UNITED STATES DEPARTMENT OF THE INTERIOR GEOLOGICAL SURVEY

COAL DRILLING DURING 1978 IN BIG HORN, DANIELS, DAWSON,
MUSSELSHELL, RICHLAND, ROOSEVELT, ROSEBUD, VALLEY,
AND YELLOWSTONE COUNTIES, MONTANA

Ву

U.S. Geological Survey

and

Montana Bureau of Mines and Geology

Open-File Report 80-267

1980

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

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Abbreviations used in this report	
cbncs - carbonaceous E.R electrical resistance fe - ferruginous Sens. setting - sensitivity setting S.P spontaneous potential	
T.C time constant	

COAL DRILLING DURING 1978 IN BIG HORN, DANIELS, DAWSON, MUSSELSHELL, RICHLAND, ROOSEVELT, ROSEBUD, VALLEY,

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By U.S. Geological Survey

and

Montana Bureau of Mines and Geology

Introduction

Between April 19 and December 1, 1978, 196 test holes, for a total of 69,986 ft, were drilled in Big Horn, Daniels, Dawson, Musselshell, Richland, Roosevelt, Rosebud, Valley, and Yellowstone Counties, Mont. (figs. 1-6). Selected samples were taken, and splits were submitted to the U.S. Bureau of Mines for proximate analyses, ultimate analyses, heating-value determinations, and analyses of forms of sulfur. Analyses of trace elements in coal ash have been made by the U.S. Geological Survey (USGS) and will be published later.

The drilling was conducted under two USGS grants (14-08-0001-G-441) and 14-08-0001-G-555) to the Montana Bureau of Mines and Geology (MBMG) for the purpose of evaluating and classifying mineral lands in the public domain.

Because of the lack of topographic map coverage and because of the poor weather conditions at the time of drilling, surface elevations for several drill holes were not recorded. These drill holes are: US-78150 through US-78162, US-78165 through US-78167, and US-78187 through US-78189. An altimeter survey of the drill sites will be conducted during the 1980 field season, and the results will be reported later.

The locations of drill holes are identified on the logs by township, range, section, and tract. For the tract designation, each section is

first divided symmetrically into four quadrants, designated A for northeast quadrant, B for northwest quadrant, C for southwest quadrant, and D for southeast quadrant. Then each of those is divided into four equal quadrants and designated by the same letter system. This system is repeated until a single section is divided into 256 equal units. A location within 1/256th of a section (2.5 acres is a standard section) is therefore designated by a progression of four letters. For example, the tract designation ACDC is in the SW4SE4SW4NE4 of a section.

Acknowledgments

Fieldwork was done by: H. J. Jensen, L. A. Sauer, and K. L. Williams, technicians, and Miller Hansen and R. J. Pederson, geologists (all MBMG personnel). Drill-hole locations were proposed by Deborah Allen, A. C. Banet, Jr., Carole Connor, Charles Frey, Jim Hinds, Vickie D. Niermeier, J. M. Spencer, M. A. S. Spencer, and Steven Volz (all USGS geologists). Field assistance was provided by A. C. Banet, Jr., Carole Connor, Charles Frey, and M. A. S. Spencer. Coordinator of field activities was R. E. Matson (MBMG).

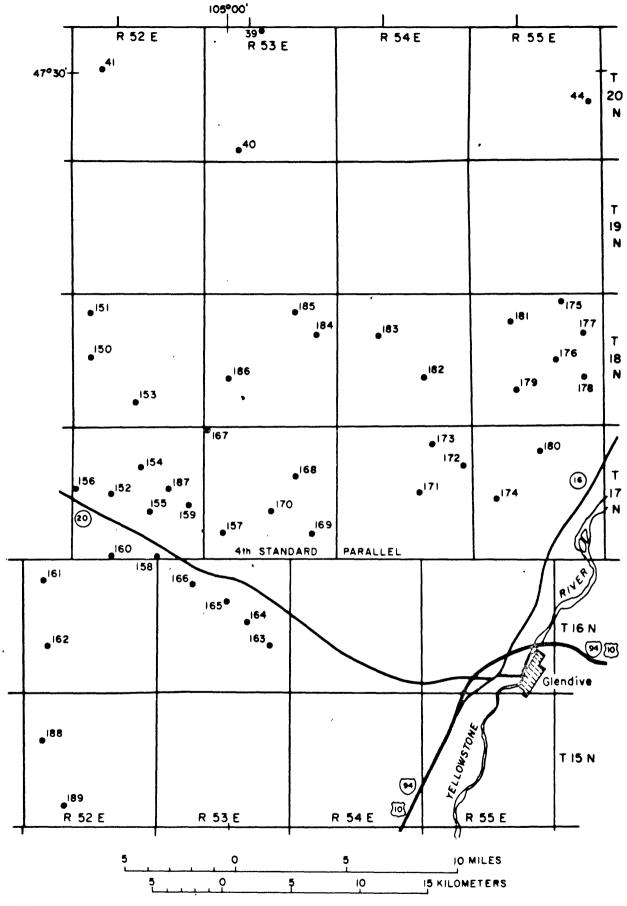
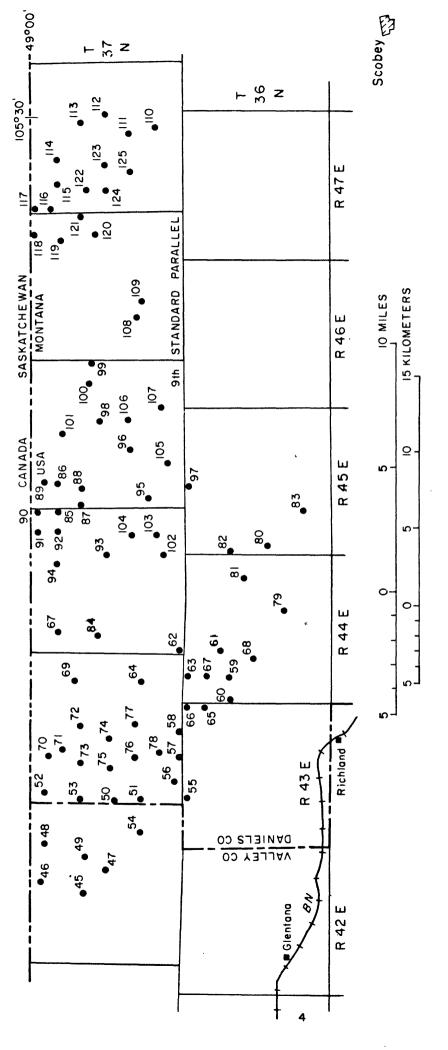


