16-79	DATE COMP. 8-16-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 2 T.143 N., R. 93 W., FOOTAGE LOC.		20 ft <del>XXX</del> FSL 2170 ft <del>XXX</del> FWL	GROUND ELEV 2235 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft CORING ---	TOTAL DEPTH 380 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 24 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed <u>20</u> ft/min Logged depth <u>380</u> ft Gamma range <u>15</u> cps Gamma T.C. <u>3</u> sec	Density range: <u>3</u> cps Density T.C.: <u>1</u> sec SP sensitivity: <u>100</u> mV Resistance sensitivity: <u>5</u> ohms	DEPTH	
				FEET	METERS
soil, med-brn, silt, clay, unconsol				0	0
siltst, lt-brn; high clay content					
lignite (26-33)				10	
clayst, med-gy, very silty				50	
lignite (50.5-52)				20	
clayst, med-gy, very silty					
clayst, med-gy, sli silty				100	30
lignite (100-117)					
clayst, dk-gy				40	
lignite (126-127)					
siltst, med-gy				150	50
clayst, dk-gy, sli silty					
lignite (168.5-170)				50	
clayst, dk-gy, very silty					
lignite (172.5-173.5)					
siltst, dk-gy				200	60
lignite (182.5-183.5)					
lignite (188-191)					
siltst, med-gy				70	
clayst, lt-gy, mod silty					
siltst, med-gy				250	80
lignite (242.5-244)					
lignite (247.5-248.5)					
lignite (255-256.5)				300	90
siltst, med-gy					
clayst, med-gy, sli silty				100	
siltst, med-gy					
lignite (303.5-305)					
siltst, lt-gy					
sandst, lt-gy, fine-grained				350	

## REMARKS:

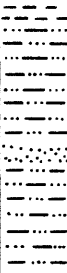
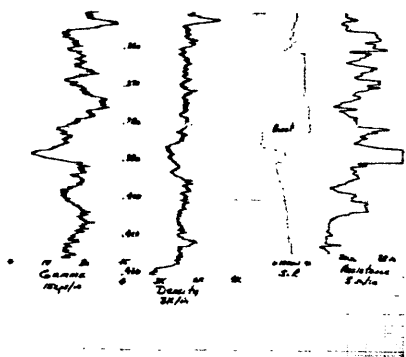
LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range <u>3</u> cps		DEPTH	
		Logged depth: <u>380</u> ft    Density T.C.: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv			
		Gamma TC <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms			
siltst, med-gy; high clay content lignite (362-365) siltst, med-gy				350	110
				400	120
	450			130	
	500			140	
	550			150	
	600			160	
	650			170	
	700			180	
	750			190	
	800			200	
	850			210	
	900			220	
	950				
	1000				
	1050				
	1100				

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 64  
SHEET 1 OF 2

AREA Three River		QUAD NAME Marshall NW	
DATE STARTED 8-16-79	DATE COMP. 8-16-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 24 T.143 N., R. 93 W., FOOTAGE LOC.		520 ft	FEL 25 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 421 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 420 ft	Density T.C.: 1 sec
		Gamma range 15 cps	SP sensitivity 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol			0 0
clayst, med-gy, sli silty			10
siltst, med-gy			50
clayst, med-gy, mod silty			20
			100
sandst, lt-gy, med-grained, calc, well-consol			40
lignite (132.5-137)			150
lignite (140.5-142.5)			50
clayst, med-gy, very silty			60
clayst, dk-gy, mod silty			200
clayst, dk-brn			70
lignite (188-189)			80
lignite (199-203.5)			90
lignite (209.5-211)			100
clayst, med-gy, very silty			300
sandst, lt-gy, fine-grained, calc, well-consol			350
siltst, dk-gy			
lignite (272-283.5)			
clayst, med-gy, mod silty			
lignite (324.5-325.5)			
clayst, dk-gy, sli silty			
lignite (339-340)			
siltst, dk-gy			
lignite (346-347)			

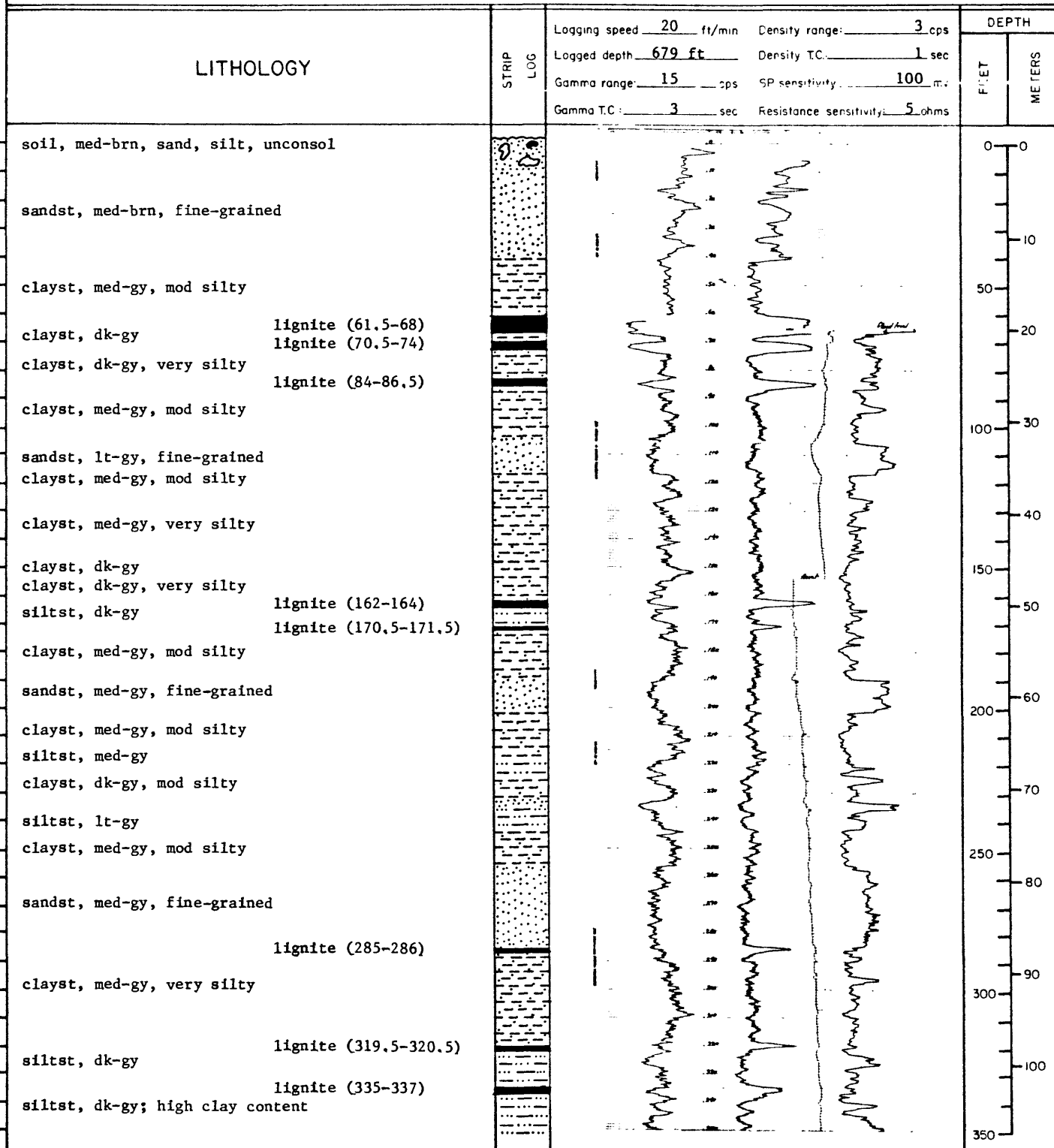
## REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth: <u>420</u> ft    Density T.C. <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C. <u>3</u> sec    Resistance sensitivity <u>5</u> ohms		DEPTH	
				FEET	METERS
clayst, dk-gy				350	
siltst, med-gy				110	
sandst, lt-gy, med-grained, calc, well-consol				120	
siltst, med-gy				400	
	TD 421			130	
				450	
				140	
				500	
				150	
				160	
				550	
				170	
				180	
				600	
				190	
				650	
				200	
				210	
				700	
				220	
				750	

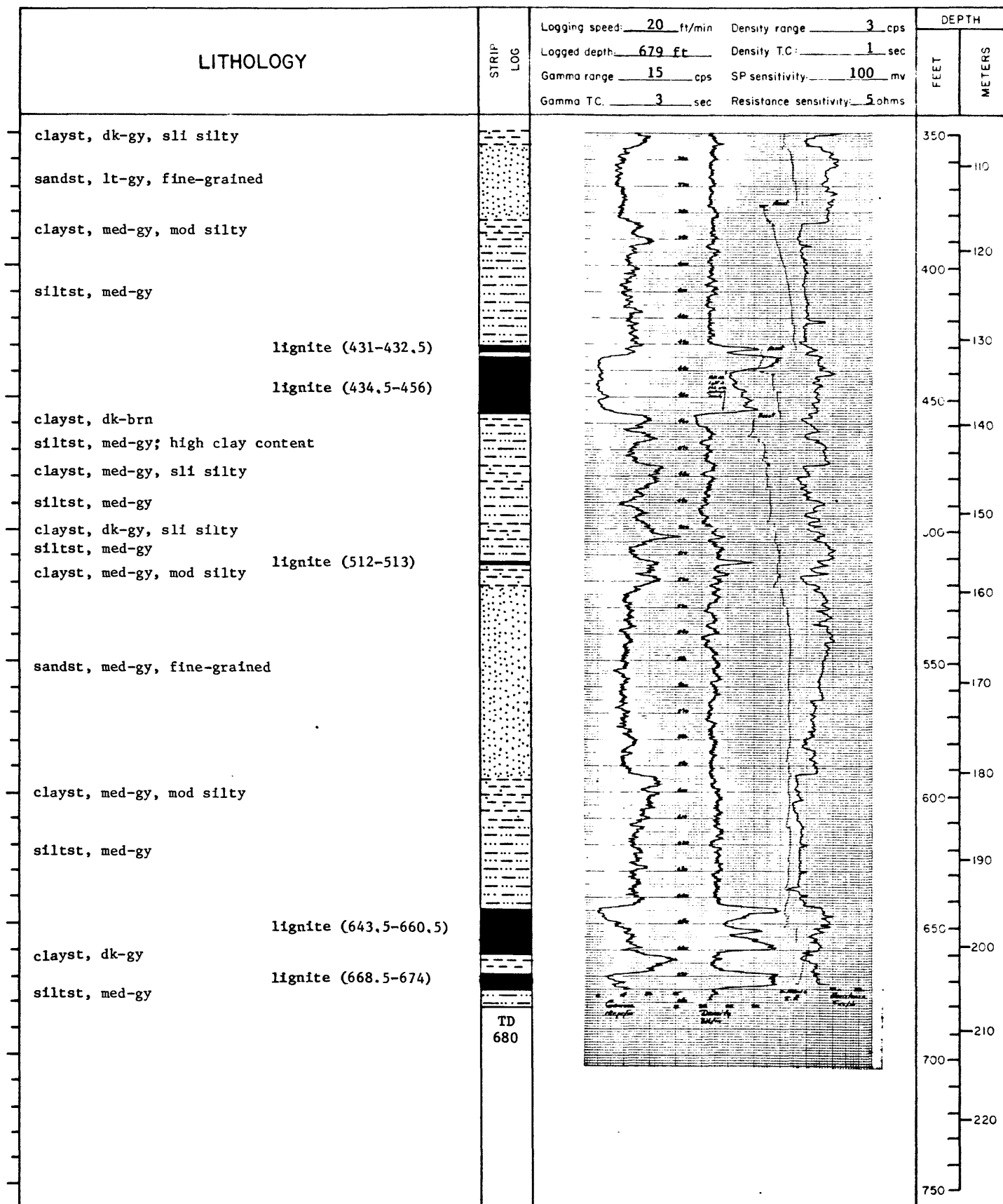
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 65  
SHEET 1 OF 2

AREA Three River		QUAD NAME Wannagan Creek East	
DATE STARTED 7-24-79	DATE COMP. 7-24-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 20 T. 142 N., R. 101 W., FOOTAGE LOC.		2035 ft FNL XXX	940 ft XXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 680 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



## REMARKS:



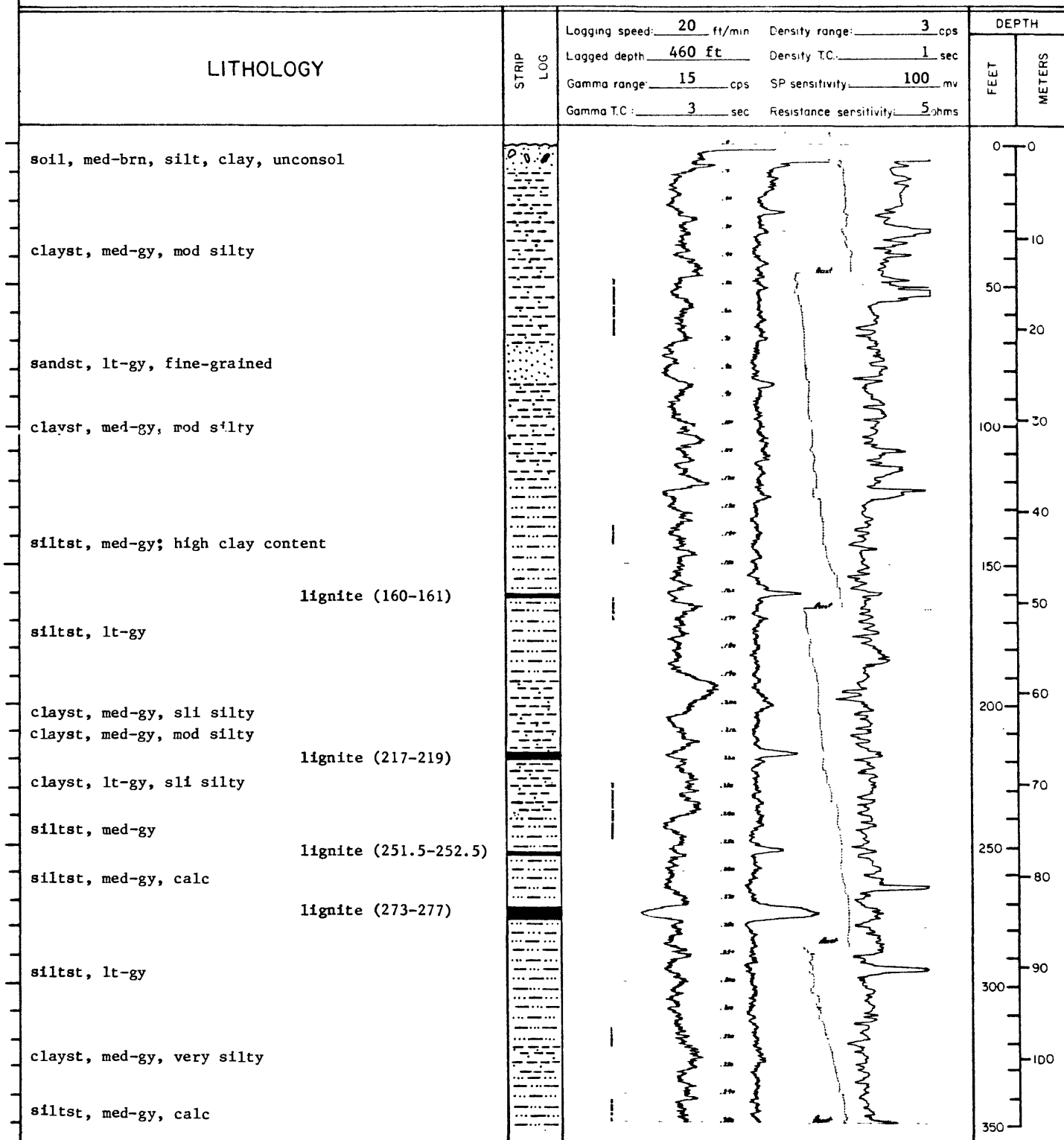


## UNITED STATES GEOLOGICAL SURVEY

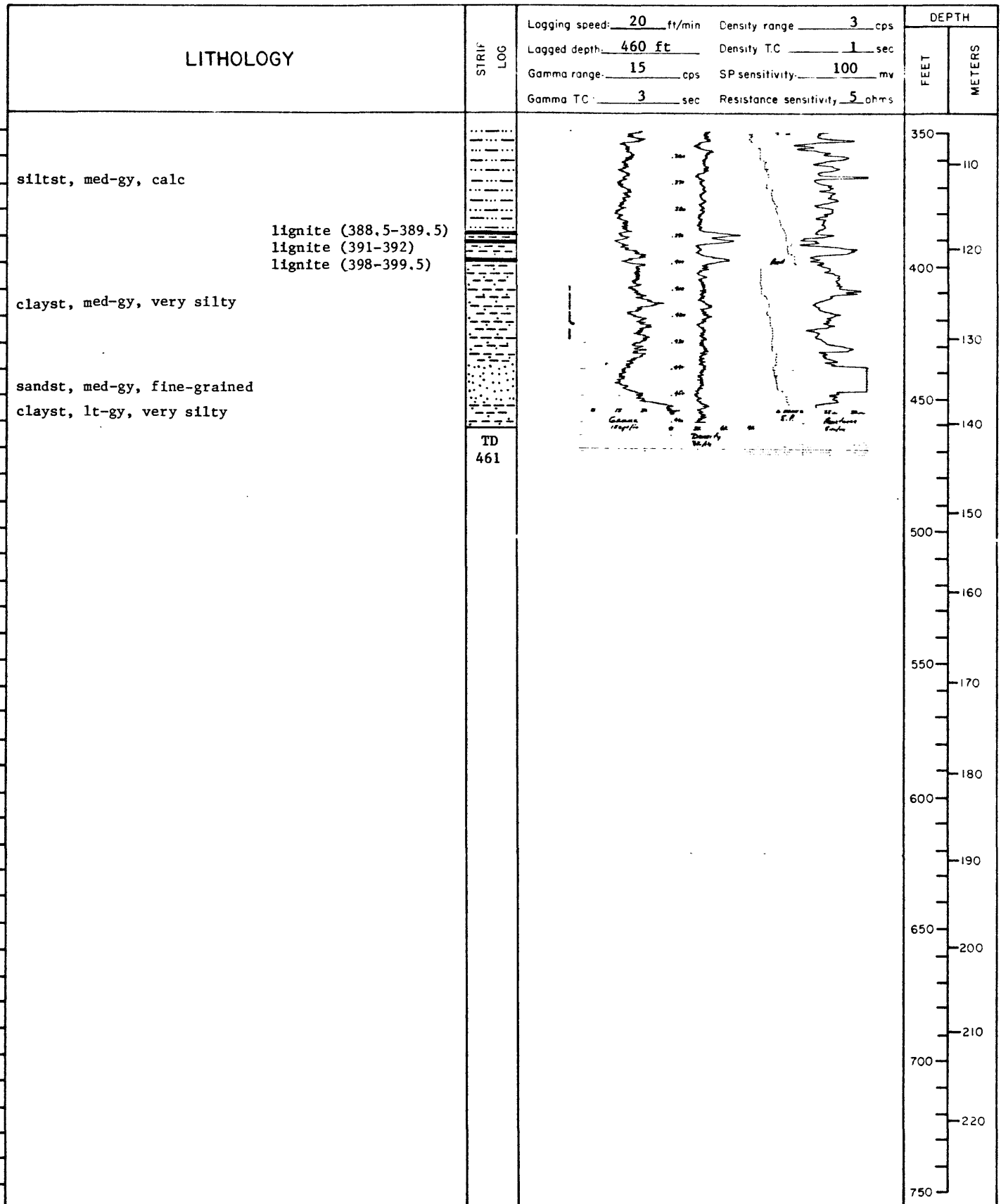
HOLE NO 66  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gorham NW	
DATE STARTED 7-25-79	DATE COMP. 7-25-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 6 T.142 N., R.100 W., FOOTAGE LOC. 2478 ft		FNL 300 ft	FEL 2778 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE	
		ROTARY 461 ft	CORING ---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	

REMARKS:



## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

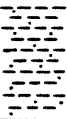
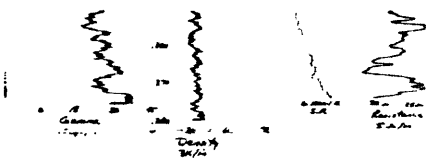
HOLE NO 67  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gorham SE	
DATE STARTED 7-25-79	DATE COMP. 7-25-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 27 T.142 N., R. 100 W., FOOTAGE LOC.		68 ft FNL <del>XXX</del>	35 ft FEL <del>XXX</del>
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth: 379 ft	Density TC: 1 sec	FEET	METERS		
soil, med-brn, sand, silt, unconsol				0	0		
clayst, med-brn, very silty							
clayst, dk-brn lignite (16-18)							
clayst, med-gy, very silty lignite (20-21.5)							
clayst, med-gy, very silty lignite (26.5-28)							
siltst, lt-grn				50	20		
clayst, med-gy, very silty							
clayst, dk-brn, sli silty, cbnccs lignite (95.5-97.5)				100	30		
siltst, med-gy lignite (120-121)							
siltst, med-gy; high clay content				40			
clayst, med-gy, sli silty				150	50		
siltst, med-gy; high clay content							
clayst, med-gy, very silty lignite (189.5-192)				200	60		
clayst, med-gy, very silty							
clayst, med-gy, very silty lignite (232.5-233.5)							
clayst, med-gy, very silty lignite (236.5-238.5)							
clayst, med-gy, very silty				250	70		
clayst, dk-gy, sli silty lignite (255.5-261)							
siltst, med-gy				80			
sandst, lt-gy, fine-grained, calc							
clayst, lt-gy, mod silty lignite (300-302)				300	90		
clayst, lt-gy, mod silty							
clayst, lt-gy, mod silty lignite (336-341)							
clayst, lt-gy, mod silty lignite (347.5-348.5)				100			
				350			

REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>379</u> ft		Density T.C. <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv			
		Gamma T.C. <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms			
clayst, med-gy, mod silty						350	HC
	TD 380					400	120
					450	130	
					500	140	
					550	150	
					600	160	
					650	170	
					700	180	
					750	190	
						200	
						210	
						220	

## UNITED STATES GEOLOGICAL SURVEY

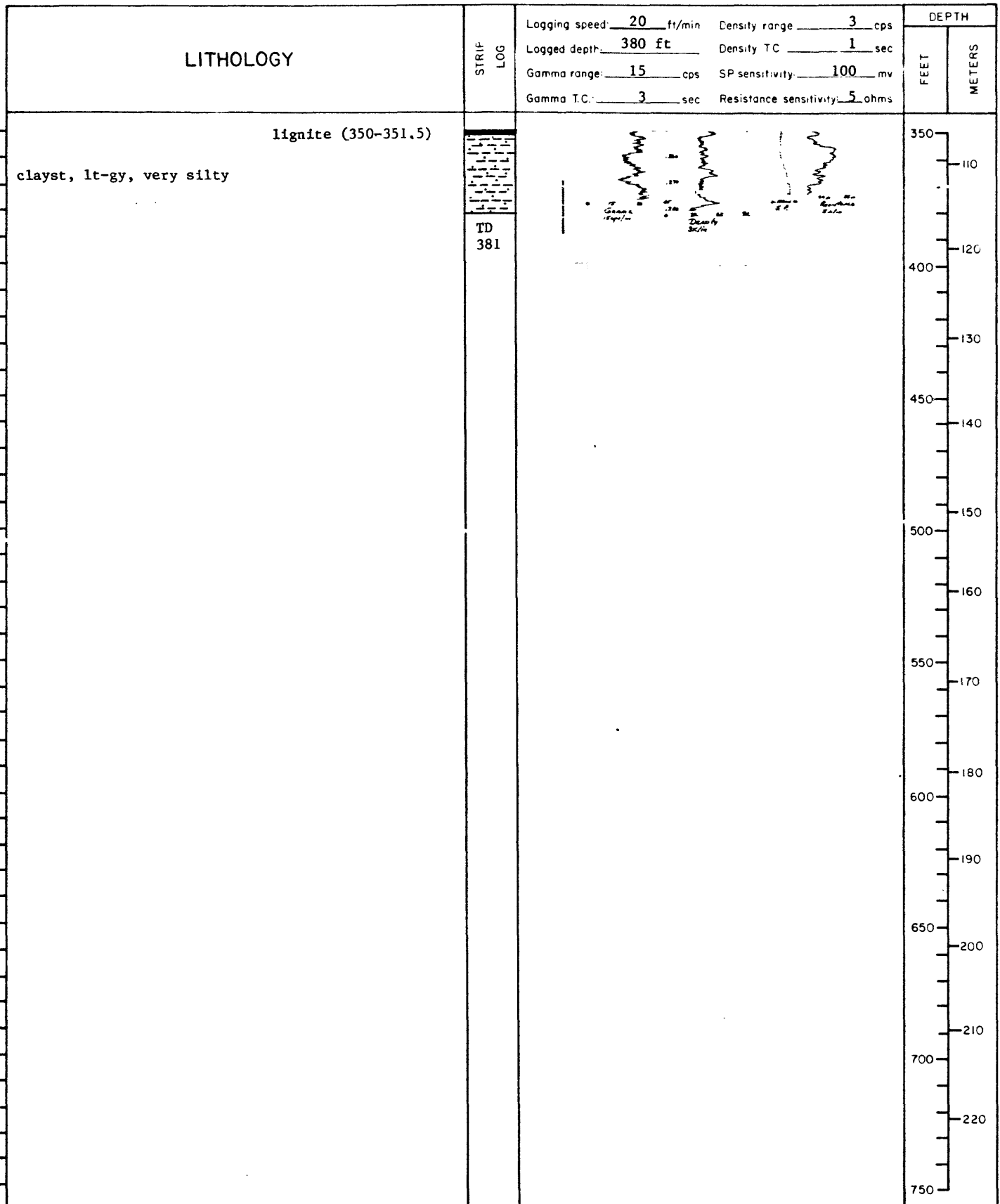
HOLE NO 68  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fairfield	
DATE STARTED 7-26-79	DATE COMP. 7-26-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 2 T.142 N., R. 99 W., FOOTAGE LOC. 45 ft		XXX FSL 230 ft	XXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 381 ft	CORING ---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 5 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range 3 cps		DEPTH	
		Logged depth 380 ft	Density T.C. 1 sec	Gamma range 15 cps	SP sensitivity 100 mv	FEET	METERS
soil, med-brn, sand, silt, clay, unconsol clayst, med-brn, very silty						0	0
siltst, med-brn						10	
						50	
sandst, med-gy, fine-grained						20	
						100	30
clayst, dk-gy, mod silty						40	
lignite (130-135)						150	50
clayst, med-gy, very silty						50	
lignite (172-174)						200	60
clayst, med-gy, very silty						70	
lignite (210-212.5)						250	80
clayst, lt-gy, very silty						300	90
siltst, med-gy						100	
clayst, med-gy, mod silty						350	
lignite (285.5-296)							
lignite (298.5-304)							
siltst, med-gy							
lignite (324.5-326.5)							
siltst, med-gy							

REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 69  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gorham	
DATE STARTED 7-25-79	DATE COMP. 7-25-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 8 T.142 N., R. 99 W., FOOTAGE LOC.		1085 ft FNL K3X	198 ft FNL FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 360 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range 3 cps		DEPTH	
		Logged depth 360 ft	Density TC 1 sec	FEET	METERS		
soil, med-brn, silt, clay, unconsol				0	0		
clayst, med-gy, very silty				10			
siltst, lt-gy				20			
sandst, med-gy, fine-grained				30			
siltst, med-gy				40			
clayst, dk-gy, sli silty				50			
clayst, med-gy, very silty				60			
siltst, med-gy				70			
clayst, med-gy, mod silty				80			
siltst, med-gy, calc				90			
clayst, dk-gy, sli silty				100			
clayst, lt-gy, very silty				110			

lignite (167-170.5)

lignite (289.5-299.5)

REMARKS:

LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
clayst, lt-gy, very silty			
	TD 360	350	
		110	
		120	
		400	
		130	
		450	
		140	
		500	
		150	
		160	
		550	
		170	
		180	
		600	
		190	
		650	
		200	
		210	
		700	
		220	
		750	



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 70  
SHEET 1 OF 1

AREA Three River		QUAD NAME Rattlesnake Butte			
DATE STARTED 7-26-79		DATE COMP. 7-26-79		COUNTY Billings	STATE North Dakota
LOCATION: SEC. 34 T.142 N., R. 99 W.,		FOOTAGE LOC. 1580 ft		FNL X73	17 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 340 ft		CORING ---	GROUND ELEV 2630 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		TOTAL DEPTH 340 ft	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					
LITHOLOGY		STRIP LOG	Logging speed: 20 ft/min		Density range: 3 cps
			Lagged depth: 339 ft		Density TC: 1 sec
			Gamma range: 15 cps		SP sensitivity: 100 mv
			Gamma TC: 3 sec		Resistance sensitivity: 5 ohms
					DEPTH
					FEET
					METERS
soil, med-brn, silt, clay, unconsol					0
siltst, med-brn					0
clayst, dk-brn, very silty					10
lignite (24-29.5)					50
clayst, med-gy, very silty					20
siltst, dk-gy					30
lignite (51-52)					40
lignite (55-56)					50
lignite (58-59)					60
siltst, dk-gy					70
lignite (60.5-61.5)					80
lignite (70.5-73)					90
lignite (74-76)					100
clayst, med-gy, very silty					110
siltst, med-gy					120
lignite (113.5-115)					130
clayst, med-gy, very silty					140
siltst, lt-gy, calc					150
clayst, med-gy, mod silty					160
siltst, med-gy					170
clayst, med-gy, mod silty					180
lignite (191-192)					190
clayst, med-gy, mod silty					200
lignite (252.5-254)					210
siltst, med-gy					220
clayst, med-gy, sli silty					230
lignite (280.5-282)					240
clayst, med-gy, very silty					250
lignite (312-315)					260
siltst, med-gy					270
sandst, lt-gy, fine-grained					280
					290
					300
					310
					320
					330
					340
					350

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 71  
SHEET 1 OF 2

AREA Three River		QUAD NAME Hungry Man Butte			
DATE STARTED 8-3-79		DATE COMP. 8-3-79		COUNTY Billings	STATE North Dakota
LOCATION: SEC. 4 T.142 N., R. 98 W.,		FOOTAGE LOC. 210 ft		XXX FSL 405 ft	XXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 361 ft		TOTAL DEPTH 361 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 2 ft	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range: 3 cps Logged depth 360 ft Density TC: 1 sec Gamma range 15 cps SP sensitivity: 100 mv Gamma TC: 3 sec Resistance sensitivity: 5 ohms				DEPTH	
						FEET	METERS
soil, med-brn, silt, clay, unconsol						0	0
siltst, med-gy						10	
clayst, lt-gy, very silty						50	
siltst, lt-gy; high clay content						20	
clayst, med-gy, very silty						100	
lignite (93.5-101)						30	
clayst, med-gy, sli silty						40	
clayst, dk-brn to blk, cbncc						150	
siltst, med-gy						50	
clayst, med-gy, mod silty						200	
lignite (150-152.5)		60					
clayst, dk-gy, mod silty		70					
clayst, dk-gy		250					
clayst, dk-gy		80					
lignite (175-179)		300					
clayst, med-gy, mod silty		90					
lignite (221.5-236)		100					
clayst, dk-gy, sli silty							
lignite (243-247)							
lignite (248-250.5)							
siltst, med-gy; high clay content							
lignite (251.5-254)							
clayst, med-gy, very silty							
lignite (299.5-300.5)							
clayst, med-gy, mod silty							
lignite (317.5-318.5)							
siltst, med-gy							

REMARKS:

LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
clayst, med-gy, sli silty lignite (351-352)	TD 361	350	110
		400	120
		450	130
		500	140
		550	150
		600	160
		650	170
		700	180
		750	190
			200
			210
			220
			230
			240
			250
			260
			270
			280
			290
			300
			310
			320
			330
			340
			350

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 72  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fairfield SE	
DATE STARTED 8-3-79	DATE COMP. 8-3-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 28 T.142 N., R. 98 W., FOOTAGE LOC. 30 ft		FNL <del>KXX</del> 105 ft	FEL <del>KXX</del> GROUND ELEV 2642 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 360 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 360 ft	Density TC: 1 sec
		Gamma range 15 cps	SP sensitivity 100 mv
		Gamma TC 3 sec	Resistance sensitivity 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, sand, silty, unconsol			0 0
sandst, med-brn, fine-grained			10
lignite (66.5-73)			20
clayst, med-gy, mod silty			30
siltst, lt-gy			40
clayst, med-gy, sli silty			50
lignite (145-147)			60
lignite (149-154.5)			70
clayst, med-gy, sli silty			80
sandst, lt-gy, med-grained, calc, well-consol			90
clayst, med-gy, sli silty			100
lignite (189-209)			110
clayst, med-gy, sli silty			120
lignite (233-243.5)			130
clayst, med-gy, sli silty			140
lignite (267.5-270.5)			150
lignite (281.5-283.5)			160
lignite (285-286)			170
siltst, dk-gy			180
siltst, med-gy			190
lignite (309.5-310.5)			200
clayst, med-gy, very silty			210

# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 72  
SHEET 2 OF 2

REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>360</u> ft		Density T.C.: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv			
		Gamma T.C.: <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms			
clayst, med-gy, very silty						350	
	TD 360					110	
						120	
						130	
						140	
						150	
						160	
						170	
						180	
						190	
						200	
						210	
						220	
						750	

# UNITED STATES GEOLOGICAL SURVEY

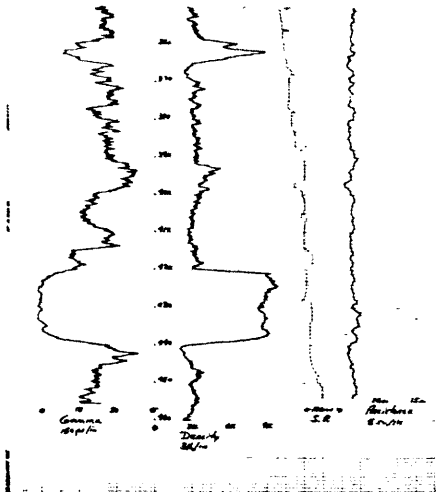
HOLE NO 73  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gorham SE	
DATE STARTED 7-24-79	DATE COMP. 7-24-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 4 T.141 N., R. 100 W., FOOTAGE LOC.		63 ft <del>KXX</del> FSL	23 ft <del>KXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 460 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP	LOG	LOGGING DATA		DEPTH	
			Logging speed: 20 ft/min	Density range: 3 cps	FEET	METERS
soil, med-brn, silt, clay, unconsol			Logged depth: 460 ft	Density T.C. 1 sec		
clayst, med-brn, very silty			Gamma range: 15 cps	SP sensitivity: 100 mv		
			Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms		
lignite (18.5-20)					0	0
siltst, med-gy					10	
sandst, med-gy, fine-grained					50	
clayst, lt-gy, sli silty					20	
lignite (86-99)					30	
siltst, dk-gy					100	
clayst, med-gy, mod silty					40	
siltst, med-gy; high clay content					150	
lignite (168-170.5)					50	
siltst, med-gy					200	
clayst, med-gy, mod silty					60	
lignite (199-200)					70	
clayst, lt-gy, very silty					250	
lignite (252-253)					80	
lignite (254-255.5)					90	
siltst, med-gy					300	
clayst, med-gy, sli silty					100	
siltst, med-gy					350	
lignite (341-342)						
siltst, med-gy						

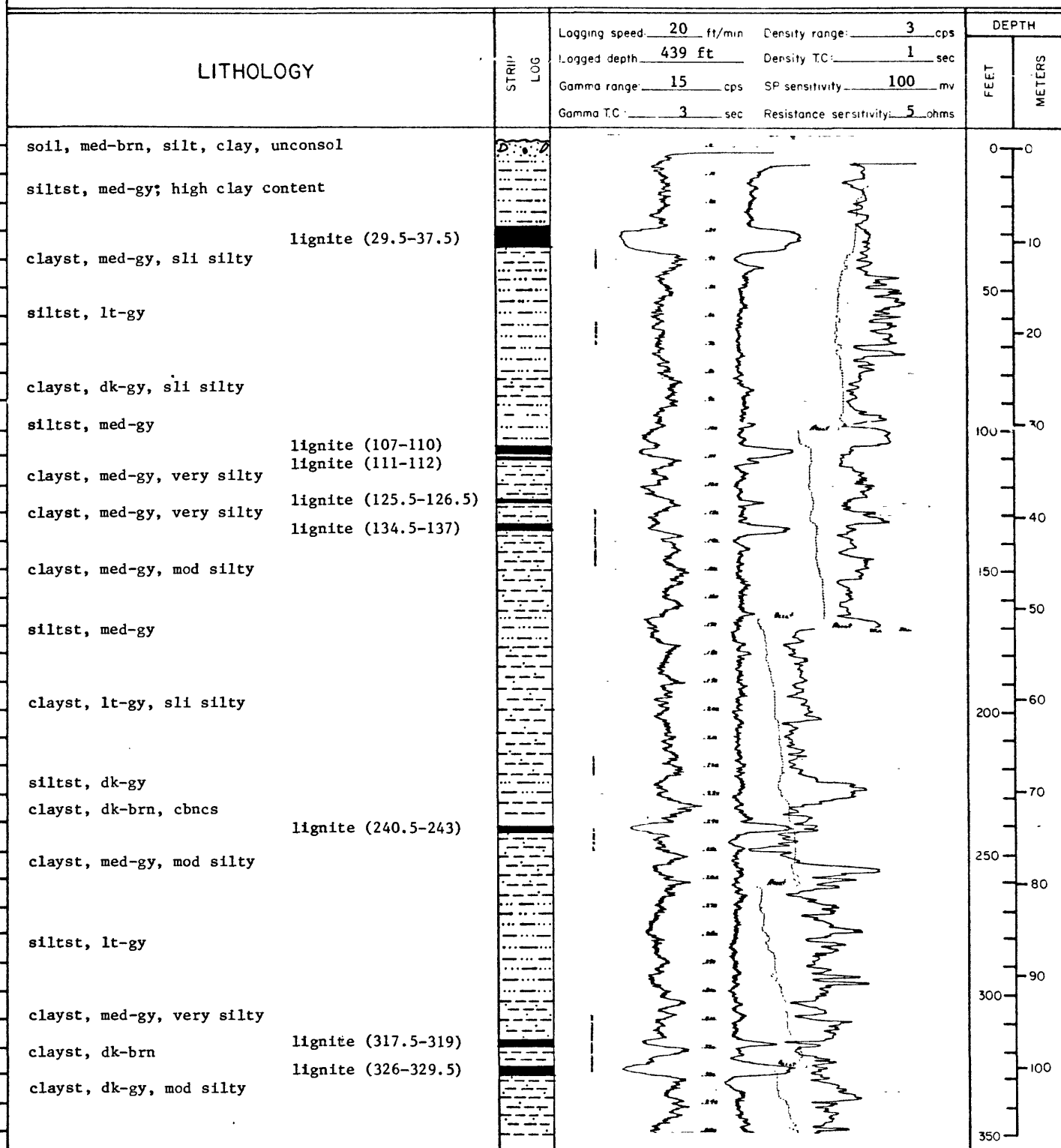
## REMARKS:

LITHOLOGY	STR LOG	Logging speed: 20 ft/min    Density range 3 cps		DEPTH	
		Logged depth: 460 ft	Density TC 1 sec	FEET	METERS
		Gamma range: 15 cps	SP sensitivity 100 mv		
		Gamma TC 3 sec	Resistance sensitivity 5 ohms		
siltst, med-gy					
lignite (359.5-360.5)					
lignite (361.5-364)					
clayst, med-gy, very silty					
siltst, med-gy					
clayst, med-gy, sli silty					
siltst, med-gy					
lignite (420.5-439)					
clayst, lt-gy, mod silty					
	TD 460				

## UNITED STATES GEOLOGICAL SURVEY

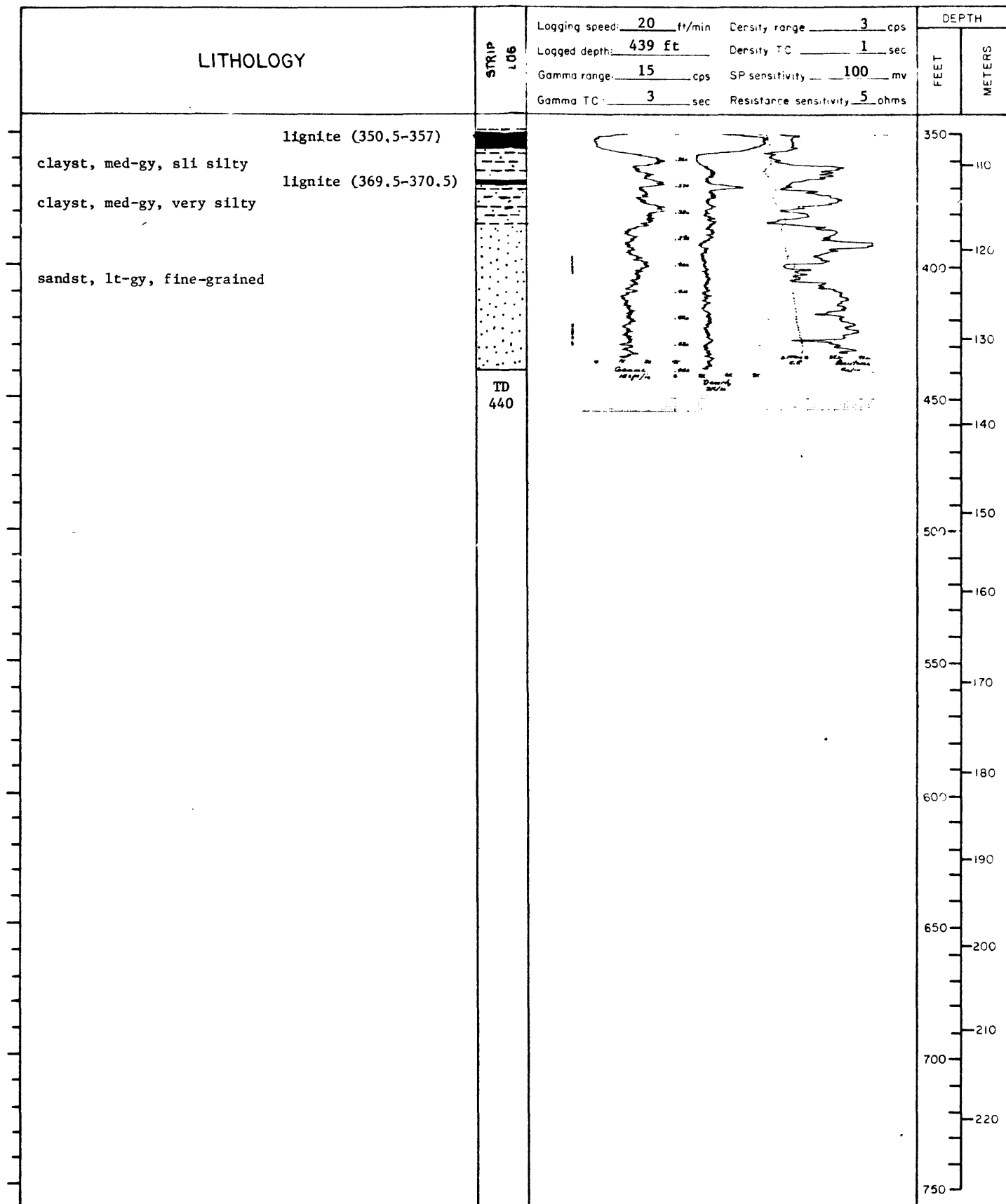
HOLE NO 74  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fryburg NW	
DATE STARTED 7-23-79	DATE COMP. 7-23-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 1 T.140 N., R.101 W., FOOTAGE LOC. 2360 ft		<del>XXX</del> FSL 710 ft	<del>XXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			





## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 75  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gorham SE	
DATE STARTED 7-23-79	DATE COMP. 7-23-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 8 T.141 N., R.99 W., FOOTAGE LOC.		27 ft FSL	72 ft FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV 2678 ft	
		TOTAL DEPTH 360 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 360 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol			0
clayst, med-gy, very silty			10
clayst, dk-brn, cbnccs			50
lignite (47-56.5)			20
lignite (60-62)			30
lignite (63-68)			40
siltst, dk-gy; high clay content			50
sandst, med-gy, fine-grained			60
lignite (98.5-100)			70
siltst, med-gy			80
clayst, med-gy, sli silty			90
lignite (143.5-144.5)			100
lignite (145.5-147)			110
lignite (150-151.5)			120
lignite (153.5-154.5)			130
clayst, lt-gy, very silty			140
siltst, lt-gy			150
clayst, dk-gy, very silty			160
lignite (271-272)			170
clayst, med-gy, very silty			180
clayst, dk-gy, very silty			190
lignite (296-298.5)			200
lignite (305.5-308)			210
clayst, dk-gy, very silty			220
sandst, med-gy, fine-grained			230
			240
			250
			260
			270
			280
			290
			300
			310
			320
			330
			340
			350

REMARKS:

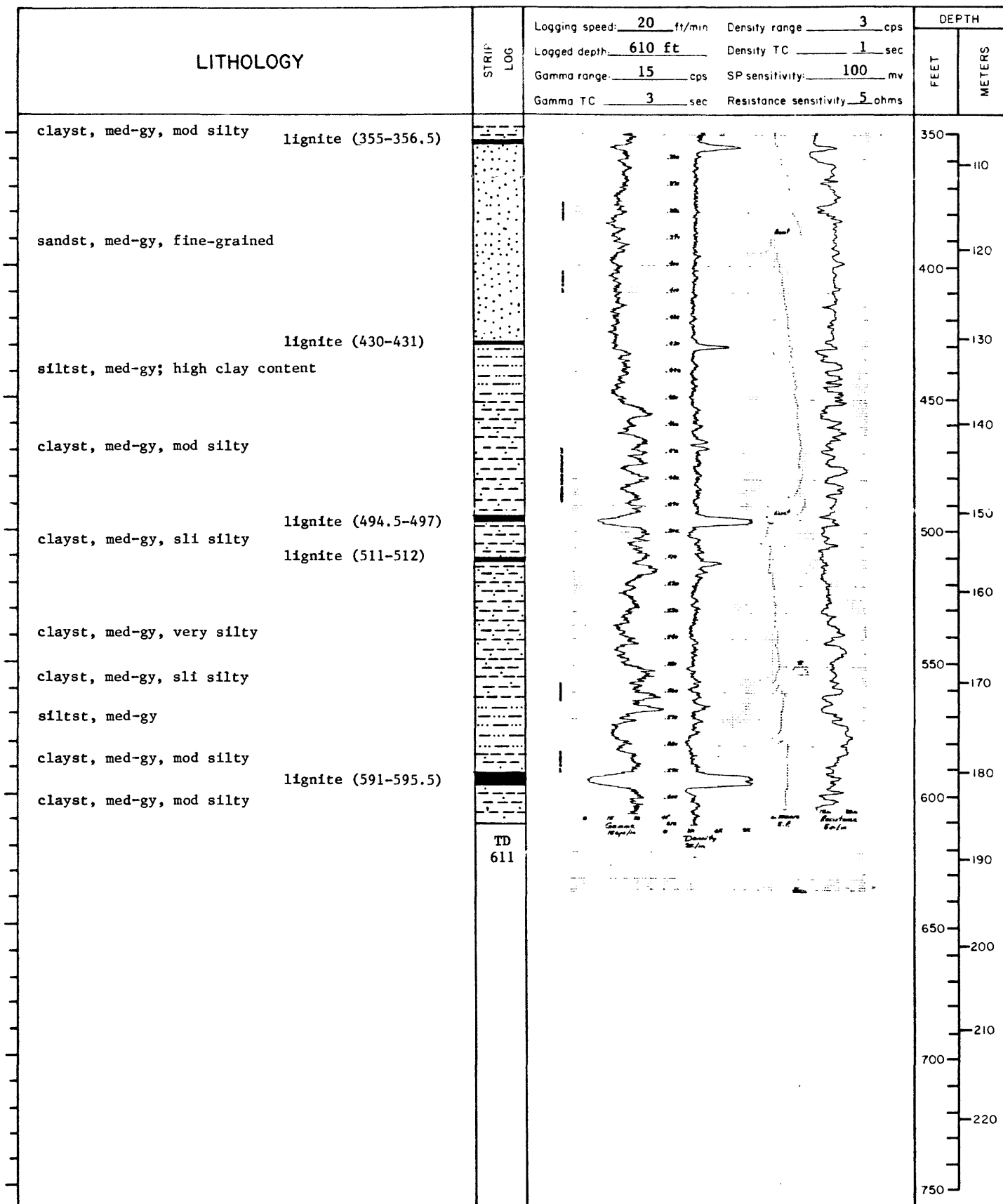
LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
sandst, med-gy, fine-grained			
	TD 360		
		350	
		110	
		120	
		400	
		130	
		450	
		140	
		500	
		150	
		160	
		550	
		170	
		180	
		600	
		190	
		650	
		200	
		210	
		700	
		220	
		750	

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 76  
SHEET 1 OF 2

AREA Three River		QUAD NAME Rattlesnake Butte	
DATE STARTED 7-23-79	DATE COMP. 7-23-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 24 T. 141 N., R. 99 W., FOOTAGE LOC. 204 ft		XXX FSL 42 ft	FEL XXX GROUND ELEV 2585 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 611 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 610 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, sand, silt, unconsol			0 0
sandst, med-gy, fine-grained			10
clayst, dk-gy, very silty			50 20
lignite (82.5-89.5)			100 30
clayst, med-gy, mod silty			40
lignite (116-117.5)			150 50
clayst, med-gy, mod silty			200 60
siltst, lt-brn			250 70
lignite (141.5-143.5)			300 80
lignite (150.5-153)			350 90
lignite (154.5-156)			100
clayst, med-gy, very silty			350
lignite (196.5-198.5)			
clayst, med-gy, sli silty			
sandst, lt-gy, med-grained, calc, well-consol			
clayst, lt-gy, sli silty			
lignite (309-310)			
lignite (312-317)			
clayst, med-gy, mod silty			

## REMARKS:

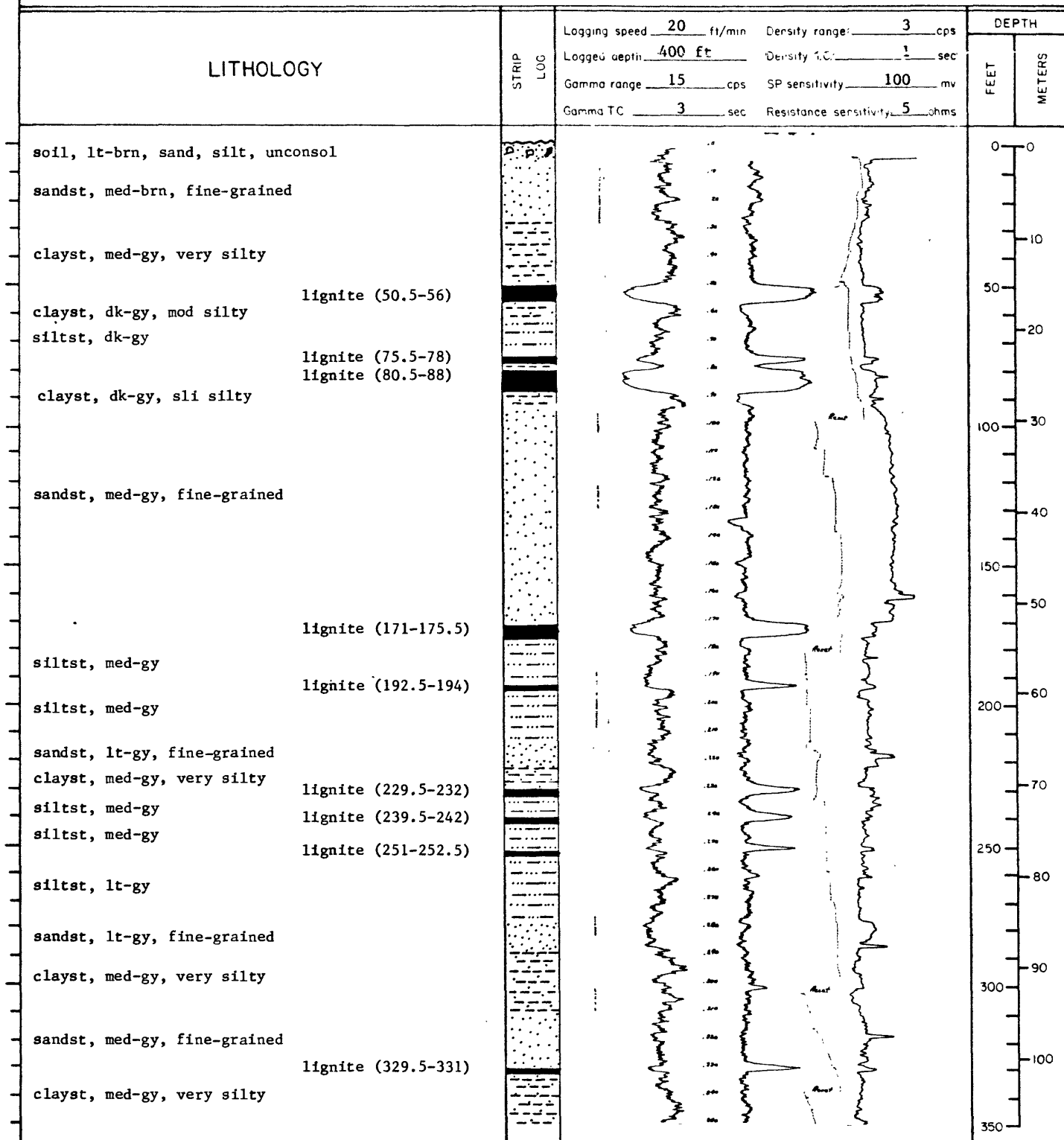


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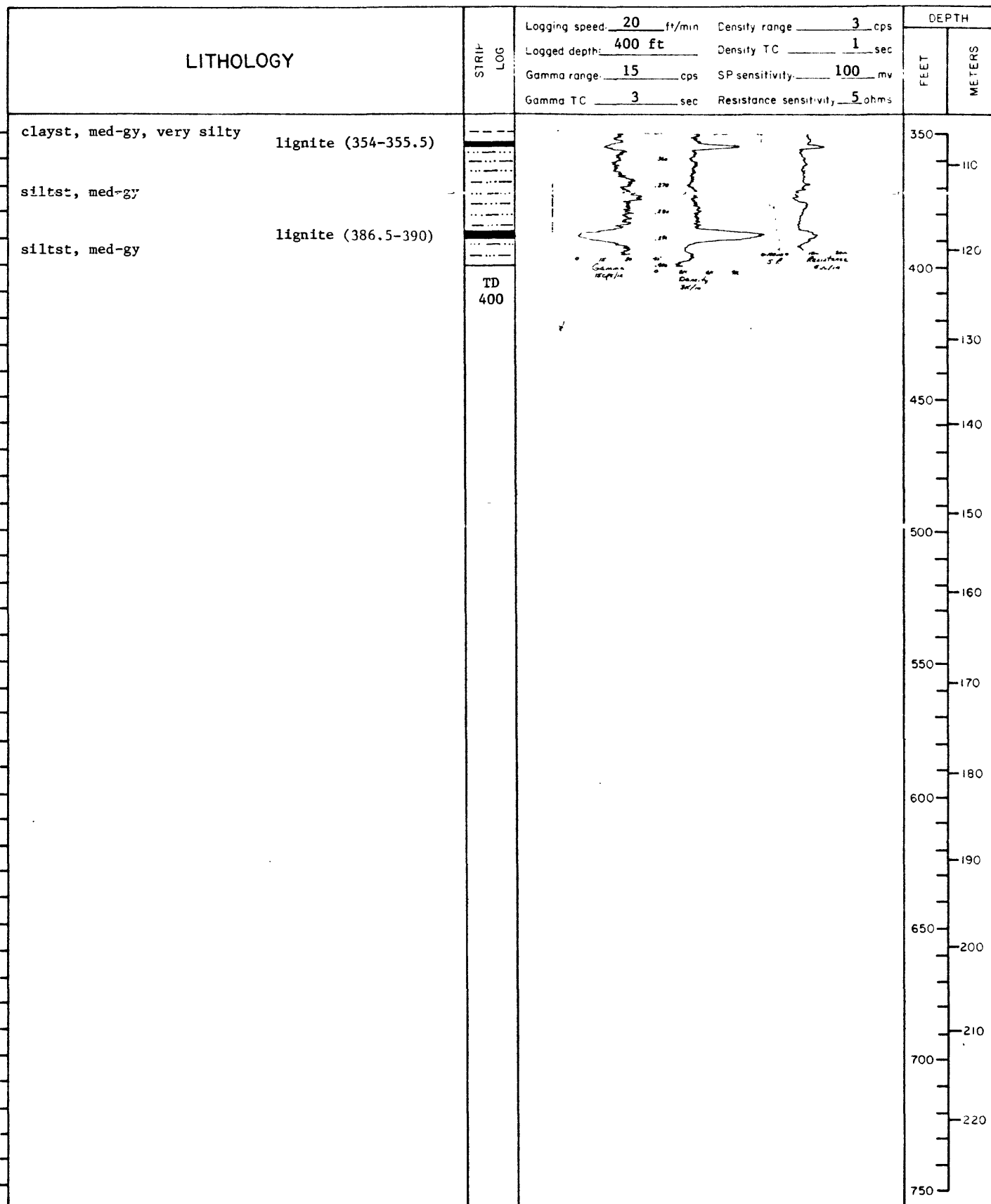
HOLE NO 77  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Rattlesnake Butte</b>	
DATE STARTED <b>7-22-79</b>	DATE COMP. <b>7-22-79</b>	COUNTY <b>Billings</b>	STATE <b>North Dakota</b>
LOCATION: SEC. <b>6</b> T.141 N., R. 98 W., FOOTAGE LOC. <b>550 ft</b>		<b>XXX FSL</b> <b>20 ft</b> <b>FEL XXX</b>	GROUND ELEV <b>2632 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>400 ft</b> CORING <b>---</b>	TOTAL DEPTH <b>400 ft</b>
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	DEPTH TO FLUID LEVEL <b>5 ft</b>
LITHOLOGY RECORDED BY <b>S. Christensen</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	

REMARKS:



REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 78  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fairfield SE	
DATE STARTED 7-22-79	DATE COMP. 7-22-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 8 T.141 N., R. 97 W., FOOTAGE LOC. 250 ft		FNL <del>XXX</del> 18 ft	GROUND ELEV 2625 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 361 ft	TOTAL DEPTH 361 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 8 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

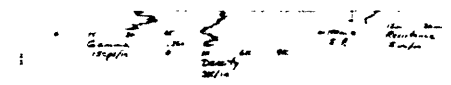
LITHOLOGY	STRIP	LOG	Logging speed <u>20</u> ft/min    Density range: <u>3</u> cps Logged depth <u>360</u> ft    Density TC: <u>1</u> sec Gamma range <u>15</u> cps    SP sensitivity <u>100</u> mv Gamma TC <u>3</u> sec    Resistance sensitivity <u>5</u> ohms		DEPTH	
			FEET	METERS		
soil, lt-brn, sand, silt, unconsol					0	0
sandst, lt-grn, fine-grained					10	
clayst, med-gy, very silty					50	
siltst, med-gy					20	
clayst, med-gy, sli silty      lignite (91-93)					100	30
siltst, lt-gy					40	
clayst, dk-gy, very silty      lignite (164-165)					150	50
clayst, med-gy, very silty					200	60
clayst, dk-gy      lignite (195.5-197) lignite (198.5-203)					250	80
clayst, med-gy, very silty      lignite (207.5-228)					300	90
clayst, med-gy, very silty					350	100
clayst, med-gy, mod silty      lignite (259-269)						
clayst, med-gy, mod silty      lignite (293-301)						
clayst, med-gy, mod silty      lignite (314.5-316)						
siltst, lt-gy						
clayst, med-gy, sli silty						



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 78  
SHEET 2 OF 2

REMARKS:

LITHOLOGY	STRIP LOG	Logging speed <u>20</u> ft/min		Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>360</u> ft		Density T.C.: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv			
		Gamma T.C. <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms			
clayst, med-gy, sli silty						350	
	TD 361					110	
					120		
					400		
					130		
					450		
					140		
					500		
					150		
					160		
					550		
					170		
					180		
					600		
					190		
					650		
					200		
					210		
					700		
					220		
					750		

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 78C  
SHEET 1 OF 1

AREA Three River		QUAD NAME Fairfield SE	
DATE STARTED 8-17-79	DATE COMP. 8-17-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 8 T. 141 N., R. 97 W., FOOTAGE LOC. 270 ft		FNL <del>KXX</del> 18 ft	KXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 257 ft CORING 40 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Menge		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS: continuous core taken from 193 ft to 233 ft.			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min		Density range 3 cps		DEPTH	
		Logged depth 257 ft	Density TC 1 sec	FEET	METERS		
soil, lt-brn				0	0		
sandst, lt-grn, fine-grained				10			
clayst, med-gy, very silty				50			
siltst, med-gy				20			
clayst, med-gy, sli silty				100	30		
siltst, lt-gy				40			
clayst, dk-gy, very silty				150	50		
clayst, med-gy, very silty				50			
clayst, dk-gy				200	60		
clayst, med-gy, very silty				70			
				250	80		
				300	90		
				100			
				350			

lignite (91-93)  
 lignite (164-165)  
 lignite (195.5-197)  
 lignite (198.5-203)  
 lignite (207.5-228)

TD 257  
 CORING ZONE

Logging speed 20 ft/min  
 Logged depth 257 ft  
 Gamma range 15 cps  
 Gamma TC 3 sec  
 Density range 3 cps  
 Density TC 1 sec  
 SP sensitivity 100 mv  
 Resistance sensitivity 5 ohms

# UNITED STATES GEOLOGICAL SURVEY

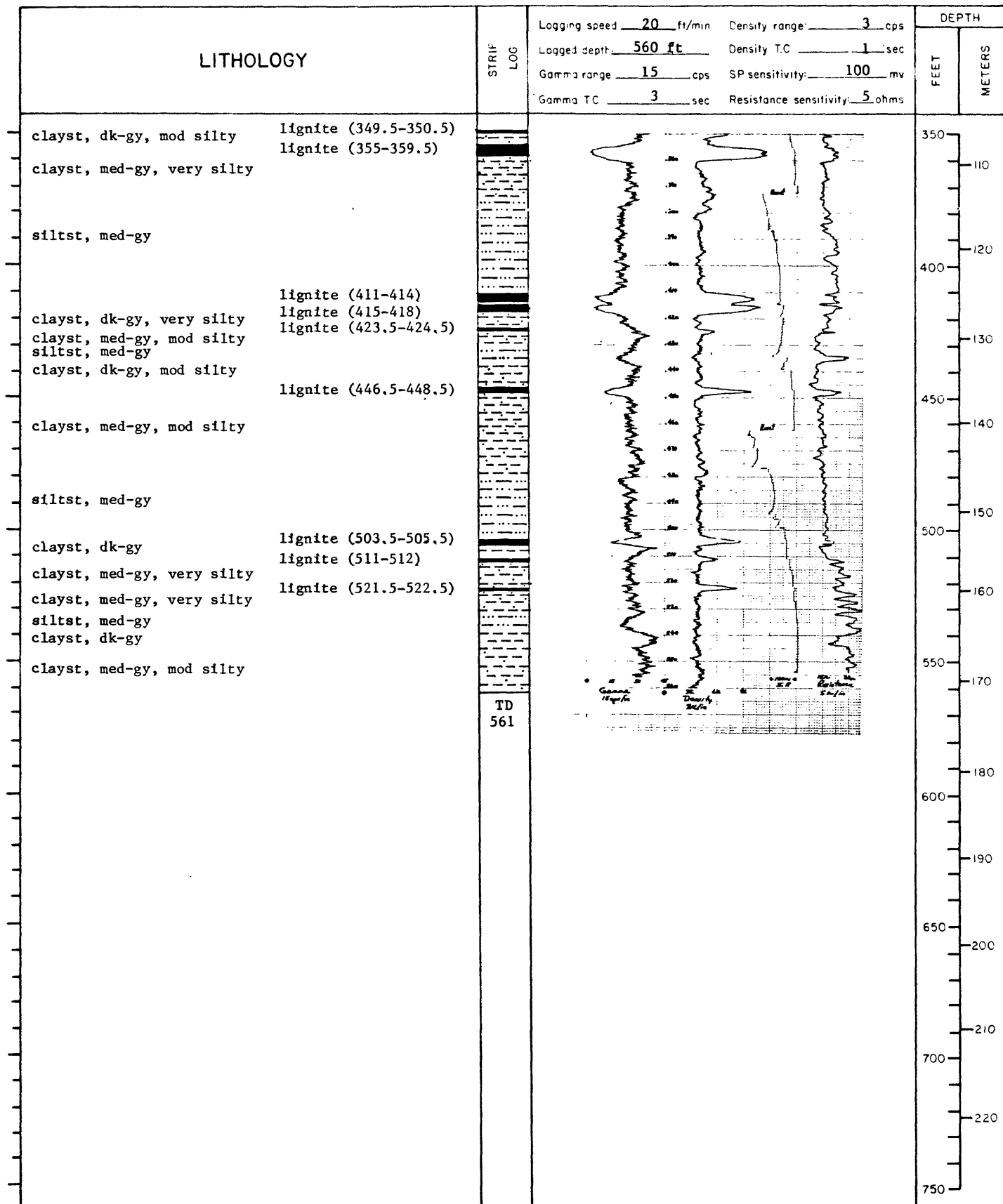
HOLE NO 79  
SHEET 1 OF 2

AREA Three River		QUAD NAME New Hradec South	
DATE STARTED 8-17-79	DATE COMP. 8-17-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 28 T. 141 N., R. 97 W., FOOTAGE LOC. 200 ft		FEL 25 ft	GROUND ELEV 2552 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 561 ft	TOTAL DEPTH 561 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 4 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP	LOG	LOGGING DATA		DEPTH	
			FEET	METERS		
soil, med-brn, silt, clay, unconsol			Logging speed 20 ft/min	Density range 3 cps		
clayst, lt-brn, mod silty			Logged depth 560 ft	Density T.C. 1 sec		
sandst, med-brn, fine-grained			Gamma range 15 cps	SP sensitivity 100 mv		
clayst, dk-brn, sli silty lignite (68-72)			Gamma T.C. 3 sec	Resistance sensitivity 5 ohms		
clayst, med-gy, mod silty						
clayst, med-gy, mod silty lignite (126-127)						
siltst, med-gy						
clayst, dk-gy						
clayst, dk-gy, mod silty lignite (156.5-160)						
clayst, dk-brn, sli silty lignite (172.5-182)						
sandst, med-gy, fine-grained						
clayst, dk-brn, sli silty lignite (216.5-218)						
siltst, med-gy; high clay content						
clayst, dk-gy						
clayst, dk-gy, very silty lignite (296.5-298)						
clayst, dk-gy, very silty lignite (312-313.5)						
clayst, dk-gy						
clayst, dk-gy, very silty lignite (349.5-350.5)						

## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 80  
SHEET 1 OF 1

AREA Three River		QUAD NAME Dickinson North	
DATE STARTED 7-12-79	DATE COMP 7-12-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 26 T.141 N., R. 96 W., FOOTAGE LOC. 270 ft		XXX FSL 9 ft	FEL XXX GROUND ELEV 2548 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 340 ft	CORING --- TOTAL DEPTH 340 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 3 ft
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

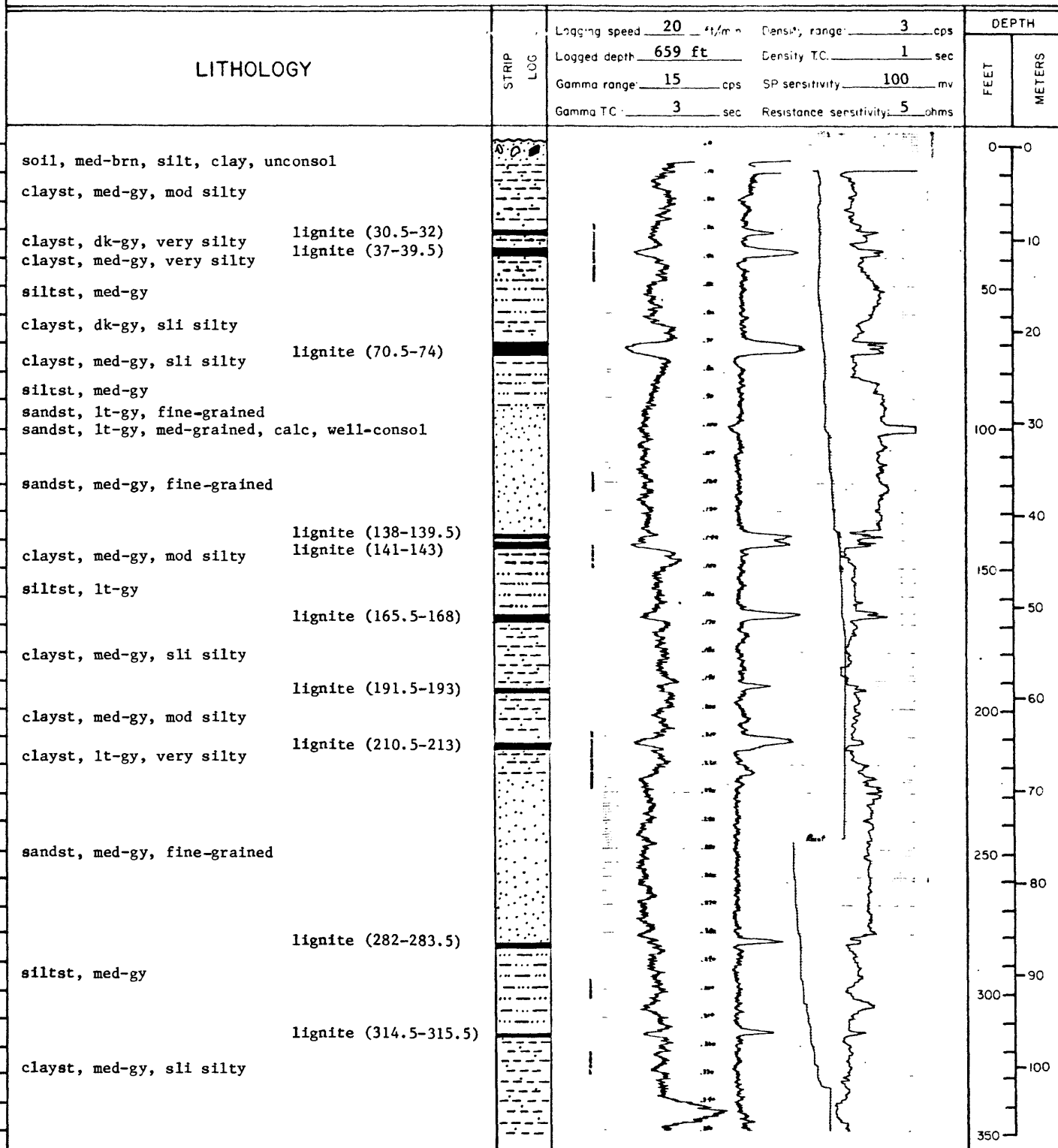
  

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min		Density range 3 cps		DEPTH	
		Logged depth 339 ft		Density T.C. 1 sec		FEET	METERS
		Gamma range 15 cps		SP sensitivity 100 mv			
		Gamma T.C. 3 sec		Resistance sensitivity 5 ohms			
soil, med-brn, silt, clay, unconsol						0	0
siltst, med-brn; high clay content							
clayst, med-gy, silty						10	
lignite (40.5-42)						50	
siltst, med-gy						20	
clayst, dk-gy, very silty						30	
lignite (101.5-102.5)						100	
lignite (103.5-108.5)							
clayst, med-gy, very silty						40	
lignite (141-144.5)						150	
lignite (146.5-148.5)						50	
lignite (149.5-151)							
lignite (153-159)						200	
lignite (160-163)						60	
lignite (164-165)						70	
clayst, med-gy, very silty						250	
sandst, med-gy, fine-grained						80	
siltst, med-gy; high clay content						90	
siltst, med-gy						300	
lignite (264-266)						100	
sandst, lt-gy, fine-grained							
siltst, dk-gy							
lignite (298.5-299.5)							
lignite (303-304)							
siltst, dk-gy							
clayst, med-gy, silty							
	TD 340					350	

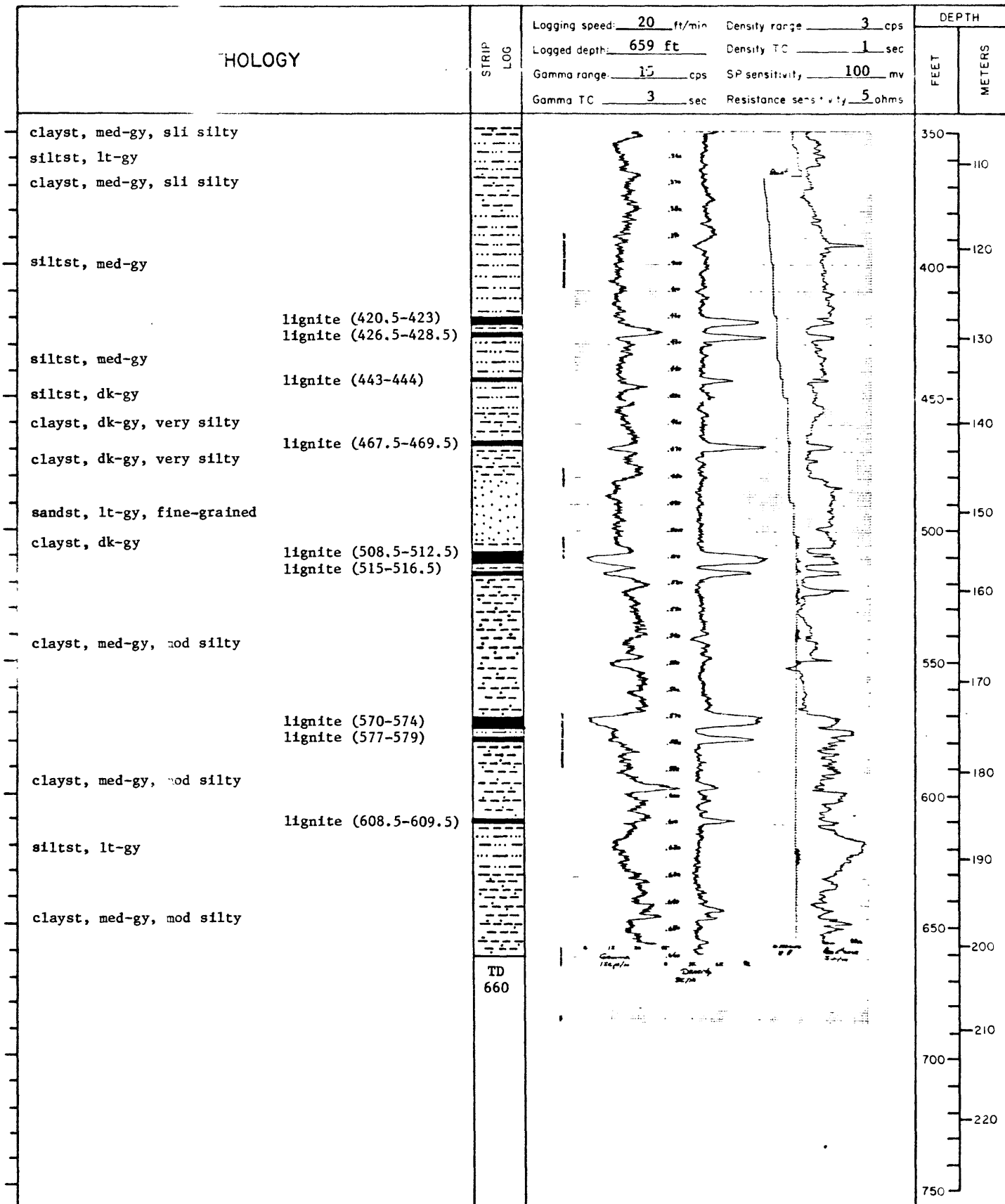
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 81  
SHEET 1 OF 2

AREA Three River		QUAD NAME Hirschville SW	
DATE STARTED 7-12-79	DATE COMP 7-12-79	COUNTY Dunn	STATE North Dakota
LOCATION: SEC. 30 T.141 N., R. 94 W., FOOTAGE LOC. 228 ft		FNL XXX 28 ft	XXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 660 ft	CORING ---
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 10 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



## REMARKS:

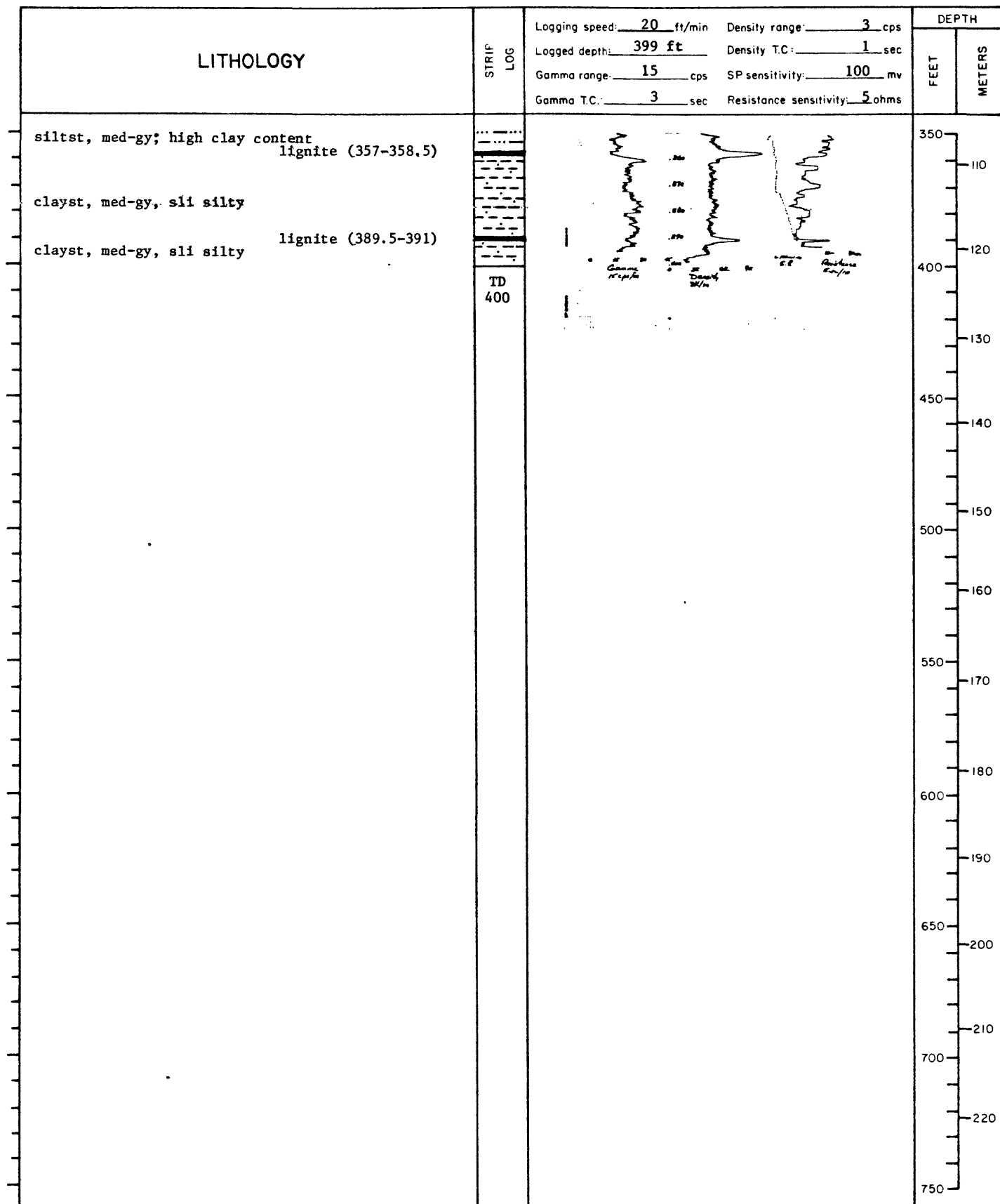


HOLE NO 82  
SHEET 1 OF 2

162



REMARKS:

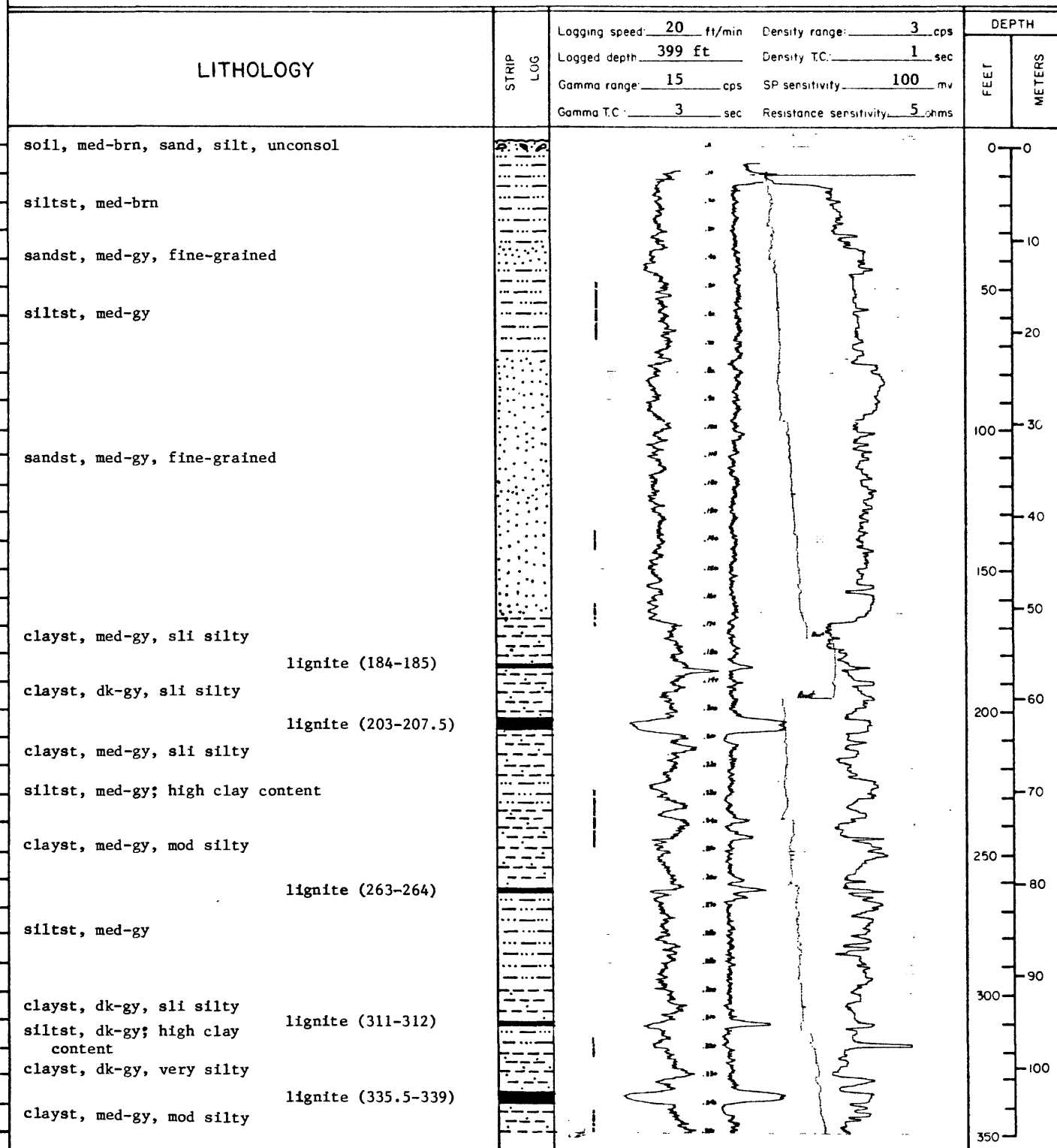


## UNITED STATES GEOLOGICAL SURVEY


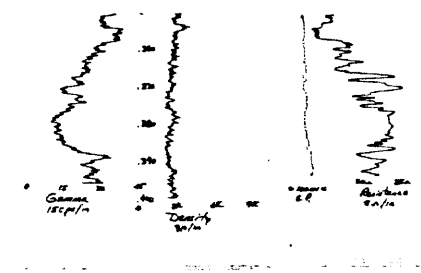
HOLE NO 83  
SHEET 1 OF 2

AREA Three River		QUAD NAME Indian Butte	
DATE STARTED 7-7-79	DATE COMP. 7-7-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 32 T.141 N., R. 91 W., FOOTAGE LOC.		85 ft <del>XXX</del> FSL 42 ft <del>XXX</del> FEL <del>XXX</del>	GROUND ELEV 2040 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 400 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	TOTAL DEPTH 400 ft
LITHOLOGY RECORDED BY A. Banet		DEPTH TO FLUID LEVEL 12 ft	
GEOPHYSICAL LOGS RECORDED BY J. Wald			

REMARKS:



## REMARKS:

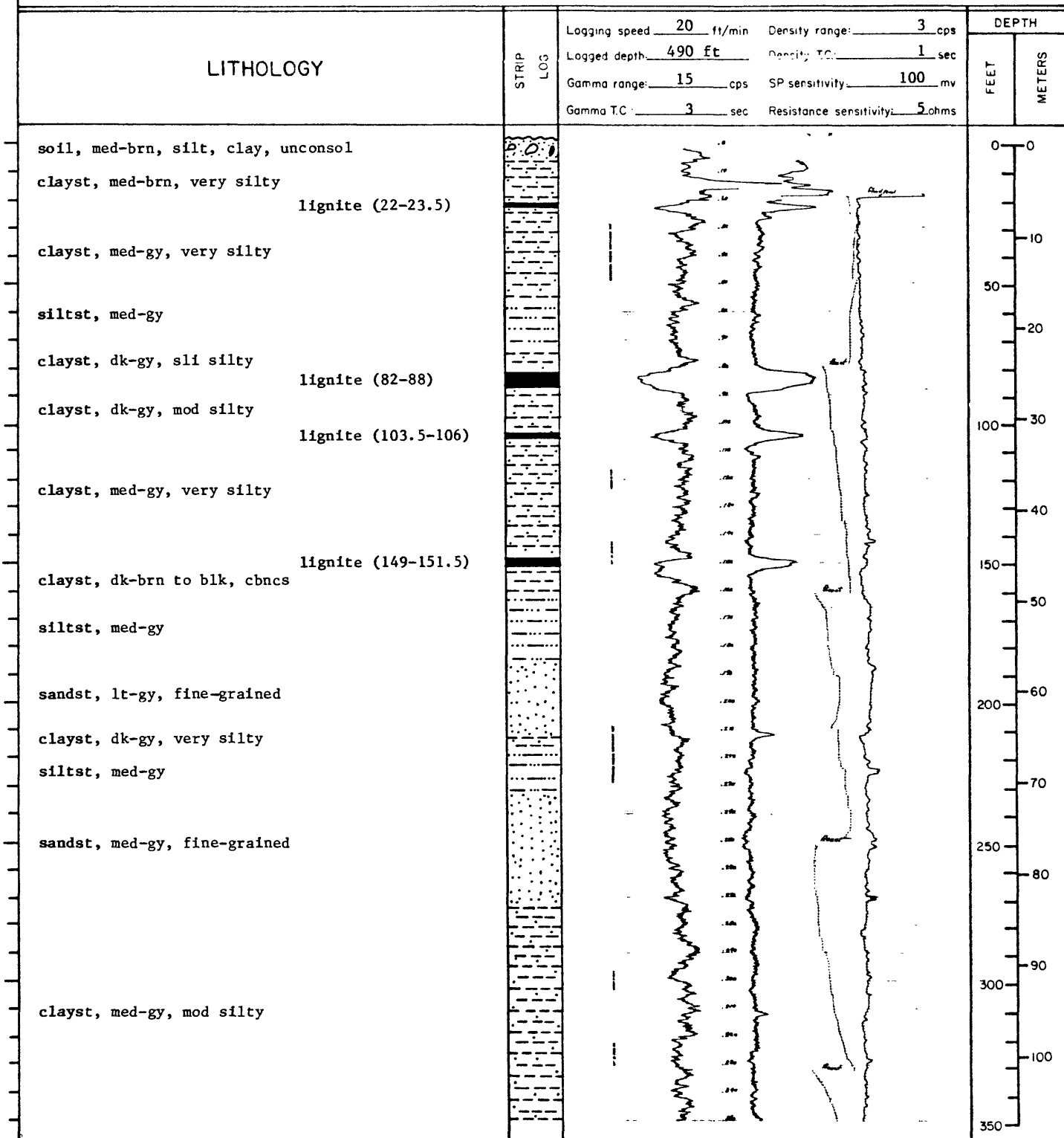
LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
clayst, med-gy, mod silty siltst, med-gy sandst, lt-gy, fine-grained clayst, med-gy, very silty	 TD 400	Logging speed: <u>20</u> ft/min    Density range <u>3</u> cps Logged depth: <u>399</u> ft    Density T.C. <u>1</u> sec Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C. <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms  	
		350	110
		400	120
		450	130
		500	140
		550	150
		600	160
		650	170
		700	180
		750	190
			200
			210
			220

# UNITED STATES GEOLOGICAL SURVEY

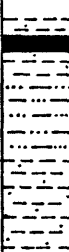
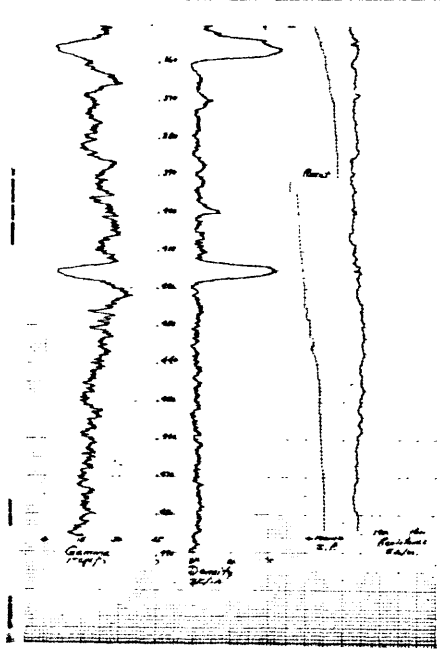
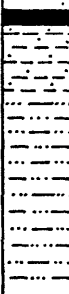
HOLE NO 84  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Fryburg NE</b>	
DATE STARTED <b>7-23-79</b>	DATE COMP. <b>7-23-79</b>	COUNTY <b>Billings</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 2 T.140 N., R.100 W., FOOTAGE LOC.		1320 ft FNL <del>XXX</del> 2570 ft <del>XXX</del> FWL	GROUND ELEV <b>2768 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>490 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	TOTAL DEPTH <b>490 ft</b>
LITHOLOGY RECORDED BY <b>M. Hudson</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	

REMARKS:



REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps		DEPTH			
		Logged depth: <u>490</u> ft    Density T.C.: <u>1</u> sec		FEET	METERS		
		Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv					
		Gamma TC: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms					
clayst, med-gy, mod silty				350			
clayst, med-gy, sli silty				110			
siltst, med-gy				120			
clayst, med-gy, mod silty				400			
clayst, lt-gy, very silty				130			
siltst, lt-gy				140			
	TD 490			150			
				500			
				160			
				550			
				170			
				180			
				600			
				190			
				650			
				200			
				210			
				700			
				220			
				750			

# UNITED STATES GEOLOGICAL SURVEY

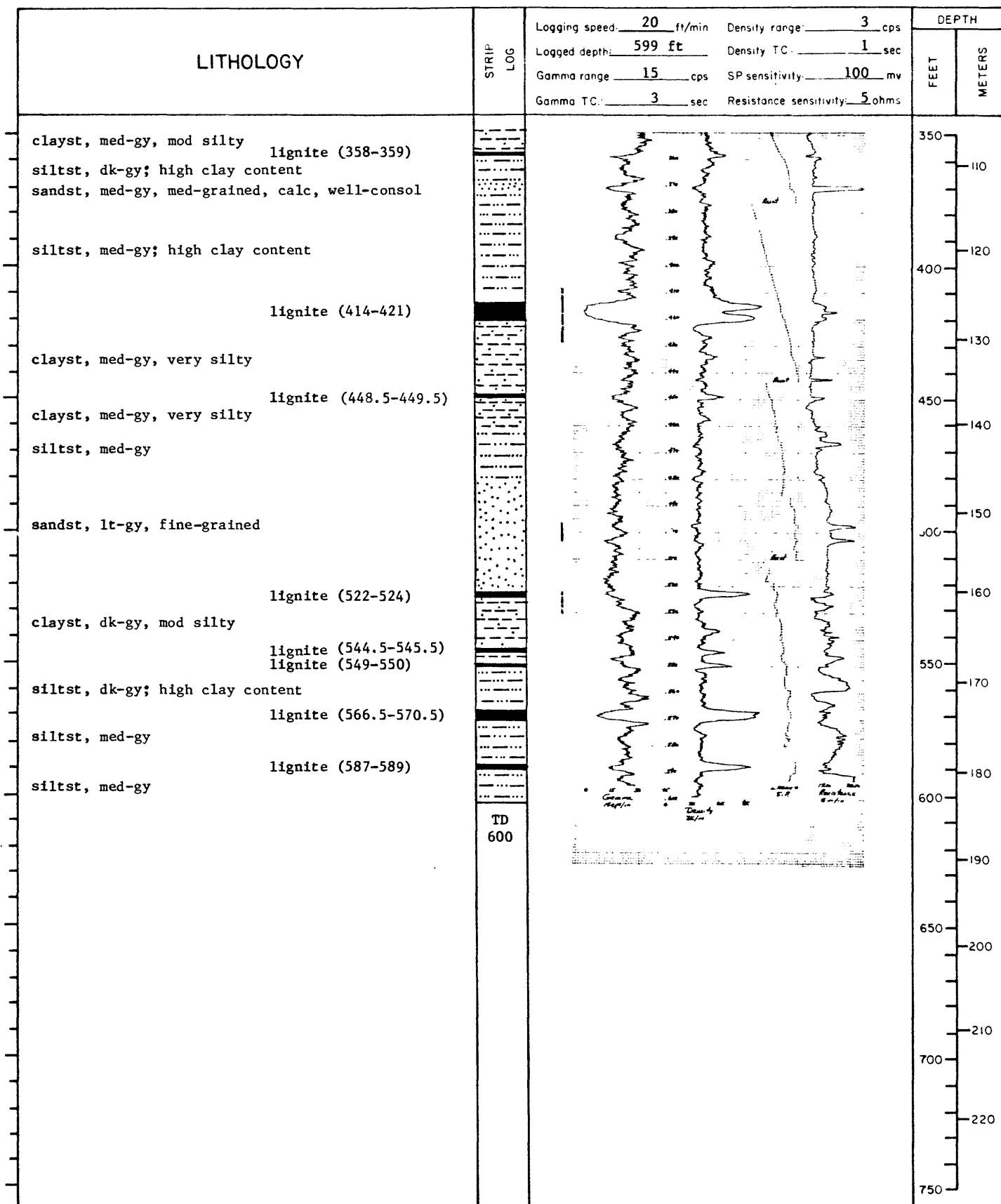
HOLE NO 85  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield	
DATE STARTED 7-23-79	DATE COMP. 7-23-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 10 T.140 N., R. 99 W., FOOTAGE LOC.		270 ft FNL <del>XXX</del>	12 ft <del>XXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 600 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	LOGGING DATA		DEPTH	
		Logging speed: 20 ft/min	Density range: 3 cps	FEET	METERS
soil, med-brn, silt, clay, unconsol		Logged depth: 599 ft	Density TC: 1 sec		
clayst, med-gy, mod silty		Gamma range: 15 cps	SP sensitivity: 100 mv		
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms		
lignite (52-54)				0	0
				10	
				50	
				20	
siltst, med-gy				100	30
lignite (113.5-121)					
clayst, dk-gy, very silty				40	
lignite (141-143)				150	50
siltst, med-gy; high clay content				50	
lignite (180.5-182)				200	60
clayst, dk-gy, sli silty					
				70	
sandst, lt-gy, fine-grained				250	80
lignite (262-263.5)					
clayst, med-gy, very fine		80			
		90			
siltst, med-gy		300	90		
sandst, med-gy, fine-grained		100			
clayst, med-gy, mod silty		350	100		

## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 86  
SHEET 1 OF 2

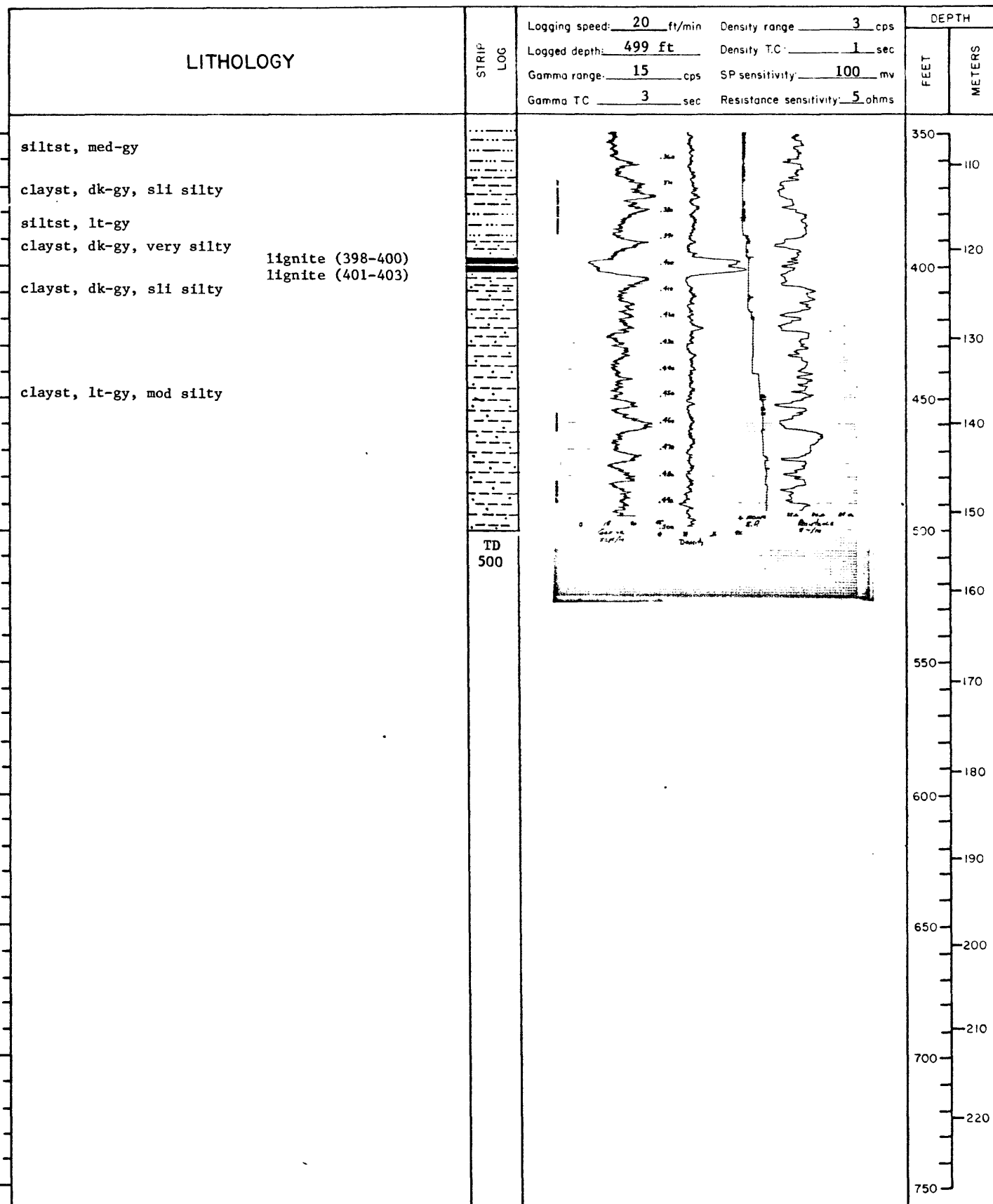
AREA Three River		QUAD NAME Belfield NE	
DATE STARTED 7-13-79	DATE COMP. 7-13-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 28 T.140 N., R. 98 W., FOOTAGE LOC.		63 ft <del>XXX</del> FSL 21 ft <del>FEL</del> <del>XXX</del>	GROUND ELEV 2520 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 500 ft CORING ---	TOTAL DEPTH 500 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 6 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP	LOG	Logging speed <u>20</u> ft/min Density range: <u>3</u> cps Logged depth <u>499</u> ft Density TC: <u>1</u> sec Gomo range <u>15</u> cps SP sensitivity: <u>100</u> mv Gamma TC: <u>3</u> sec Resistance sensitivity: <u>5</u> ohms		DEPTH	
			FEET	METERS		
soil, med-brn, silt, clay, unconsol	0				0	
clayst, med-gy, very silty					10	
lignite (47.5-49.5)					50	
clayst, med-gy, mod silty					20	
lignite (69-82)					100	
clayst, dk-gy, mod silty					30	
lignite (105-108)					40	
clayst, med-gy, very silty					150	
siltst, lt-gy					50	
clayst, med-gy, very silty					200	
					70	
clayst, dk-gy, sli silty					250	
lignite (241.5-246)					80	
lignite (252.5-259.5)					90	
siltst, med-gy					300	
siltst, med-gy					100	
lignite (269.5-270.5)					350	
lignite (280.5-283)						
clayst, med-gy, very silty						
siltst, med-gy						
lignite (333.5-335)						
lignite (345.5-347)						



## REMARKS:

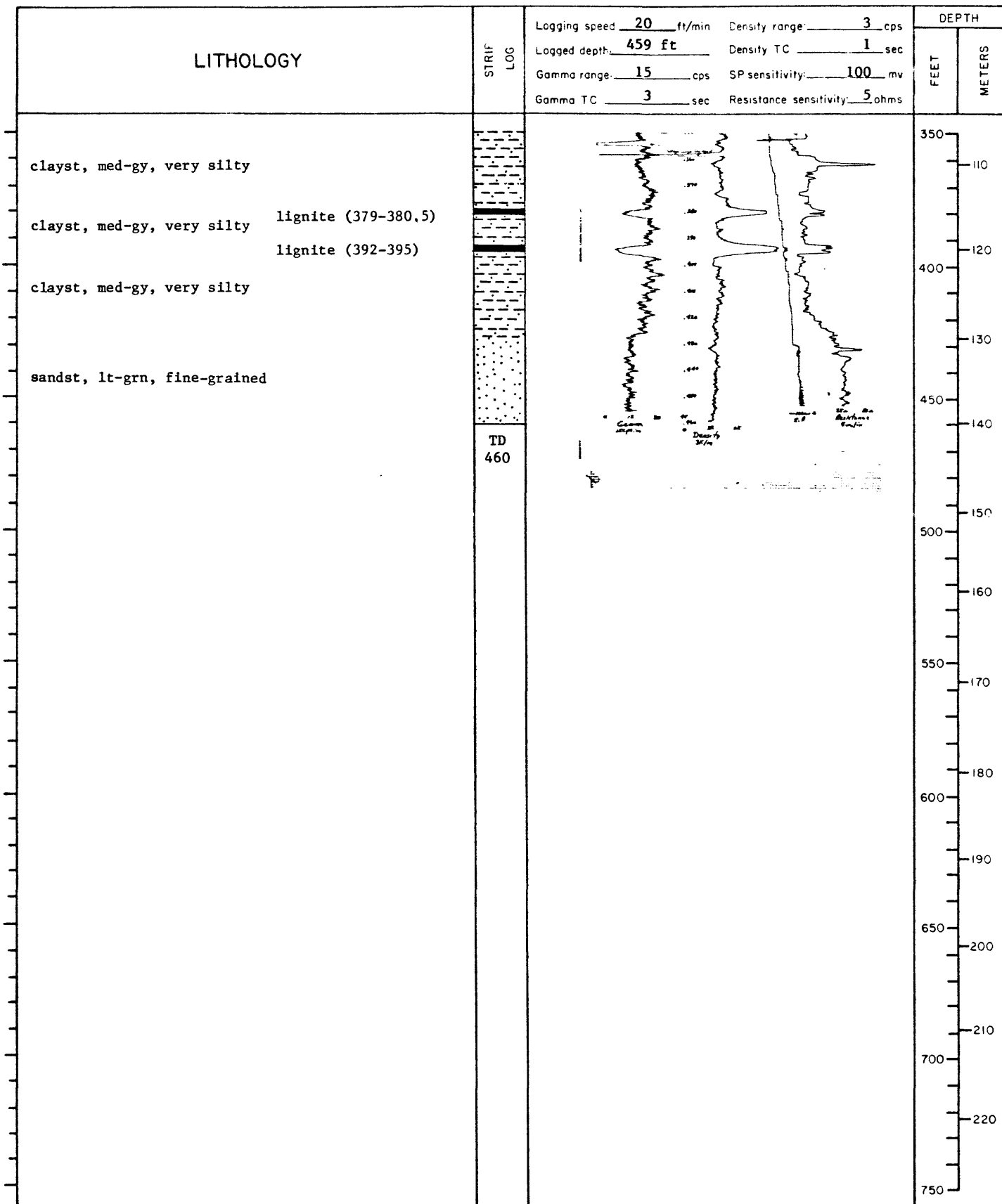


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 87  
SHEET 1 OF 2

AREA Three River		QUAD NAME New Hradec South	
DATE STARTED 7-13-79	DATE COMP. 7-13-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 26 T.140 N., R. 97 W., FOOTAGE LOC.		22 ft <del>XXX</del> FSL 2300 ft <del>XXX</del> FWL	GROUND ELEV 2558 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 460 ft CORING ---	TOTAL DEPTH 460 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 10 ft
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 459 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
			DEPTH FEET METERS
soil, med-brn, silt, clay, unconsol			0 0
clayst, med-brn, very silty			10
lignite (32.5-43)			50
clayst, med-gy, very silty			20
siltst, med-gy			100
sandst, med-gy, fine-grained			30
siltst, med-gy			40
siltst, med-gy lignite (135.5-137)			150
clayst, med-gy, very silty lignite (141-142)			50
siltst, lt-gy			200
sandst, lt-gy, fine-grained			70
clayst, lt-gy, mod silty			250
siltst, med-gy			80
clayst, dk-gy, very silty lignite (320-327.5)			300
clayst, dk-brn lignite (343-345.5)			100
			350

REMARKS:

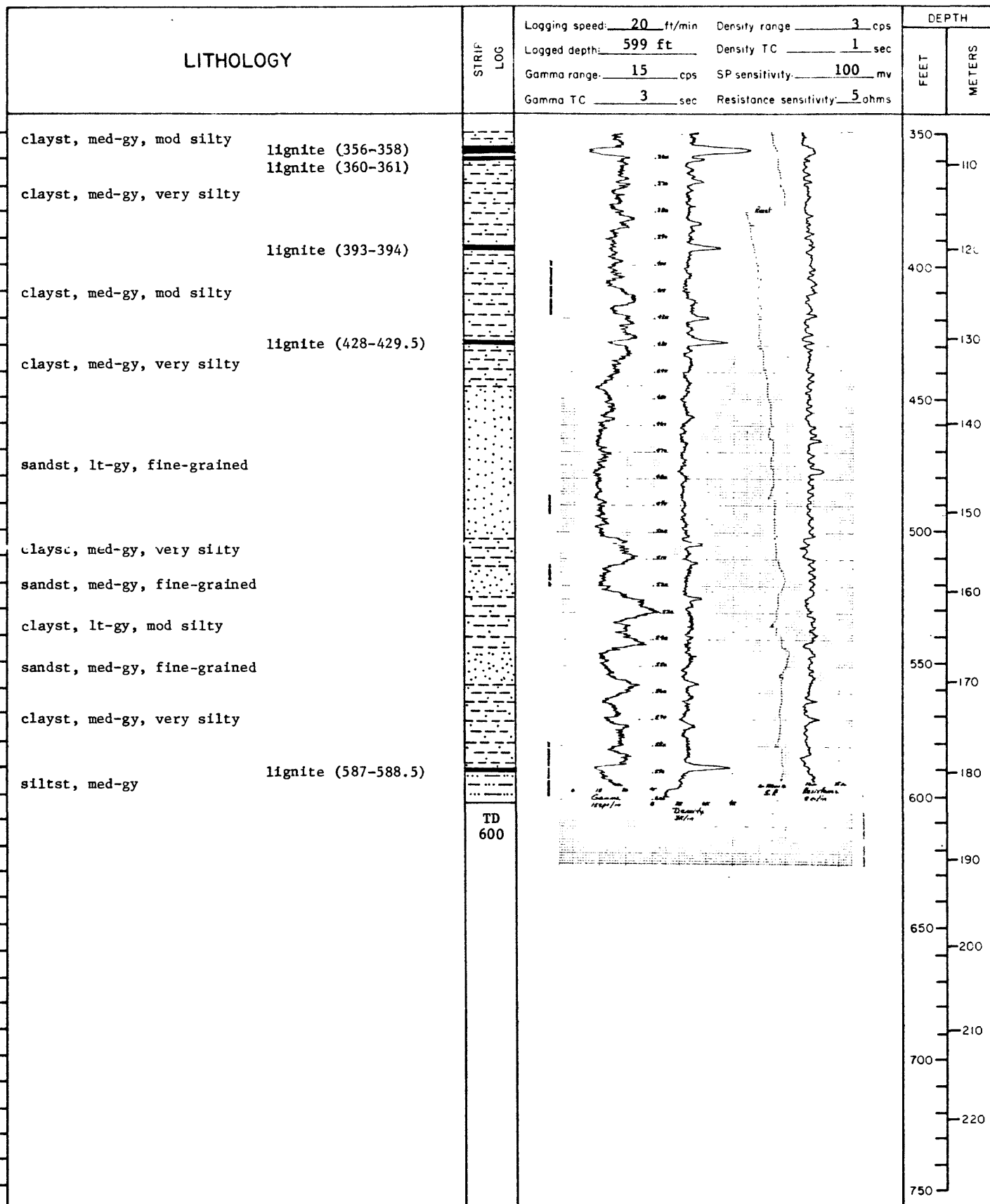


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 88  
SHEET 1 OF 2

AREA Three River		QUAD NAME New Hradec South	
DATE STARTED 7-22-79	DATE COMP. 7-22-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 30 T. 140 N., R. 97 W., FOOTAGE LOC.		30 ft <del>RXX</del> FSL 201 ft <del>RXX</del> FWL	GROUND ELEV 2578 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 600 ft CORING ---	TOTAL DEPTH 600 ft
DRILLING AGENCY: Gregory Drilling Company	DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 11 ft
LITHOLOGY RECORDED BY S. Christensen	GEOPHYSICAL LOGS RECORDED BY J. Wald		
REMARKS:			
LITHOLOGY		Logging speed: 20 ft/min Logged depth: 599 ft Gamma range: 15 cps Gamma T.C.: 3 sec Density range: 3 cps Density T.C.: 1 sec SP sensitivity: 100 mv Resistance sensitivity: 5 ohms	DEPTH FEET METERS
soil, med-brn, silt, clay, unconsol clayst, med-brn, mod silty clayst, med-gy, very silty clayst, dk-gy lignite (81-92.5) siltst, med-gy clayst, med-gy, sli silty lignite (140-141.5) siltst, med-gy lignite (161-172) clayst, med-gy, very silty lignite (202-205) clayst, med-gy, mod silty clayst, lt-gy, very silty clayst, dk-brn, sli silty sandst, med-gy, fine-grained lignite (296.5-304) siltst, lt-gy lignite (329-332.5) lignite (335-337) clayst, med-gy, mod silty			0 10 20 30 40 50 60 70 80 90 100 350

## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 89  
SHEET 1 OF 2

AREA <span style="float: right;">Three River</span>		QUAD NAME <span style="float: right;">Dickinson North</span>	
DATE STARTED <span style="float: right;">7-12-79</span>	DATE COMP <span style="float: right;">7-12-79</span>	COUNTY <span style="float: right;">Stark</span>	STATE <span style="float: right;">North Dakota</span>
LOCATION: SEC. 22 T.140 N., R. 96 W., FOOTAGE LOC. 110 ft		FNL <del>XXX</del> 775 ft <del>XXX</del> FWL	GROUND ELEV <span style="float: right;">2545 ft</span>
SIZE AND BIT TYPE: <span style="float: right;">4-3/4 inch drag</span>		FOOTAGE ROTARY 360 ft CORING ---	TOTAL DEPTH <span style="float: right;">360 ft</span>
DRILLING AGENCY: <span style="float: right;">Gregory Drilling Company</span>		DRILL TYPE: <span style="float: right;">Rotary</span>	DEPTH TO FLUID LEVEL <span style="float: right;">25 ft</span>
LITHOLOGY RECORDED BY <span style="float: right;">A. Banet</span>		GEOPHYSICAL LOGS RECORDED BY <span style="float: right;">J. Wald</span>	
REMARKS:			

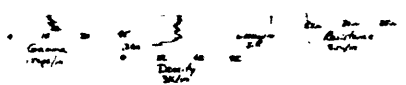
  

LITHOLOGY	STRIP LOG	LOGGING DATA		DEPTH	
		Logging speed: <span style="float: right;">20</span> ft/min	Density range: <span style="float: right;">3</span> cps	FEET	METERS
soil, med-brn, silt, clay, unconsol		Logged depth: <span style="float: right;">359</span> ft	Density TC: <span style="float: right;">1</span> sec		
clayst, med-brn, very silty		Gamma range: <span style="float: right;">15</span> cps	SP sensitivity: <span style="float: right;">100</span> mv		
		Gamma TC: <span style="float: right;">3</span> sec	Resistance sensitivity: <span style="float: right;">5</span> ohms		
				0	0
				10	
				50	
				20	
sandst, med-gy, fine-grained				100	30
				40	
clayst, dk-gy, sli silty				150	50
clayst, med-gy, mod silty				50	
				200	60
siltst, med-gy				70	
				250	80
siltst, dk-gy				80	
				300	90
clayst, med-gy, very silty				100	
				350	100
siltst, med-gy					
clayst, dk-gy					
siltst, lt-gy					
sandst, lt-gy, fine-grained					

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 89  
SHEET 2 OF 2

REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>359</u> ft	Density TC: <u>1</u> sec	Gamma range: <u>15</u> cps	SP sensitivity: <u>100</u> mv	FEET	METERS
sandst, lt-gy, fine-grained						350	
	TD 360					110	
					120		
					400		
					130		
					450		
					140		
					500		
					150		
					160		
					550		
					170		
					180		
					600		
					190		
					650		
					200		
					210		
					700		
					220		
					750		

# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 90  
SHEET 1 OF 2

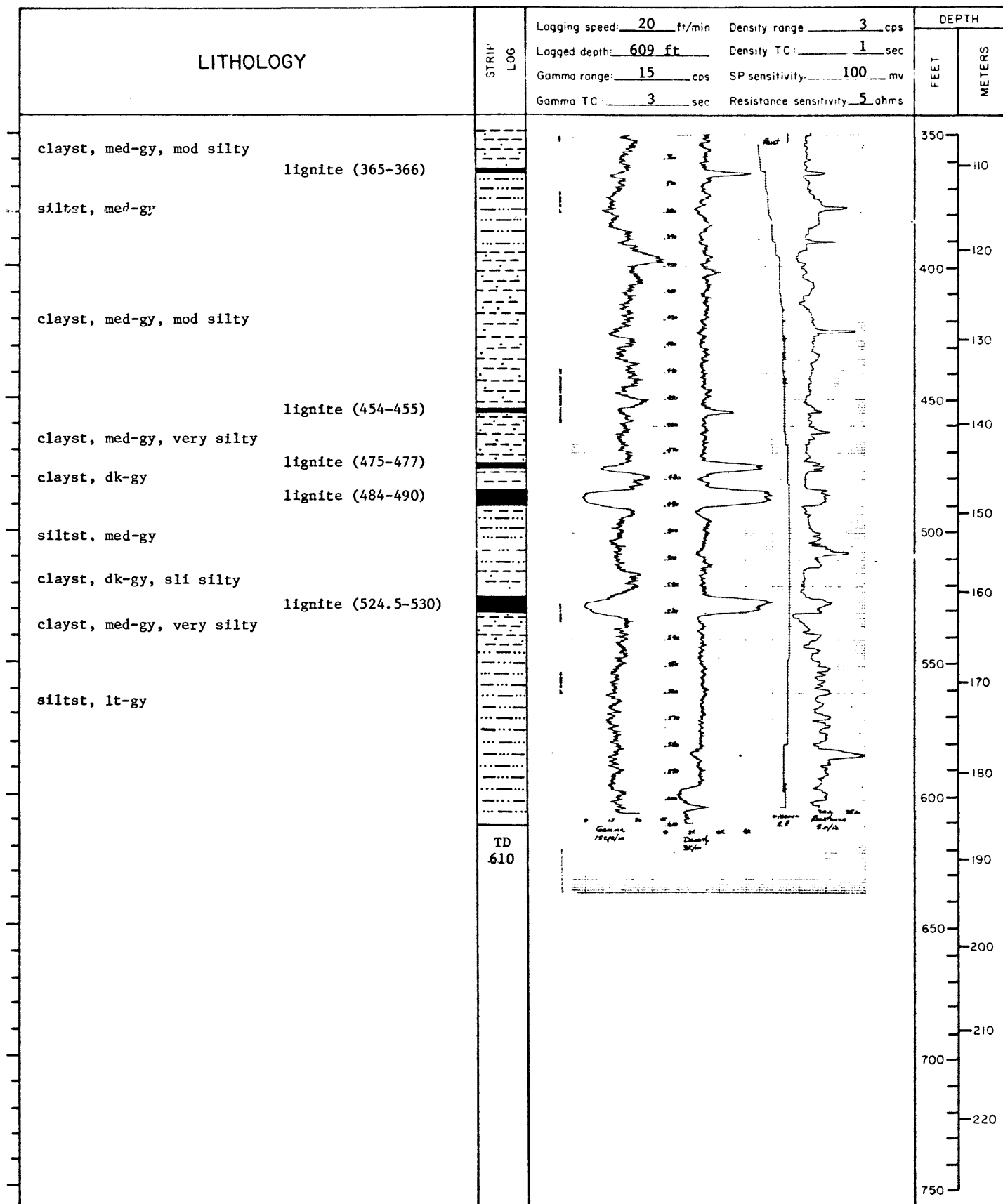
AREA Three River		QUAD NAME Davis Buttes	
DATE STARTED 7-12-79	DATE COMP. 7-12-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 6 T.140 N., R. 95 W., FOOTAGE LOC. 40 ft		FNL <del>XXXL</del> 1815 ft	<del>XXXL</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV. 2510 ft	
		TOTAL DEPTH 610 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	LOGGING DATA		DEPTH	
		Logging speed: 20 ft/min	Density range: 3 cps	FEET	METERS
soil, med-brn, silt, clay, unconsol		Logged depth: 609 ft	Density TC: 1 sec	0	0
siltst, lt-brn		Gamma range: 15 cps	SP sensitivity: 100 mv	10	
clayst, med-gy, mod silty		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms	50	
lignite (58.5-60)				20	
lignite (62-63)				30	
lignite (65.5-66.5)				40	
clayst, lt-gy, mod silty				50	
lignite (149-153)				60	
siltst, dk-gy				70	
clayst, med-gy, mod silty				80	
siltst, med-gy				90	
lignite (210-217)				100	
lignite (219-220.5)					
lignite (227-230)					
clayst, dk-brn, cbnccs					
clayst, dk-brn, cbnccs					
sandst, lt-gy, fine-grained					
clayst, med-gy, mod silty					



REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

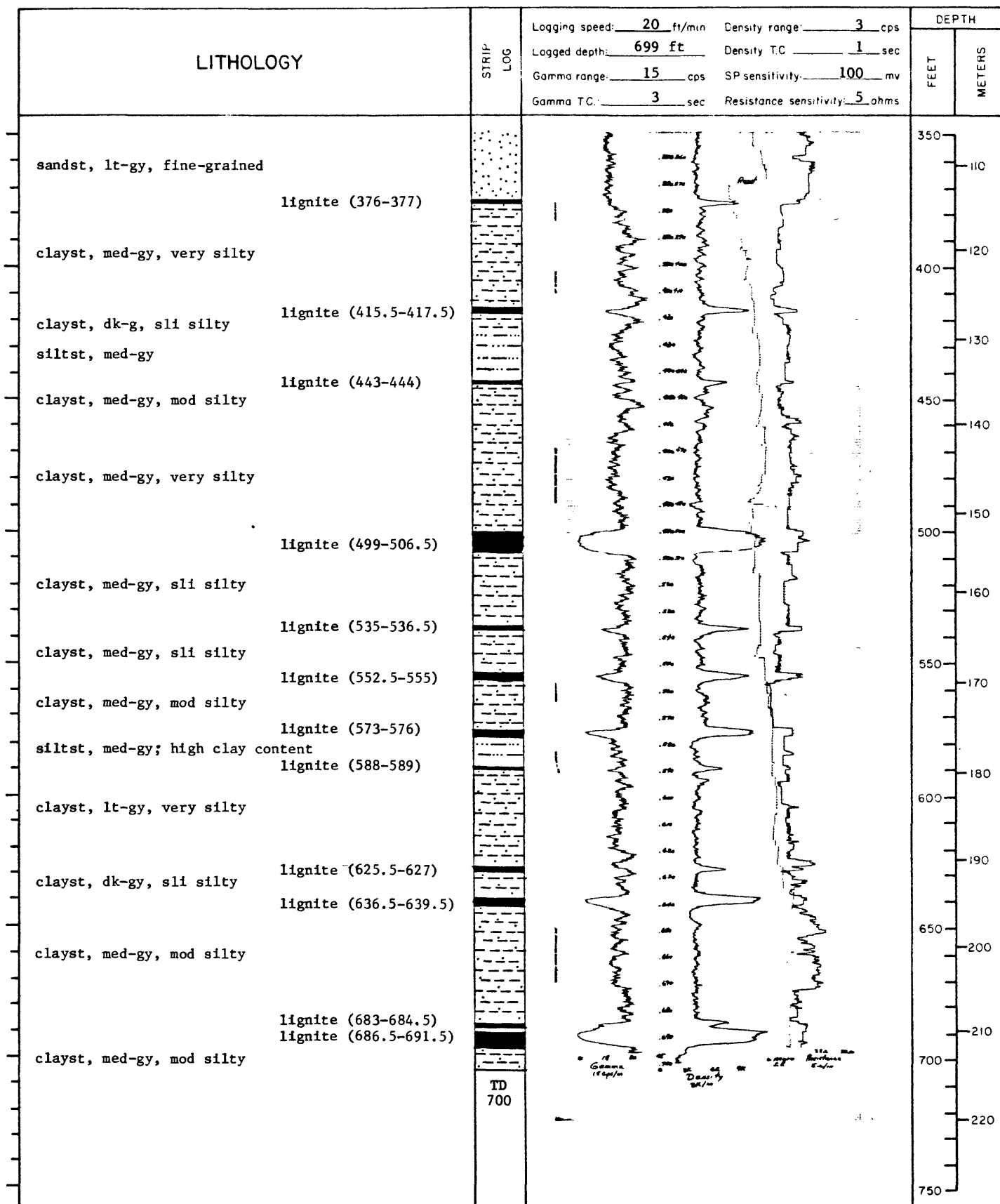
HOLE NO 91  
SHEET 1 OF 2

AREA Three River		QUAD NAME Davis Buttes	
DATE STARTED 7-11-79	DATE COMP. 7-11-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 32 T.140 N., R. 95 W., FOOTAGE LOC. 282 ft		RXX FSL 30 ft	GROUND ELEV 2510 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 700 ft CORING ---	TOTAL DEPTH 700 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 41 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range: 3 cps		DEPTH	
		Logged depth 699 ft	Density T.C.: 1 sec	FEET	METERS
soil, med-brn, sand, silt, unconsol				0	0
sandst, med-brn, fine-grained				10	
clayst, dk-gy, sli silty lignite (67.5-69.5)				20	
siltst, med-gy; high clay content				30	
clayst, med-gy, mod silty				40	
lignite (125.5-127)				50	
clayst, med-gy, mod silty				60	
lignite (157.5-158.5)				70	
clayst, dk-gy lignite (166-170.5)				80	
clayst, med-gy, mod silty lignite (181-182)				90	
clayst, lt-gy, very silty				100	
lignite (220-230.5)				110	
clayst, dk-gy, very silty				120	
				130	
				140	
				150	
				160	
				170	
				180	
				190	
				200	
				210	
				220	
				230	
				240	
				250	
				260	
				270	
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				300	
				310	
				320	
				330	
				340	
				350	

## REMARKS:

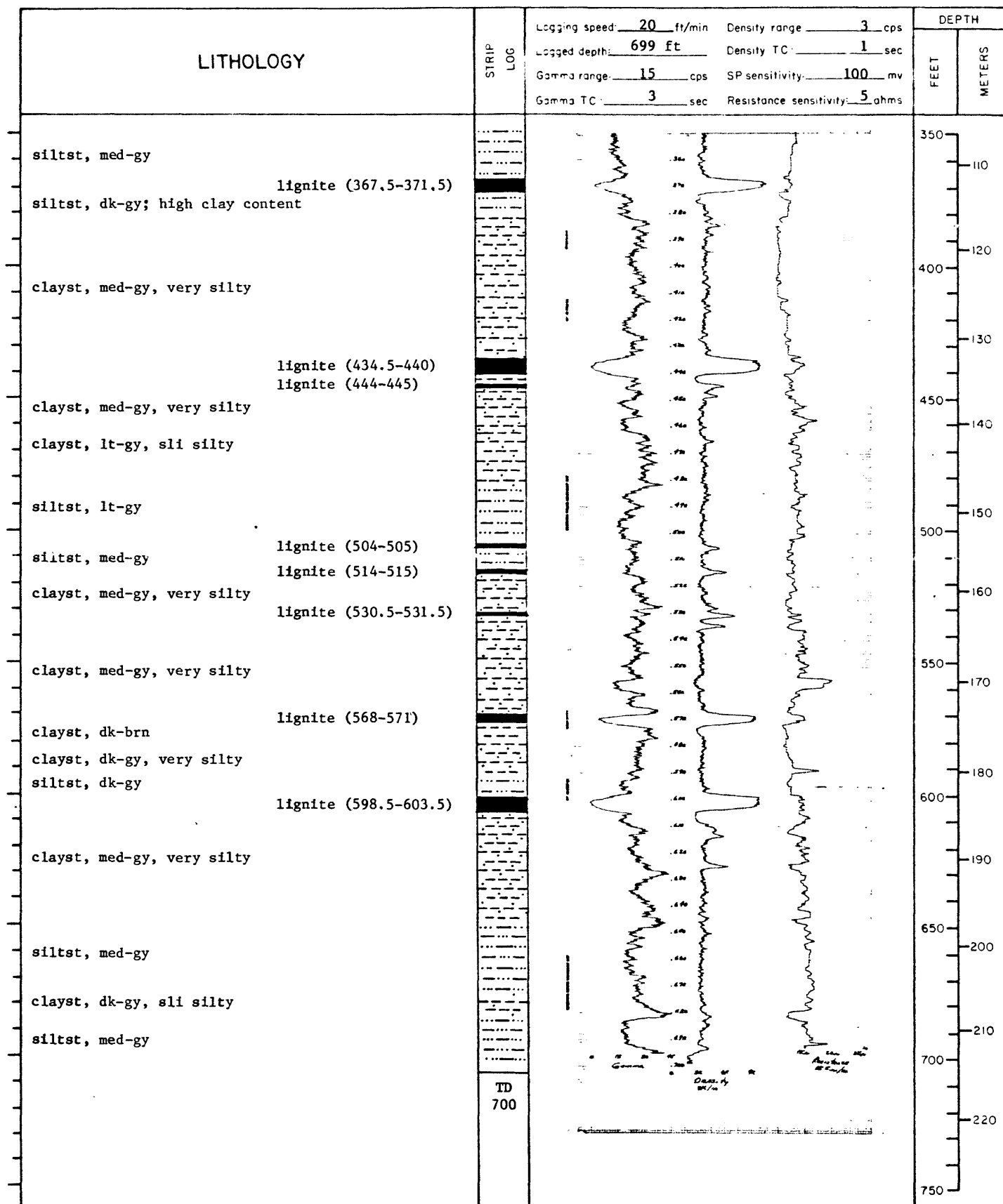


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 92  
SHEET 1 OF 2

AREA Three River		QUAD NAME Boyle	
DATE STARTED 7-11-79	DATE COMP. 7-11-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 4 T.140 N., R. 94 W., FOOTAGE LOC. 1490 ft		XXX FSL 12 ft	FEL XXX GROUND ELEV 2228 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 700 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 699 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
soil, lt-brn, sand, silt, unconsol			DEPTH FEET METERS
sandst, lt-brn, fine-grained			0 0
siltst, lt-grn			10
lignite (70-71)			50 20
clayst, lt-gy, very silty			100 30
siltst, med-gy			150 40
clayst, dk-gy			200 50
clayst, dk-gy, sli silty			250 60
siltst, lt-gy			300 70
clayst, med-gy, mod silty			350 80
lignite (229.5-230.5)			400 90
siltst, med-gy			450 100
clayst, med-gy, mod silty			500 110
lignite (269-271)			550 120
clayst, med-gy, mod silty			600 130
siltst, med-gy			650 140

## REMARKS:

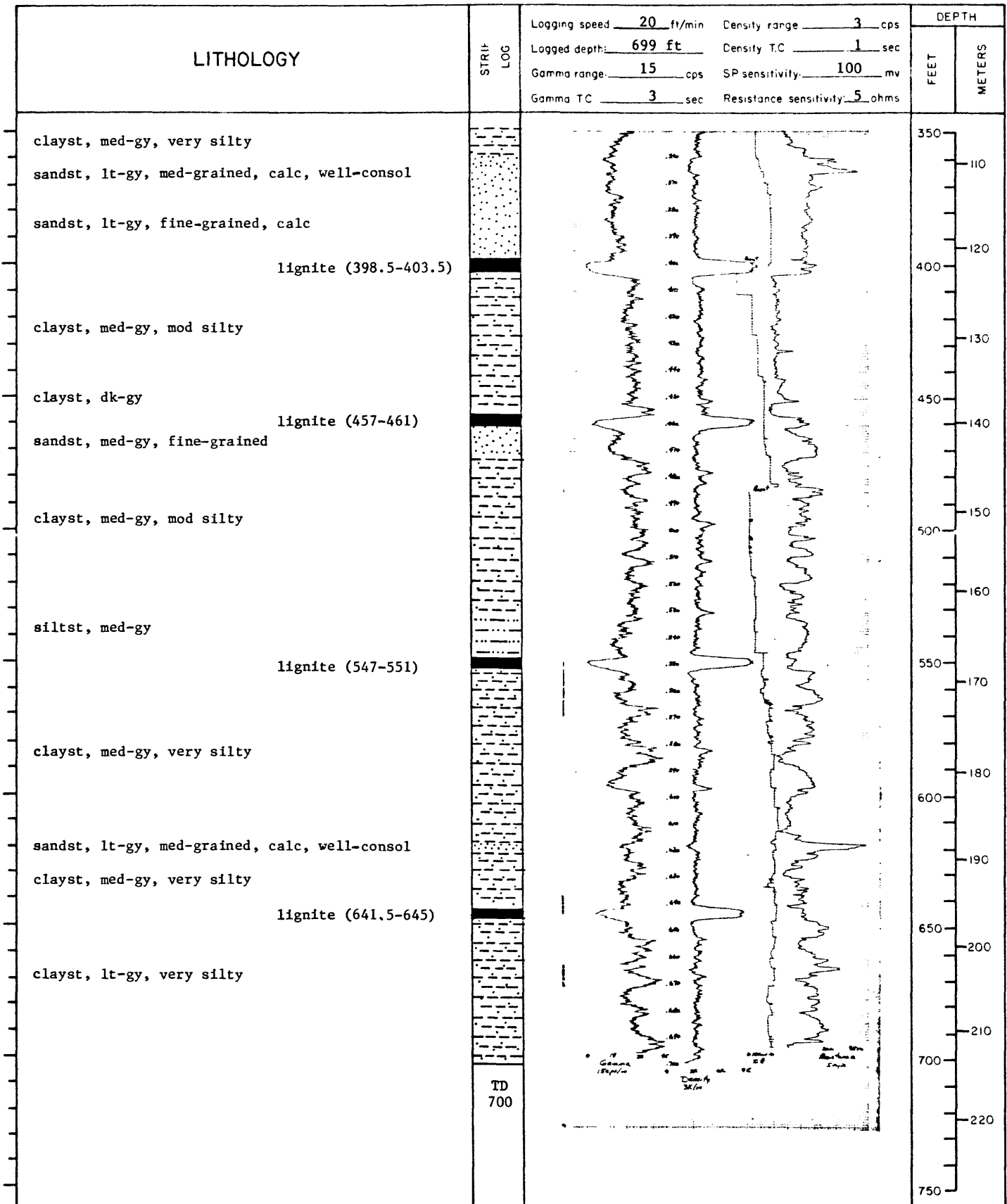


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 93  
SHEET 1 OF 2

AREA Three River		QUAD NAME Boyle	
DATE STARTED 7-12-79	DATE COMP. 7-12-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 28 T.140 N., R.94 W., FOOTAGE LOC. 46 ft FNL XXX 90 ft XXX FWL		GROUND ELEV 2355 ft	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 700 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 699 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
			DEPTH FEET METERS
soil, lt-brn, sand, silt, unconsol			0 0
clayst, med-brn, mod silty			10
clayst, med-gy, mod silty			50
clayst, med-gy, sli silty			20
lignite (101-104)			100 30
clayst, med-gy, mod silty			40
lignite (172.5-176)			150 50
clayst, med-gy, very silty			60
sandst, med-gy, fine-grained			200
clayst, dk-gy, sli silty			70
clayst, dk-gy, sli silty			250
clayst, med-gy, mod silty			80
lignite (236.5-239)			300
clayst, med-gy, mod silty			90
lignite (265.5-268)			100
clayst, med-gy, mod silty			350
lignite (301.5-303)			
clayst, lt-gy, very silty			
clayst, med-gy, very silty			
lignite (343.5-345)			

## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 94  
SHEET 1 OF 2

AREA Three River		QUAD NAME Richardton	
DATE STARTED 7-7-79	DATE COMP 7-7-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 12 T.140 N., R. 93 W., FOOTAGE LOC.		11 ft <del>XXX</del> FSL 60 ft <del>XXX</del> FEL <del>XXX</del>	GROUND ELEV 2210 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 642 ft CORING ---	TOTAL DEPTH 642 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 62 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth: 641 ft	Density TC: 1 sec	FEET	METERS		
soil, med-brn, sand, silt, unconsol				0	0		
sandst, lt-brn, fine-grained							
clayst, med-gy, mod silty				50			
lignite (64.5-67.5)				20			
clayst, med-gy, mod silty							
lignite (94.5-95.5)				100	30		
clayst, dk-gy, sli silty							
lignite (110-112)							
clayst, dk-gy, sli silty							
lignite (124-128.5)				40			
clayst, med-gy, mod silty				150			
lignite (149.5-151)				50			
clayst, med-gy, very silty							
lignite (182-183)				200	60		
clayst, lt-gy, very silty							
siltst, med-gy							
sandst, med-gy, fine-grained, calc				70			
lignite (236-241.5)							
sandst, med-gy, fine-grained				250	80		
clayst, med-gy, very silty							
				300	90		
sandst, lt-gy, fine-grained				100			
				350			



HOLE NO 94  
SHEET 2 OF 2

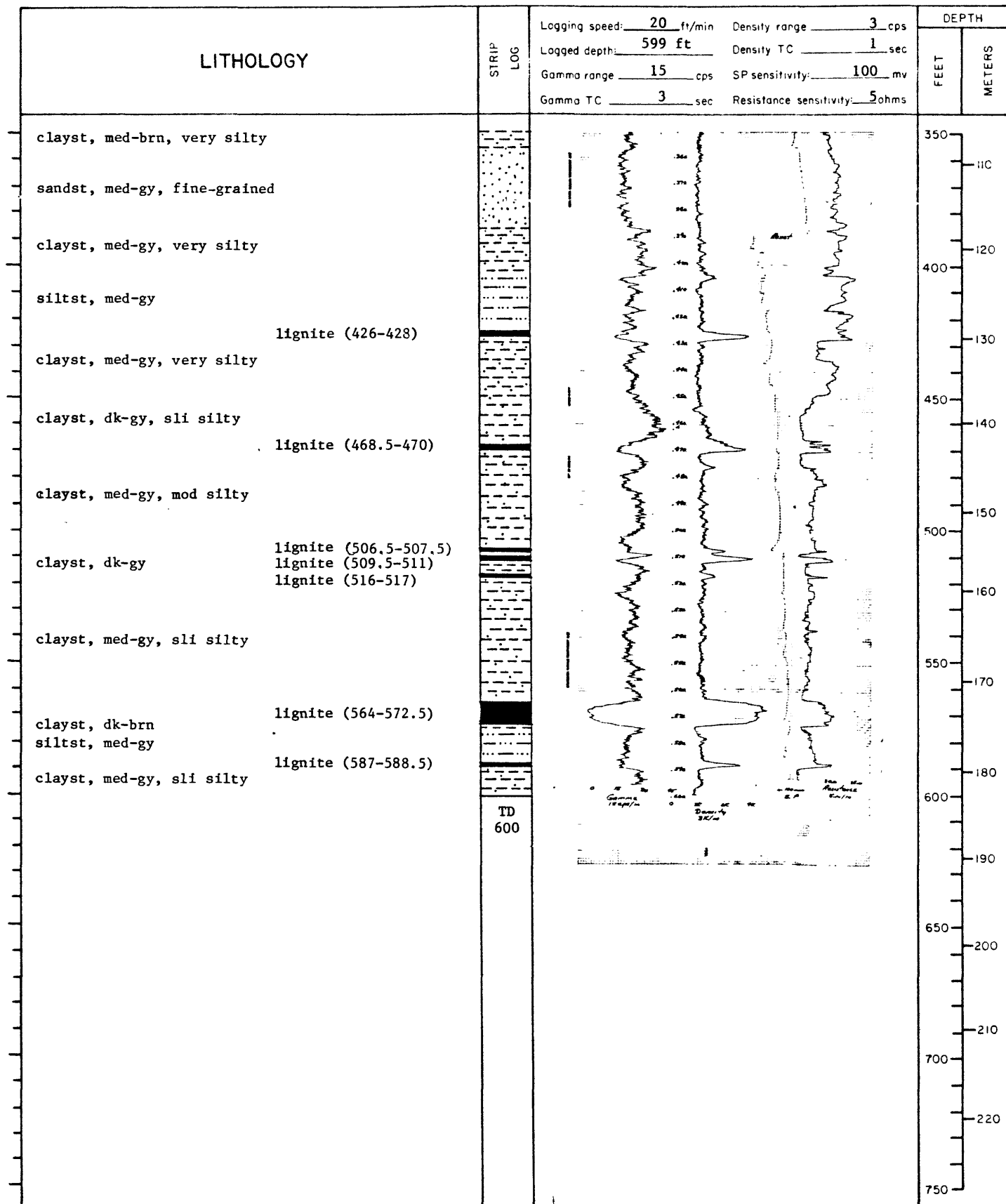
LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min Density range <u>3</u> cps				DEPTH	
		Logged depth: <u>641</u> ft		Density TC: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv			
		Gamma TC: <u>3</u> sec		Resistance sensitivity: <u>5</u> chms			
sandst, lt-gy, fine-grained						350	
						110	
clayst, med-gy, mod silty						400	120
lignite (401-403)							
clayst, med-gy, mod silty						450	130
lignite (431-435.5)							
clayst, med-gy, very silty						500	140
siltst, lt-gy							
clayst, med-gy, very silty						550	150
clayst, dk-gy, sli silty							
clayst, med-gy, sli silty						600	160
clayst, med-gy, sli silty							
lignite (482.5-484)						650	170
lignite (496-497)							
lignite (512.5-513.5)						700	180
siltst, dk-gy; high clay content							
lignite (527.5-529)						750	190
lignite (531-537.5)							
lignite (539-541.5)						800	200
clayst, dk-gy							
lignite (548.5-550)		850	210				
clayst, med-gy, sli silty							
lignite (598-599.5)		900	220				
clayst, dk-gy, sli silty							
lignite (612.5-613.5)		950					
lignite (619.5-621)							
clayst, med-gy, mod silty		1000					

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 95  
SHEET 1 OF 2

AREA Three River		QUAD NAME Taylor	
DATE STARTED 7-8-79	DATE COMP. 7-8-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 20 T. 140 N., R. 93 W., FOOTAGE LOC.		1218 ft <del>KMX</del> FSL	60 ft <del>KMX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 600 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 599 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, lt-brn, sand, silt, unconsol			0 0
sandst, med-brn, fine-grained			10
clayst, med-gy, very silty			20
lignite (107-109.5)			30
clayst, med-gy, very silty			40
lignite (141.5-143.5)			50
siltst, dk-gy; high clay content			60
siltst, dk-gy; high clay content			70
lignite (145-146.5)			80
lignite (156.5-157.5)			90
lignite (167-168)			100
clayst, lt-gy, mod silty			110
sandst, lt-gy, fine-grained			120
clayst, med-gy, mod silty			130
lignite (263-267.5)			140
clayst, lt-gy, mod silty			150
lignite (313.5-314.5)			160
clayst, med-gy, sli silty			170
lignite (332-337.5)			180
clayst, med-brn, sli silty			190
			200
			210
			220
			230
			240
			250
			260
			270
			280
			290
			300
			310
			320
			330
			340
			350

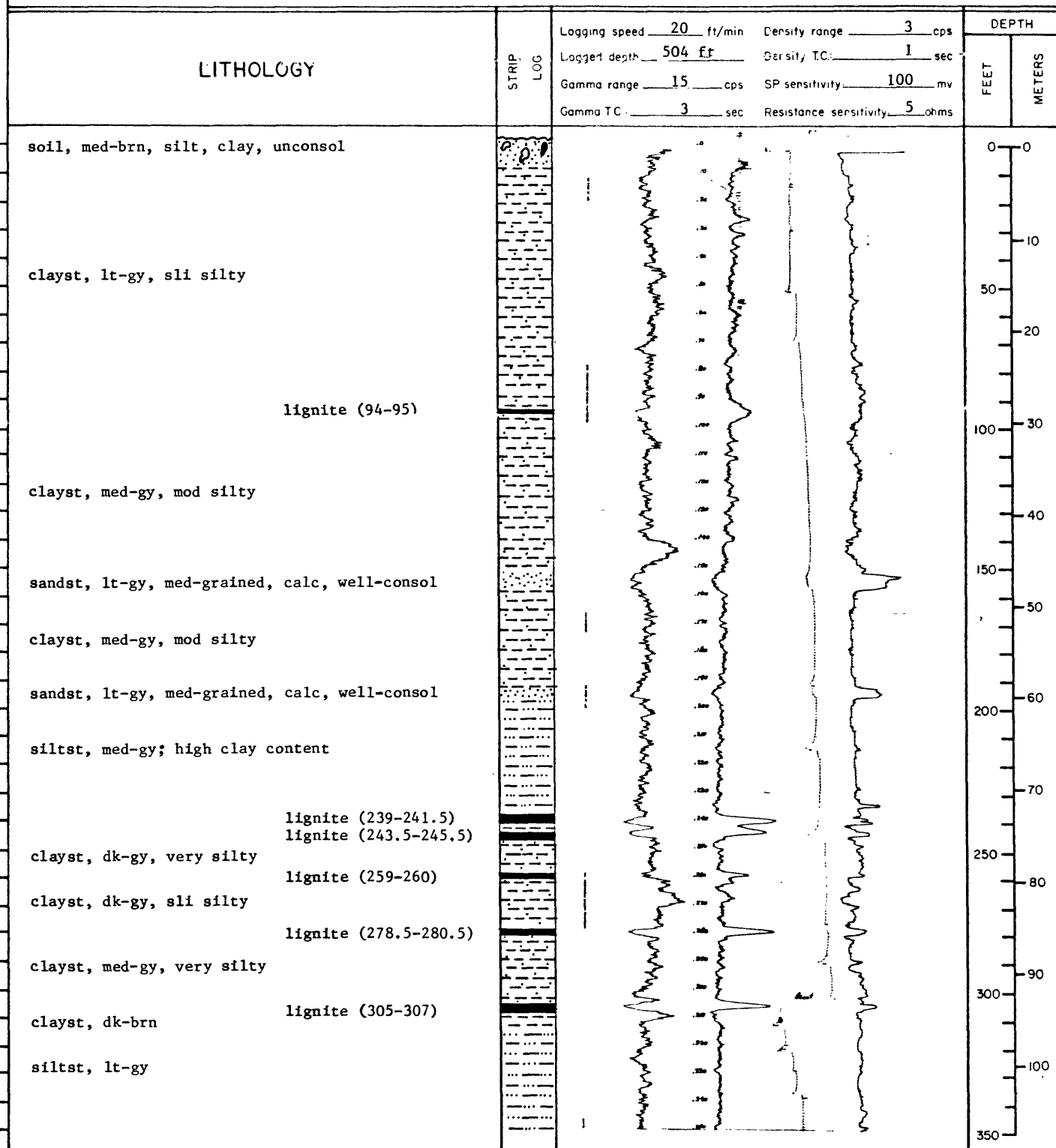
## REMARKS:



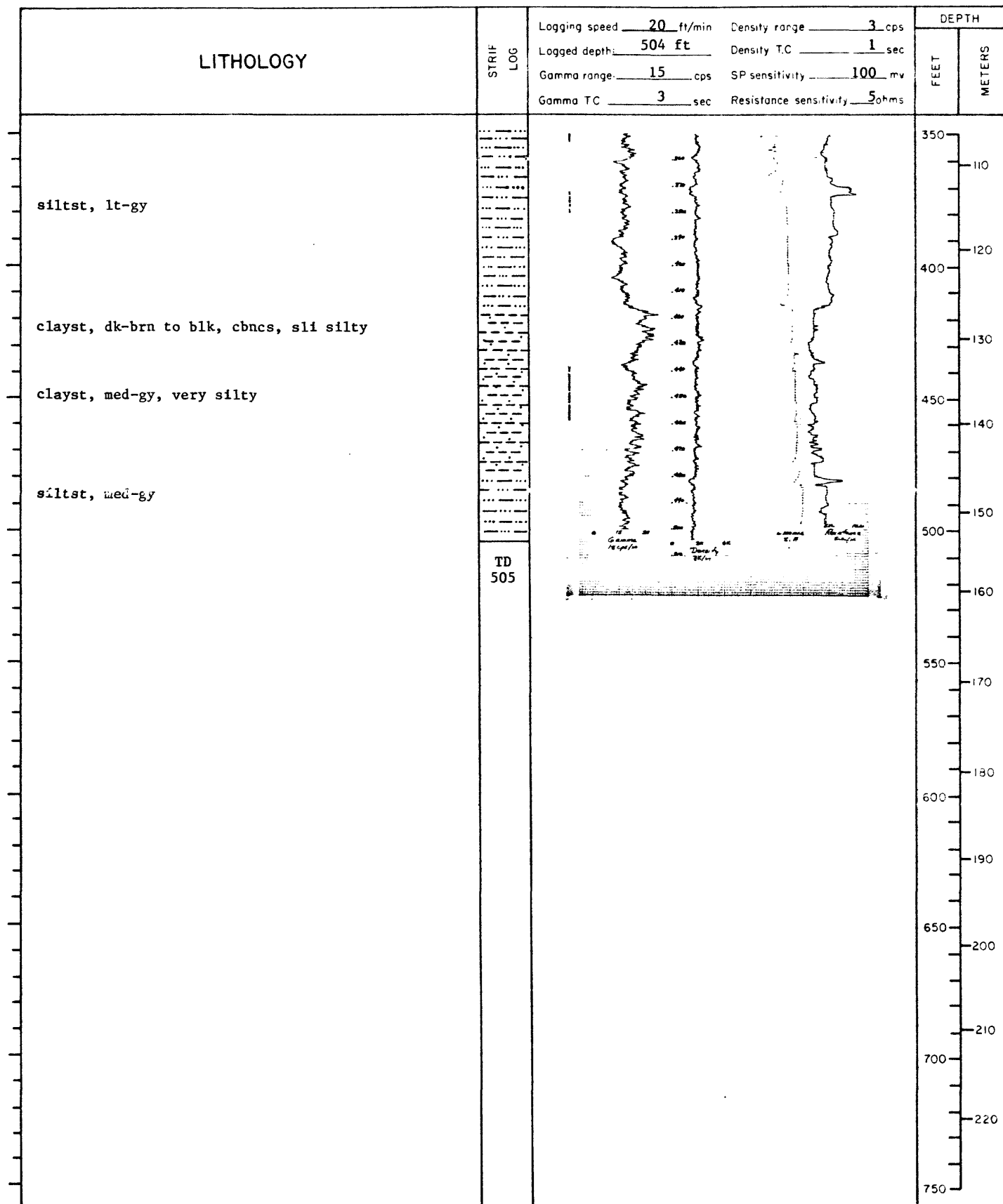
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 96  
SHEET 1 OF 2