Figure 1. - Location of holes drilled by U.S. Geological Survey and Montana Bureau of Mines and Geology in Dawson County, Montana, in 1978. US-78 prefix omitted from each drill-hole number but included on logs.



Jure 2. - Location of holes drilled by U.S. Geological Survey and Montana Bureau of Mines and Geology in Daniels and Valley Counties, Montana, in 1978. US-78 prefix omitted from each drill-hole number but included on logs. Figure 2.

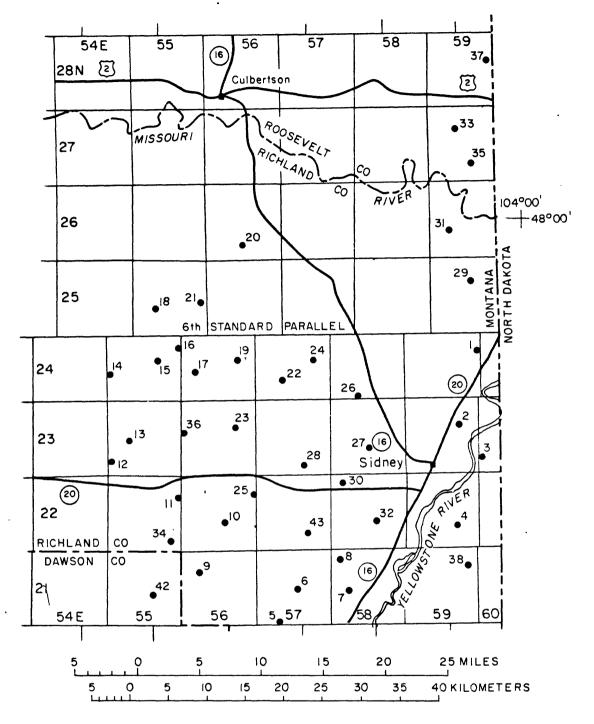


Figure 3. - Location of holes drilled by U.S. Geological Survey and Montana Bureau of Mines and Geology in Richland, Roosevelt, and Dawson Counties, Montana, in 1978. US-78 prefix omitted from each drill-hole number but included on logs.

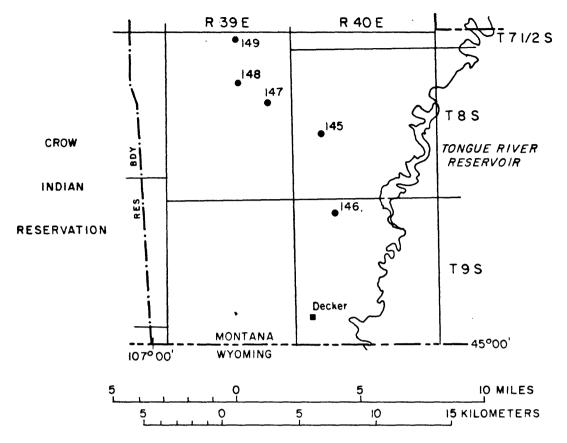
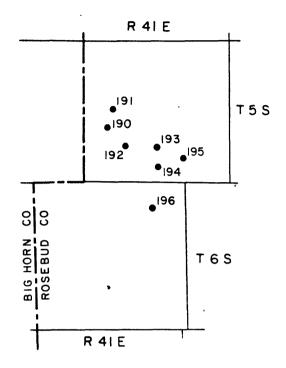


Figure 4. - Location of holes drilled by U.S. Geological Survey and Montana Bureau of Mines and Geology in Big Horn County, Montana, in 1978. US-78 prefix omitted from each drill-hole number but included on logs.





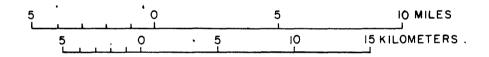


Figure 5. - Location of holes drilled by U.S. Geological Survey and Montana Bureau of Mines and Geology in Rosebud County, Montana, in 1978. US-78 prefix omitted from each drill-hole number but included on logs.

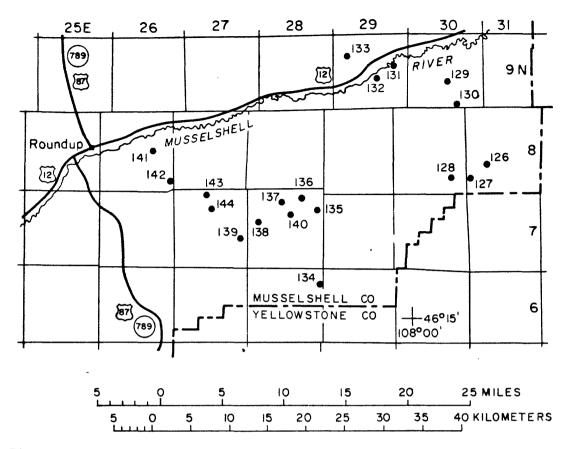
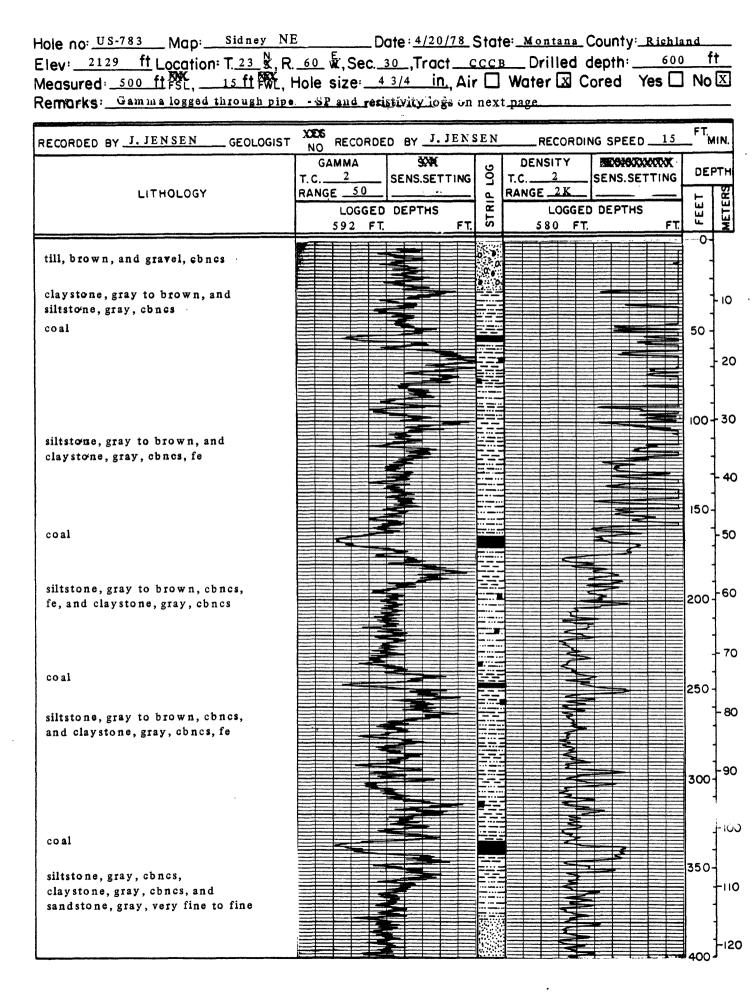


Figure 6. - Location of holes drilled by U.S. Geological Survey and Montana Bureau of Mines and Geology in Musselshell and Yellowstone Counties, Montana, in 1978. US-78 prefix omitted from each drill-hole number but included on logs.

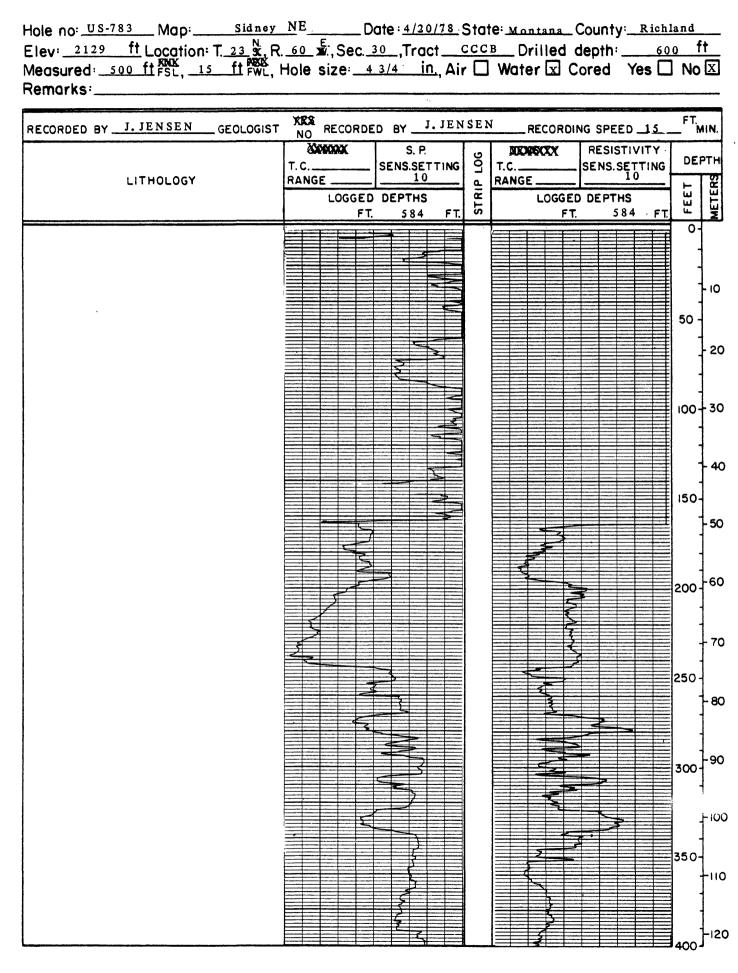
Hole no: US-781 Map: Fairview	D	ate: 4/19/78	Stat	e: Montana	County: Rich	land	
Elev: 2142 ft Location: T. 24 x, R. Measured: 90 ft FSX, 800 ft FEL Remarks:	. <u>59</u> xv.,Sec Hole size: <u>4</u>	13 ,Tract 3/4 in., Ai	r \square	A Drilled Water 🗵 (depth: 40	00 T	<u>X</u>
RECORDED BY K. WILLIAMS GEOLOGIST	XXES NO RECORDE	ED BY K.WII	LIA	M S RECORD	ING SPEED	FT N	MIN.
LITHOLOGY	GAMMA T.C2 RANGE200	S. P. SENS.SETTING 500 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 5 K	RESISTIVITY SENS.SETTING 100 D DEPTHS	FEET	METERS T
alluvium			0 0 0 0			50 -	- 10
siltstone, gray, cbncs, and claystone, gray, cbncs						100	30
coal						150-	- 40 - 50
claystone, light-gray, cbncs, and siltstone, light-gray to gray, cbncs	N. W.				8 8	200	-60 -70
coal, with partings of claystone, gray						250 ·	-
siltstone, light-gray to gray, cbncs, and claystone, gray, cbncs	3		60 - 10 - 10 - 10 - 10 - 10 - 10 - 10 -		3	300	-90
claystone, gray, cbncs, and siltstone, gray, cbncs coal	\$				*	350-	-110
claystone, gray, and siltstone, gray	Ž				2		-120