AREA Three River		QUAD NAME Indian Butte	
DATE STARTED 7-7-79	DATE COMP. 7-7-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 10 T. 140 N., R. 91 W., FOOTAGE LOC. 1265 ft		FNL <del>XXX</del> 11 ft	FEL <del>XXX</del> GROUND ELEV 2152 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE	
		ROTARY 505 ft	CORING --- TOTAL DEPTH 505 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

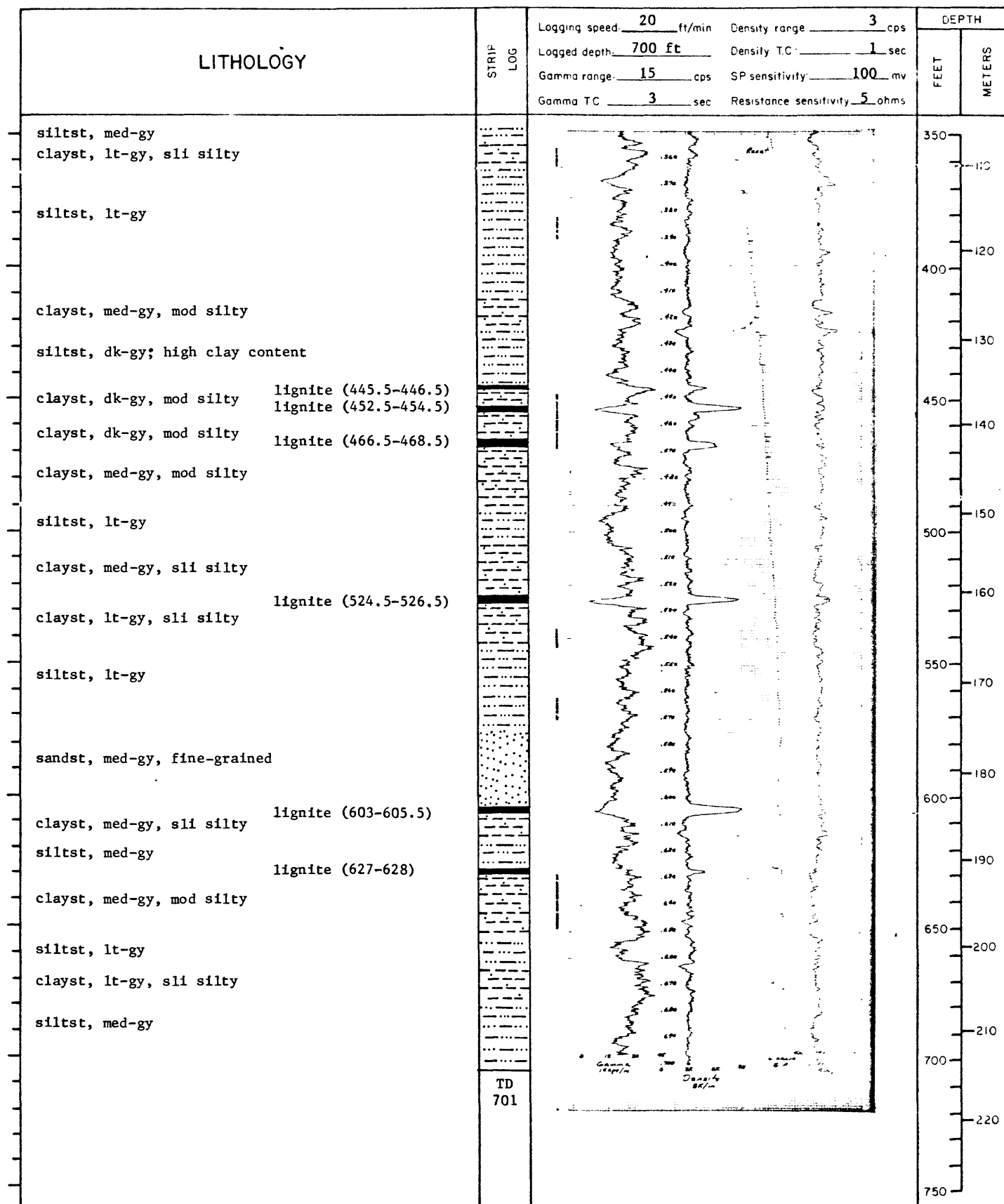
HOLE NO 97  
SHEET 1 OF 2

AREA Three River		QUAD NAME Indian Butte	
DATE STARTED 7-6-79	DATE COMP. 7-6-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 20 T.140 N., R.91 W., FOOTAGE LOC.		9 ft <del>XXX</del> FSL 372 ft <del>XXX</del> FWL	GROUND ELEV 2330 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 701 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	TOTAL DEPTH 701 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min Density range: 3 cps		DEPTH	
		Logged depth: 700 ft	Density T.C.: 1 sec	FEET	METERS
soil, med-brn, silt, clay, unconsol siltst, dk-gy				0	0
clayst, med-gy, mod silty				10	
lignite (38-40)				50	
clayst, med-gy, sli silty				20	
clayst, med-gy, very silty				100	30
lignite (75.5-76.5)				40	
clayst, dk-brn siltst, med-gy				150	50
clayst, med-gy, mod silty				200	60
lignite (140.5-141.5)				250	70
clayst, med-gy, mod silty				300	90
siltst, lt-gy; high clay content				350	100
clayst, dk-brn to blk, cbnccs					
siltst, med-gy					
lignite (229-230.5)					
siltst, med-gy; high clay content					
lignite (265-266)					
clayst, dk-gy, very silty					
lignite (289.5-291.5)					
clayst, med-gy, mod silty					
siltst, med-gy					

## REMARKS:

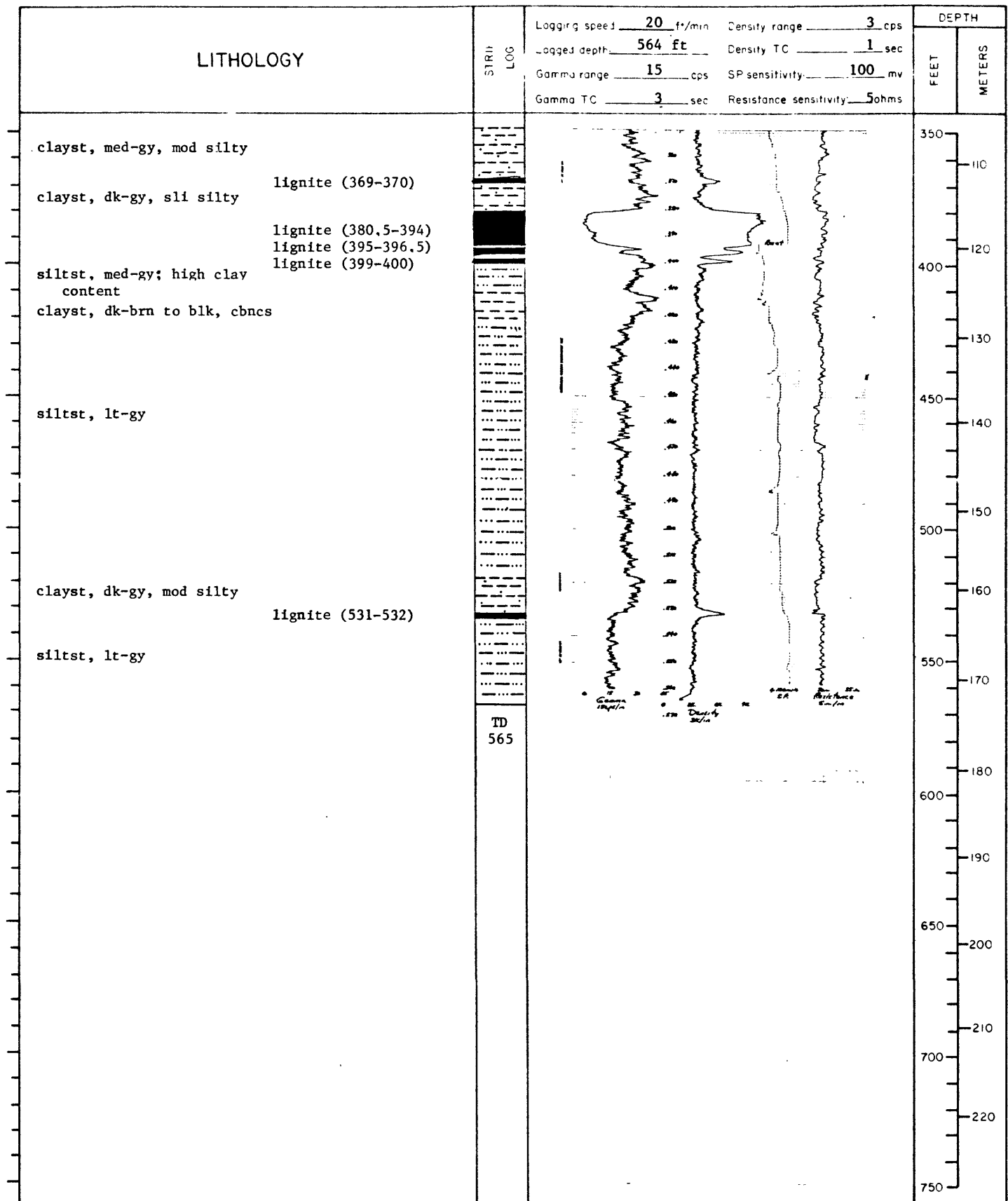


HOLE NO 98  
SHEET 1 OF 2

194



REMARKS:

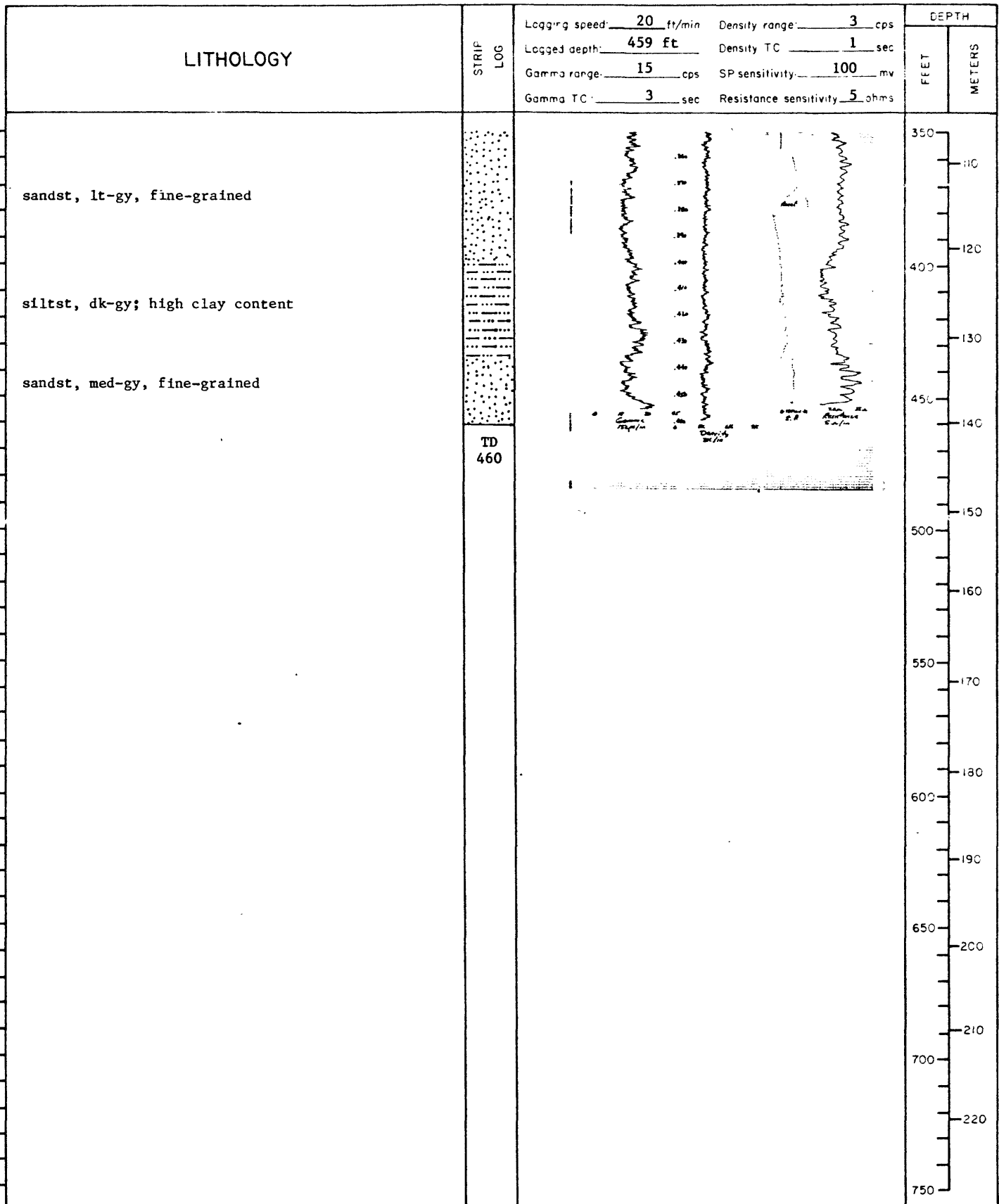


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 99  
SHEET 1 OF 2

AREA Three River		QUAD NAME Tracy Mountain	
DATE STARTED 7-21-79	DATE COMP. 7-21-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 34 T.139 N., R.101 W., FOOTAGE LOC.		512 ft FNL KXX	805 ft FEL KXX
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV 2592 ft	
		TOTAL DEPTH 460 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 459 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, lt-brn, sand, silt, unconsol		0 0	
sandst, med-gy, fine-grained		10	
lignite (32-47)		50	
clayst, med-gy, very silty		20	
clayst, med-gy, mod silty		100 30	
clayst, med-gy, sli silty		40	
clayst, med-gy, mod silty		150 50	
lignite (163-164)		50	
siltst, dk-gy		200 60	
lignite (186-187)		70	
clayst, med-gy, mod silty		250 80	
siltst, lt-gy		300 90	
lignite (234.5-240)		350	
clayst, dk-brn			
lignite (245.5-246.5)			
lignite (248-249.5)			
lignite (254-257.5)			
clayst, med-gy, very silty			
siltst, med-gy			
sandst, med-gy, fine-grained			
lignite (307.5-312)			
clayst, med-gy, very silty			
sandst, lt-gy, fine-grained			

REMARKS:

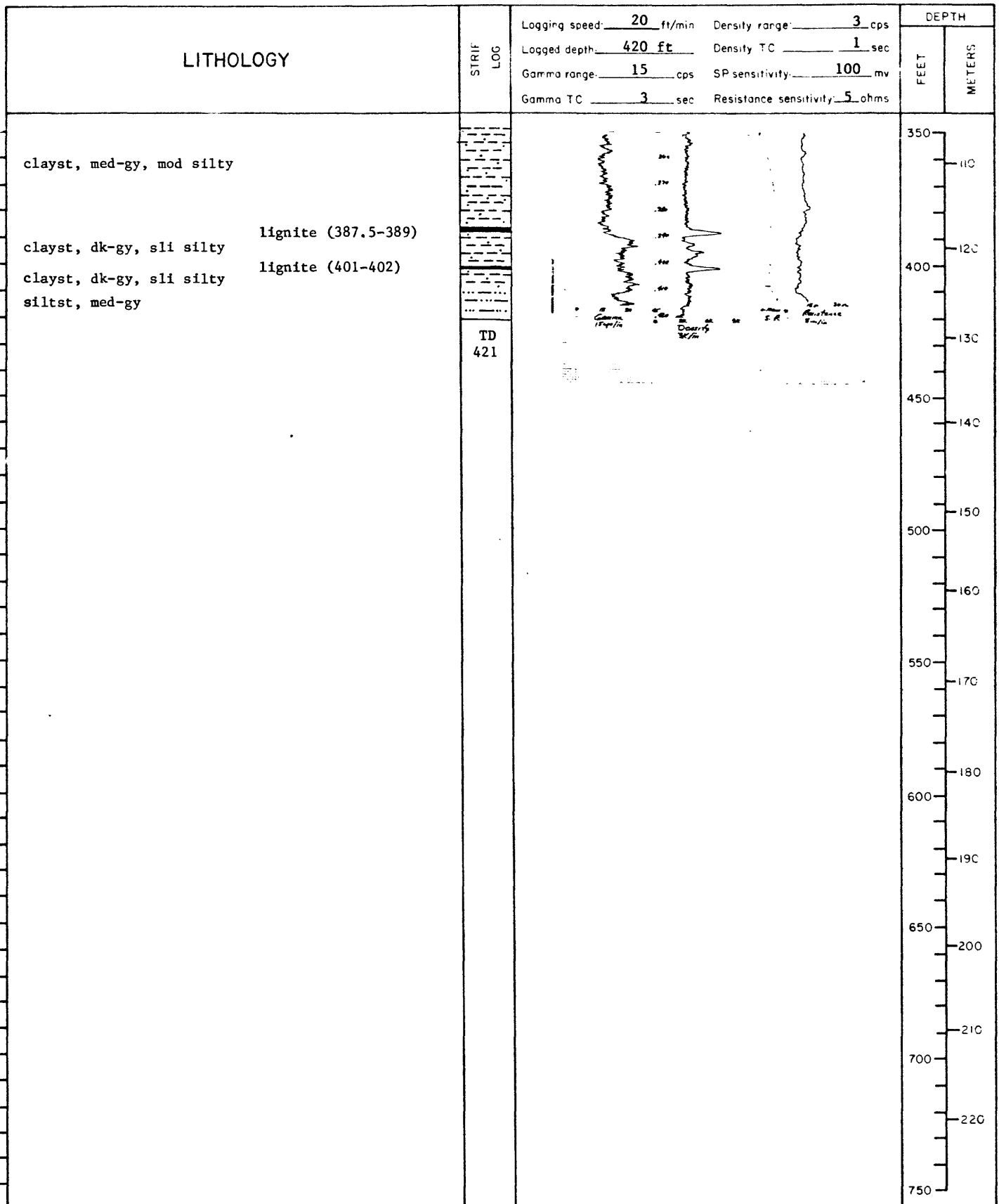


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 100  
SHEET 1 OF 2

AREA Three River		QUAD NAME Fryburg	
DATE STARTED 7-21-79	DATE COMP 7-21-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 14 T.139 N., R.100 W., FOOTAGE LOC.		650 ft FNL <del>K3X</del> 400 ft FEL <del>XKL</del>	GROUND ELEV 2688 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 421 ft CORING ---	TOTAL DEPTH 421 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 8 ft
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range: 3 cps	DEPTH
		Logged depth 420 ft Density TC: 1 sec	FEET METERS
		Gamma range 15 cps SP sensitivity 100 mv	
		Gamma TC: 3 sec Resistance sensitivity 5 ohms	
soil, med-brn, silt, clay, unconsol			0 0
siltst, lt-brn; high clay content			10
lignite (36-43)			50
clayst, med-gy, mod silty			20
siltst, dk-gy			30
clayst, dk-brn			40
clayst, med-gy, mod silty			50
lignite (134-149)			60
clayst, dk-brn			70
siltst, med-gy; high clay content			80
siltst, med-gy			90
lignite (205.5-206.5)			100
sandst, med-gy, fine-grained			
clayst, lt-gy, very silty			
lignite (261-266)			
clayst, dk-gy, sli silty			
lignite (277-278)			
clayst, dk-gy, sli silty			
lignite (293-297)			
clayst, med-gy, mod silty			

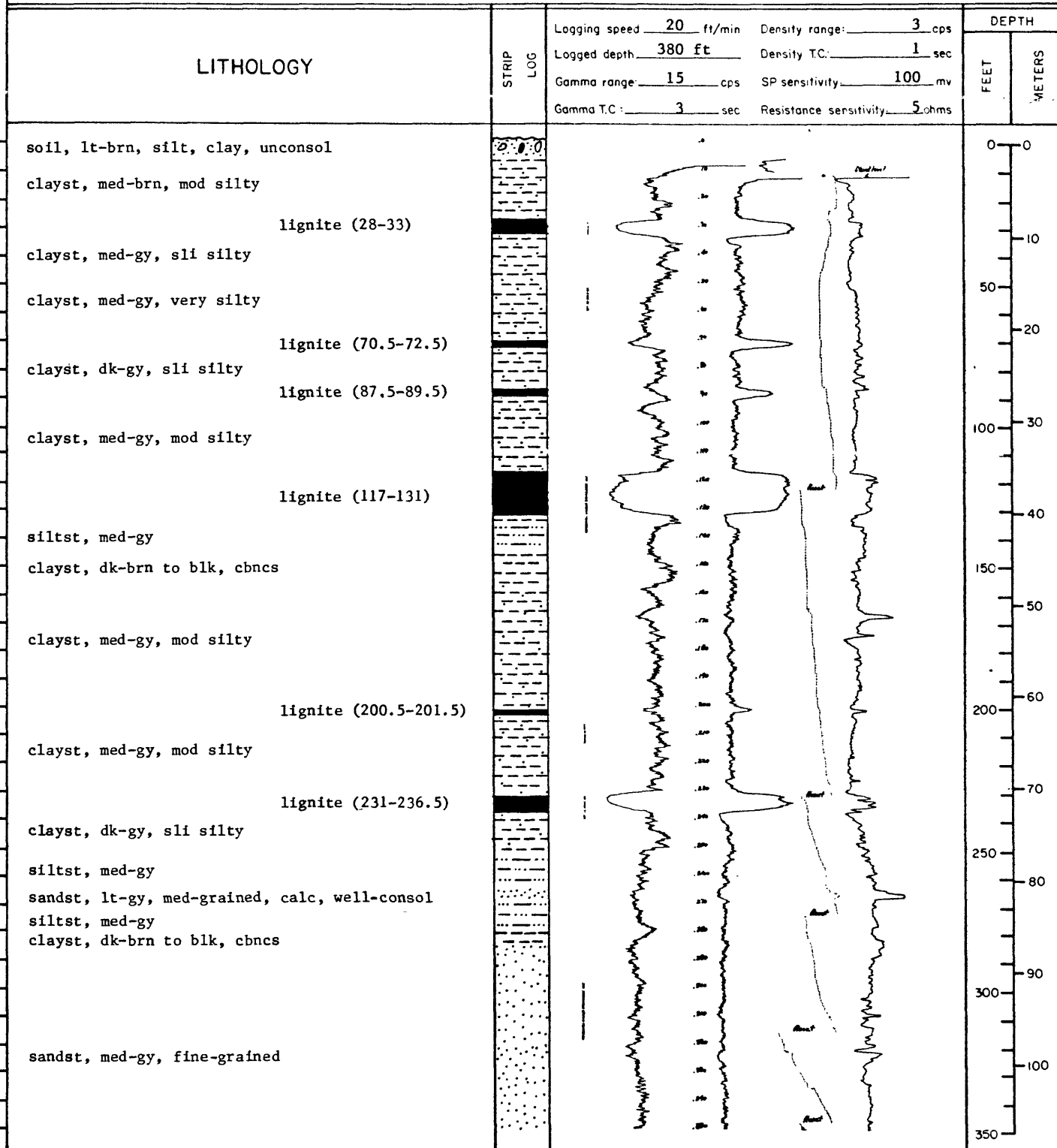
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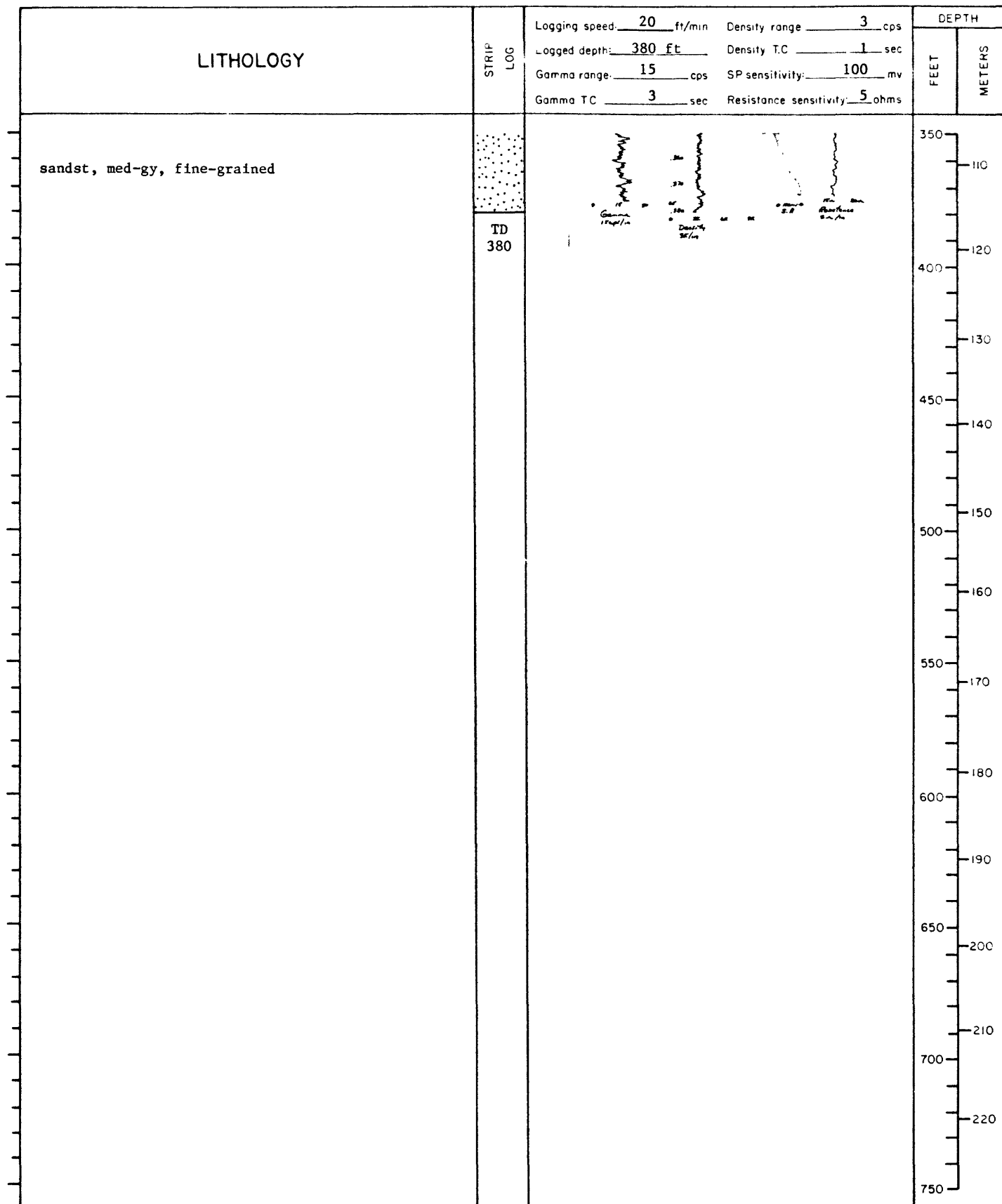
# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 101  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Belfield SW</b>	
DATE STARTED <b>7-21-79</b>	DATE COMP. <b>7-21-79</b>	COUNTY <b>Stark</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 10 T. 139 N., R. 99 W., FOOTAGE LOC. <b>108 ft</b>		<b>30 ft</b>	GROUND ELEV <b>2642 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>380 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	DEPTH TO FLUID LEVEL <b>12 ft</b>
LITHOLOGY RECORDED BY <b>S. Christensen</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS:			



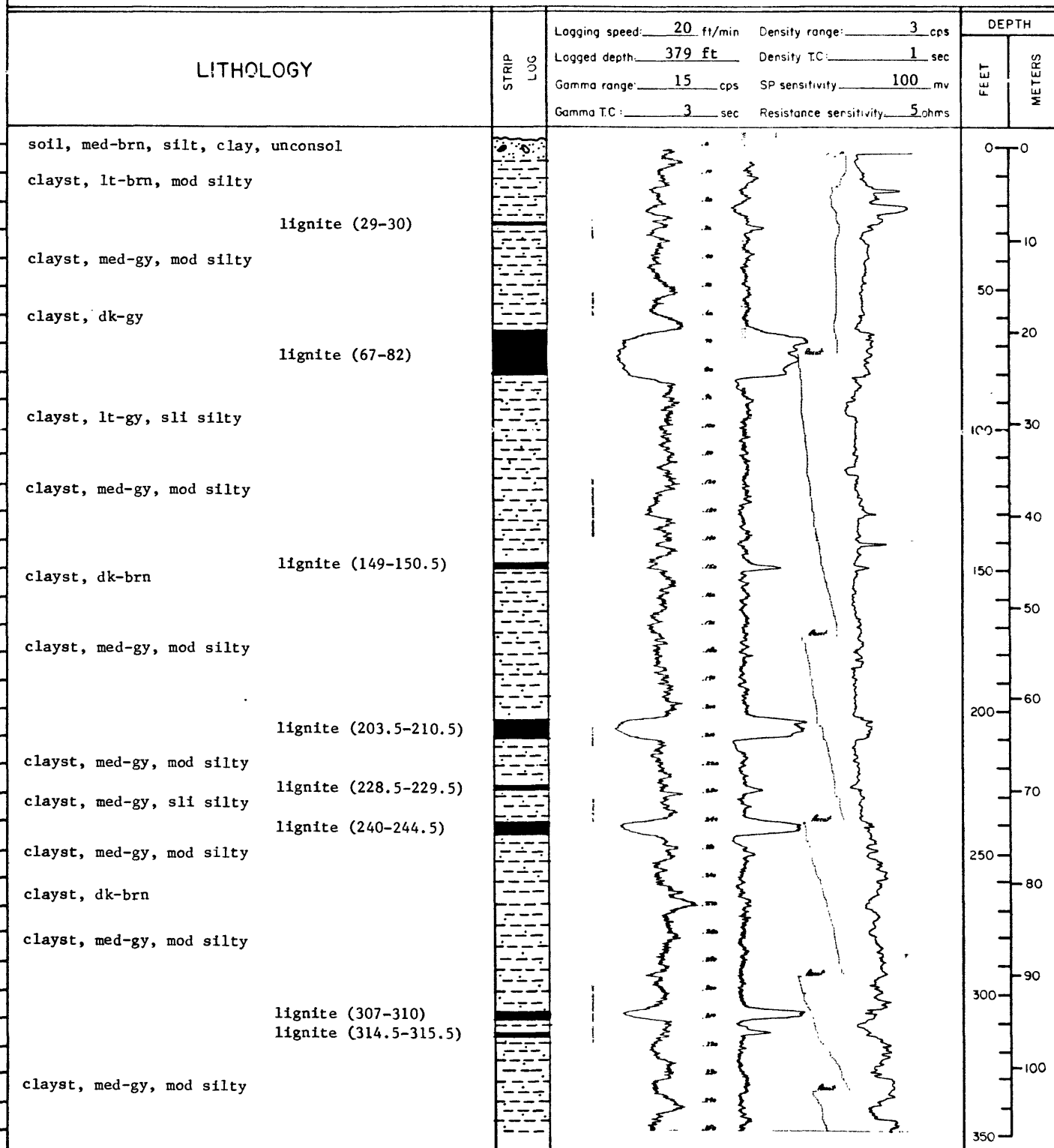
REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

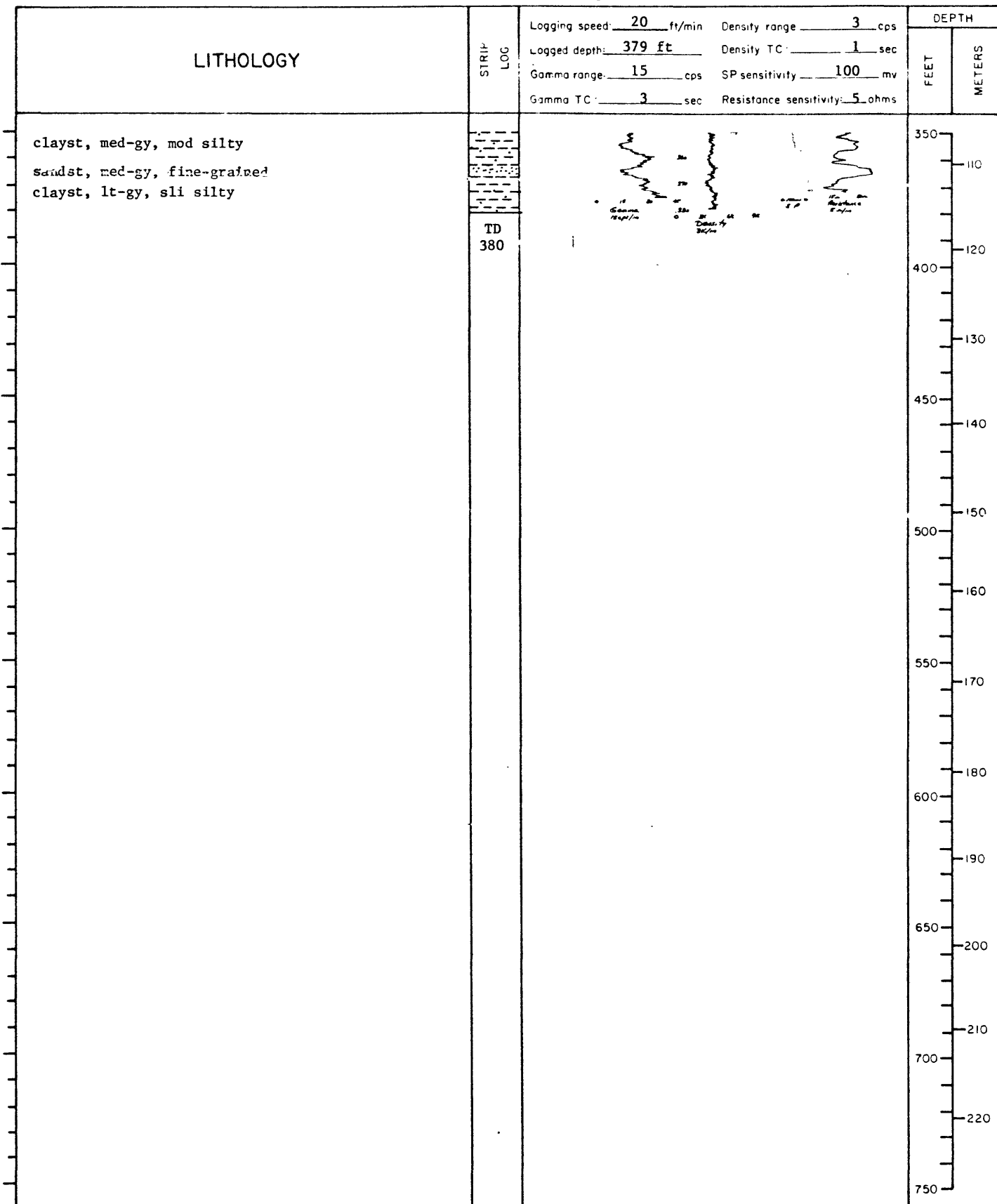
HOLE NO 102  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield SW	
DATE STARTED 7-21-79	DATE COMP. 7-21-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 30 T.139 N., R.99 W., FOOTAGE LOC.		253 ft <del>KMX</del> FSL	72 ft <del>KRX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 3 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			





REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 103  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield SE	
DATE STARTED 7-21-79	DATE COMP. 7-21-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 30 T.139 N., R. 98 W., FOOTAGE LOC. 355 ft		ROCK FSL 18 ft	FEL KXX GROUND ELEV 2555 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 360 ft	CORING --- TOTAL DEPTH 360 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 1 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth: 359 ft	Density TC: 1 sec	FEET	METERS		
soil, med-brn, silt, clay, unconsol				0	0		
siltst, lt-brn				10			
sandst, med-brn, fine-grained				50			
lignite (83.5-97.5)				20			
clayst, med-gy, sli silty				100	30		
clayst, med-gy, mod silty				40			
lignite (174.5-175.5)				150	50		
clayst, med-gy, very silty				200	60		
sandst, lt-gy, fine-grained, calc, well-consol				70			
clayst, dk-gy, sli silty				250	80		
lignite (224.5-235.5)				300	90		
clayst, dk-gy, sli silty				250	80		
lignite (254-258)				300	90		
clayst, med-gy, very silty				350	100		
sandst, med-gy, fine-grained							
clayst, lt-gy, sli silty							

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 103

SHEET 2 OF 2

REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range: <u>3</u> cps		DEPTH	
		Lagged depth: <u>359</u> ft		Density TC: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv			
		Gamma TC: <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms			
clayst, lt-gy, sli silty						350	
	TD 360					110	
					120		
					400		
					130		
					450		
					140		
					500		
					150		
					160		
					550		
					170		
					180		
					600		
					190		
					650		
					200		
					210		
					700		
					220		
					750		

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 104  
SHEET 1 OF 1

AREA Three River		QUAD NAME South Heart		1	
DATE STARTED 7-22-79		DATE COMP 7-22-79		COUNTY Stark STATE North Dakota	
LOCATION: SEC. 18 T139 N., R.97 W., FOOTAGE LOC.		1315 ft RXX FSL 50 ft FEL RXX		GROUND ELEV 2530 ft	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 340 ft CORING ---		TOTAL DEPTH 340 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 5 ft	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					

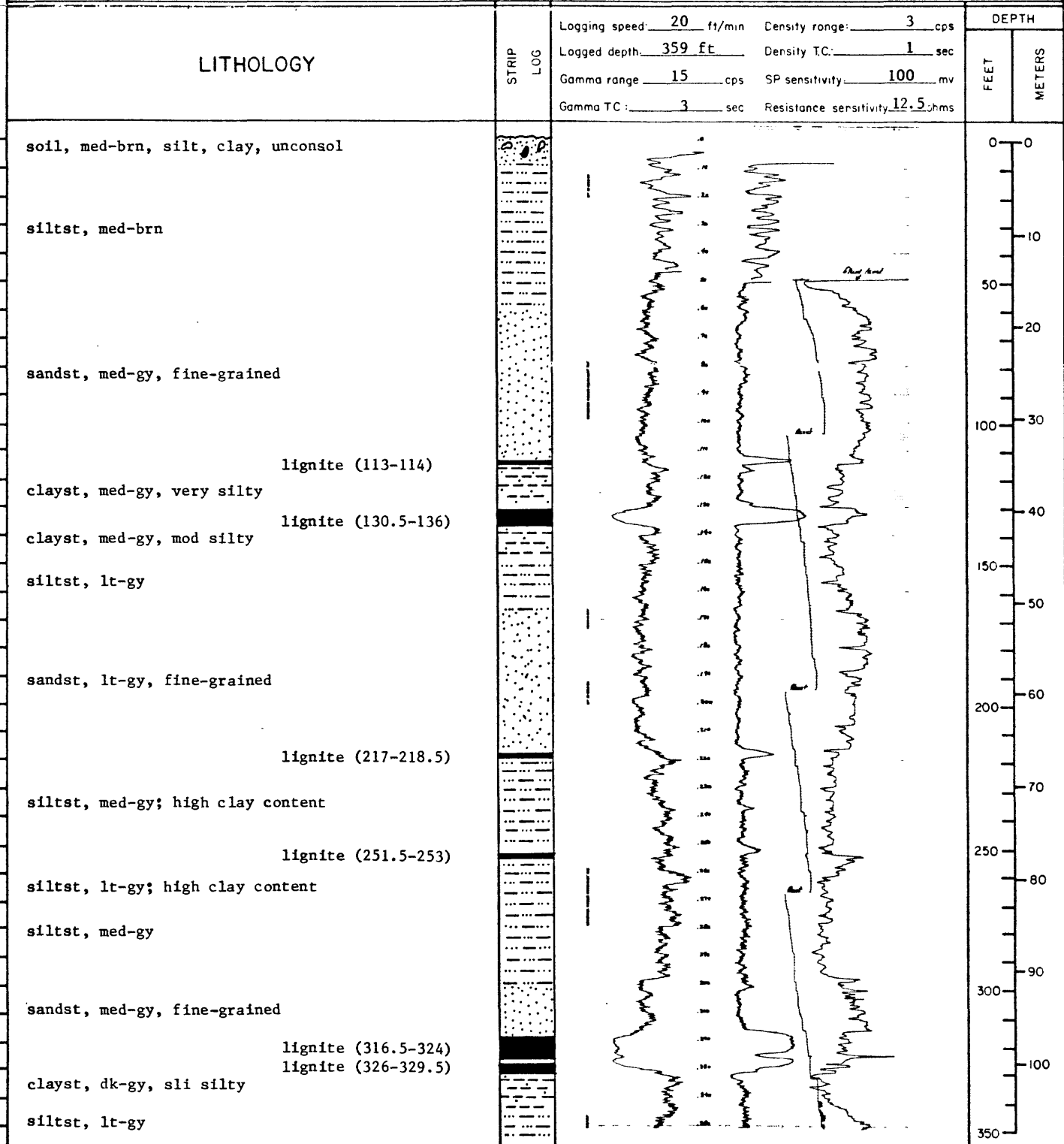
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min Density range: 3 cps		DEPTH	
		Logged depth 340 ft	Density TC: 1 sec	FEET	METERS
soil, lt-brn, sand, silt, unconsol sandst, med-brn, fine-grained				0	0
clayst, med-gy, sli silty				10	
clayst, med-gy, very silty				50	
lignite (63-73.5)				20	
lignite (75.5-77)					
clayst, dk-gy, sli silty				100	30
lignite (90.5-93)					
clayst, dk-brn to blk, cbnccs, mod silty				150	40
siltst, med-gy				50	
lignite (125-136)				40	
clayst, dk-brn				150	50
siltst, med-gy				50	
lignite (150.5-154.5)				200	60
clayst, med-gy, mod silty				60	
lignite (224.5-231)				70	
clayst, dk-brn				250	80
siltst, med-gy				80	
lignite (258.5-264.5)				300	90
clayst, dk-gy, sli silty				90	
lignite (271-272)				100	
clayst, med-gy, mod silty					
lignite (285-287)					
clayst, med-gy, mod silty					
sandst, lt-gy, fine-grained				350	100

TD 340

# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 105  
SHEET 1 OF 2

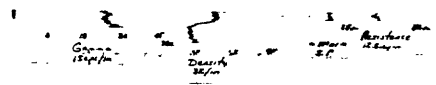
AREA <u>Three River</u>		QUAD NAME <u>Dickinson South</u>	
DATE STARTED <u>7-12-79</u>	DATE COMP. <u>7-12-79</u>	COUNTY <u>Stark</u>	STATE <u>North Dakota</u>
LOCATION: SEC. <u>30</u> T. <u>139 N.</u> R. <u>96 W.</u> , FOOTAGE LOC. <u>25 ft</u> <del>XXX</del> <u>85 ft</u> <del>FEL</del> <del>XXX</del>		GROUND ELEV. <u>2500 ft</u>	
SIZE AND BIT TYPE: <u>4-3/4 inch drag</u>		FOOTAGE ROTARY <u>360 ft</u> CORING <u>---</u>	
DRILLING AGENCY: <u>Gregory Drilling Company</u>		DRILL TYPE: <u>Rotary</u>	
LITHOLOGY RECORDED BY <u>A. Banet</u>		GEOPHYSICAL LOGS RECORDED BY <u>J. Wald</u>	
REMARKS:			



# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 105  
SHEET 2 OF 2

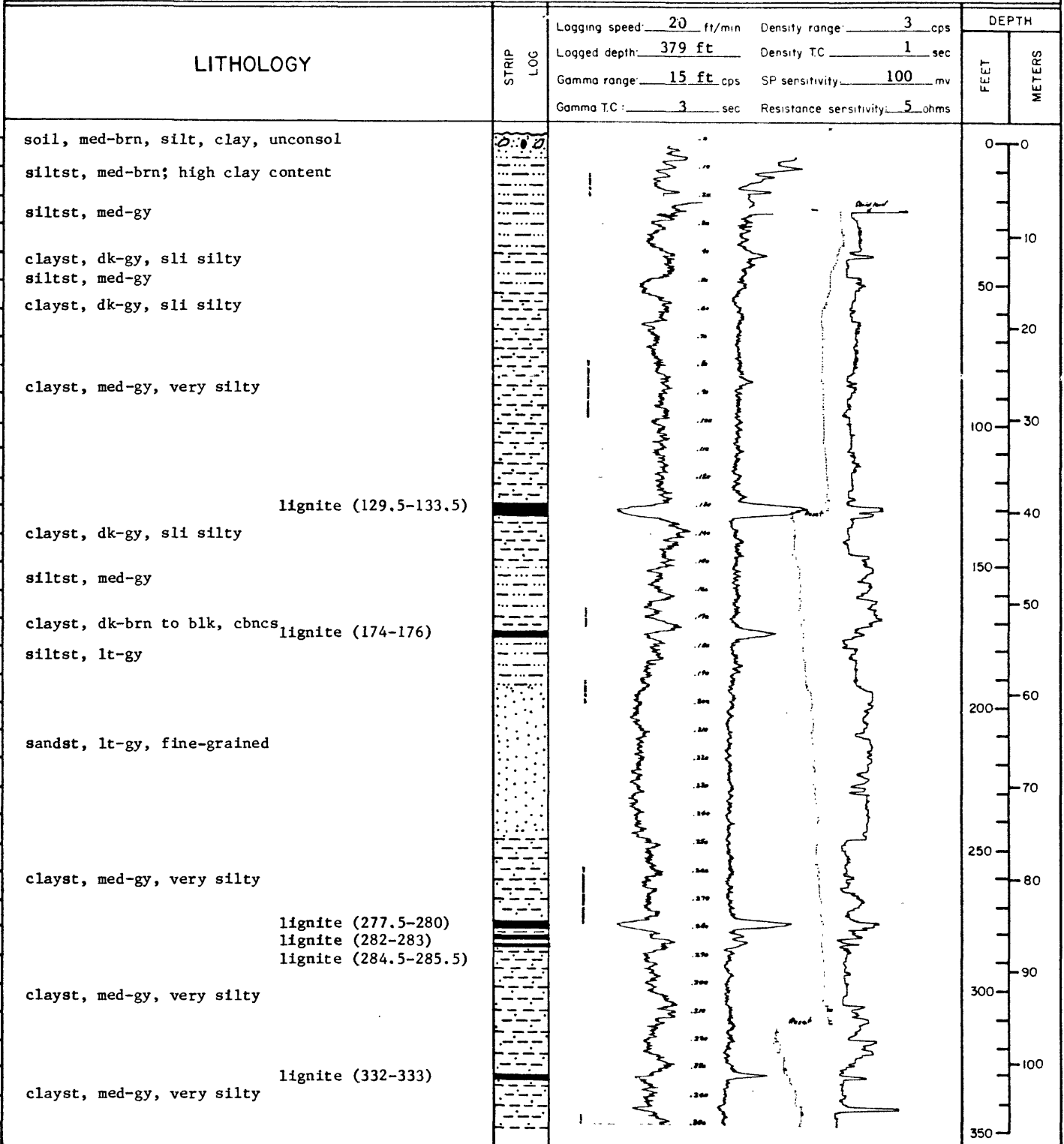
REMARKS:

LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS
siltst, lt-gy		Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps Lagged depth: <u>359</u> ft    Density T.C. <u>1</u> sec Gamma range <u>15</u> cps    SP sensitivity: <u>100</u> mv Gamma T.C. <u>3</u> sec    Resistance sensitivity <u>12.5</u> ohms	
	TD 360		
		350	110
		400	120
		450	130
		500	140
		550	150
		600	160
		650	170
		700	180
		750	190
			200
			210
			220

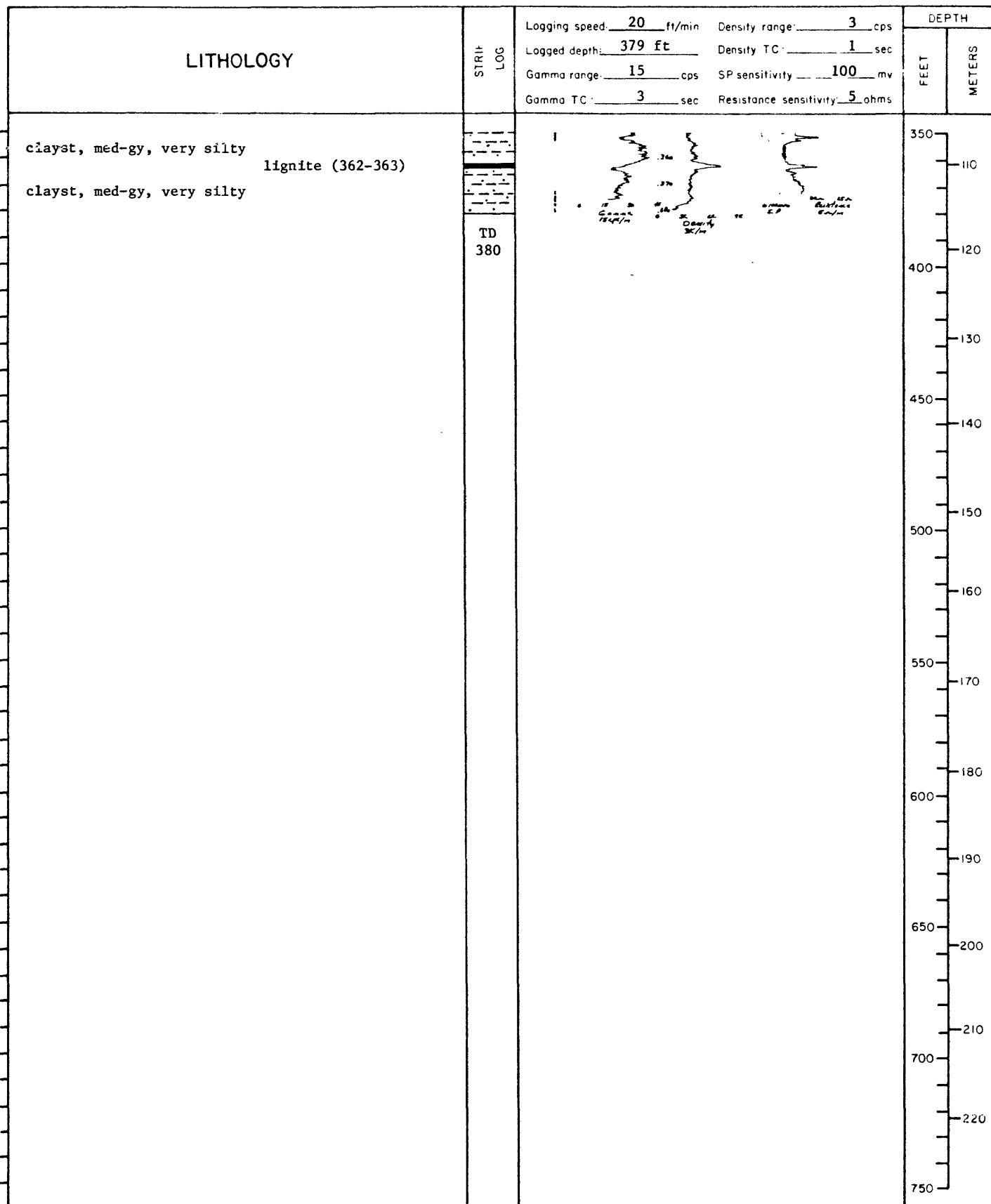
# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 106  
SHEET 1 OF 2

AREA <span style="float: right;">Three River</span>		QUAD NAME <span style="float: right;">Gladstone</span>	
DATE STARTED <span style="float: right;">7-11-79</span>	DATE COMP. <span style="float: right;">7-11-79</span>	COUNTY <span style="float: right;">Stark</span>	STATE <span style="float: right;">North Dakota</span>
LOCATION: SEC. 12 T. 139 N., R. 95 W., FOOTAGE LOC. 690 ft		FNL <span style="float: right;">65 ft</span>	GROUND ELEV. <span style="float: right;">2458 ft</span>
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft	TOTAL DEPTH <span style="float: right;">380 ft</span>
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL <span style="float: right;">25 ft</span>
LITHOLOGY RECORDED BY <span style="float: right;">A. Banet</span>		GEOPHYSICAL LOGS RECORDED BY <span style="float: right;">J. Wald</span>	
REMARKS:			



REMARKS:



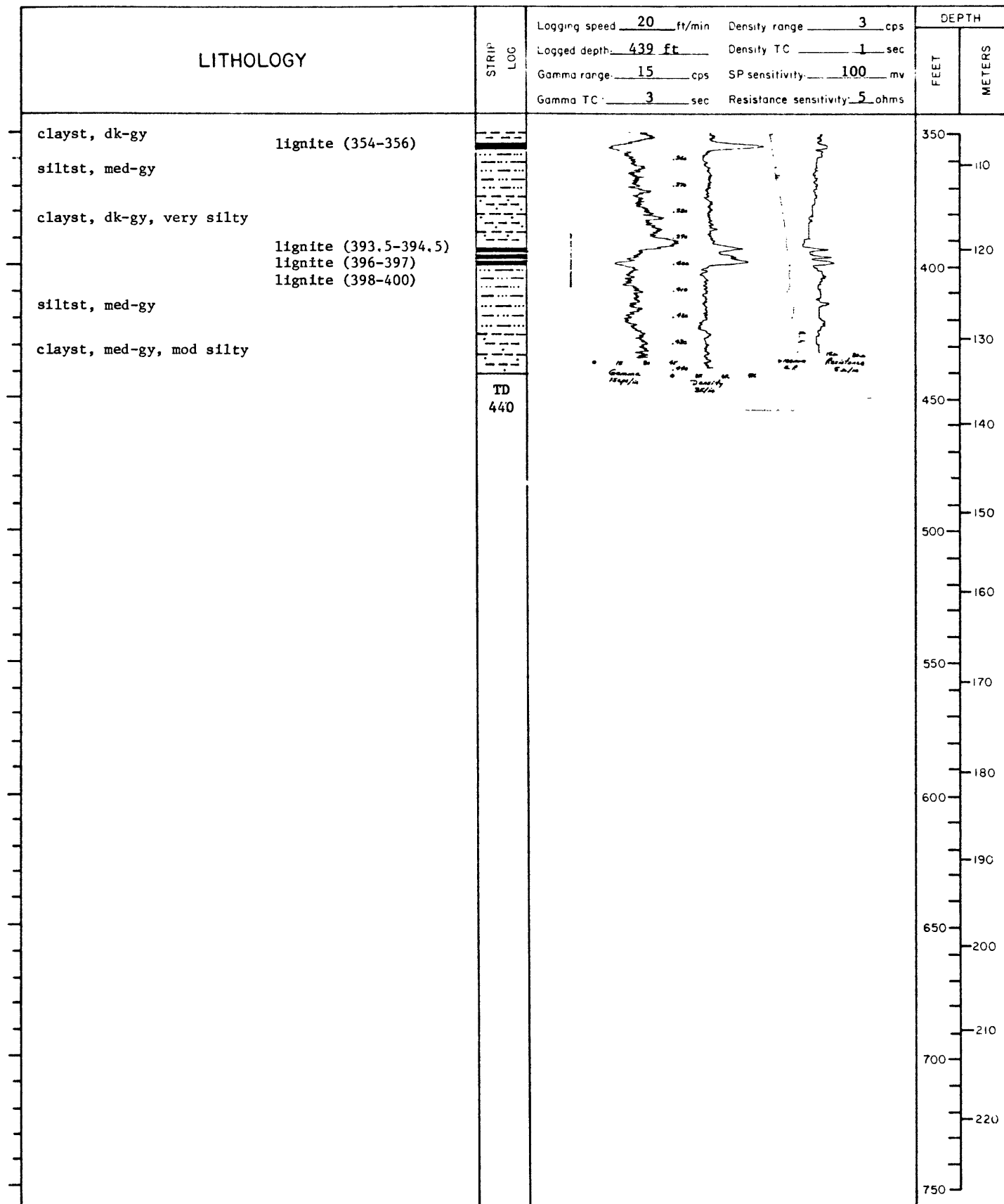


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 107  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lehigh	
DATE STARTED 7-10-79	DATE COMP. 7-10-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 34 T.139 N., R. 94 W., FOOTAGE LOC. 2310 ft		FNL X834	2290 ft FEL X834
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 c/s
		Logged depth: 439 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
			DEPTH FEET METERS
soil, lt-brn, sand, silt, unconsol			0 0
			10
sandst, lt-brn, med-grained			50 20
			100 30
			150 40
clayst, lt-gy, sli silty			200 50
lignite (164.5-165.5)			250 60
lignite (166.5-167.5)			300 70
clayst, dk-gy, very silty			350 80
lignite (193.5-196.5)			400 90
clayst, med-gy, sli silty			450 100
clayst, med-gy, very silty			500 110
clayst, dk-brn to blk, cbncc			550 120
siltst, med-gy			600 130
clayst, dk-gy, sli silty			650 140
lignite (260.5-263.5)			700 150
siltst, med-gy			750 160
lignite (284-287)			800 170
lignite (289-296)			850 180
siltst, dk-gy; high clay content			900 190
lignite (312-313)			950 200
siltst, dk-gy			1000 210
lignite (338-339)			1050 220
siltst, dk-gy			1100 230

## REMARKS:

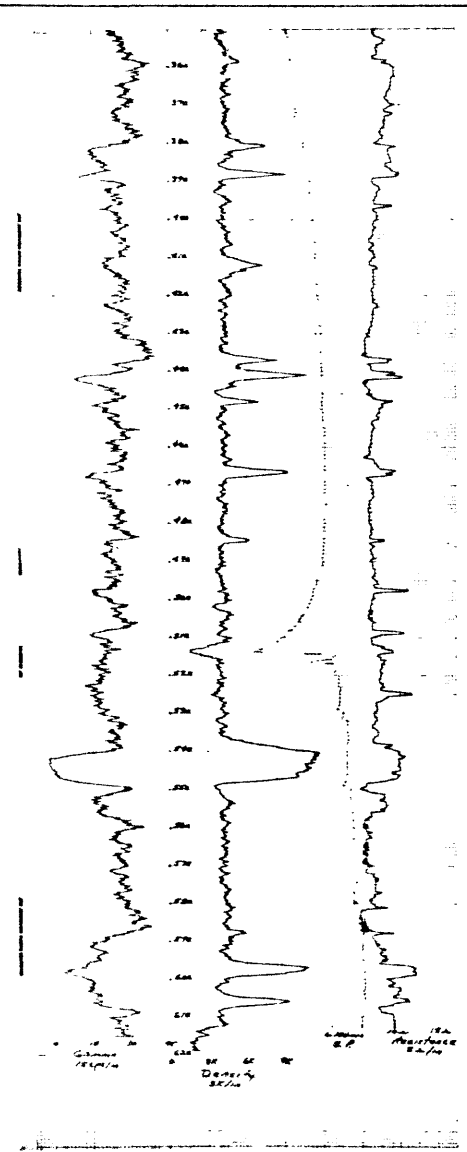


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 108  
SHEET 1 OF 2

AREA Three River		QUAD NAME Taylor	
DATE STARTED 7-8-79	DATE COMP. 7-8-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 6 T.139 N., R.93 W., FOOTAGE LOC.		1410' ft FNL <del>KXX</del>	2590 ft <del>KXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 620 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 619 ft	Density I.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, sand, silt, unconsol			0 0
sandst, med-brn, fine-grained			10
clayst, med-gy, sli silty			50
clayst, dk-gy, sli silty lignite (71.5-72.5)			20
clayst, dk-gy, sli silty lignite (79-80)			
clayst, dk-gy, sli silty lignite (86-87.5)			
clayst, med-gy, mod silty			100 30
clayst, med-gy, very silty			
clayst, med-gy, very silty			
siltst, dk-gy; high clay content lignite (120-121.5)			40
siltst, dk-gy; high clay content lignite (127-128)			
siltst, dk-gy; high clay content lignite (131.5-133)			
siltst, dk-gy; high clay content lignite (140-141.5)			150
clayst, med-gy, very silty			50
			200 60
siltst, med-gy			70
sandst, lt-gy, fine-grained			250 80
clayst, dk-gy, sli silty lignite (273.5-274.5)			
clayst, med-gy, very silty			90
			300
clayst, dk-gy, mod silty lignite (309.5-310.5)			
clayst, dk-gy, mod silty lignite (319-322.5)			
clayst, med-gy, sli silty			100
siltst, med-gy			350

## REMARKS:

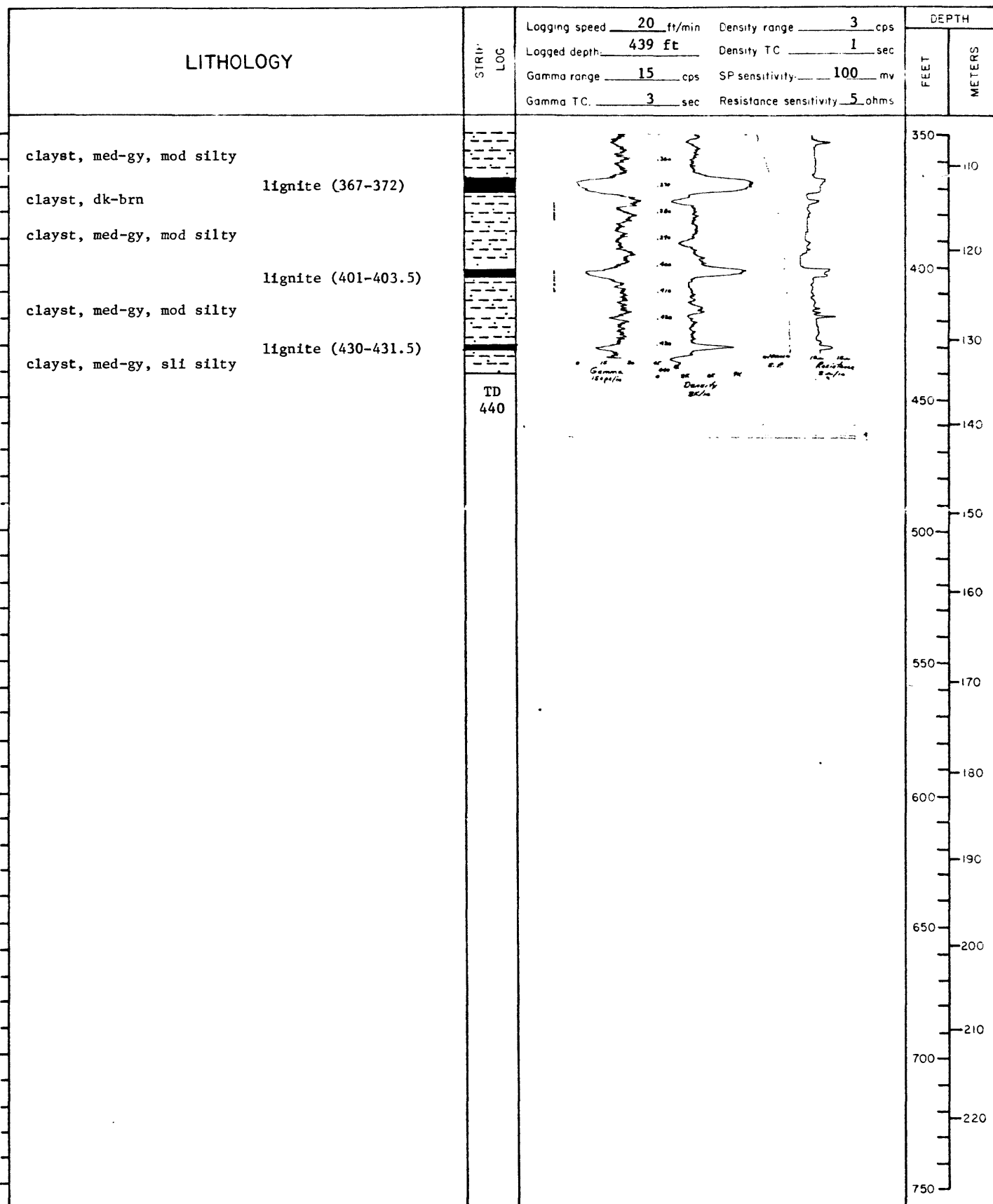
LITHOLOGY	STRAT LOG	Logging speed: <u>20</u> ft/min    Density range <u>3</u> cps		DEPTH	
		Logged depth: <u>619</u> ft	Density TC <u>1</u> sec	FEET	METERS
		Gamma range: <u>15</u> cps	SP sensitivity: <u>100</u> mv		
		Gamma TC: <u>3</u> sec	Resistance sensitivity: <u>5</u> ohms		
siltst, med-gy				350	
clayst, med-gy, mod silty					110
siltst, dk-gy					120
clayst, med-gy, mod silty					130
					140
clayst, med-gy, mod silty					150
clayst, dk-gy					160
siltst, dk-gy					170
clayst, med-gy, mod silty					180
clayst, med-gy, mod silty					190
clayst, med-gy, very silty					200
siltst, med-gy					210
clayst, dk-gy, very silty					220
siltst, lt-gy					
clayst, med-gy, mod silty					
siltst, dk-gy					
siltst, dk-gy					
clayst, med-gy, very silty					
	TD 620				

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 109  
SHEET 1 OF 2

AREA Three River		QUAD NAME Bratburg Butte			
DATE STARTED 7-8-79		DATE COMP. 7-8-79		COUNTY Stark	STATE North Dakota
LOCATION: SEC. 32 T. 139 N., R. 93 W.,		FOOTAGE LOC. 1615 ft		12 ft	GROUND ELEV. 2438 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 440 ft		CORING ---	TOTAL DEPTH 440 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 55 ft	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					
LITHOLOGY		STRIP LOG	Logging speed <u>20</u> ft/min Density range <u>3</u> cps Logged depth <u>439</u> ft Density TC <u>1</u> sec Gamma range <u>15</u> cps SP sensitivity <u>100</u> mv Gamma TC <u>3</u> sec Resistance sensitivity <u>5</u> ohms		DEPTH FEET METERS
soil, med-brn, silt, clay, unconsol  clayst, med-brn, very silty lignite (34.5-37)  clayst, med-gy, mod silty  clayst, dk-brn siltst, med-gy clayst, dk-brn lignite (78-79) clayst, med-gy, mod silty lignite (118-120.5) clayst, med-gy, very silty lignite (139.5-141) lignite (143-144) clayst, med-gy, very silty lignite (146.5-147.5) clayst, dk-gy, sli silty lignite (164-166.5)  siltst, med-gy  clayst, dk-gy, sli silty  clayst, lt-gy, very silty  clayst, med-gy, mod silty   sandst, lt-gy, med-grained, calc, well-consol clayst, med-gy, sli silty lignite (312.5-313.5) clayst, lt-gy, mod silty					0 10 20 30 40 50 60 70 80 90 100 350

REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 110  
SHEET 1 OF 2

AREA Three River		QUAD NAME Richardton	
DATE STARTED 7-7-79	DATE COMP. 7-7-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 4 T.139 N., R.92 W., FOOTAGE LOC. 60 ft		KXX FSL 60 ft	FEL KXX GROUND ELEV 2464 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 656 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 656 ft	Density T.C.: 1 sec
		Gamma range 15 cps	SF sensitivity 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol			0 0
siltst, med-brn			10
clayst, med-gy, sli silty			50 20
clayst, dk-gy lignite (74-79)			
clayst, dk-brn lignite (86.5-88)			
clayst, dk-brn lignite (92-93)			100 30
clayst, med-gy, mod silty			
lignite (121.5-125)			40
siltst, med-gy; high clay content			
sandst, lt-gy, fine-grained			150 50
clayst, med-gy, mod silty			
lignite (173.5-174.5)			200 60
clayst, med-gy, mod silty			
clayst, dk-gy, very silty lignite (221.5-222.5)			70
clayst, dk-gy, very silty lignite (227.5-229.5)			
siltst, med-gy			250 80
clayst, med-gy, very silty			
siltst, dk-gy			300 90
clayst, dk-brn lignite (281-286.5)			
sandst, med-gy, fine-grained			350 100
clayst, dk-brn lignite (321.5-323)			
siltst, med-gy			
clayst, med-gy, mod silty			

HOLE NO 110  
SHEET 2 OF 2

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min		Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>656</u> ft		Density T.C.: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv			
		Gamma TC: <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms			
clayst, med-gy, mod silty						350	110
siltst, med-gy; high clay content						400	120
siltst, dk-gy						450	130
siltst, dk-gy						500	140
clayst, dk-gy						550	150
						600	160
						650	170
						700	180
						750	190
						800	200
						850	210
						900	220
						950	230
						1000	240
						1050	250
						1100	260
						1150	270
						1200	280
						1250	290
						1300	300
		1350	310				
		1400	320				
		1450	330				
		1500	340				
		1550	350				
		1600	360				
		1650	370				
		1700	380				
		1750	390				
		1800	400				
		1850	410				
		1900	420				
		1950	430				
		2000	440				
		2050	450				
		2100	460				
		2150	470				
		2200	480				
		2250	490				
		2300	500				
		2350	510				
		2400	520				
		2450	530				
		2500	540				
		2550	550				
		2600	560				
		2650	570				
		2700	580				
		2750	590				
		2800	600				
		2850	610				
		2900	620				
		2950	630				
		3000	640				
		3050	650				
		3100	660				
		3150	670				
		3200	680				
		3250	690				
		3300	700				
		3350	710				
		3400	720				
		3450	730				
		3500	740				
		3550	750				
		3600	760				
		3650	770				
		3700	780				
		3750	790				
		3800	800				
		3850	810				
		3900	820				
		3950	830				
		4000	840				
		4050	850				
		4100	860				
		4150	870				
		4200	880				
		4250	890				
		4300	900				
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		4500	940				
		4550	950				
		4600	960				
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		4700	980				
		4750	990				
		4800	1000				
		4850	1010				
		4900	1020				
		4950	1030				
		5000	1040				
		5050	1050				
		5100	1060				
		5150	1070				
		5200	1080				
		5250	1090				
		5300	1100				
		5350	1110				
		5400	1120				



## UNITED STATES GEOLOGICAL SURVEY

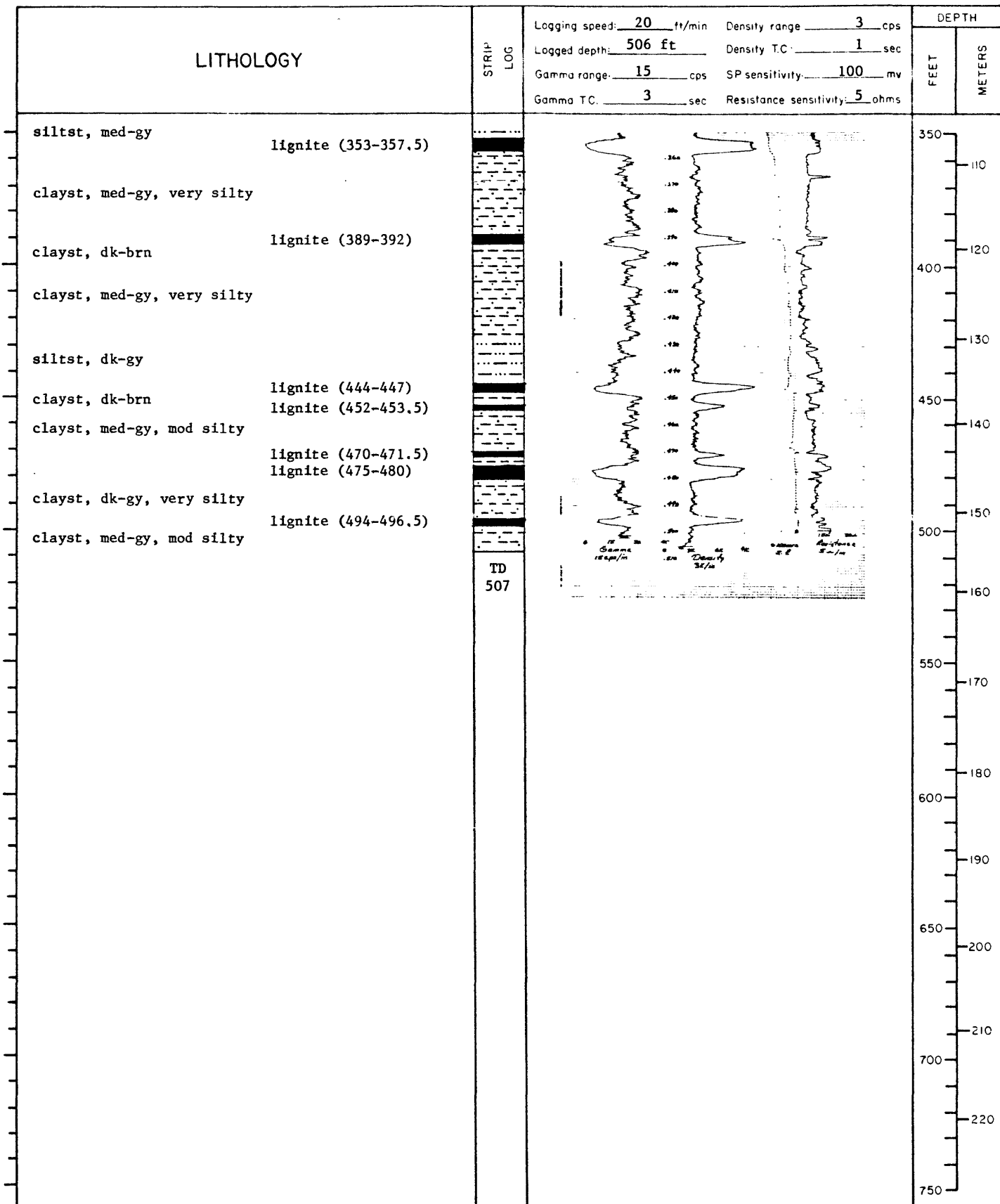
HOLE NO 111  
SHEET 1 OF 2

AREA Three River		QUAD NAME Antelope	
DATE STARTED 7-6-79	DATE COMP. 7-6-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 10 T.139 N., R.91 W., FOOTAGE LOC. 2593 ft FNL 60 ft FEL 2375 ft		GROUND ELEV 2375 ft	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 507 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range 3 cps		DEPTH	
		Laggea depth 506 ft	Density T.C. 1 sec	FEET	METERS
soil, med-brn, silt, clay, unconsol				0	0
clayst, med-gy, mod silty				10	
lignite (41.5-43)				50	
siltst, med-gy; high clay content				20	
clayst, med-gy, very silty				100	30
siltst, med-gy; high clay content				40	
clayst, dk-brn to blk, cbncs				150	50
clayst, med-gy, very silty				50	
lignite (179-181.5)				200	60
lignite (183-186)				60	
siltst, med-gy				200	60
clayst, med-gy, very silty				200	60
siltst, med-gy				200	60
clayst, dk-gy				200	60
siltst, dk-gy				200	60
lignite (220-221.5)				200	60
lignite (230-231.5)				200	60
clayst, med-gy, very silty				200	60
sandst, lt-gy, fine-grained, calc, well-consol				200	60
clayst, med-gy, very silty				200	60
lignite (277-278)				200	60
clayst, dk-brn				200	60
siltst, med-gy				200	60
clayst, dk-gy, very silty				200	60
siltst, med-gy				200	60
clayst, med-gy, sli silty				200	60
siltst, med-gy				200	60

REMARKS:

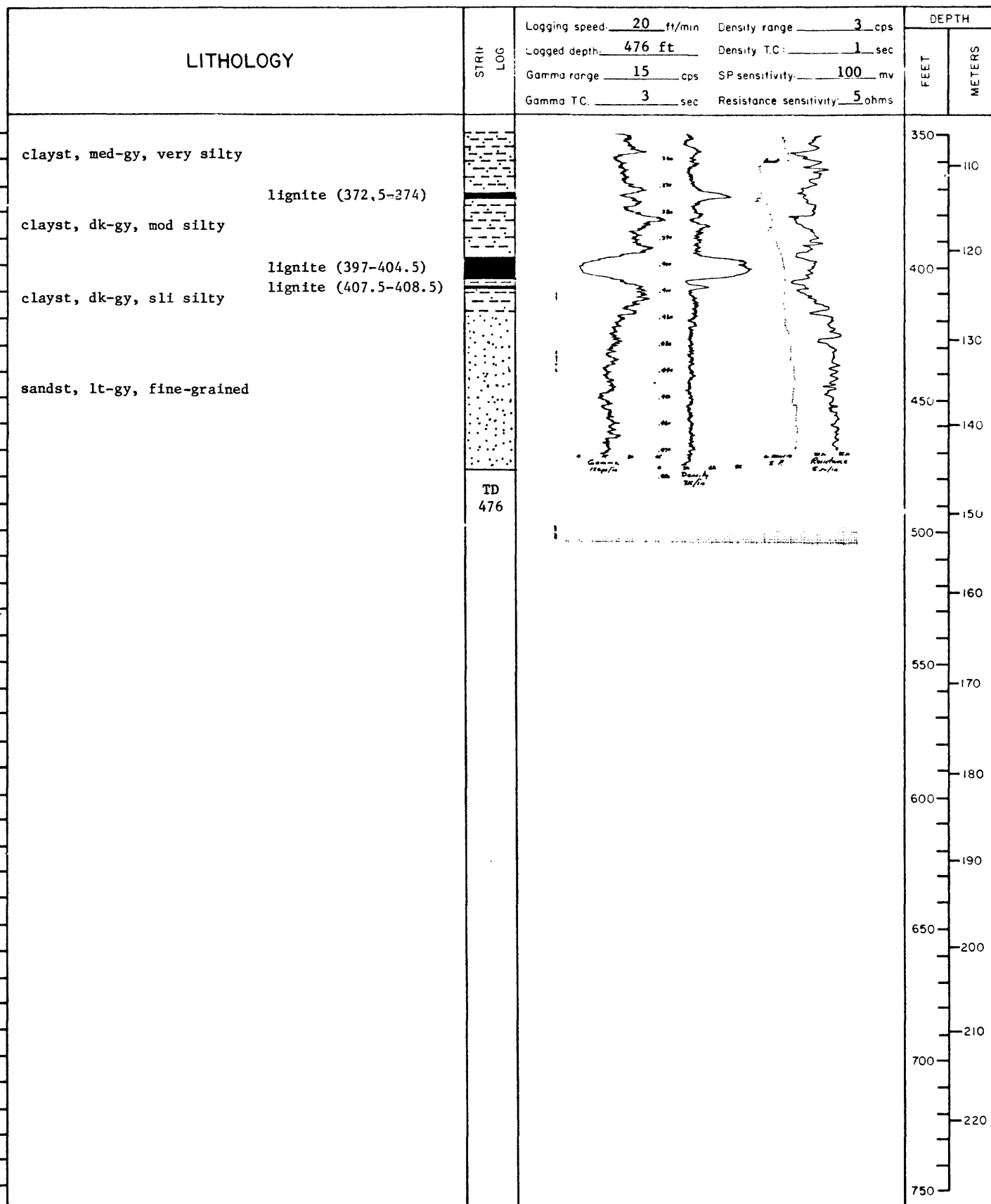


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 112  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield 3 NW (Preliminary)	
DATE STARTED 7-20-79	DATE COMP. 7-20-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 33 T.138 N., R. 101 W., FOOTAGE LOC. 780 ft		FNL <del>XXX</del> 2605 ft <del>XXX</del> FWL	GROUND ELEV 2732 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 476 ft CORING ---	TOTAL DEPTH 476 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 10 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 476 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
			DEPTH FEET METERS
soil, med-brn, silt, clay, unconsol			0 0
clayst, med-gy, sli silty			10
clayst, med-gy, mod silty			50 20
			100 30
lignite (106.5-113) lignite (115-116)			40
siltst, med-gy			50
siltst, dk-gy; high clay content			60
clayst, med-gy, very silty			70
lignite (170.5-172.5)			80
clayst, med-gy, sli silty			90
lignite (195.5-196.5)			100
siltst, med-gy			110
clayst, dk-gy, very silty			120
lignite (224.5-225.5)			130
siltst, med-gy			140
clayst, dk-gy			150
lignite (261.5-263.5) lignite (266.5-270.5)			160
clayst, dk-brn			170
clayst, dk-gy, mod silty			180
clayst, med-gy, mod silty			190
lignite (282-284)			200
clayst, lt-gy, very silty			210
siltst, lt-gy			220
sandst, lt-gy, fine-grained, well-consol			230

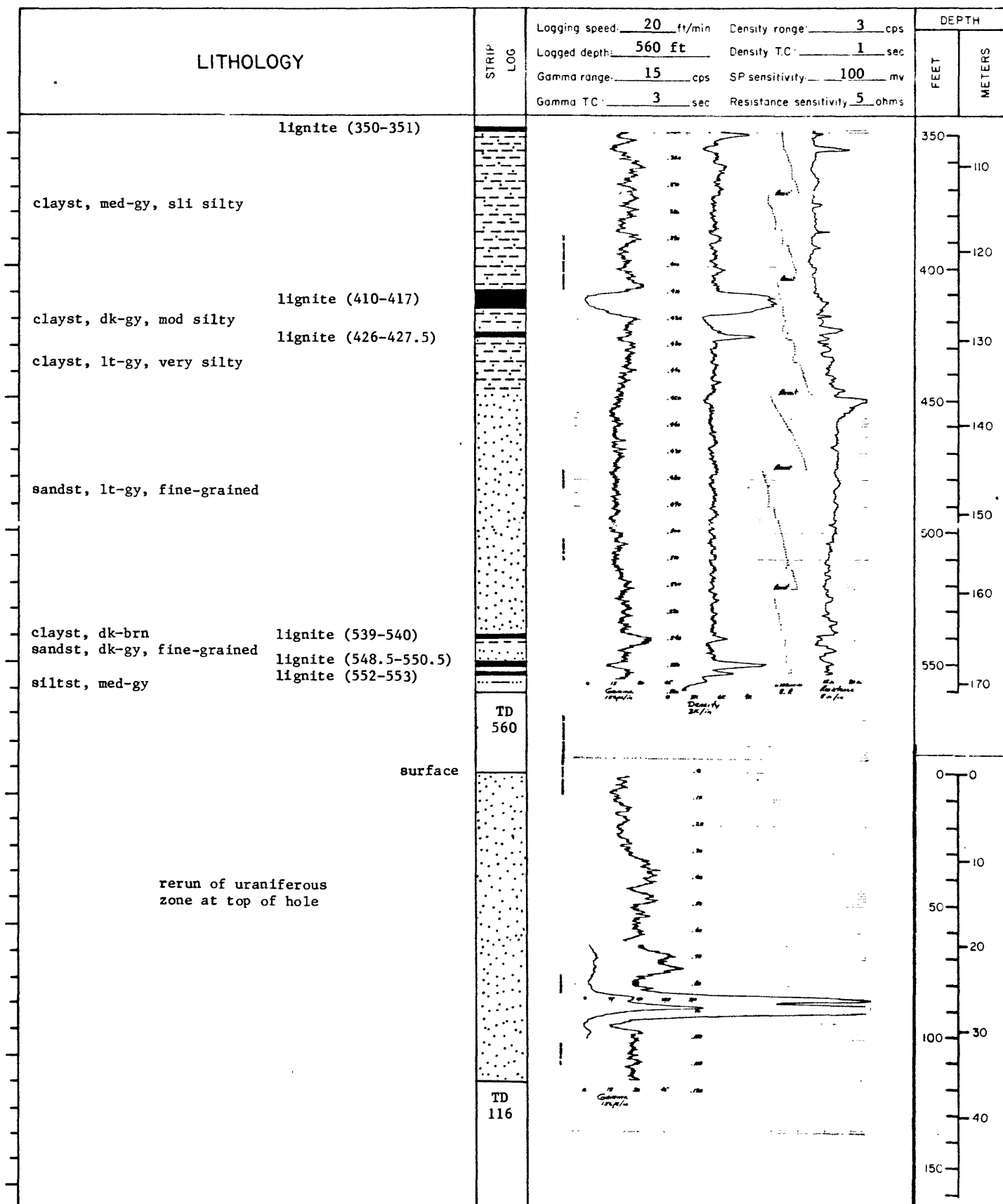
REMARKS:



HOLE NO 113  
SHEET 1 OF 2

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## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

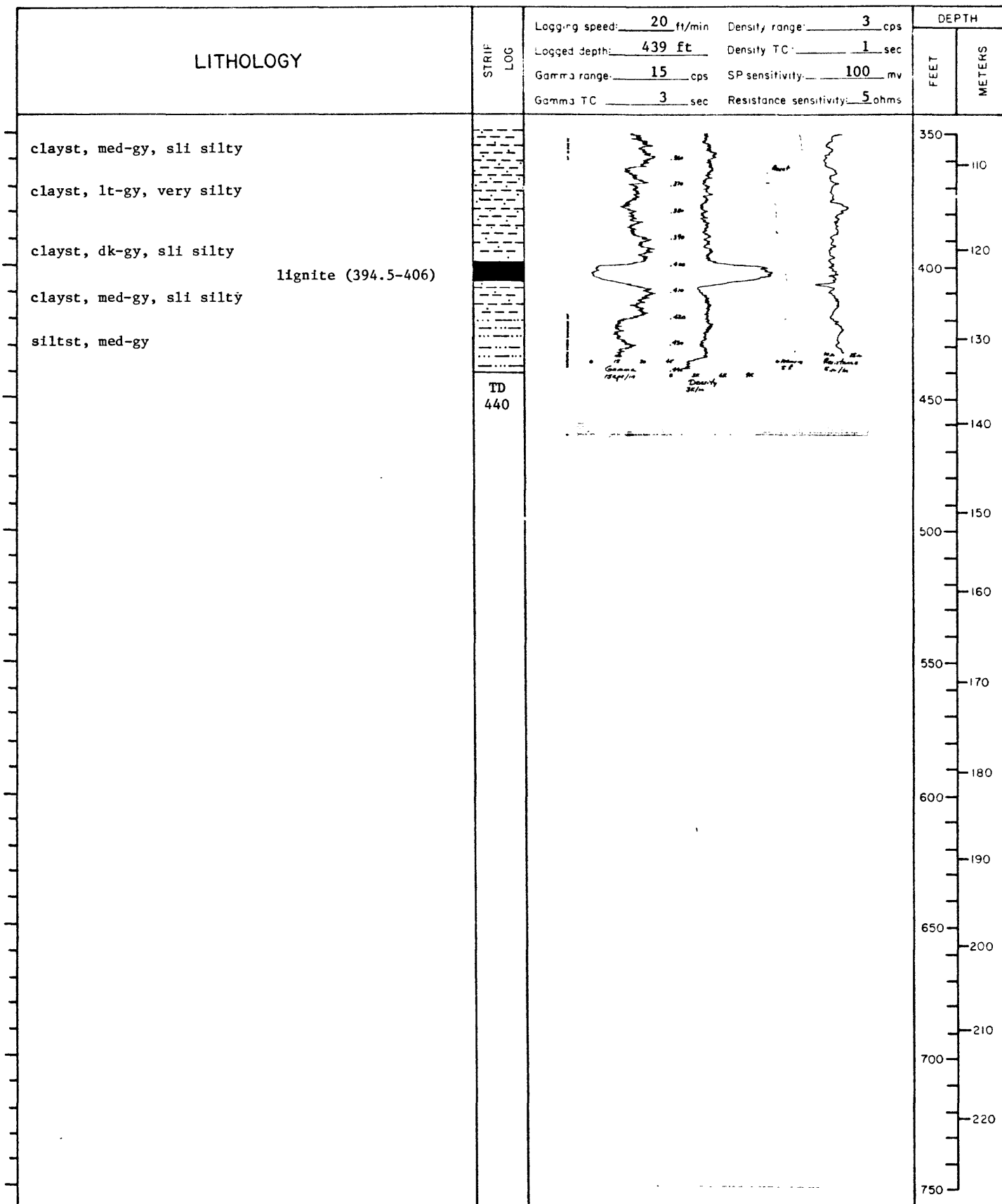
HOLE NO 114  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield SW	
DATE STARTED 7-19-79	DATE COMP. 7-19-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 14 T. 138 N., R. 99 W., FOOTAGE LOC.		2380 ft FNL <del>XXX</del>	80 ft FEL <del>XXX</del>
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV 2628 ft	
		TOTAL DEPTH 440 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	LOGGING DATA		DEPTH	
		Logging speed 20 ft/min	Density range: 3 cps	FEET	METERS
soil, med-brn, silt, clay, unconsol		Logged depth 439 ft	Density TC: 1 sec	0	0
clayst, lt-brn, very silty		Gamma range: 15 cps	SP sensitivity: 100 mv	10	
siltst, med-gy; high clay content		Gamma TC 3 sec	Resistance sensitivity: 5 ohms	20	
clayst, dk-gy				30	
clayst, dk-brn				40	
clayst, lt-gy, very silty				50	
siltst, lt-gy				60	
clayst, med-gy, very silty				70	
clayst, med-gy, mod silty				80	
lignite (232.5-234)				90	
lignite (235.5-247.5)				100	
lignite (249-250)				110	
clayst, dk-gy, sli silty				120	
clayst, dk-gy, sli silty				130	
siltst, med-gy				140	
clayst, med-gy, sli silty				150	
clayst, med-gy, mod silty				160	
lignite (321.5-324.5)				170	
clayst, dk-gy, very silty				180	
lignite (326-327.5)				190	
lignite (339-340)				200	
clayst, dk-gy, mod silty				210	
				220	
				230	
				240	
				250	
				260	
				270	
				280	
				290	
				300	
				310	
				320	
				330	
				340	
				350	

## REMARKS:

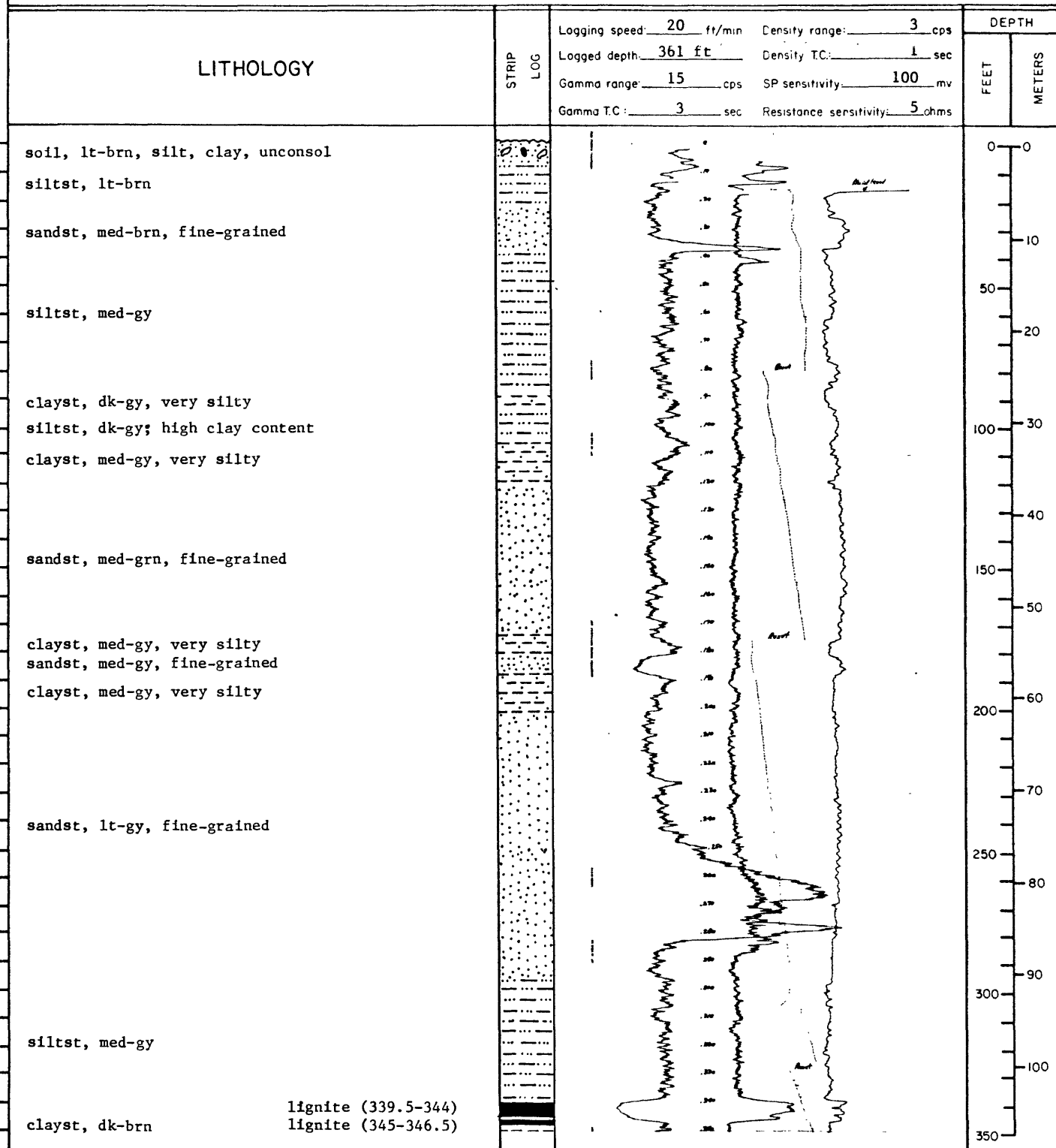




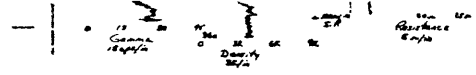
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 115  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield 4 NE (Preliminary)			
DATE STARTED 7-18-79	DATE COMP. 7-18-79	COUNTY Stark	STATE North Dakota		
LOCATION: SEC. 28 T. 138 N., R. 98 W., FOOTAGE LOC.		1130 ft FNL XXX	35 ft FEL XXX	GROUND ELEV 2472 ft	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 361 ft CORING ---		TOTAL DEPTH 361 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 17 ft	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					



REMARKS:

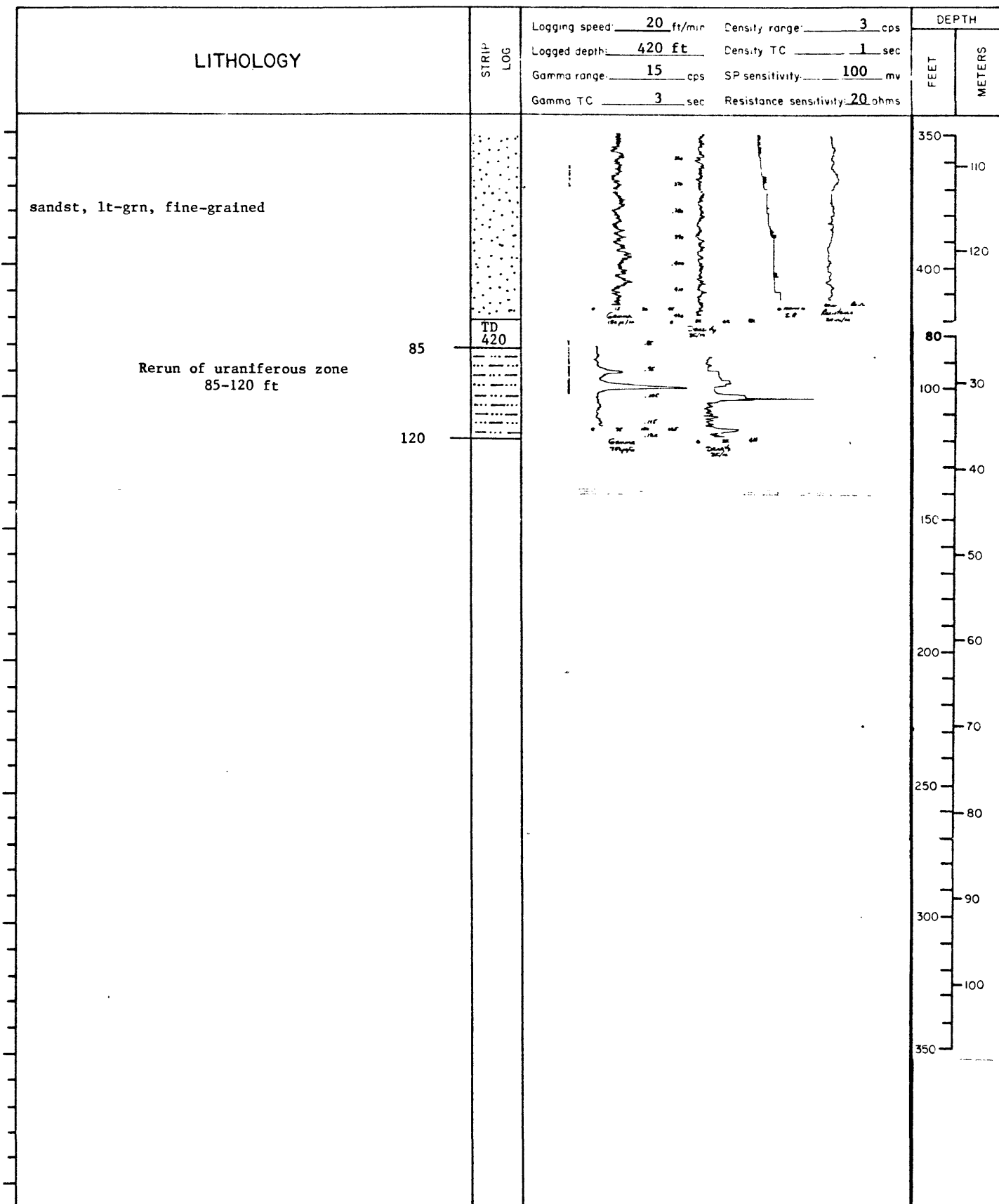
LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>361</u> ft    Density T.C.: <u>1</u> sec		FEET	METERS
siltst, med-gy		Gamma range: <u>15</u> cps	SP sensitivity: <u>100</u> mv		
		Gamma T.C.: <u>3</u> sec	Resistance sensitivity: <u>5</u> ohms		
	TD 361			350	
				110	
				120	
				400	
				130	
				450	
				140	
				150	
				500	
				160	
				550	
				170	
				180	
				600	
				190	
				650	
				200	
				210	
				700	
				220	
				750	