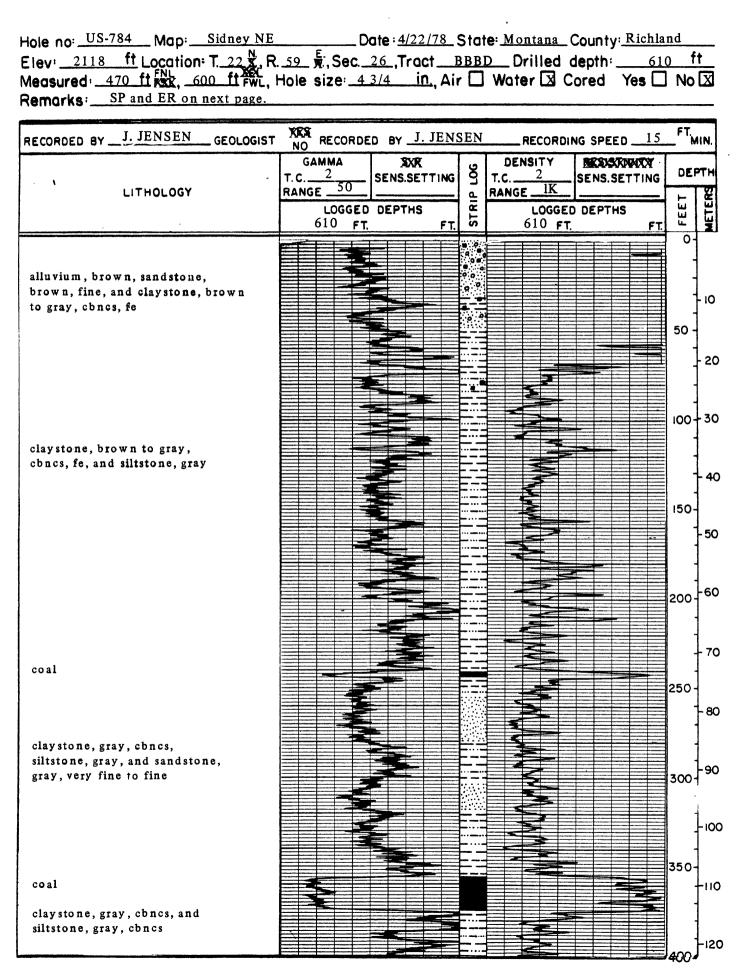
Hole no: US-782 Map: Fairview	D	ate: 4/20/78	Stat	e: Montana	County: Rich	land	
Elev: 1917 ft Location: T. 23 x, R. Measured: 130 ft FNL, 2607 ft FWL, I	<u>59</u> &,Sec Hole size:_4	14 ,Tract <u>B</u> 3/4 in., Ai	AAA r 🗆	Drilled Water∑C	depth: 40 Cored Yes [No	<u>†</u> X
RECORDED BY J. JENSEN GEOLOGIST	XXXXX NO RECORDE	D BY J. JEN	SEN	RECORDI	NG SPEED 20	FT.	AIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 250 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 2K	RESISTIVITY SENS.SETTING 100 D DEPTHS 391 FT	EET O	METERS T
	393 P1.		.0,0	398 PT	. 391 PI	0-	لقا
	7			3 A		50 -	-10
gravel, fe			0		3	-	- 20
)			3	100-	30
claystone, gray to brown, fe, cbncs, siltstone, gray to brown, and sandstone, gray to brown, fe			4.07	7		150-	- 50
coal claystone, gray to brown, cbncs coal		<i>\{</i>) } }	200	-60
claystone, gray to brown, fe, cbncs		<u> </u>				250	70
siltstone, brown, fe, cbncs, and claystone, brown						300-	-90
coal, with parting of claystone, gray, cbncs						350-	-100
claystone, gray to brown, siltstone, gray to brown, sandstone, gray, very fine to fine, and limestone, gray		Š		Ž		400	-120

10 (page 12 follows)