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 116  
SHEET 1 OF 2

AREA Three River		QUAD NAME Dickinson South				
DATE STARTED 7-13-79	DATE COMP. 7-13-79	COUNTY Stark	STATE North Dakota			
LOCATION: SEC. 12 T.138 N., R. 97 W.,		FOOTAGE LOC. 18 ft	XXX FSL 24 ft	XXX FWL	GROUND ELEV 2678 ft	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 420 ft CORING ---		TOTAL DEPTH 420 ft		
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 14 ft		
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald				
REMARKS:						
LITHOLOGY		STRIP LOG	Logging speed: 20 ft/min Density range: 3 cps		DEPTH	
			Logged depth: 420 ft Density TC: 1 sec		FEET	METERS
soil, med-brn, gravel, sand, silt, unconsol alluvium, gravel, sand, med-brn, unconsol			Gamma range: 15 cps SP sensitivity: 100 mv		0	0
siltst, med-brn			Gamma TC: 3 sec Resistance sensitivity: 20 ohms		10	
clayst, med-gy, sli silty			20			
clayst, med-gy, very silty			30			
siltst, lt-gy			40			
clayst, med-gy, mod silty			50			
siltst, med-gy			60			
clayst, dk-gy lignite (214-215.5)			70			
clayst, dk-brn			80			
siltst, dk-gy lignite (239.5-240.5)			90			
clayst, dk-gy, sli silty			100			
siltst, lt-gy			110			
clayst, lt-gy, very silty			120			
sandst, lt-grn, fine-grained			130			

REMARKS:

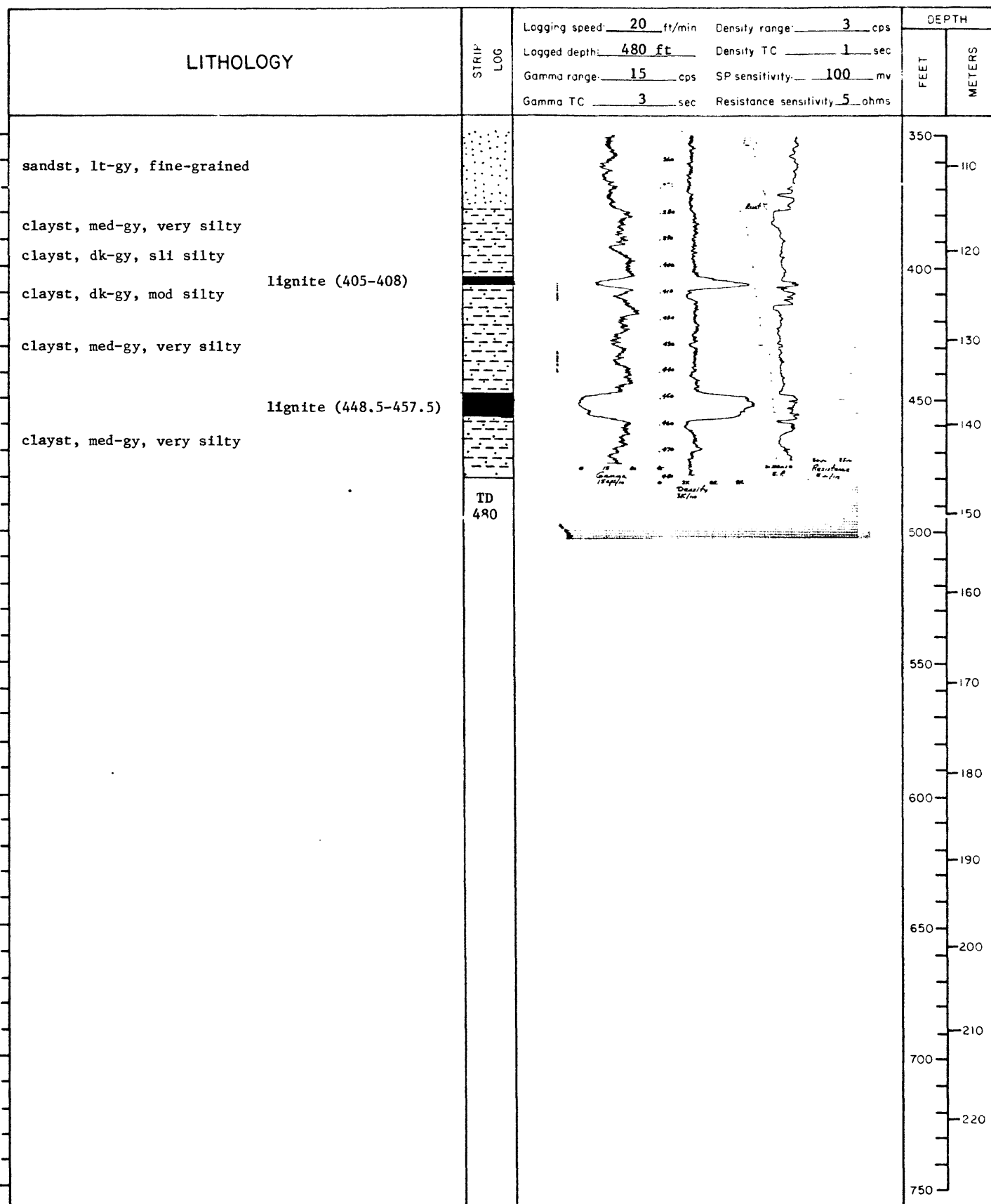


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 117  
SHEET 1 OF 2

AREA Three River		QUAD NAME New England NW	
DATE STARTED 7-18-79	DATE COMP. 7-18-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 20 T.138 N., R. 97 W., FOOTAGE LOC.		1160 ft <b>XXX</b> FSL	36 ft <b>XXX</b> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 480 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 480 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, lt-brn, silt, clay, unconsol		0 0	
clayst, med-brn, very silty		10	
siltst, lt-brn		50	
clayst, med-gy, very silty		20	
siltst, med-gy		100	
clayst, lt-gy, mod silty		30	
siltst, med-gy; high clay content		40	
sandst, lt-gy, fine-grained		150	
clayst, dk-gy		50	
siltst, med-gy		200	
clayst, dk-gy		60	
clayst, med-gy, mod silty	lignite (214.5-217.5)	70	
siltst, lt-gy		250	
clayst, med-gy, mod silty		80	
	lignite (266-272)	90	
clayst, med-gy, mod silty		300	
sandst, lt-gy, fine-grained		100	
		350	

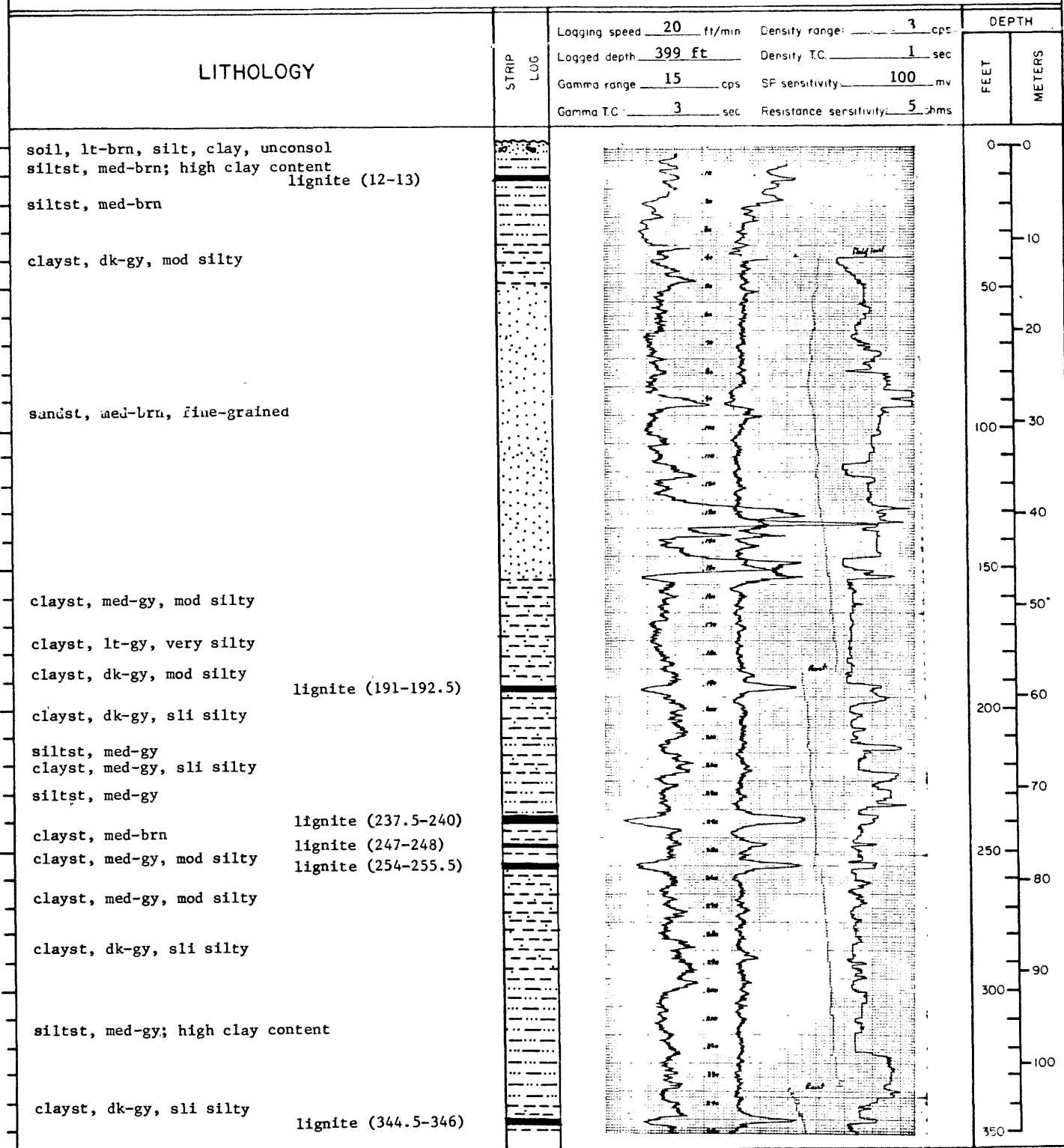
## REMARKS:



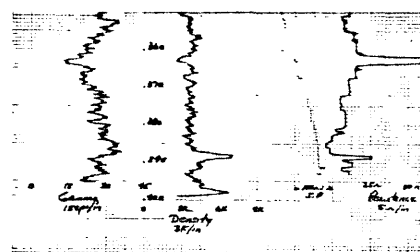
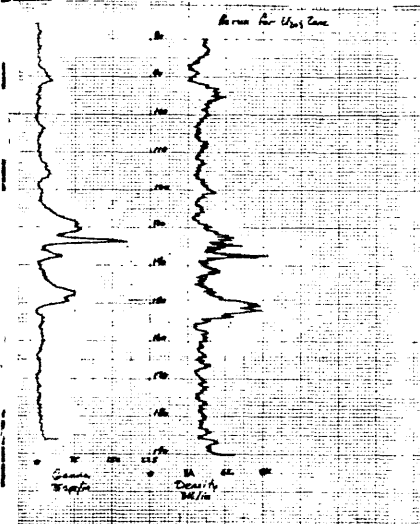
## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 118  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lehigh	
DATE STARTED 7-11-79	DATE COMP. 7-11-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 18 T. 138 N., R. 95 W., FOOTAGE LOC. 22 ft		XXX FSL 2190 ft	FEL XXXL GROUND ELEV 2558 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 400 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	DEPTH TO FLUID LEVEL 39 ft
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			



## REMARKS:

LITHOLOGY	STRIP LOG	Logging speed <u>20</u> ft/min    Density range <u>3</u> cps		DEPTH	
		Logged depth: <u>399</u> ft    Density TC: <u>1</u> sec		FEET	METERS
		Gamma range: <u>15</u> cps    SP sensitivity: <u>100</u> mv			
		Gamma TC: <u>3</u> sec    Resistance sensitivity: <u>5</u> ohms			
clayst, dk-gy, sli silty				350	
sandst, med-gy, fine-grained, calc, well-consol				110	
clayst, med-gy, mod silty				120	
clayst, med-gy, very silty      lignite (388-389)				400	
	TD 400			80	
80 ft				100	30
				40	
				150	
				50	
				200	60
				70	
				250	
				80	
				300	90
				100	
				350	
rerun of uraniferous zone					
190 ft					

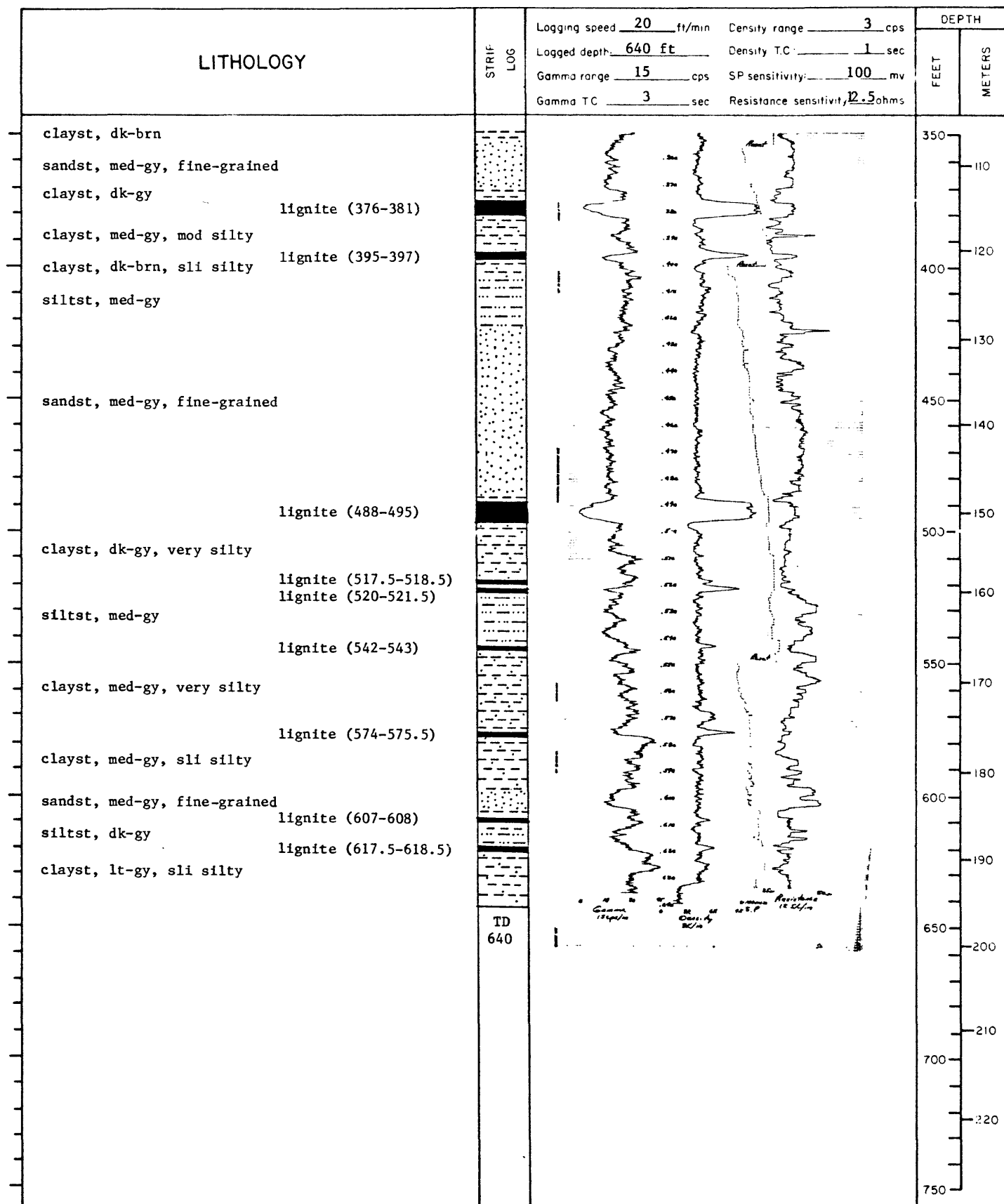


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 119  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lefor NW	
DATE STARTED 7-10-79	DATE COMP. 7-10-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 34 T. 138 N., R. 95 W., FOOTAGE LOC.		12 ft FNL XXX	48 ft FNL XXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 640 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 640 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 12.5 ohms
		DEPTH	
		FEET	METERS
soil, lt-brn, sand, silt, unconsol			0
sandst, med-brn, fine-grained			10
clayst, dk-gy, sli silty lignite (70.5-72.5)			20
siltst, med-gy			30
clayst, med-gy, mod silty			40
lignite (120-121.5)			50
clayst, med-gy, mod silty			60
lignite (145-146.5)			70
clayst, lt-gy, mod silty			80
clayst, lt-gy, very silty			90
clayst, med-gy, mod silty			100
lignite (280.5-281.5)			110
clayst, med-gy, very silty			120
lignite (306-307)			130
lignite (310-311)			140
clayst, dk-gy, very silty			150
lignite (331-332)			160
clayst, dk-brn, mod silty			170
clayst, dk-brn			180
			190
			200
			210
			220
			230
			240
			250
			260
			270
			280
			290
			300
			310
			320
			330
			340
			350

## REMARKS:

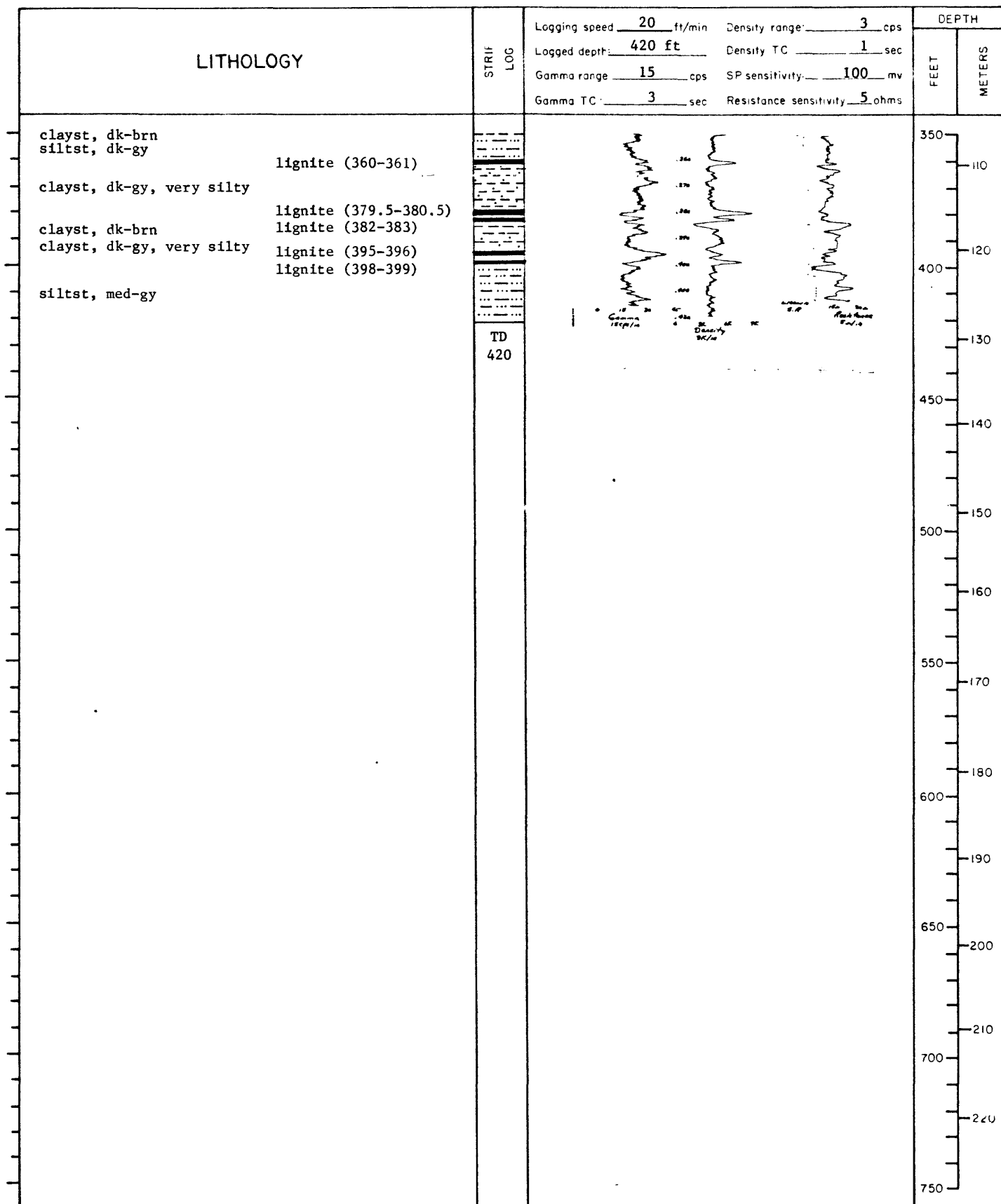


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 120  
SHEET 1 OF 2

AREA Three River		QUAD NAME Gladstone	
DATE STARTED 7-9-79	DATE COMP. 7-9-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 8 T.138 N., R. 94 W., FOOTAGE LOC.		30 ft FNL <del>XXX</del>	825 ft <del>XXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 420 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 420 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, lt-brn, silt, clay, unconsol siltst, med-brn lignite (12.5-14)			0 0
clayst, med-gy, mod silty			10
siltst, med-gy			50
clayst, med-gy, mod silty			20
lignite (71.5-73)			100
clayst, med-gy, very silty			30
siltst, med-gy			40
clayst, dk-gy, mod silty			150
clayst, med-gy, very silty			50
siltst, med-gy			60
clayst, med-gy, mod silty			70
lignite (168.5-170)			200
siltst, dk-gy; high clay content			60
clayst, med-gy, mod silty			70
lignite (221-222.5)			250
clayst, dk-gy, mod silty			80
lignite (245-250.5)			90
clayst, dk-brn			100
siltst, dk-gy			300
siltst, lt-gy			100
clayst, dk-brn to blk, cbncs			350
sandst, lt-gy, fine-grained, calc, well-consol			
clayst, med-gy, very silty			
lignite (334-337)			
clayst, dk-gy, very silty			
lignite (345-350)			

REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

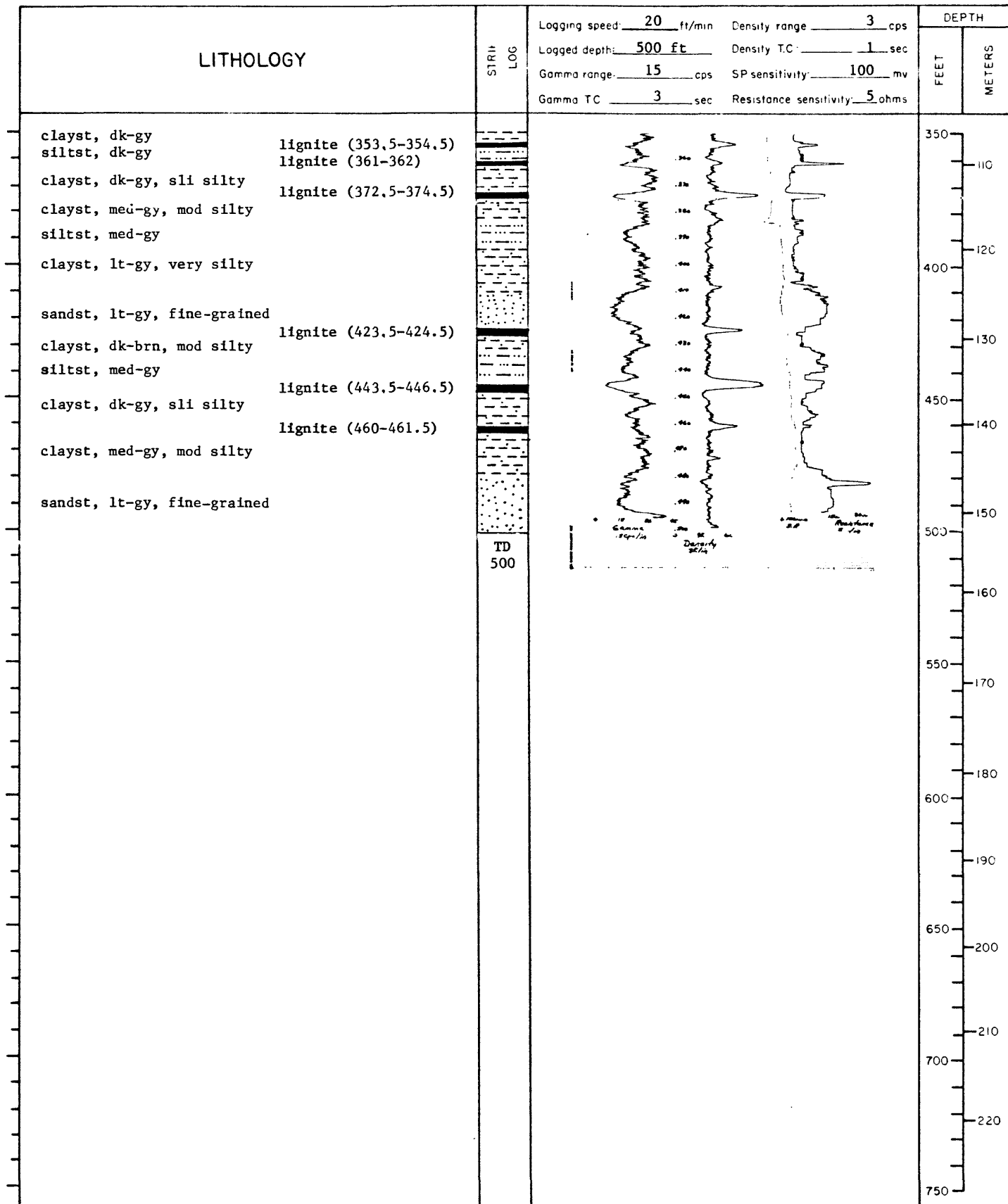
HOLE NO 121  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lefor			
DATE STARTED 7-9-79		DATE COMP. 7-9-79		COUNTY Stark	STATE North Dakota
LOCATION: SEC. 34 T. 138 N., R. 94 W.,		FOOTAGE LOC. 35 ft <del>XXX</del> FSL 15 ft <del>XXX</del> FWL		GROUND ELEV. 2512 ft	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 500 ft CORING ---		TOTAL DEPTH 500 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 10 ft	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range: 3 cps		DEPTH	
		Logged depth: 500 ft	Density T.C. 1 sec	FEET	METERS
soil, lt-brn, sand, silt, unconsol				0	0
sandst, med-brn, fine-grained				10	
clayst, dk-brn lignite (54-57.5)				50	
clayst, med-gy, mod silty				20	
clayst, dk-brn lignite (98-99.5)				100	30
clayst, med-gy, very silty					
clayst, dk-brn					
clayst, lt-gy, mod silty				40	
clayst, dk-gy, sli silty lignite (149-151)				150	50
siltst, med-gy; high clay content				50	
clayst, dk-gy, mod silty lignite (206.5-207.5)				200	60
clayst, dk-gy, mod silty lignite (225-226)					
clayst, dk-gy, mod silty lignite (230-231.5)				70	
clayst, med-gy, mod silty lignite (249-250)				250	80
clayst, med-gy, very silty				80	
clayst, med-gy, mod silty lignite (281-282)					
clayst, med-gy, mod silty lignite (290-291)				90	
clayst, med-gy, mod silty lignite (296-297)				300	90
siltst, lt-gy, calc, well-consol					
clayst, lt-gy, sli silty lignite (325.5-326.5)				100	
clayst, med-gy, mod silty				350	

## REMARKS:

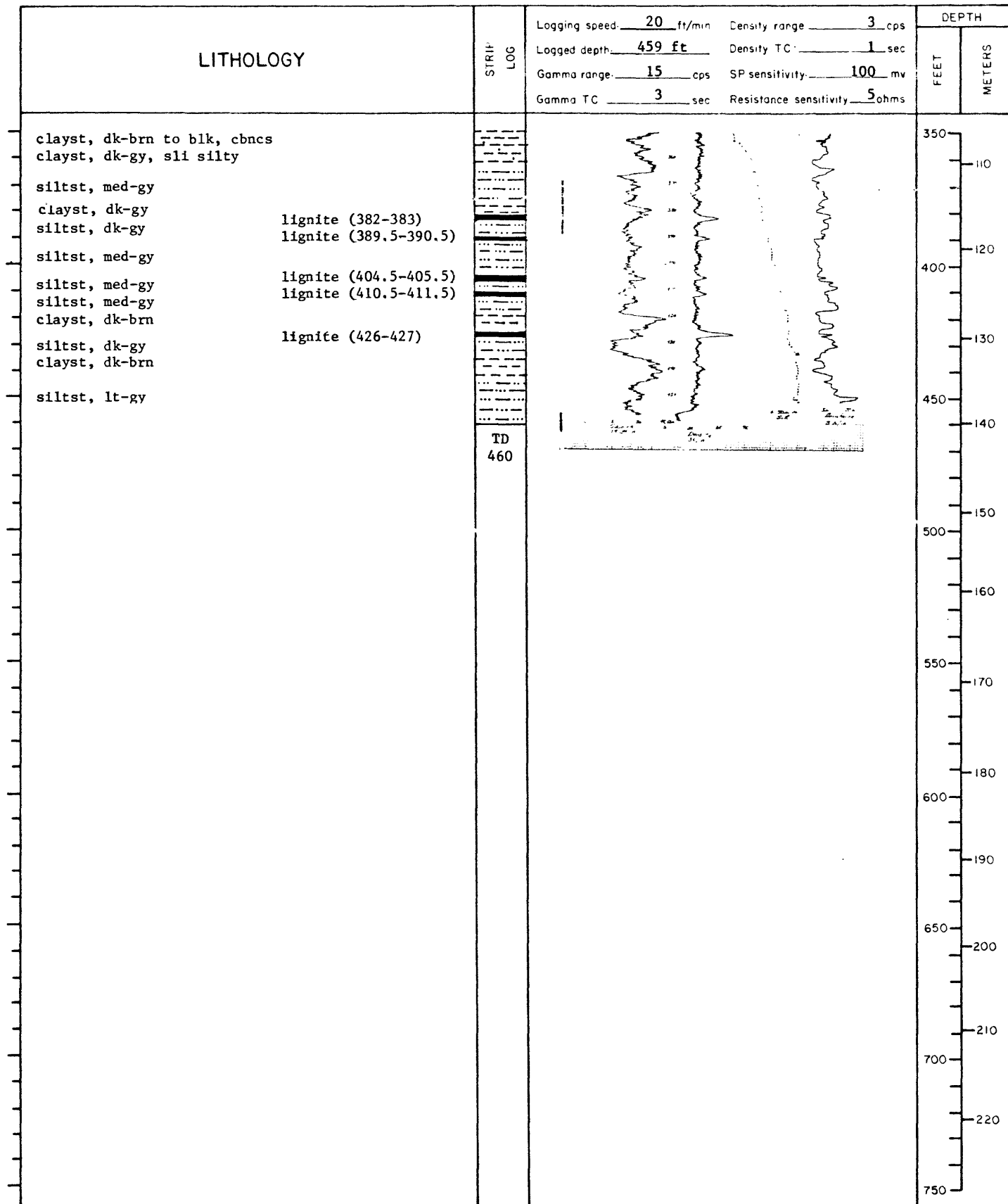


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 122  
SHEET 1 OF 2

AREA Three River		QUAD NAME White Butte NE				
DATE STARTED 7-5-79	DATE COMP. 7-5-79	COUNTY Stark	STATE North Dakota			
LOCATION: SEC. 26 T. 138 N., R. 93 W., FOOTAGE LOC.		2605 ft	FNL XXX	15 ft	FEL XXX	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 460 ft CORING ---		GROUND ELEV 2390 ft		
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		TOTAL DEPTH 460 ft		
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald		DEPTH TO FLUID LEVEL 57 ft		
REMARKS:						
LITHOLOGY		STRIP LOG	Logging speed: 20 ft/min Density range: 3 cps		DEPTH	
			Logged depth: 459 ft Density T.C.: 1 sec		FET METERS	
Gamma range: 15 cps SP sensitivity: 100 mv		Gamma T.C.: 3 sec Resistance sensitivity: 5 ohms				
soil, med-brn, silt, clay, unconsol					0	0
siltst, lt-brn lignite (17-18.5)					10	
siltst, med-gy lignite (39-41)					20	
siltst, med-gy lignite (80-82.5)					30	
siltst, med-gy					40	
clayst, dk-gy, very silty					50	
siltst, med-gy; high clay content					60	
clayst, dk-gy, sli silty lignite (146-148.5)					70	
clayst, dk-gy, mod silty					80	
sandst, med-gy, fine-grained lignite (187-188)					90	
siltst, med-gy					100	
clayst, med-gy, mod silty					110	
sandst, lt-gy, fine-grained					120	
clayst, dk-gy, sli silty lignite (249-250.5)					130	
clayst, dk-gy, sli silty					140	
siltst, dk-gy lignite (265-266)					150	
siltst, dk-gy lignite (277.5-278.5)					160	
clayst, med-gy, mod silty lignite (291.5-293.5)					170	
clayst, med-gy, very silty					180	
clayst, dk-gy, mod silty lignite (326-327)					190	
siltst, med-gy lignite (333.5-335.5)		200				
clayst, dk-brn to blk, cbnccs		210				

## REMARKS:





## UNITED STATES GEOLOGICAL SURVEY

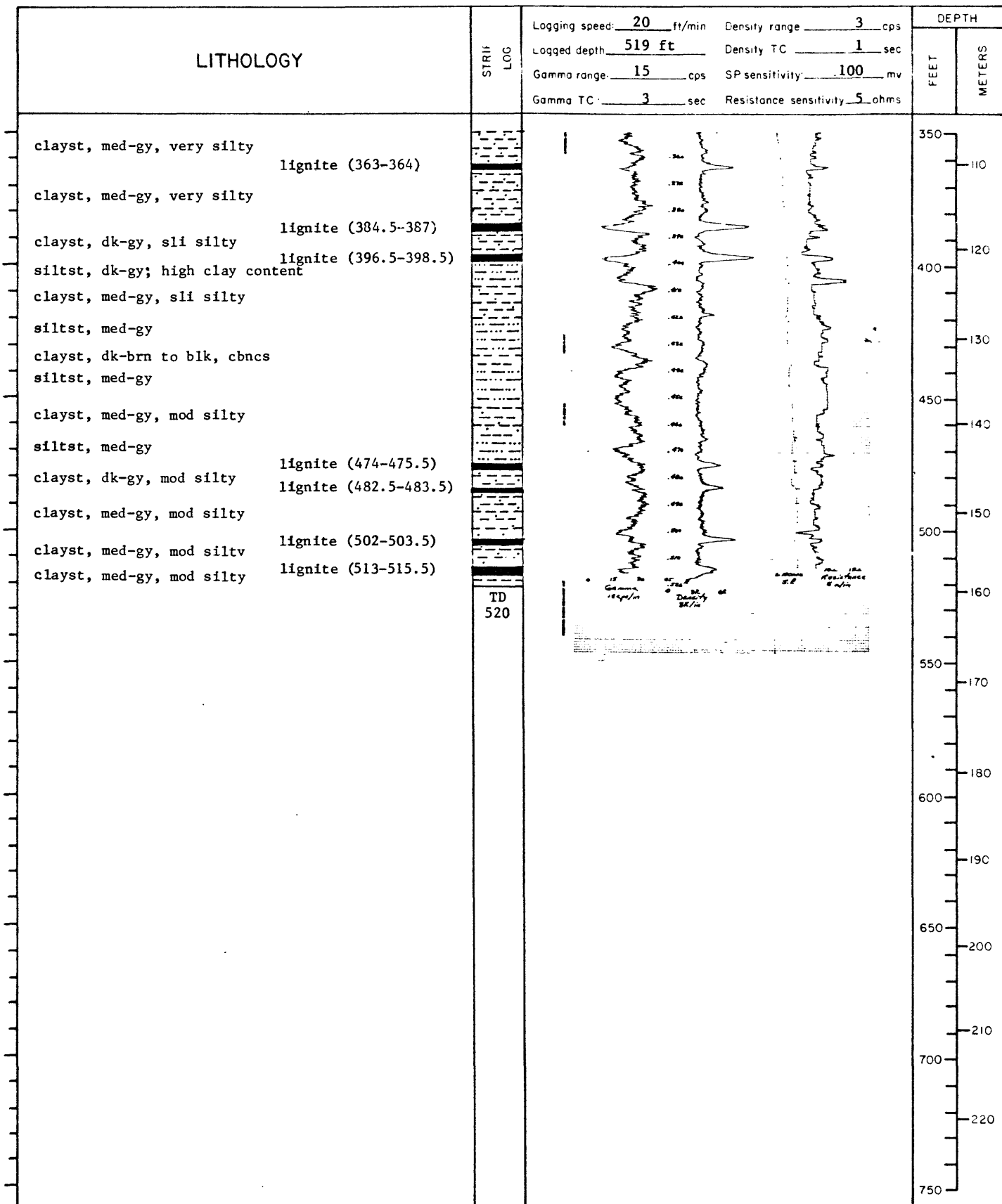
HOLE NO 123  
SHEET 1 OF 2

AREA Three River		QUAD NAME White Butte NW			
DATE STARTED 7-9-79	DATE COMP. 7-9-79	COUNTY Stark	STATE North Dakota		
LOCATION: SEC. 32 T. 138 N., R. 93 W., FOOTAGE LOC.		62 ft FNL XXX	8 ft XXX FWL	GROUND ELEV	2484 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 520 ft CORING ---		TOTAL DEPTH	520 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 10 ft	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					

LITHOLOGY	S-RIIP LOG	Logging speed: 20 ft/min		Density range: 3 cps		DEPTH	
		Logged depth: 519 ft		Density T.C.: 1 sec		FEET	METERS
		Gamma range: 15 cps		SP sensitivity: 100 mv			
		Gamma T.C.: 3 sec		Resistance sensitivity: 5 ohms			
soil, lt-brn, silt, clay, unconsol						0	0
siltst, med-brn							
clayst, med-gy, very silty						10	
siltst, dk-gy		lignite (53-55)				50	
		lignite (59.5-62)				20	
clayst, med-gy, mod silty							
clayst, dk-gy, sli silty		lignite (82-83.5)				30	
sandst, med-gy, fine-grained						100	
clayst, dk-gy, sli silty		lignite (116.5-120)				40	
clayst, med-gy, mod silty							
clayst, dk-gy, mod silty		lignite (142-143.5)				150	
clayst, med-gy, very silty						50	
		lignite (174.5-175.5)				60	
clayst, med-gy, mod silty						200	
		lignite (295.5-296.5)				70	
clayst, med-gy, mod silty						80	
		lignite (284-285.5)				90	
clayst, med-gy, very silty		lignite (286.5-288)				300	
siltst, med-gy						100	
		lignite (325-327)					
		lignite (328-329)					
siltst, med-gy; high clay content						350	

## REMARKS:

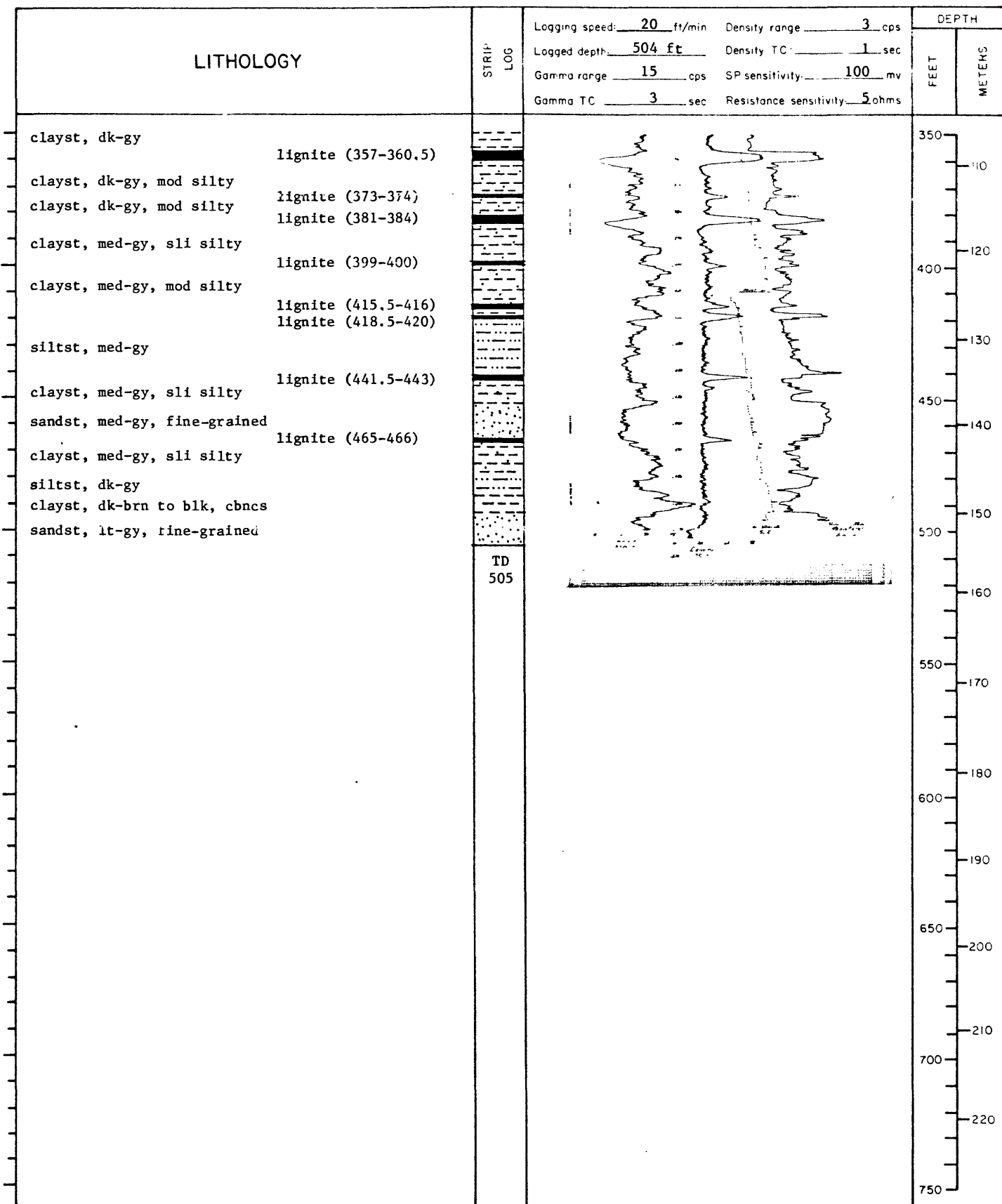


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 124  
SHEET 1 OF 2

AREA Three River		QUAD NAME Richardton SE	
DATE STARTED 7-5-79	DATE COMP. 7-5-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 8 T. 138 N., R. 92 W., FOOTAGE LOC.		220 ft <del>XXX</del> FSL	1205 ft <del>XXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 505 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 504 ft	Density TC: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma TC: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, med-brn, silt, clay, unconsol clayst, med-brn, very silty lignite (8-12)			0 0
siltst, med-brn			10
clayst, dk-brn lignite (70.5-72)			20
siltst, med-gy			30
clayst, dk-gy lignite (102-104)			40
siltst, lt-gy			50
sandst, lt-gy, fine-grained, calc			60
clayst, med-gy, sli silty			70
siltst, med-gy lignite (208.5-210)			80
clayst, med-gy, mod silty			90
clayst, dk-brn to blk, cbncc siltst, med-gy			100
sandst, med-gy, fine-grained			110
clayst, dk-gy, sli silty lignite (299.5-303)			120
siltst, med-gy			130
clayst, med-gy, very silty			140
			150
			160
			170
			180
			190
			200
			210
			220
			230
			240
			250
			260
			270
			280
			290
			300
			310
			320
			330
			340
			350

## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

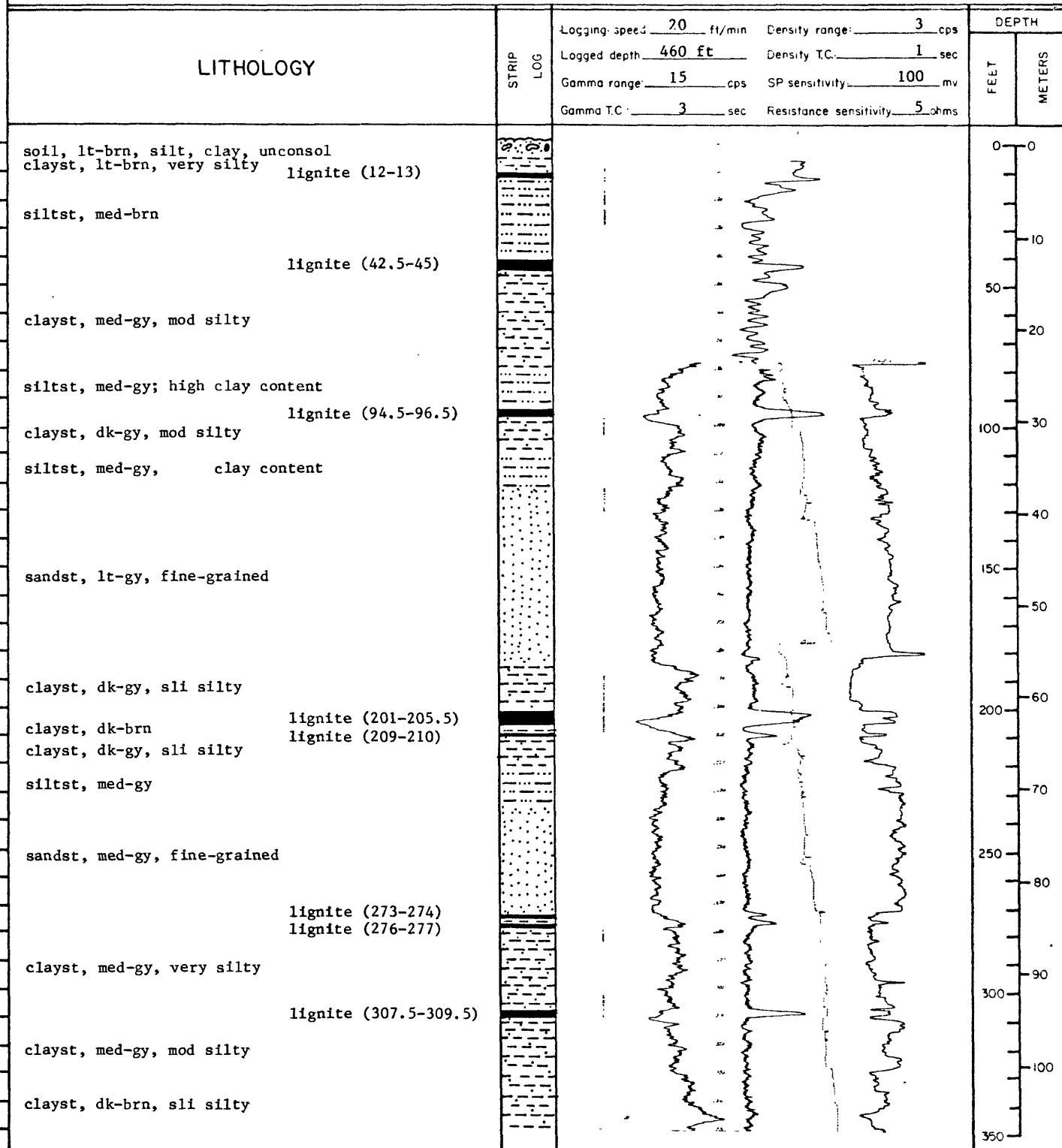
HOLE NO 125  
SHEET 1 OF 1

AREA Three River		QUAD NAME Antelope	
DATE STARTED 7-5-79	DATE COMP. 7-5-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 6 T.138 N., R. 91 W., FOOTAGE LOC.		10 ft FNL <del>XXX</del>	2420 ft FEL <del>XXX</del>
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 332 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range: 3 cps
		Logged depth 332 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
			DEPTH FEET METERS
soil, lt-brn, silt, clay, unconsol			0 0
			10
sandst, med-brn, fine-grained			50 20
			100 30
clayst, dk-gy lignite (117-121)			40
clayst, med-gy, very silty			50
siltst, med-gy			60
sandst, lt-gy, fine-grained			70
clayst, dk-brn to blk, cbncc			80
clayst, med-gy, mod silty			90
			100
			110
			120
			130
			140
			150
			160
			170
			180
			190
			200
			210
			220
			230
			240
			250
			260
			270
			280
			290
			300
			310
			320
			330
			340
			350
			360
			370
			380
			390
			400
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			770
			780
			790
			800
			810
			820
			830
			840
			850
			860
			870
			880
			890
			900
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			920
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			940
			950
			960
			970
			980
			990
			1000
			1010
			1020
			1030
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			1070
			1080
			1090
			1100
			1110
			1120
			1130
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			1190
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			3000
			3010
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			3070
			3080
			3090
			3100
			3110
			3120
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			3150
			3160
			3170
			3180
			3190
			3200
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			3570
			3580
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			3600
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			3620
			3630
			3640
			3650

## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 126  
SHEET 1 OF 2

AREA Three River		QUAD NAME Antelope			
DATE STARTED 7-5-79	DATE COMP. 7-5-79	COUNTY Stark	STATE North Dakota		
LOCATION: SEC. 10 T. 138 N., R. 91 W.,		FOOTAGE LOC. 10 ft	FNL <del>XXX</del>	96 ft	FEL <del>XXX</del>
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 460 ft		CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		TOTAL DEPTH 460 ft	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald		DEPTH TO FLUID LEVEL 78 ft	
REMARKS:					