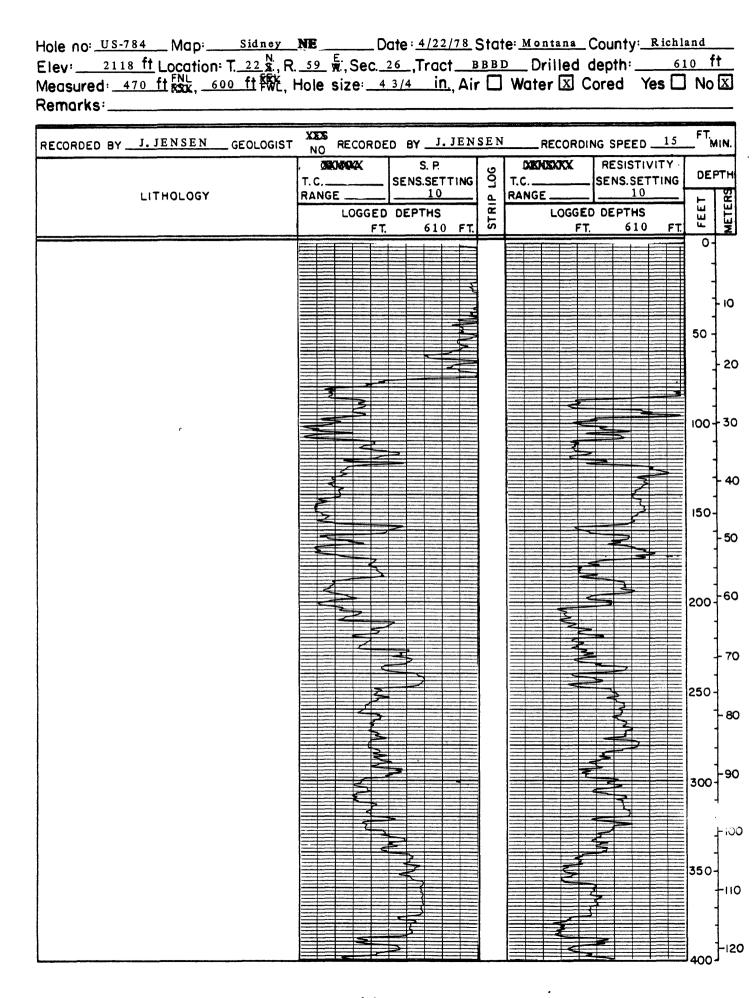
LITHOLOGY	GAMMA	S.P	DENSITY	RESISTIVITY	FEET	AFTER
siltstone, gray, cbncs, claystone, gray, cbncs, and sandstone, gray, very fine to fine					400-	-13
coal					450- -	- - - - - -
siltstone, gray, claystone, gray, cbncs, and sandstone, gray, very fine to fine					500-	† † † †
•					-	
claystone, gray, cbncs, and siltstone, gray, very fine to fine.				3	550-]
					600-	┥ ┩ ╇ ╇
		•		•	650 - - -	
		<i>.</i>			700	+
		,	,		750-	1 1 1 1 1 1 1
					-	<u> </u>
				·	800-	
				,	850-	1 1 1 1 1
	13	,			900.	-





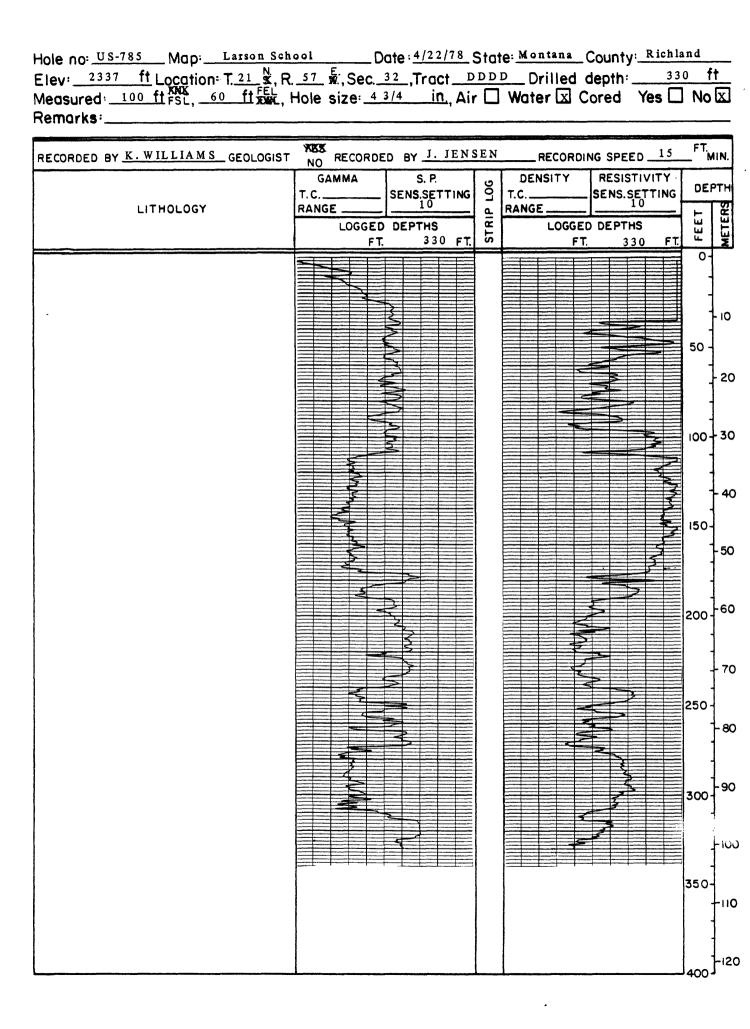
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, gray, cbncs, and siltstone, gray, cbncs						400-	-130
coal						450-	
claystone, gray, cbncs, siltstone, gray, cbncs, and sandstone, blue-gray, very fine to fine						-	140
						500-	-150
coal, with parting claystone, gray						550-	-160
claystone, gray, siltstone, gray, cbncs, fe, and sandstone, gray, very fine			-			-1	-170
·						600-	-180
						· -	-190
						650-	-200
						700	210
							-220
						750-	-230
·						800-	240
·							-250
						850	-260
							-27C

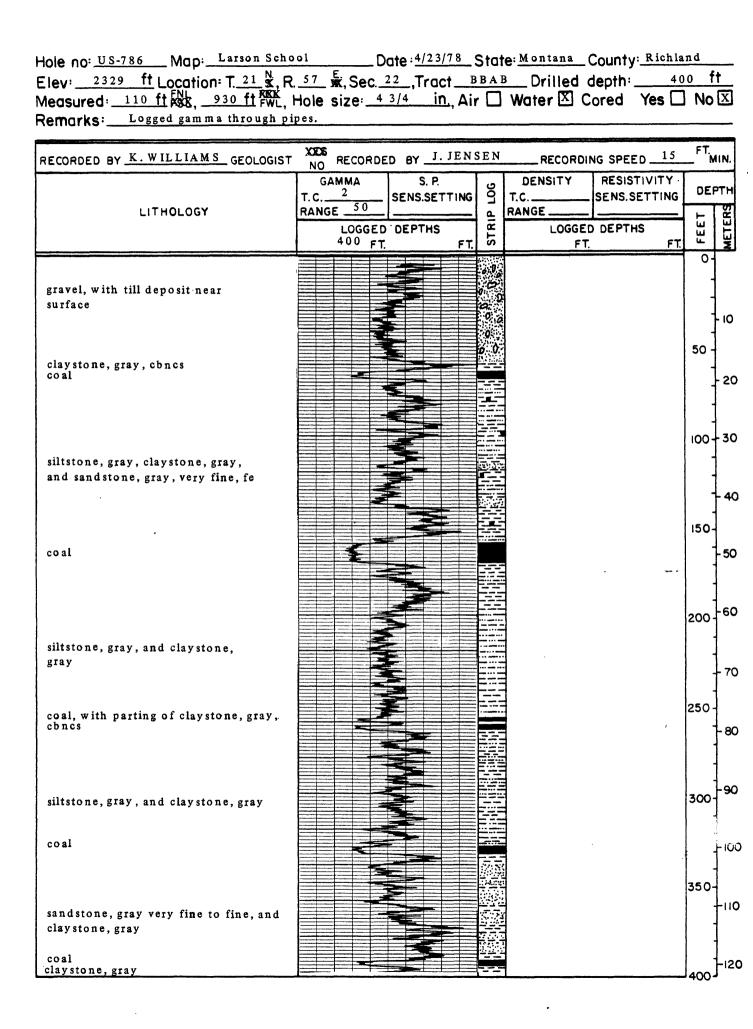
17____



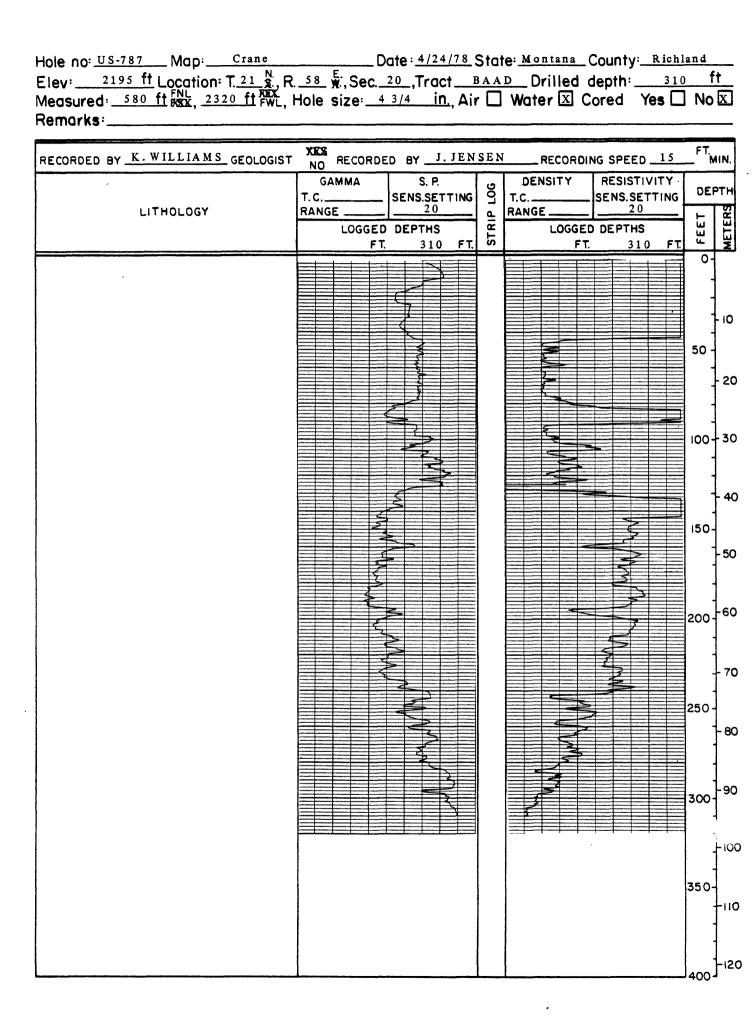
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	E 3	_
		3				400-	o
						450-	Э
				2 2 2 3 3 3 3 3 3 3 3 3 3		500-	0
					}	550-	
					2	-180	
						- - - - -	0
·						650	,)O
						700-	
						75023	
						800-	10
-						850-	
						- 26	

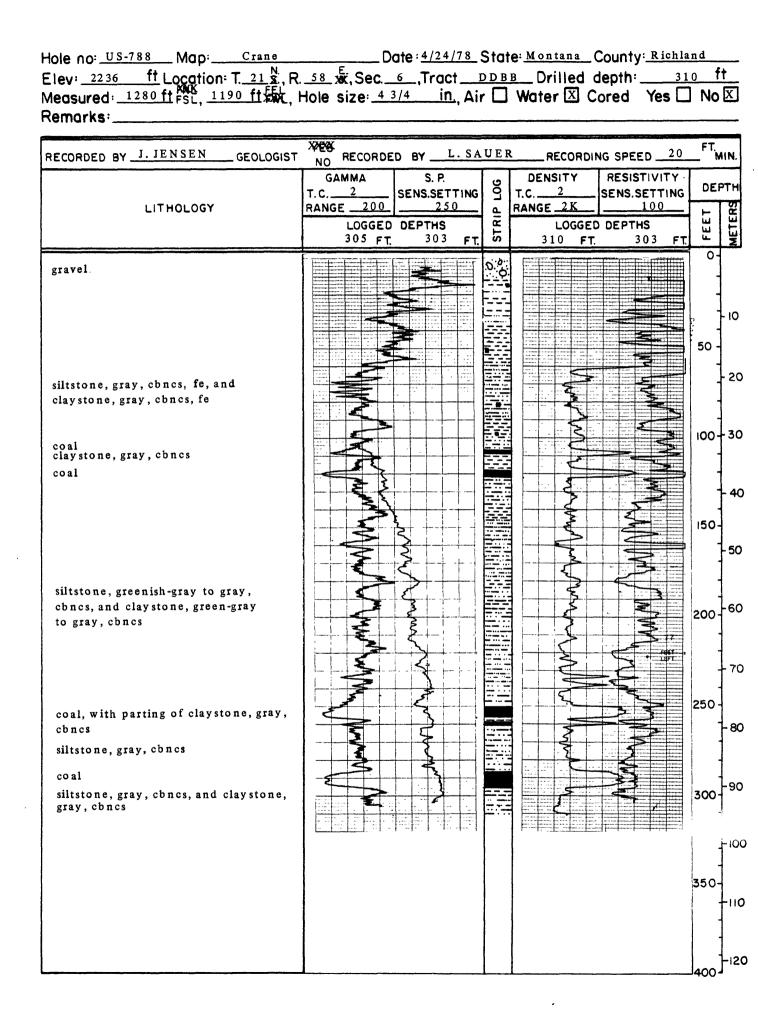
LITHOLOGY	GAMMA T. C2	S. P.					IN.
	RANGE 50	SENS.SETTING DEPTHS	STRIP LOG		RESISTIVITY SENS.SETTING DEPTHS FT	FEET	METERS T
gravel			0.0			01	10
siltstone, gray, some cbncs, fe, claystone, gray to brown, some cbncs, and sandstone, brown, very fine to fine				3		50 -	20
coal				Š	3	100	·30 ·40
sandstone, brown to light-yellow, very fine to fine, fe, siltstone, light-gray, and claystone, light-gray						150-	- 50
						2007	-60
siltstone, gray, some cbncs, sandstone, light gray, very fine to fine, and claystone, light gray to						250 -	- 70 - 80
gray, some cbncs coal						300-	-90
siltstone, gray				5	4	<u> </u>	-100





ECORDED BY K. WILLIAMS GEOLOG	GIST NO RECORDS	ED BY J. JEN		RECORDI	NG SPEED 15 RESISTIVITY	FT. N	WI.
LITHOLOGY	T. C. 2 RANGE 50	S. P. SENS.SETTING	907 0	T.C. 2 RANGE 1K	SENS.SETTING		
-		DEPTHS FT.	STRIP		DEPTHS FT.	FEET	
andstone, brown, very fine to		10,000	0.0			0-	
ne, and gravel			0			-	$\left\{ \right.$
			σ Q				}
			===			50 -	$\frac{1}{1}$
							}
							$\frac{1}{1}$
						100-	1
							1
claystone, brown to gray, iltstone, brown, and sandstone, white, very fine to fine, fe							1
							ſ
						150-	1
							1
							1
						200-	╁
							1
							1
oal							$\frac{1}{2}$
laystone, gray, some cbncs, and iltstone, gray, some cbncs						250	1
							$\left\{ \right.$
oal							1
laystone, gray, cbncs, and						300-	+
ltstone, gray, cbncs							1
							+
					•		1
						350-	1
	1		I	1		[ſ





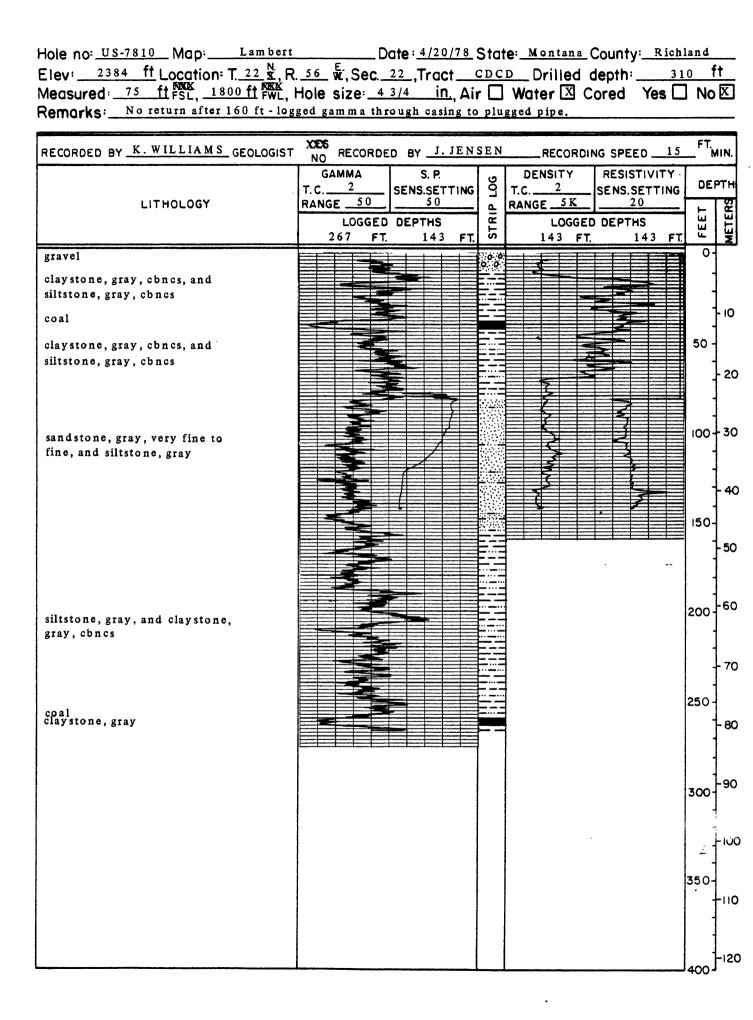
Hole no: US-789 Map: McCone Heights Date: 4/24/78 State: Montana County: Richland Elev: 2630 ft Location: T. 21 N., R. 56 W., Sec. 8 , Tract CDAC Drilled depth: 410 ft Measured: 800 ft FSL, 2100 ft FWL, Hole size: 43/4 in., Air Water X Cored Yes No X Remarks: SP and ER on next page. FT. RECORDED BY K. WILLIAMS GEOLOGIST RECORDED BY J. JENSEN RECORDING SPEED ___15 NO GAMMA S. P. DENSITY RESISTIVITY DEPTH T. C. ____2 SENS.SETTING T.C. 2 SENS.SETTING RANGE 2K RANGE 50 LITHOLOGY ٥ FEET æ LOGGED DEPTHS LOGGED DEPTHS ST 310 FT. 410 FT. alluvium - 10 50 20 100 + 30 claystone, gray to brown, some cbncs, siltstone, gray to brown, some cbncs, fe, and limestone, gray 150-200 +60 70 coal 250-- 80 claystone, gray, siltstone, gray, and sandstone, gray, very fine to fine, 300 coal, with parting of claystone, gray 350claystone, gray, some cbncs, and siltstone, gray, some cbncs

US-________

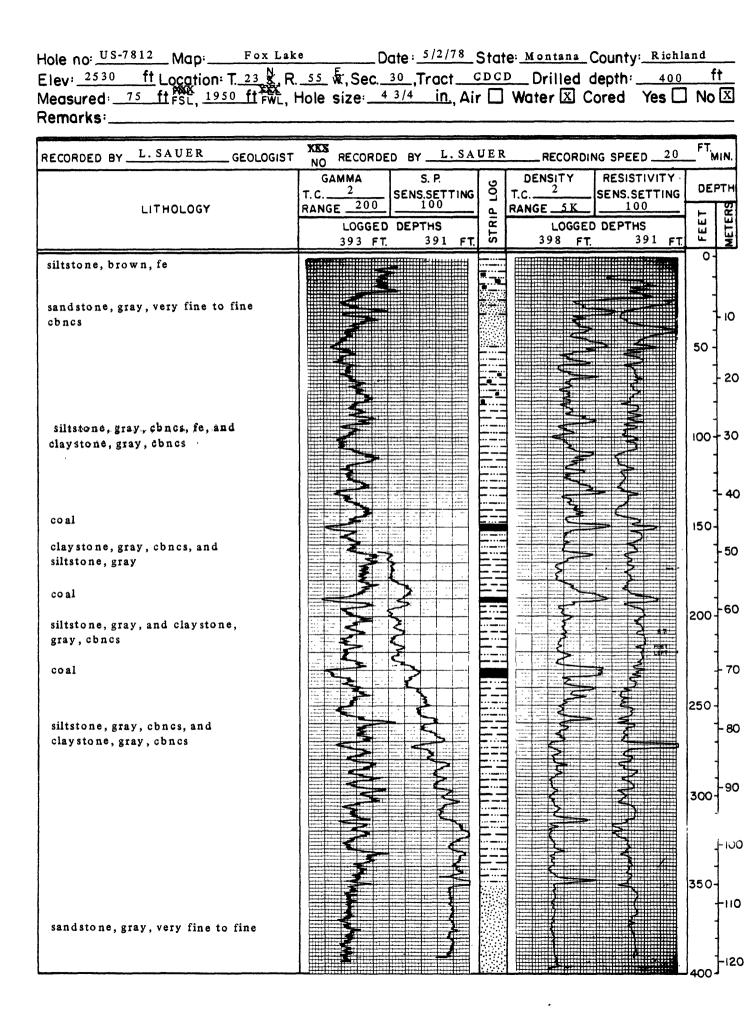
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, gray, and siltstone, gray						400-	
			-			_	-130
				·		-	
						450- -	-140
						-	
					,	- 500-	-150
						_	
		•					-160
						550-	-170
							,,,
						1	-180
						600-	
		,				-	-190
						650 -	 .
				•		-	-200
						_	-210
						700	
						_	-220
						750-	
				. •		7307	-230
						1	
						800-	-240
						-	-250
						- - -	
						850-	-260
						}	
						000	-270