HOLE NO 126  
SHEET 2 OF 2

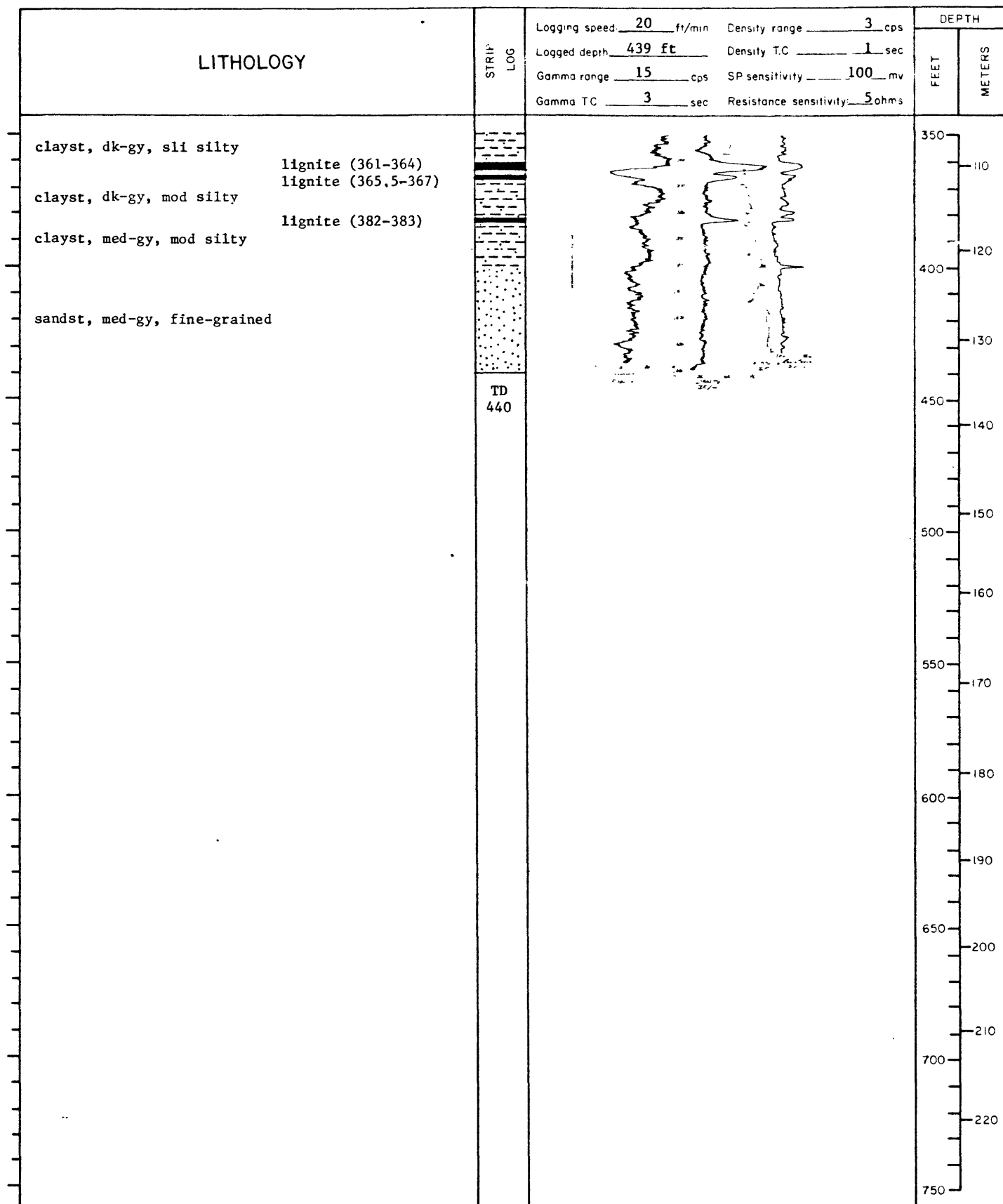
LITHOLOGY	STRIP LOG	DEPTH		
		FEET	METERS	
clayst, med-gy, mod silty siltst, med-gy clayst, med-gy, very silty siltst, dk-gy clayst, dk-gy <div style="text-align: right;">lignite (397-400)</div> clayst, med-gy, mod silty   siltst, med-gy		Logging speed <u>20</u> ft/min    Density range <u>3</u> cps Lagged depth <u>460</u> ft    Density T.C. <u>1</u> sec Gamma range <u>15</u> cps    SP sensitivity <u>100</u> mv Gamma T.C. <u>3</u> sec    Resistance sensitivity <u>5</u> ohms		350 110 120 400 130 450 140 500 150 550 160 600 170 650 180 700 190 750 200 210 220
TD 460				

HOLE NO 127  
SHEET 1 OF 2

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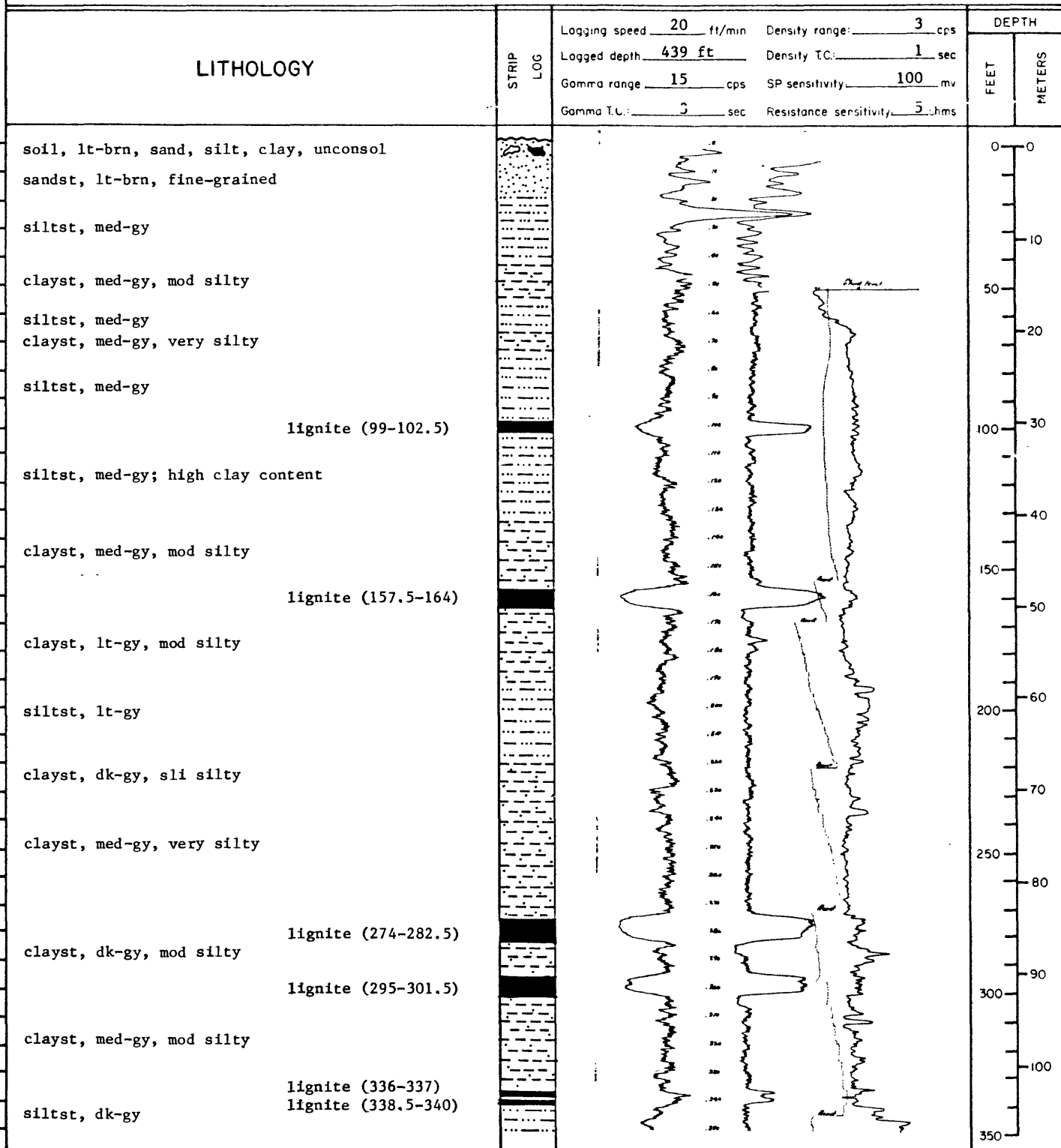
REMARKS:



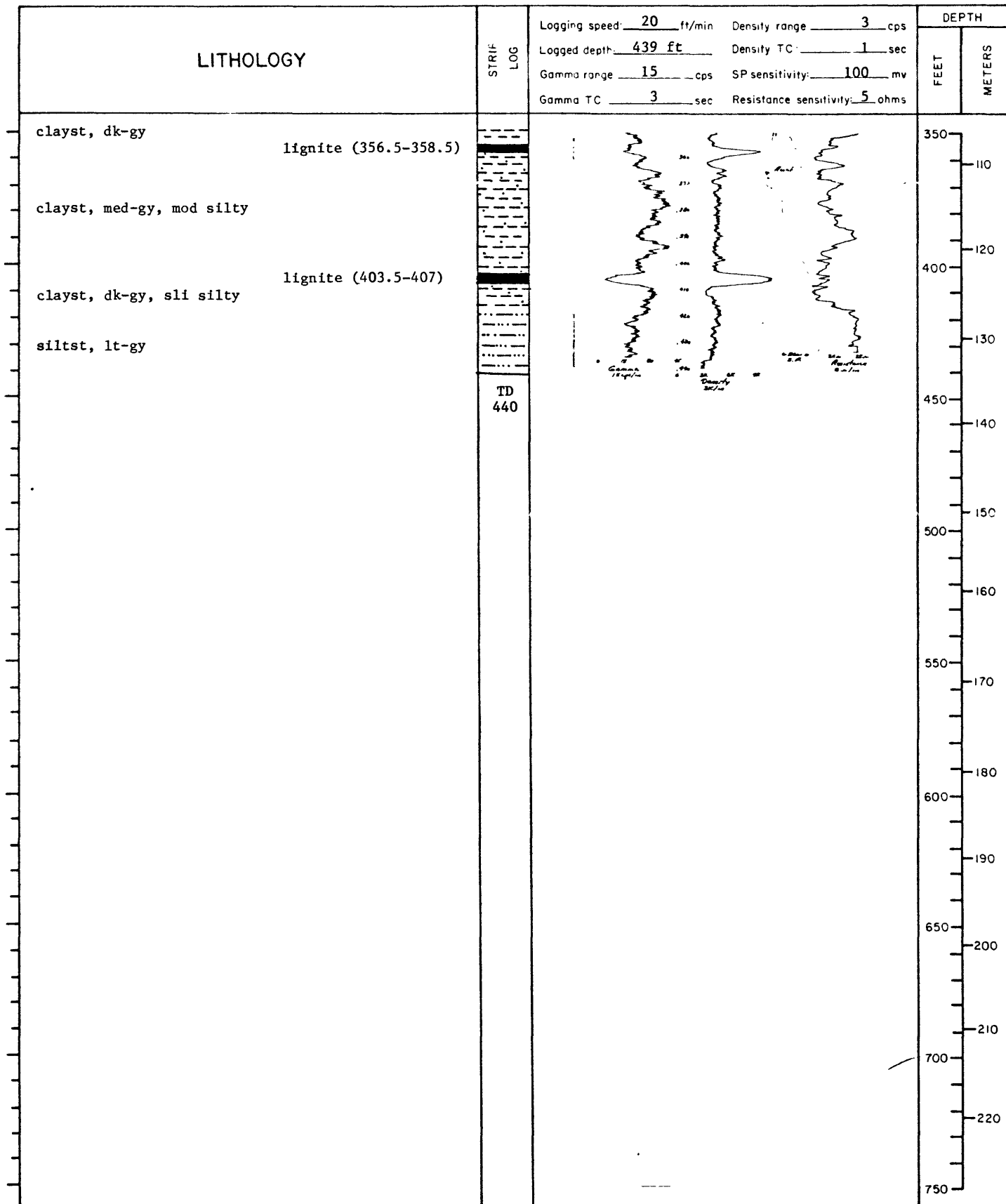
# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 128  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Belfield 3 NE (Preliminary)</b>	
DATE STARTED <b>7-20-79</b>	DATE COMP <b>7-20-79</b>	COUNTY <b>Billings</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 14 T. 137 N., R. 101 W., FOOTAGE LOC. 910 ft		FNL <b>XXX</b> 205 ft	FEL <b>XXX</b> 2862 ft
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>440 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	
LITHOLOGY RECORDED BY <b>L. Tomac</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS:			



REMARKS:

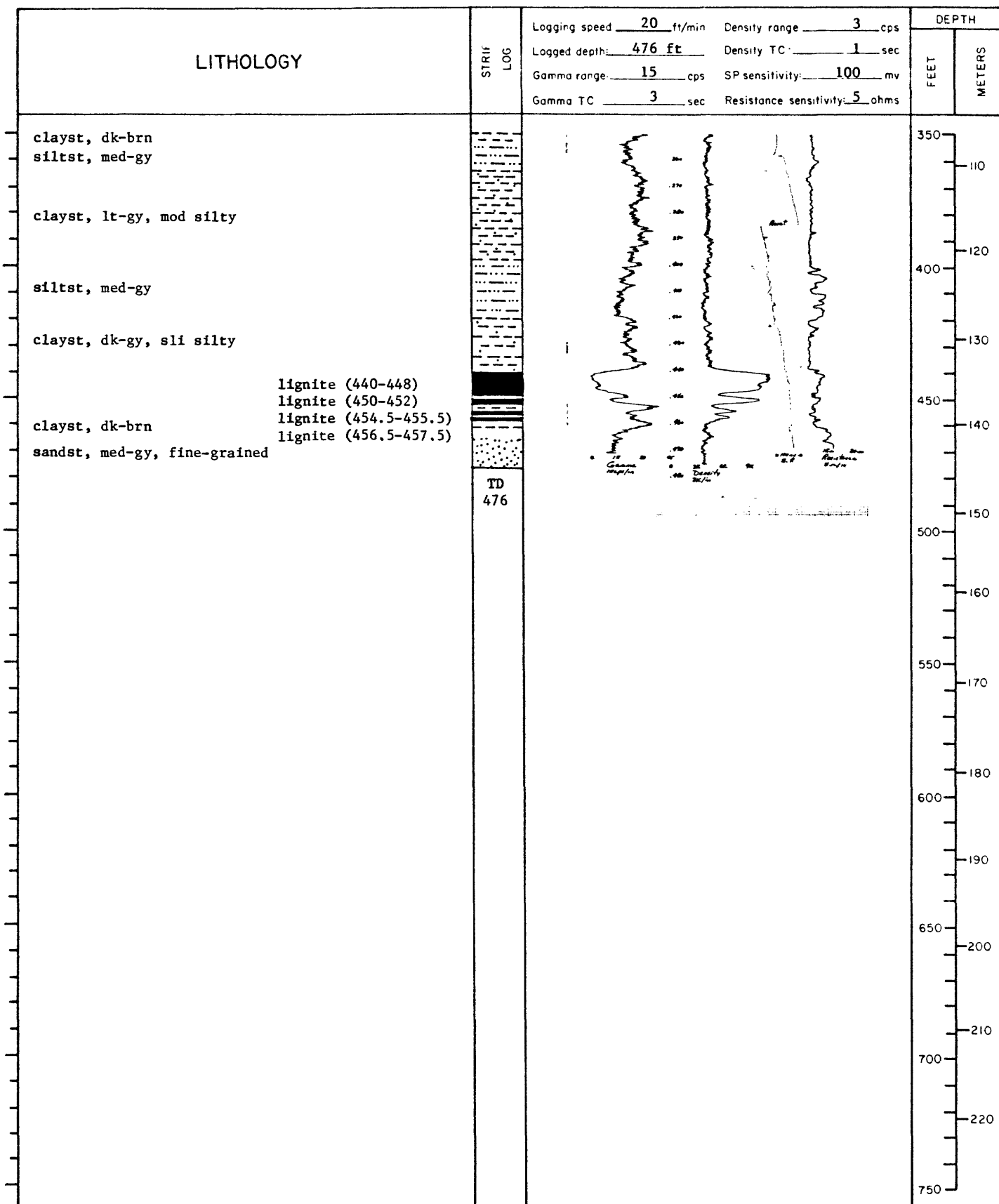


# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 129  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield 3 NE (Preliminary)	
DATE STARTED 7-20-79	DATE COMP. 7-20-79	COUNTY Billings	STATE North Dakota
LOCATION: SEC. 20 T.137 N., R. 100 W., FOOTAGE LOC.		189 ft FNL <del>XXXL</del>	1930 ft <del>XXXL</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV 2962 ft	
		TOTAL DEPTH 476 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY		Logging speed: 20 ft/min    Density range: 3 cps Logged depth: 476 ft    Density T.C.: 1 sec Gamma range: 15 cps    SP sensitivity: 100 mv Gamma T.C.: 3 sec    Resistance sensitivity: 5 ohms	
		DEPTH FEET    METERS	
soil, lt-brn, sand, silt, unconsol  sandst, med-brn, fine-grained  clayst, dk-gy, very silty      lignite (64-68)  clayst, med-gy, mod silty  lignite (109-111)  clayst, med-gy, mod silty  lignite (134.5-140) lignite (142-143)  siltst, med-gy      lignite (159.5-161.5)  clayst, med-gy, sli silty clayst, dk-brn to blk, cbncc clayst, med-gy, sli silty      lignite (193.5-197.5) clayst, dk-gy      lignite (205.5-211.5)  clayst, dk-brn  clayst, med-gy, very silty  siltst, med-gy  lignite (278-283)  clayst, med-gy, very silty  siltst, lt-gy  clayst, med-gy, mod silty  lignite (338.5-344.5) lignite (347-348)			

## REMARKS:

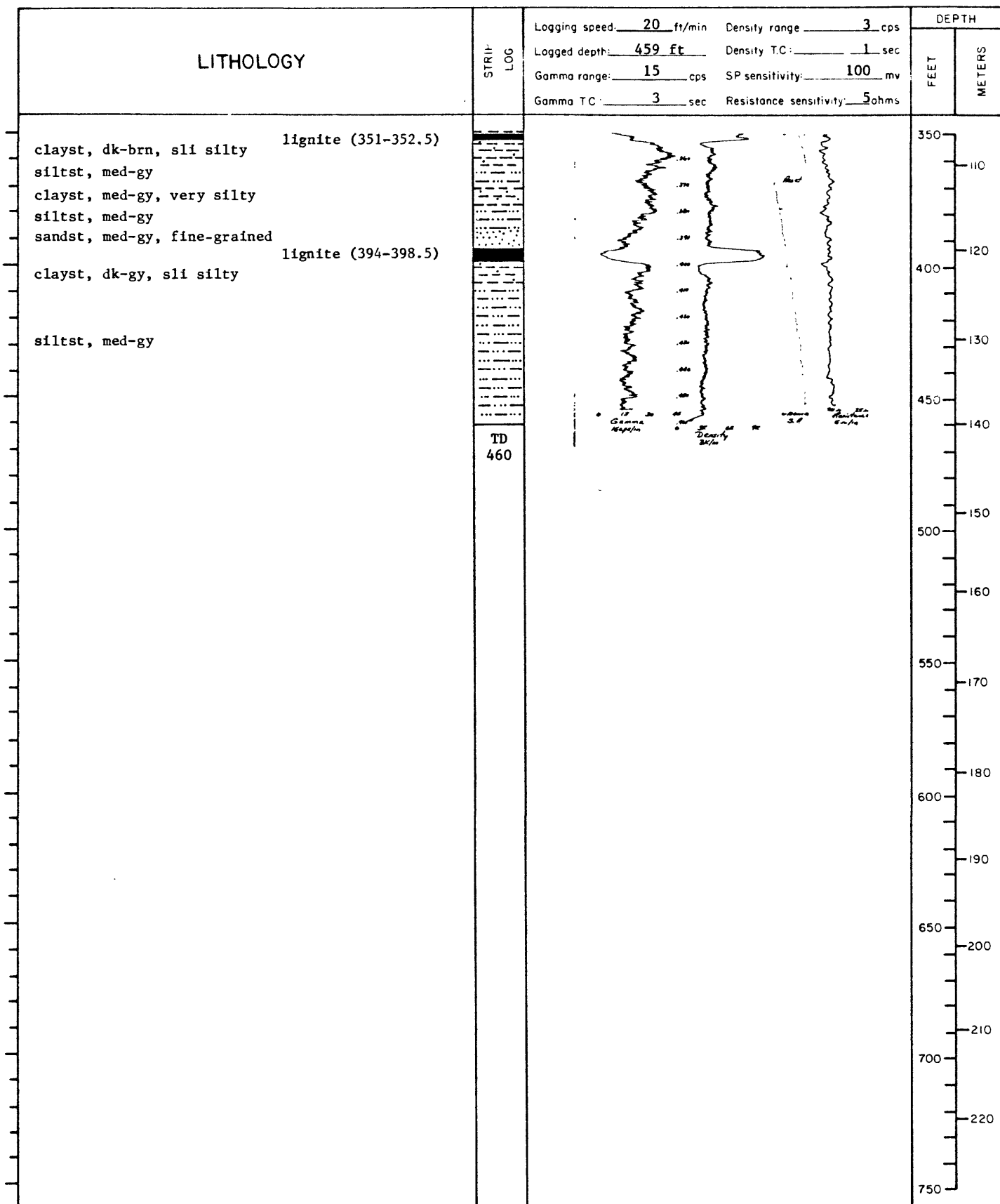


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 130  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield 4 NW (Preliminary)			
DATE STARTED 7-19-79	DATE COMP. 7-19-79	COUNTY Stark	STATE North Dakota		
LOCATION: SEC. 10 T. 137 N., R. 99 W., FOOTAGE LOC.		FNL 485 ft	XXX	20 ft	FEL XXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE			GROUND ELEV 2684 ft
		ROTARY 460 ft	CORING	---	TOTAL DEPTH 460 ft
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary			DEPTH TO FLUID LEVEL 14 ft
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min Density range: 3 cps			DEPTH
		Logged depth: 459 ft Density TC: 1 sec			
		Gamma range: 15 cps SP sensitivity: 100 mv			FEET
		Gamma T.C.: 3 sec Resistance sensitivity: 5 ohms			METERS
soil, lt-brn, silt, clay, unconsol					0
clayst, med-brn, very silty					10
clayst, dk-gy, mod silty					50
clayst, dk-brn lignite (40-47)					20
siltst, dk-gy lignite (62.5-64)					30
clayst, med-gy, sli silty					40
clayst, med-gy, mod silty lignite (83.5-89.5)					50
clayst, dk-gy, sli silty					60
					70
clayst, med-gy, mod silty					80
					90
lignite (182-187)					100
lignite (191-196)					150
clayst, dk-brn					200
clayst, med-gy, very silty					250
		300			
sandst, med-gy, fine-grained		350			
clayst, dk-gy, sli silty					
lignite (342.5-350)					

REMARKS:

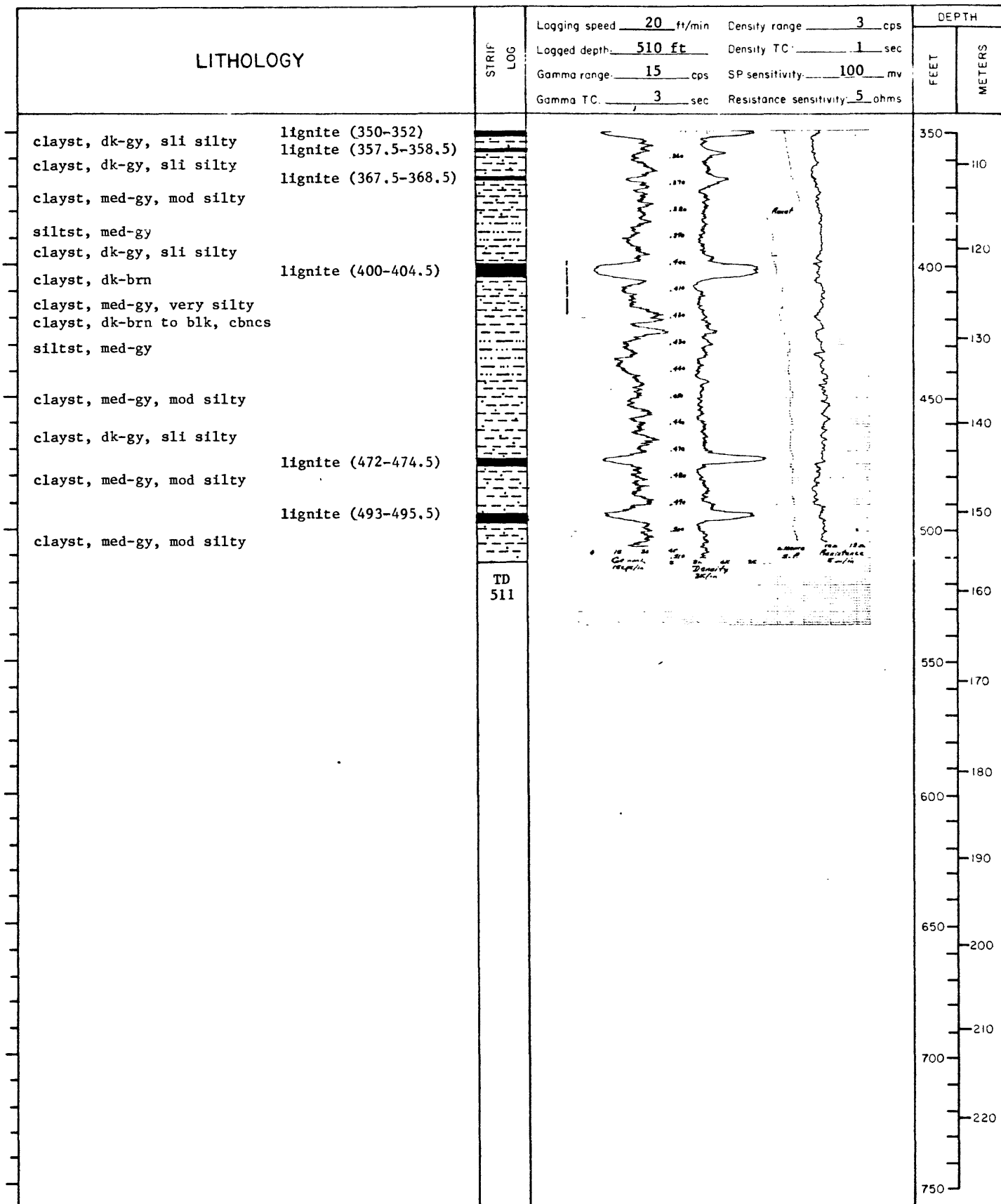


HOLE NO 131  
SHEET 1 OF 2

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## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

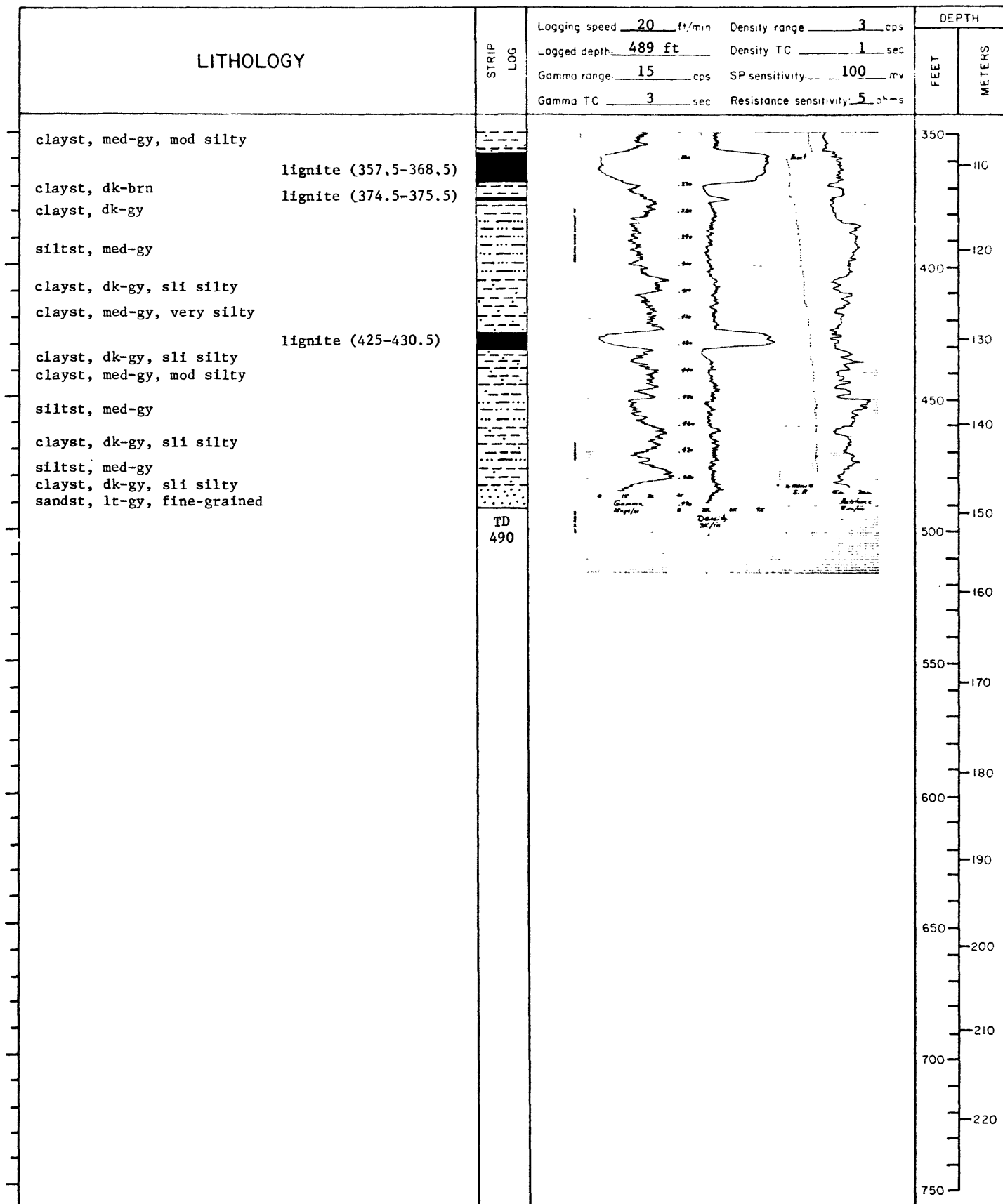
HOLE NO 132  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield 4 NW (Preliminary)	
DATE STARTED 7-20-79	DATE COMP. 7-20-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 20 T. 137 N., R. 99 W., FOOTAGE LOC.		50 ft <del>XXX</del> FSL 120 ft <del>XXX</del> FEL <del>XXX</del>	GROUND ELEV 2748 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 490 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	TOTAL DEPTH 490 ft
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range: 3 cps		DEPTH	
		Logged depth 489 ft	Density TC 1 sec	FEET	METERS
soil, lt-brn, silt, clay, unconsol				0	0
clayst, med-brn, very silty				10	
clayst, med-gy, very silty lignite (36-38)				50	
clayst, dk-brn lignite (52-59)				20	
siltst, med-gy				30	
clayst, dk-gy, mod silty lignite (81.5-82.5)				100	
clayst, med-gy, very silty lignite (89-92)				30	
clayst, dk-gy lignite (107.5-117)				40	
clayst, dk-gy, sli silty				150	
siltst, med-gy				50	
sandst, med-gy, fine-grained, calc, well-consol				200	
sandst, lt-gy, fine-grained				60	
lignite (217-224.5)				70	
lignite (227-235)				80	
clayst, dk-brn				250	
sandst, med-gy, fine-grained				80	
clayst, med-gy, calc, well-consol				90	
sandst, med-gy, fine-grained				300	
clayst, med-gy, mod silty				100	
				350	

## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

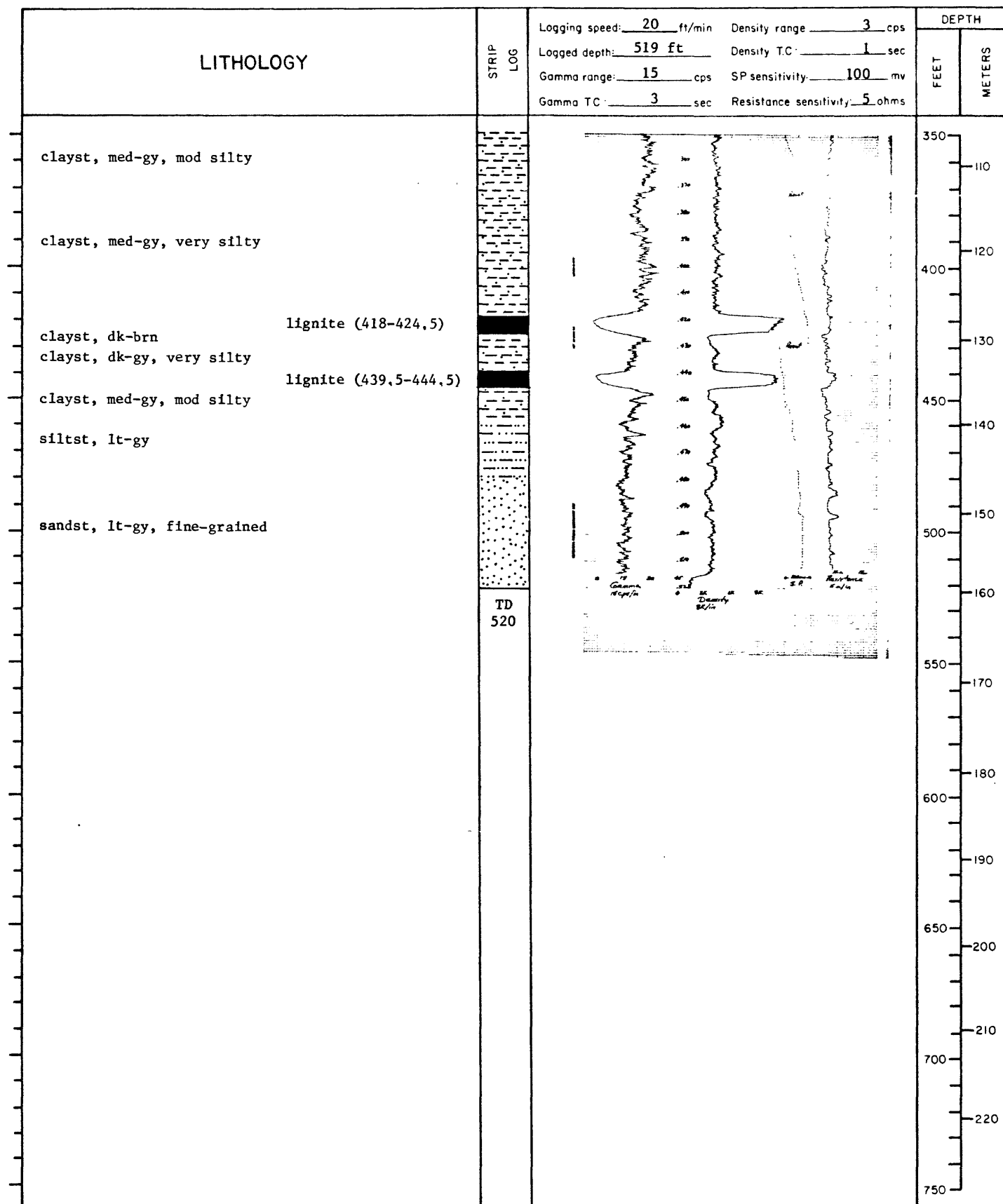
HOLE NO 133  
SHEET 1 OF 2

AREA Three River		QUAD NAME Belfield 4 NE (Preliminary)			
DATE STARTED 7-19-79		DATE COMP. 7-19-79		COUNTY Stark	STATE North Dakota
LOCATION: SEC. 8 T.137 N., R.98 W.,		FOOTAGE LOC. 27 ft		KMK FSL 1610 ft	FEL XXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 520 ft		CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		GROUND ELEV 2816. ft	
LITHOLOGY RECORDED BY L. Tomac		GEOPHYSICAL LOGS RECORDED BY J. Wald		TOTAL DEPTH 520 ft	
REMARKS:					

LITHOLOGY	STRIP	LOG	Log data		DEPTH	
			Logging speed: 20 ft/min	Density range: 3 cps	FEET	METERS
soil, lt-brn, sand, silt, unconsol			Logged depth: 519 ft	Density TC: 1 sec		
sandst, med-brn, fine-grained			Gamma range: 15 cps	SP sensitivity: 100 mv		
clayst, dk-gy, sli silty			Gamma TC: 3 sec	Resistance sensitivity: 5 ohms		
clayst, med-gy, very silty						
clayst, dk-gy, sli silty						
clayst, med-gy, very silty						
lignite (127.5-133)						
clayst, dk-gy, very silty						
lignite (150-151)						
clayst, med-gy, very silty						
lignite (152-153.5)						
clayst, dk-brn						
lignite (171-177)						
lignite (182-183)						
siltst, med-gy; high clay content						
clayst, dk-gy, very silty						
siltst, med-gy						
clayst, dk-gy, very silty						
sandst, med-gy, fine-grained						
siltst, med-gy; high clay content						
clayst, dk-gy, sli silty						
lignite (334.5-341)						
clayst, dk-brn						

## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 134  
SHEET 1 OF 2

AREA Three River		QUAD NAME New England NW	
DATE STARTED 7-18-79	DATE COMP. 7-18-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 12 T. 137 N., R. 98 W., FOOTAGE LOC.		18 ft <b>KXX</b> FSL	35 ft <b>KXX</b> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 506 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range: 3 cps		DEPTH	
		Logged depth 505 ft	Densit, TC 1 sec	FEET	METERS
soil, lt-brn, silt, clay, unconsol				0	0
clayst, med-brn, mod silty				10	
sandst, lt-gy, fine-grained				50	
clayst, med-gy, mod silty				20	
clayst, med-gy, mod silty				100	30
clayst, med-gy, mod silty				40	
clayst, med-gy, very silty				150	50
clayst, med-gy, mod silty				200	60
clayst, dk-brn				70	
clayst, med-gy, mod silty				250	80
siltst, med-gy				300	90
clayst, dk-gy, mod silty				350	100
clayst, dk-gy, very silty					
clayst, med-gy, mod silty					

lignite (99.5-100.5)  
 lignite (112-113)  
 lignite (131.5-137)  
 lignite (167-169)  
 lignite (188.5-194)  
 lignite (299.5-300.5)  
 lignite (306-307)  
 lignite (342-351.5)

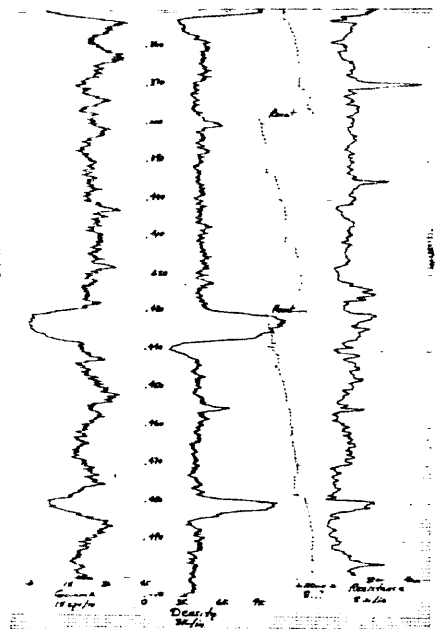
## REMARKS:

LITHOLOGY	STRIP LOG	DEPTH	
		FEET	METERS

Logging speed: <u>20</u> ft/min		Density range: <u>3</u> cps
Logged depth: <u>505</u> ft		Density T.C.: <u>1</u> sec
Gamma range: <u>15</u> cps		SP sensitivity: <u>100</u> mv
Gamma T.C.: <u>3</u> sec		Resistance sensitivity: <u>5</u> ohms

clayst, dk-brn	lignite (342-351.5)		350
clayst, dk-gy, very silty			110
	lignite (380-381)		120
siltst, med-gy; high clay content			400
clayst, med-gy, mod silty			130
	lignite (430.5-437.5)		450
clayst, dk-brn			140
clayst, dk-gy, mod silty			150
siltst, med-gy	lignite (454.5-455.5)		160
clayst, dk-gy, mod silty			170
	lignite (479.5-482)		180
clayst, dk-gy, sli silty			190
siltst, med-gy			200
			210
			220
			750

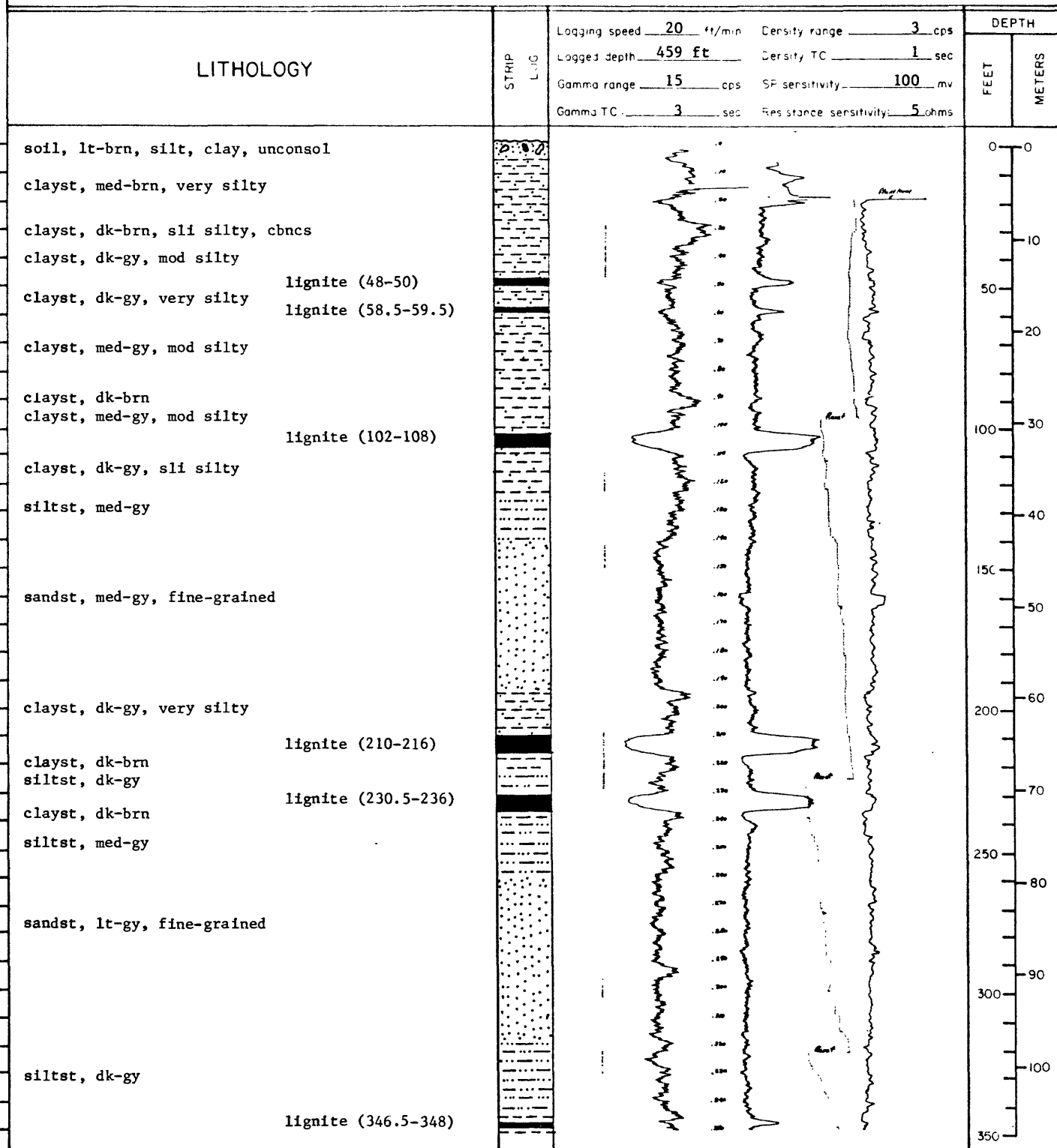
TD 506
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## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 135  
SHEET 1 OF 2

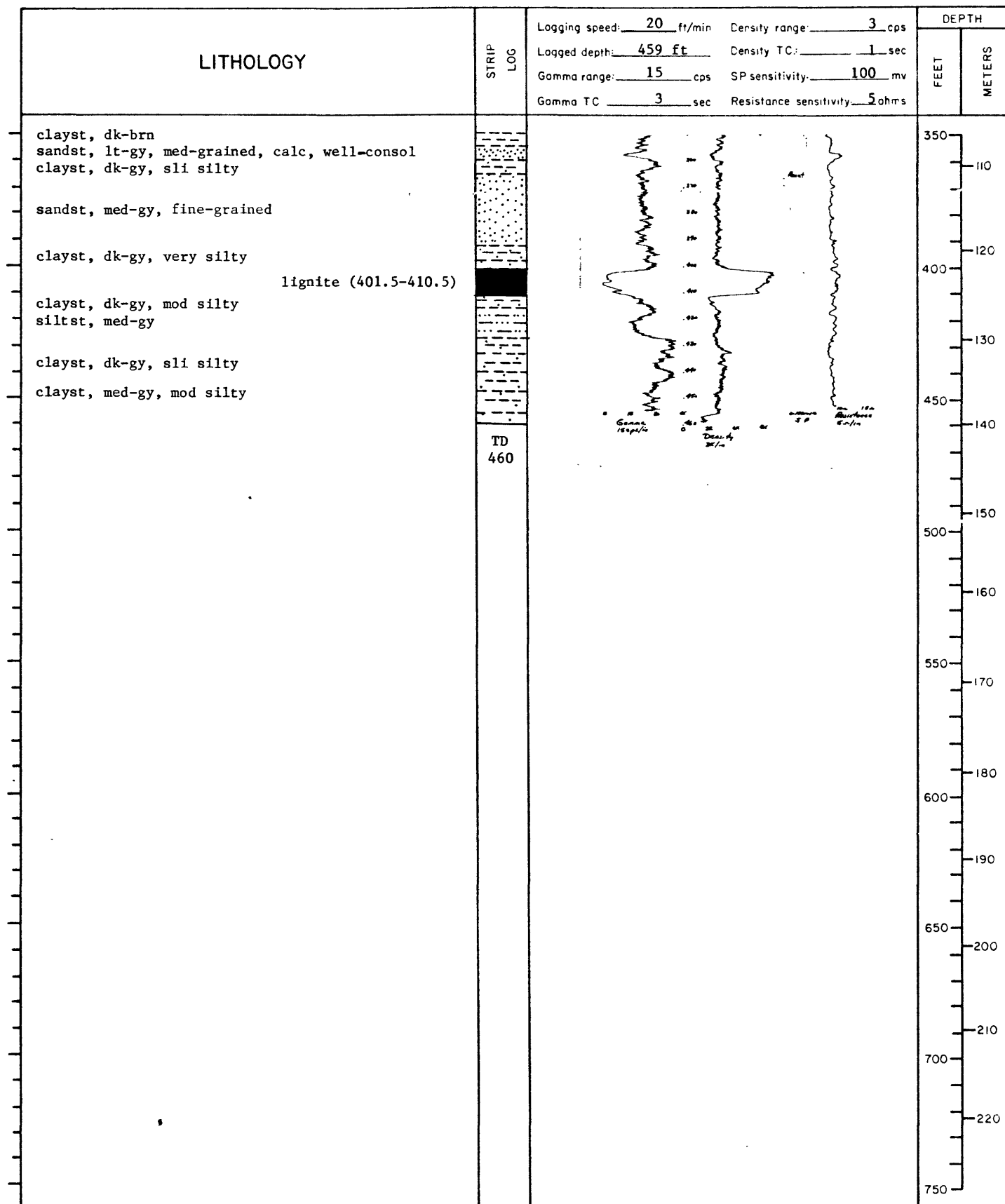
AREA Three River		QUAD NAME Belfield 4 NE (Preliminary)			
DATE STARTED 7-19-79	DATE COMP. 7-19-79	COUNTY Stark	STATE North Dakota		
LOCATION: SEC. 30 T. 137 N., R. 98 W., FOOTAGE LOC.		6 ft	KXX FSL	100 ft	FEL KXX
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE		TOTAL DEPTH 460 ft	
		ROTARY 460 ft	CORING ---		
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 19 ft	
LITHOLOGY RECORDED BY M. Hudson		GEOPHYSICAL LOGS RECORDED BY J. Wald			

REMARKS:





## REMARKS:

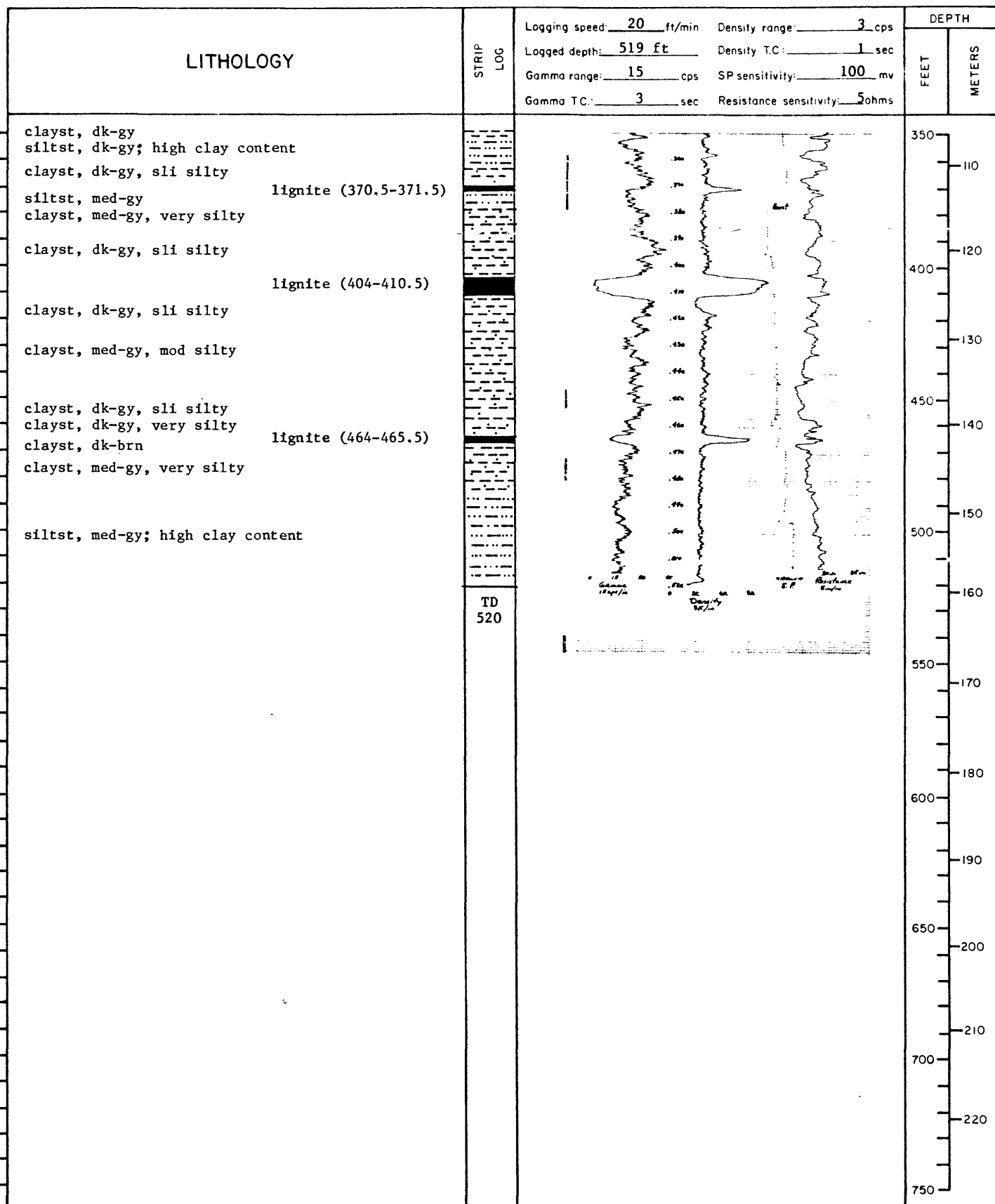


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 136  
SHEET 1 OF 2

AREA Three River		QUAD NAME New England NW	
DATE STARTED 7-18-79	DATE COMP. 7-18-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 10 T. 137 N., R. 97 W., FOOTAGE LOC.		20 ft FNL KXX	65 ft RXX FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		GROUND ELEV 2648 ft	
		TOTAL DEPTH 520 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth: 519 ft	Density T.C. 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
		DEPTH	
		FEET	METERS
soil, lt-brn, silt, clay, unconsol			0 0
siltst, med-brn			
clayst, med-gy, mod silty			10
siltst, med-gy			50
			20
sandst, med-gy, fine-grained			100 30
			40
clayst, dk-gy, mod silty			150
			50
lignite (173-176.5)			
lignite (179.5-180.5)			
clayst, med-gy, very silty			200 60
siltst, med-gy			
clayst, dk-gy, very silty			70
lignite (233-240)			
clayst, med-gy, mod silty			250
			80
siltst, med-gy; high clay content			
clayst, dk-gy, very silty			90
siltst, dk-gy			300
lignite (296.5-297.5)			
sandst, med-gy, fine-grained			100
			350

## REMARKS:

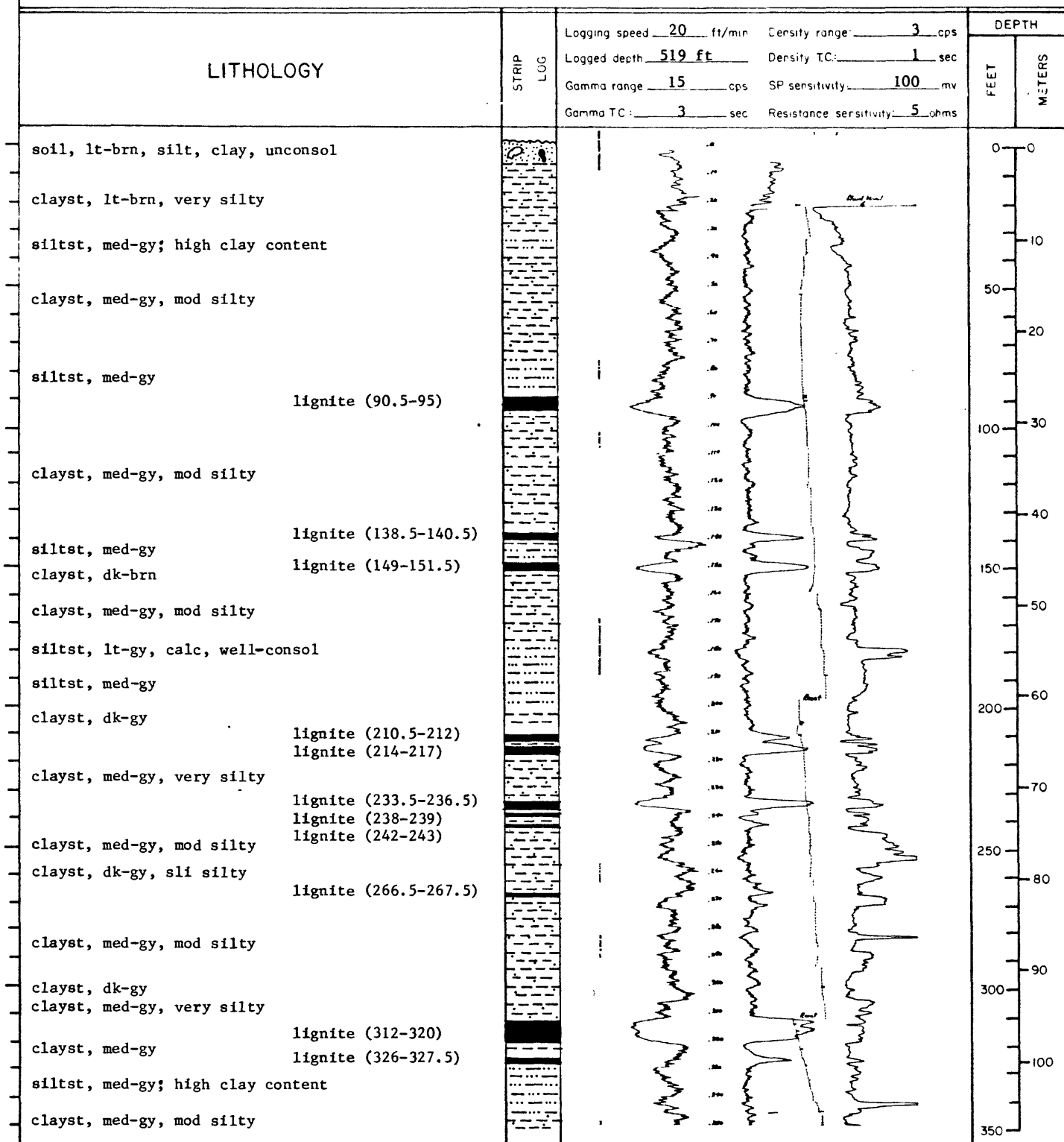


# UNITED STATES GEOLOGICAL SURVEY

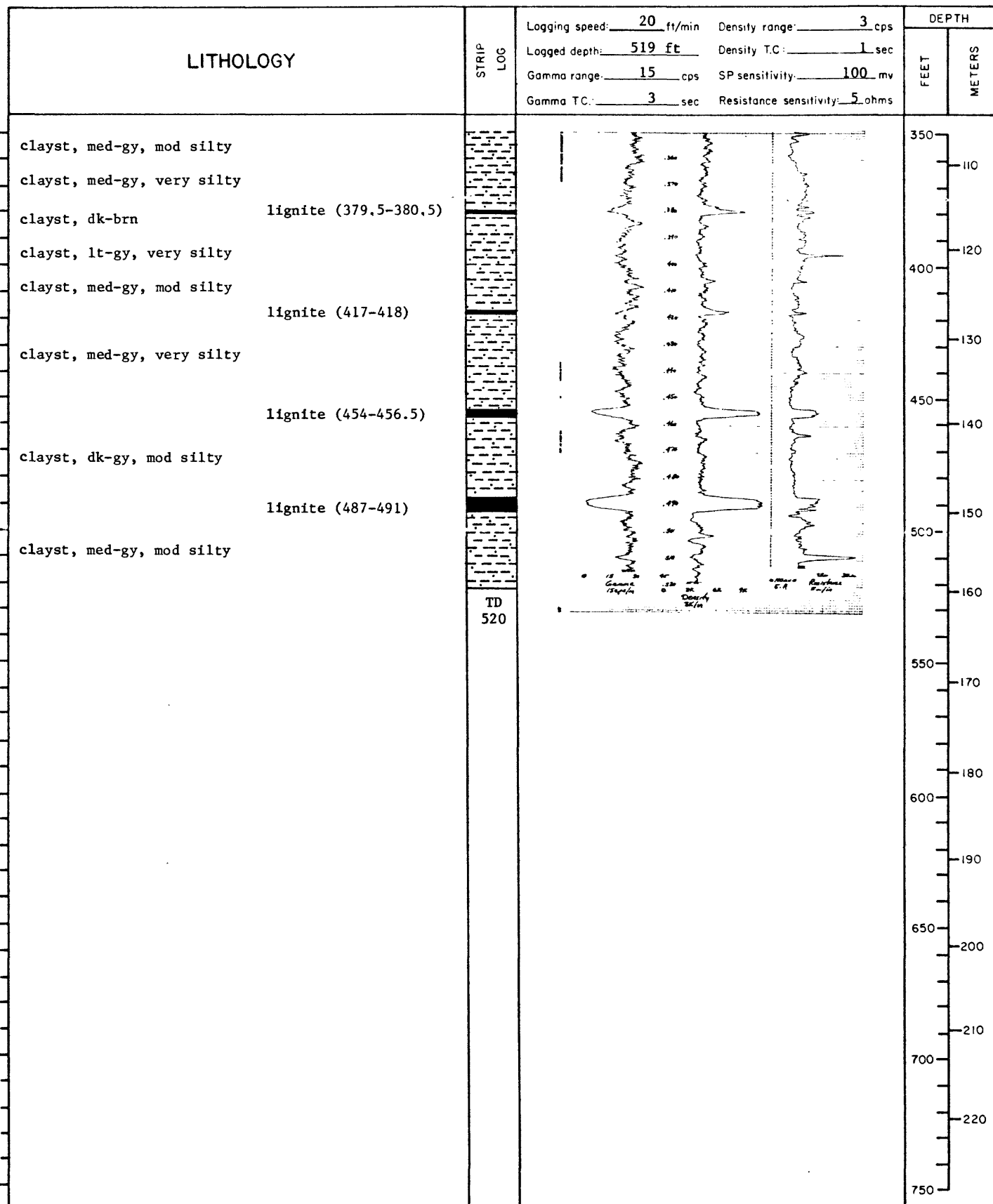
HOLE NO 137  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Scheffield</b>	
DATE STARTED <b>7-18-79</b>	DATE COMP. <b>7-18-79</b>	COUNTY <b>Stark</b>	STATE <b>North Dakota</b>
LOCATION: SEC. <b>6 T.137 N., R. 96 W.,</b>		FOOTAGE LOC. <b>48 ft</b>	GROUND ELEV. <b>2625 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>520 ft</b>	TOTAL DEPTH <b>520 ft</b>
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	DEPTH TO FLUID LEVEL <b>21 ft</b>
LITHOLOGY RECORDED BY <b>M. Hudson</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	

REMARKS:



## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

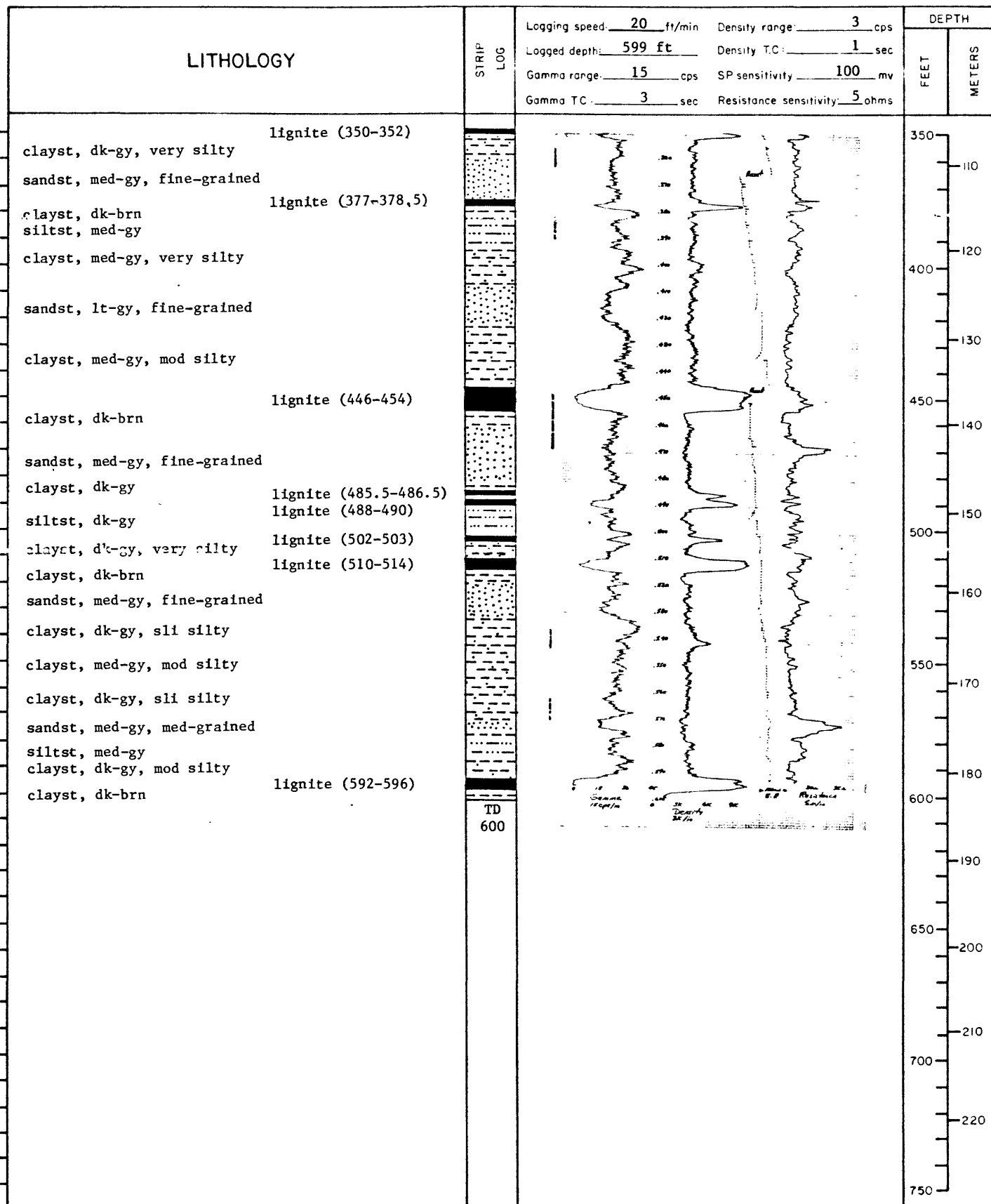
HOLE NO 138  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>Scheffield</b>	
DATE STARTED <b>7-18-79</b>	DATE COMP. <b>7-18-79</b>	COUNTY <b>Stark</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 30 T.137 N., R. 96 W., FOOTAGE LOC. <b>520 ft</b>		<del>XXXX</del> FSL <b>60 ft</b>	<del>XXXX</del> FWL <b>GROUND ELEV 2728 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>600 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	
LITHOLOGY RECORDED BY <b>S. Christensen</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS:			

LITHOLOGY	STRIP LOG	Geophysical Data		DEPTH	
		Logging speed <u>20</u> ft/min Logged depth <u>599</u> ft Gamma range <u>15</u> cps Gamma T.C. <u>3</u> sec	Density range: <u>3</u> cps Density T.C.: <u>1</u> sec SP sensitivity: <u>100</u> mv Resistance sensitivity: <u>5</u> ohms	FEET	METERS
soil, lt-brn, sand, silt, unconsol				0	0
sandst, med-brn, fine-grained					
siltst, med-gy; high clay content					
lignite (40-41)					
clayst, med-gy, sli silty					
siltst, lt-gy					
clayst, dk-gy, sli silty					
lignite (82.5-87.5)					
clayst, med-gy, mod silty					
lignite (130-137)					
clayst, dk-brn					
clayst, med-gy, very silty					
clayst, dk-gy, sli silty					
lignite (159.5-161)					
lignite (162.5-164)					
clayst, dk-gy, sli silty					
lignite (171-172.5)					
lignite (178-179.5)					
siltst, med-gy					
clayst, lt-gy, sli silty					
sandst, med-gy, fine-grained					
clayst, dk-gy					
lignite (270.5-280)					
clayst, dk-brn					
clayst, med-gy, mod silty					
siltst, med-gy; high clay content					
clayst, dk-gy, sli silty					
sandst, med-gy					
clayst, dk-gy					

## REMARKS:

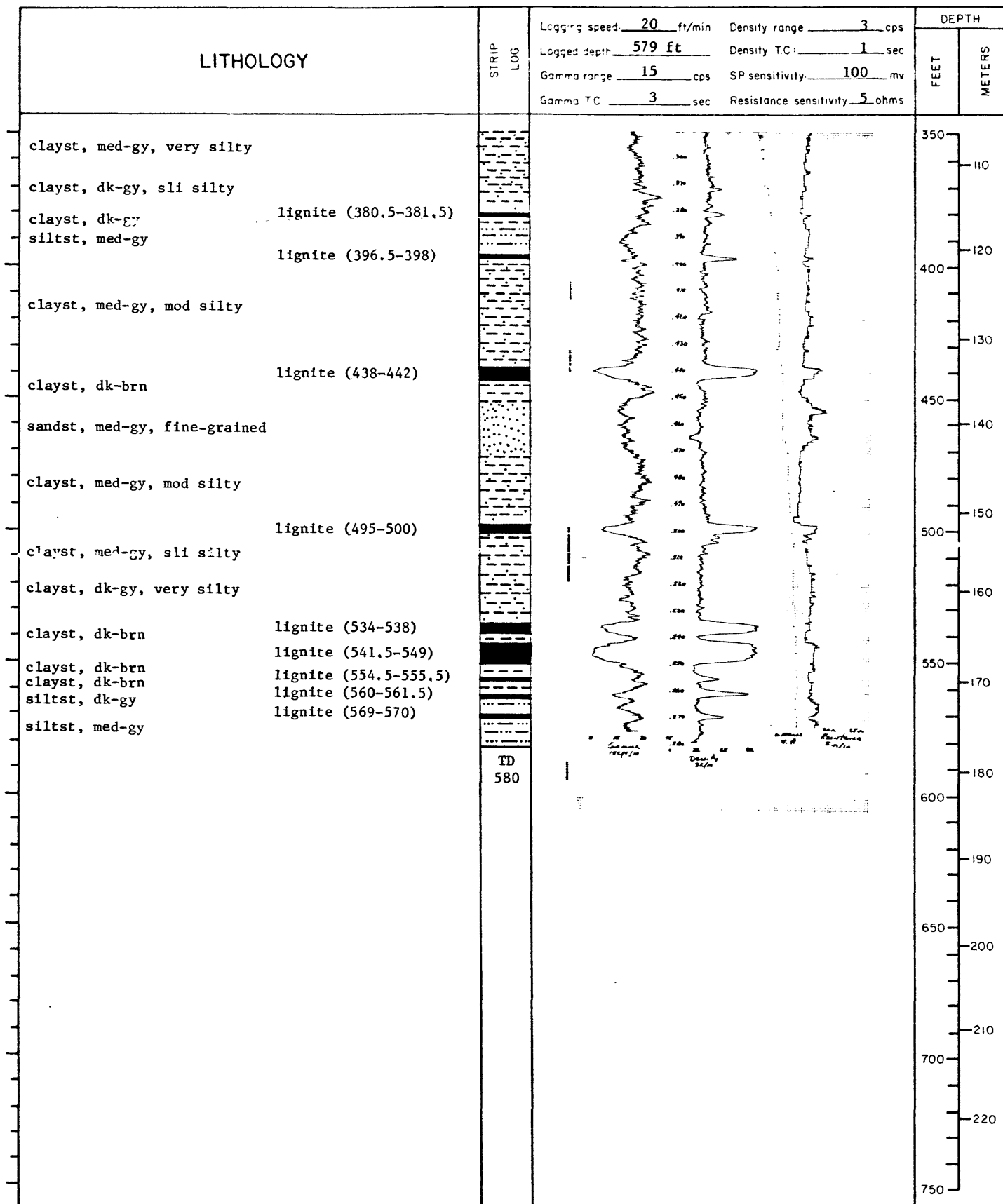


HOLE NO 139  
SHEET 1 OF 2

274



## REMARKS:

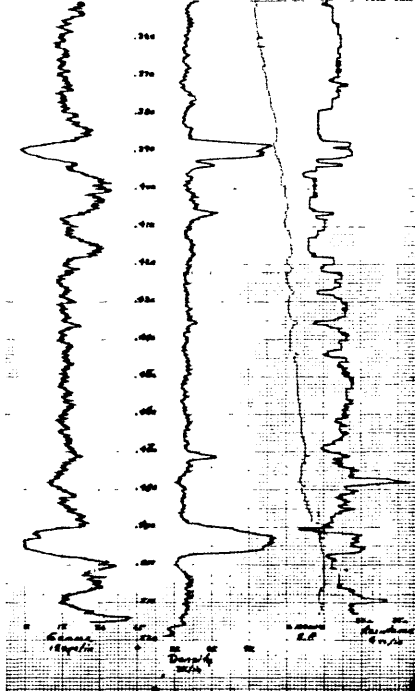


## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 140  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lefor	
DATE STARTED 7-9-79	DATE COMP. 7-9-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 12 T.137 N., R. 95 W., FOOTAGE LOC.		84 ft FNL XBL	24 ft FNL FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 520 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company	DRILL TYPE: Rotary		GROUND ELEV 2640 ft
LITHOLOGY RECORDED BY M. Hudson	GEOPHYSICAL LOGS RECORDED BY J. Wald		TOTAL DEPTH 520 ft
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed: 20 ft/min	Density range: 3 cps
		Logged depth 519 ft	Density T.C.: 1 sec
		Gamma range: 15 cps	SP sensitivity: 100 mv
		Gamma T.C.: 3 sec	Resistance sensitivity: 5 ohms
soil, lt-brn, silt, clay, unconsol			
clayst, med-brn, mod silty			
lignite (39.5-40.5)			
clayst, med-gy, mod silty			
clayst, lt-gy, very silty			
siltst, med-gy			
clayst, dk-gy, very silty			
lignite (224.5-225.5)			
clayst, med-gy, very silty			
siltst, med-gy; high clay content			
clayst, dk-gy, very silty			
lignite (323-324.5)			
clayst, med-gy, very silty			
lignite (337.5-338.5)			

## REMARKS:

LITHOLOGY	STRIP LOG	Logging speed: <u>20</u> ft/min    Density range: <u>3</u> cps		DEPTH	
		Logged depth: <u>519</u> ft	Density TC: <u>1</u> sec	FEET	METERS
		Gamma range: <u>15</u> cps	SP sensitivity: <u>100</u> mv		
		Gamma TC: <u>3</u> sec	Resistance sensitivity: <u>5</u> ohms		
clayst, med-gy, very silty				350	
siltst, med-gy				110	
clayst, dk-gy					
lignite (387.5-392)				120	
clayst, dk-gy, sli silty					
lignite (393-394)				400	
siltst, dk-gy					
clayst, med-gy, mod silty				130	
siltst, med-gy				450	
				140	
				150	
siltst, dk-gy					
lignite (471-472)				500	
clayst, dk-gy, mod silty					
				160	
				550	
clayst, dk-brn, sli silty				170	
sandst, med-gy, fine-grained					
clayst, med-gy, sli silty				180	
				600	
				190	
				650	
				200	
				210	
				700	
				220	
				750	
	TD 520				
	277				

# UNITED STATES GEOLOGICAL SURVEY

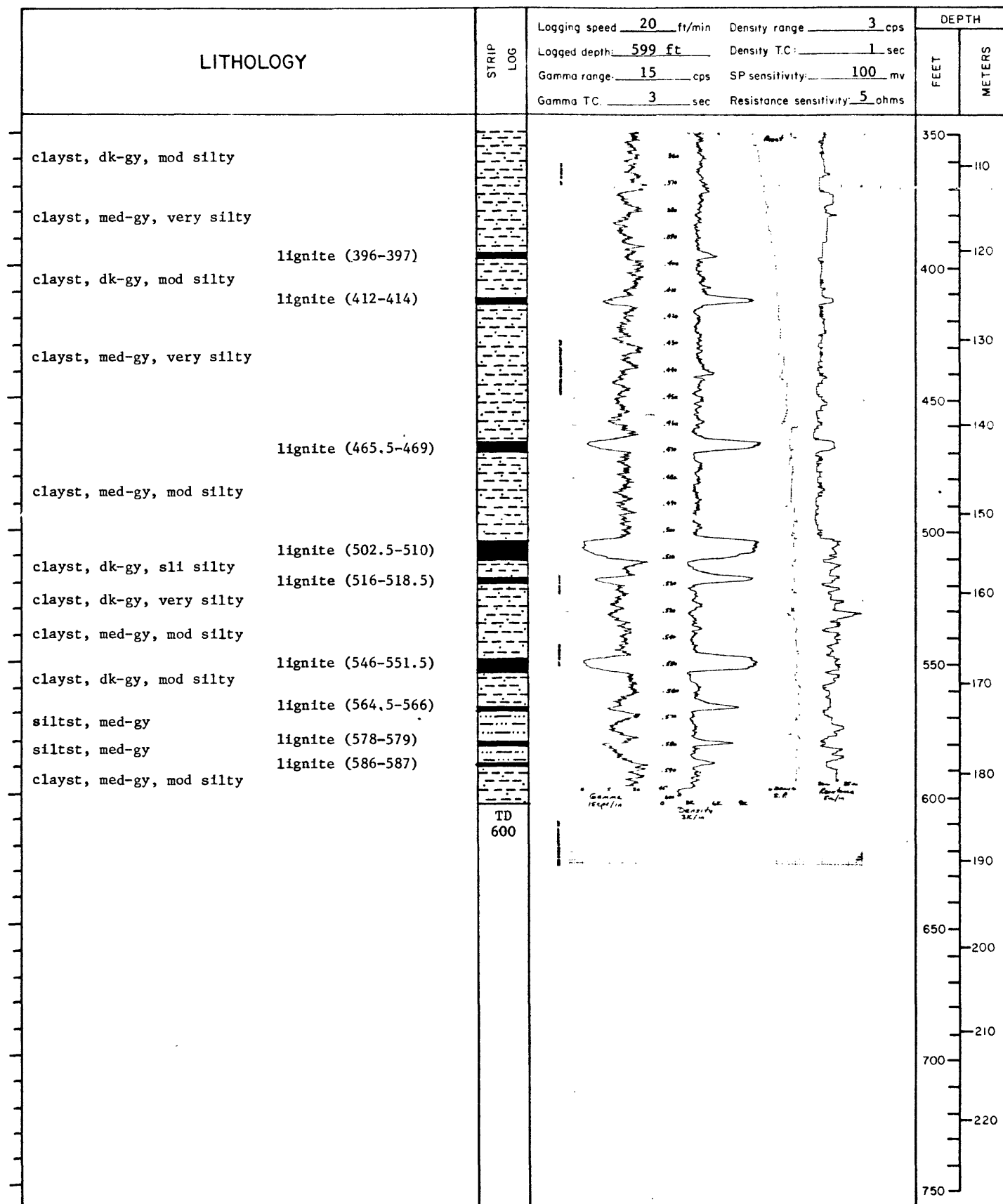
HOLE NO 141  
SHEET 1 OF 2

AREA Three River		QUAD NAME Lefor NW	
DATE STARTED 7-10-79	DATE COMP. 7-10-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 30 T.137 N., R. 95 W., FOOTAGE LOC.		12 ft <del>XXX</del> FSL 41 ft <del>XXX</del> FWL	GROUND ELEV 2750 ft
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 600 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			

LITHOLOGY	STRIP LOG	LOGGING DATA		DEPTH	
		Logging speed 20 ft/min	Density range 3 cps	FEET	METERS
soil, lt-brn, sand, silt, unconsol		Logged depth 599 ft	Density TC 1 sec	0	0
sandst, med-brn, fine-grained		Gamma range 15 cps	SP sensitivity 100 mv	10	
clayst, med-gy, mod silty		Gamma TC 3 sec	Resistance sensitivity 5 ohms	50	
clayst, dk-gy, sli silty				20	
siltst, med-gy; high clay content				100	30
clayst, med-gy, mod silty				150	
clayst, dk-gy, mod silty lignite (118.5-119.5)				40	
clayst, dk-gy, sli silty lignite (126-127)				50	
siltst, med-gy				200	60
clayst, med-gy, very silty				70	
siltst, med-gy				250	80
sandst, med-gy, fine-grained				300	90
clayst, dk-gy, mod silty lignite (229-231)				100	
clayst, med-gy, very silty				350	
siltst, med-gy; high clay content					
sandst, lt-gy, fine-grained, calc, well-consol					
clayst, med-gy, very silty					
clayst, dk-gy, mod silty lignite (333.5-339.5)					

## REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

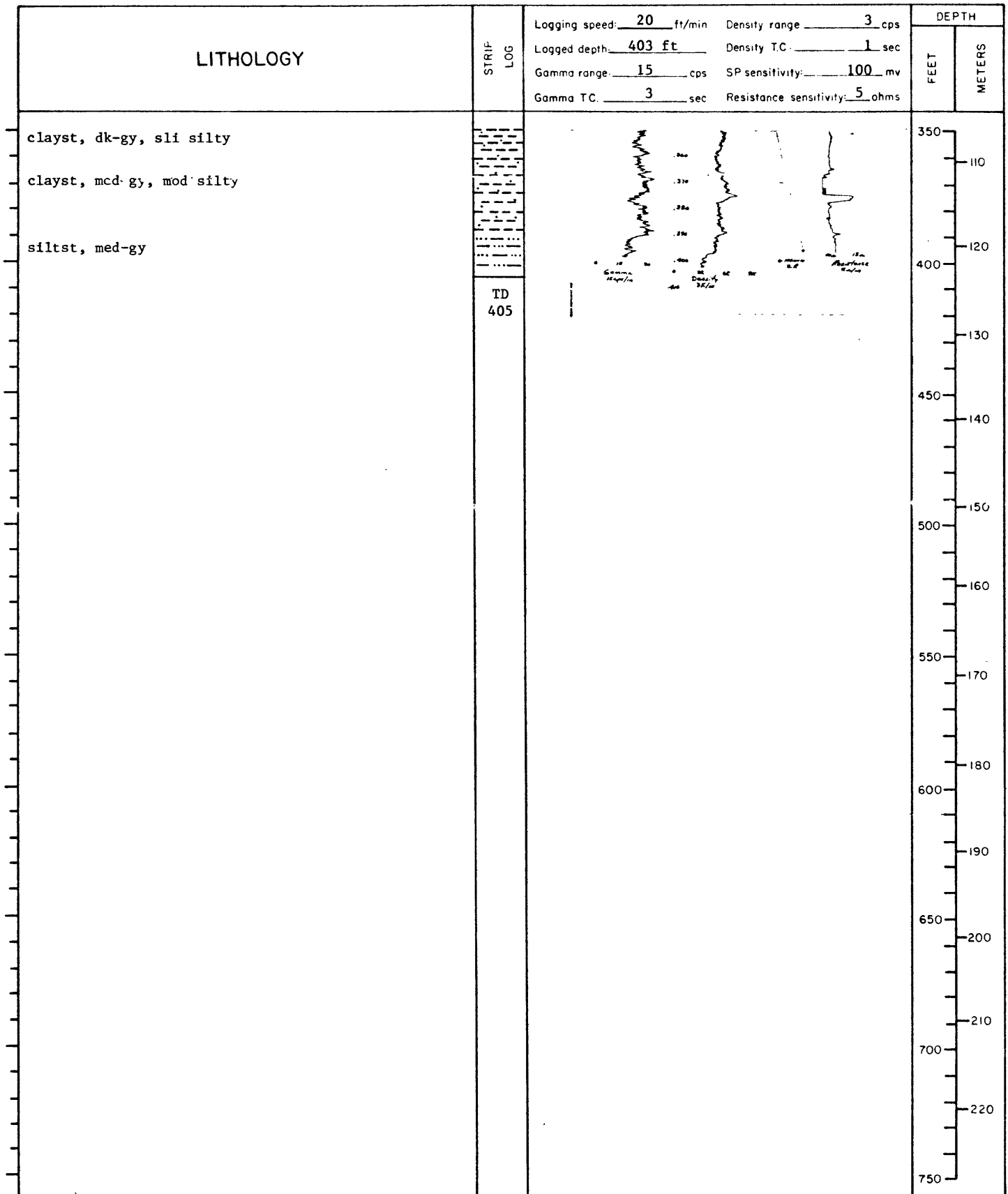
HOLE NO 142  
SHEET 1 OF 2

AREA <b>Three River</b>		QUAD NAME <b>White Butte NW</b>	
DATE STARTED <b>7-9-79</b>	DATE COMP. <b>7-9-79</b>	COUNTY <b>Stark</b>	STATE <b>North Dakota</b>
LOCATION: SEC. 24 T. 137 N., R. 94 W., FOOTAGE LOC. <b>1725 ft</b>		FNL <del>XXX</del> <b>15 ft</b>	FEL <del>XXX</del> <b>2540 ft</b>
SIZE AND BIT TYPE: <b>4-3/4 inch drag</b>		FOOTAGE ROTARY <b>405 ft</b> CORING <b>---</b>	
DRILLING AGENCY: <b>Gregory Drilling Company</b>		DRILL TYPE: <b>Rotary</b>	
LITHOLOGY RECORDED BY <b>A. Banet</b>		GEOPHYSICAL LOGS RECORDED BY <b>J. Wald</b>	
REMARKS:			

LITHOLOGY	STRIP	LOG	GEOPHYSICAL DATA		DEPTH	
			Logging speed <u>20</u> ft/min Logged depth <u>403 ft</u> Gamma range <u>15</u> cps Gamma TC <u>3</u> sec	Density range <u>3</u> cps Density TC <u>1</u> sec SP sensitivity <u>100</u> mv Resistance sensitivity <u>5</u> ohms	FEET	METERS
soil, lt-brn, silt, clay, unconsol					0	0
siltst, med-brn					10	
clayst, med-gy, very silty					50	
clayst, lt-gy, mod silty, calc					20	
siltst, med-gy					100	30
clayst, dk-gy, mod silty					40	
clayst, med-gy, mod silty					150	50
clayst, dk-gy, sli silty					200	60
sandst, med-gy, fine-grained					250	70
clayst, med-gy, mod silty					300	90
clayst, med-gy, sli silty					350	100
clayst, dk-gy, sli silty						350

REMARKS:



# UNITED STATES GEOLOGICAL SURVEY

HOLE NO 143  
SHEET 1 OF 2

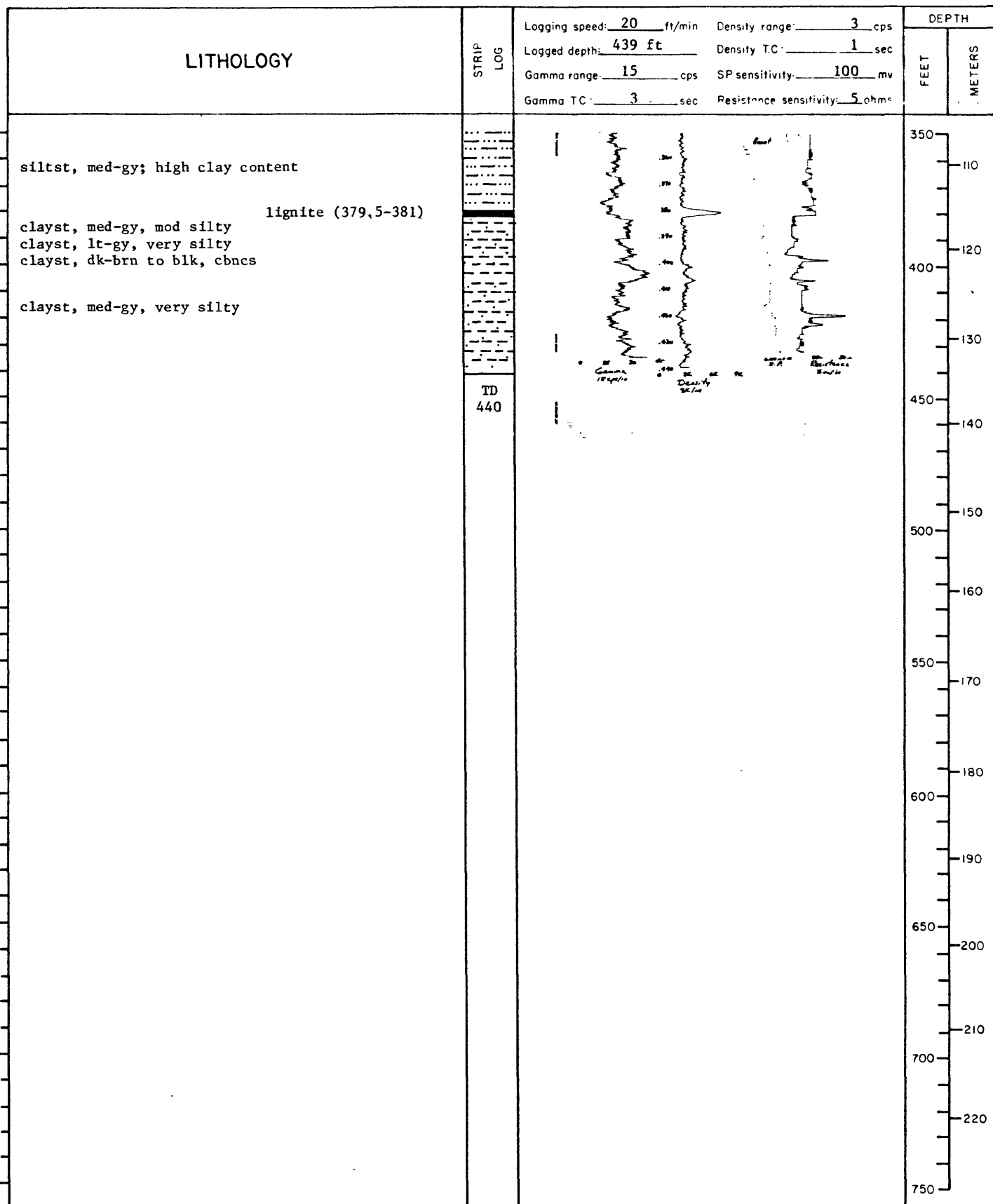
AREA      Three River		QUAD NAME      Lefor	
DATE STARTED      7-10-79	DATE COMP      7-10-79	COUNTY      Stark	STATE      North Dakota
LOCATION: SEC. 30 T.137 N., R.94 W. , FOOTAGE LOC.      20 ft      FNL <del>XXX</del> 2610 ft      FEL <del>XXX</del>		GROUND ELEV      2520 ft	
SIZE AND BIT TYPE:      4-3/4 inch drag		FOOTAGE ROTARY      440 ft      CORING      ---	
DRILLING AGENCY:      Gregory Drilling Company		DRILL TYPE:      Rotary	
LITHOLOGY RECORDED BY      A. Banet		GEOPHYSICAL LOGS RECORDED BY      J. Wald	
REMARKS:			

LITHOLOGY	STRIP	LOG	GEOPHYSICAL DATA		
			Logging speed: 20 ft/min Logged depth: 439 ft Gamma range: 15 cps Gamma T.C.: 3 sec	Density range: 3 cps Density T.C.: 1 sec SP sensitivity: 100 mv Resistance sensitivity: 5 ohms	
soil, lt-brn, sand, silt, unconsol	LOG	STRIP		DEPTH	
sandst, lt-brn, fine-grained				FEET	METERS
clayst, med-gy, mod silty				0	0
siltst, med-gy				10	
sandst, med-gy, med-grained, calc				50	
clayst, med-gy, very silty				20	
clayst, dk-gy, sli silty				100	30
clayst, med-gy, very silty				40	
siltst, med-brn				150	50
clayst, med-gy, mod silty				50	
clayst, dk-gy, sli silty				200	60
siltst, med-gy				70	
clayst, dk-gy, sli silty				250	80
clayst, med-gy, very silty				80	
siltst, lt-gy				90	
sandst, med-gy, fine-grained				300	90
siltst, med-gy; high clay content	100				
	350	100			



## REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

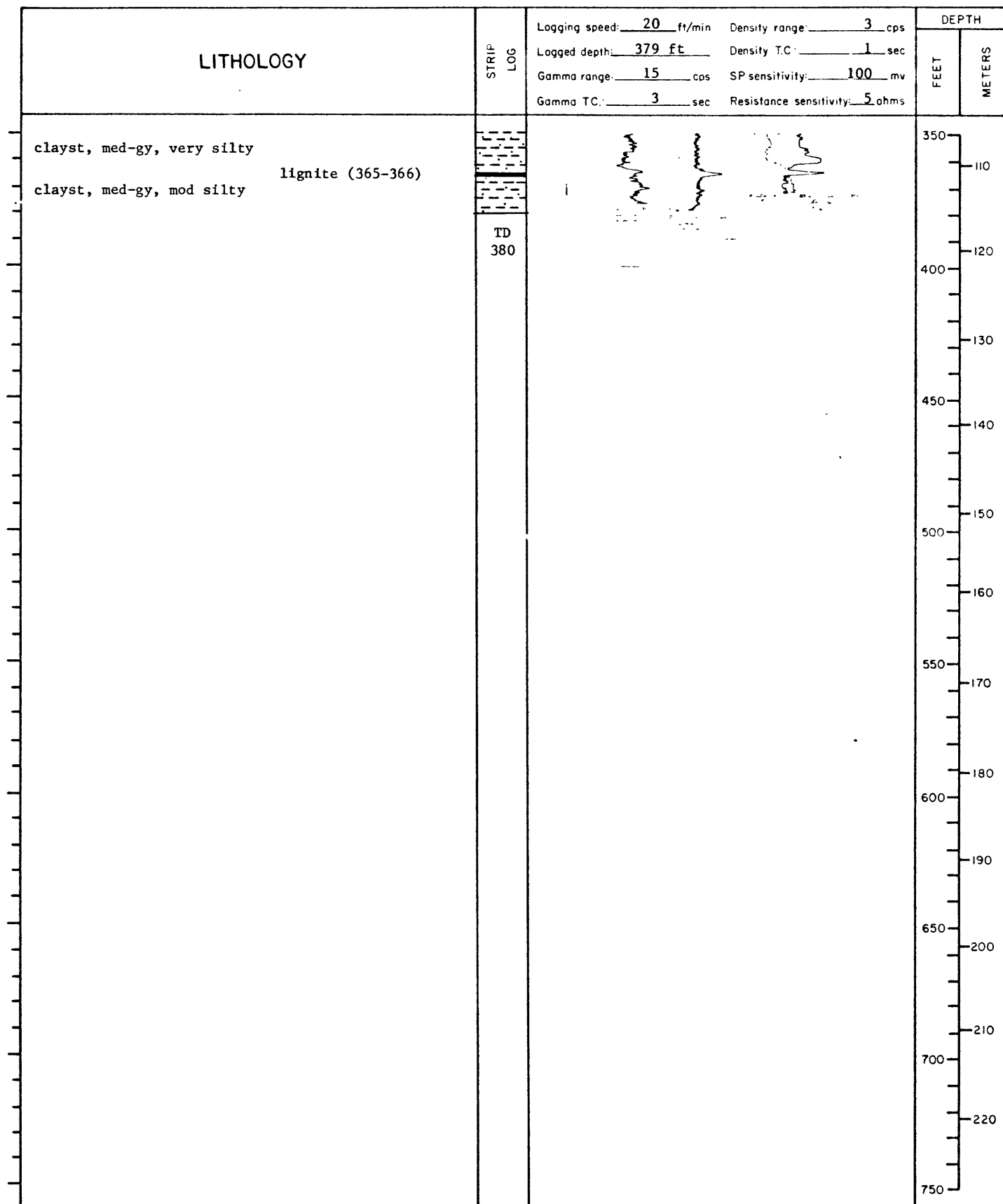
HOLE NO 144  
SHEET 1 OF 2

AREA Three River		QUAD NAME White Butte NW			
DATE STARTED 7-5-79	DATE COMP. 7-5-79	COUNTY Stark	STATE North Dakota		
LOCATION: SEC. 22 T.137 N., R. 93 W., FOOTAGE LOC.		12 ft FNL <del>XXX</del>	54 ft FEL <del>XXX</del>	GROUND ELEV 2526 ft	
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 380 ft CORING ---		TOTAL DEPTH 380 ft	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary		DEPTH TO FLUID LEVEL 30 ft	
LITHOLOGY RECORDED BY A. Banet		GEOPHYSICAL LOGS RECORDED BY J. Wald			
REMARKS:					

LITHOLOGY	STRIP LOG	Logging speed 20 ft/min Density range: 3 cps		DEPTH	
		Logged depth 379 ft	Density TC 1 sec	FLEET	METERS
soil, lt-brn, silt, clay, unconsol				0	0
siltst, med-brn; high clay content lignite (12.5-13.5)					
siltst, med-gy				10	
clayst, dk-brn lignite (59-60)				50	
siltst, med-gy				20	
clayst, med-gy, mod silty					
siltst, med-gy				100	30
clayst, dk-gy lignite (107.5-109.5)					
clayst, med-gy, very silty					
clayst, dk-gy, very silty lignite (129-130.5)				40	
siltst, med-gy; high clay content				150	50
clayst, dk-gy, mod silty lignite (181-182)					
siltst, med-gy lignite (184-185)				200	60
clayst, dk-gy					
siltst, lt-gy					
clayst, dk-gy, mod silty					
siltst, dk-gy lignite (225.5-226.5)				70	
siltst, dk-gy lignite (230-231)					
clayst, dk-brn lignite (237-238)				250	80
clayst, med-gy, mod silty					
clayst, med-gy, very silty				300	90
clayst, dk-gy, very silty lignite (276.5-277.5)					
clayst, med-gy, mod silty lignite (286-287)					
siltst, med-gy					
clayst, dk-gy, mod silty					
siltst, med-gy					
clayst, med-gy, sli silty					
clayst, dk-gy, sli silty lignite (335.5-337)				350	100

REMARKS:



## UNITED STATES GEOLOGICAL SURVEY

HOLE NO 145  
SHEET 1 OF 1

AREA Three River		QUAD NAME White Butte NE	
DATE STARTED 7-5-79	DATE COMP. 7-5-79	COUNTY Stark	STATE North Dakota
LOCATION: SEC. 22 T.137 N., R. 92 W., FOOTAGE LOC.		45 ft FNL <del>XXX</del>	12 ft <del>XXX</del> FWL
SIZE AND BIT TYPE: 4-3/4 inch drag		FOOTAGE ROTARY 340 ft CORING ---	
DRILLING AGENCY: Gregory Drilling Company		DRILL TYPE: Rotary	
LITHOLOGY RECORDED BY S. Christensen		GEOPHYSICAL LOGS RECORDED BY J. Wald	
REMARKS:			
LITHOLOGY	STRIP LOG	Logging speed 20 ft/min	Density range 3 cps
		Logged depth 339 ft	Density TC 1 sec
		Gamma range 15 cps	SP sensitivity 100 mv
		Gamma TC 3 sec	Resistance sensitivity 5 ohms
		DEPTH	
		FEET	METERS
soil, lt-brn, sand, silt, unconsol			0 0
sandst, med-gy, fine-grained			
lignite (39-40)			10
clayst, med-gy, very silty			50
lignite (71.5-72.5)			20
lignite (74-75)			
clayst, med-gy, very silty			100
lignite (103-104.5)			30
siltst, dk-gy			
clayst, dk-gy, mod silty			40
clayst, med-gy, very silty			
sandst, med-gy, med-grained, calc			150
clayst, med-gy, very silty			50
siltst, med-gy			
clayst, med-gy, mod silty			200
clayst, med-gy, very silty			60
clayst, dk-gy, sli silty			
clayst, med-gy, very silty			70
lignite (256.5-257.5)			250
sandst, lt-gy, fine-grained			80
clayst, dk-gy			
clayst, med-gy, very silty			300
clayst, med-gy, sli silty			90
			100
			350
	TD 340		

HOLE NO 146  
SHEET 1 OF 2

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REMARKS:

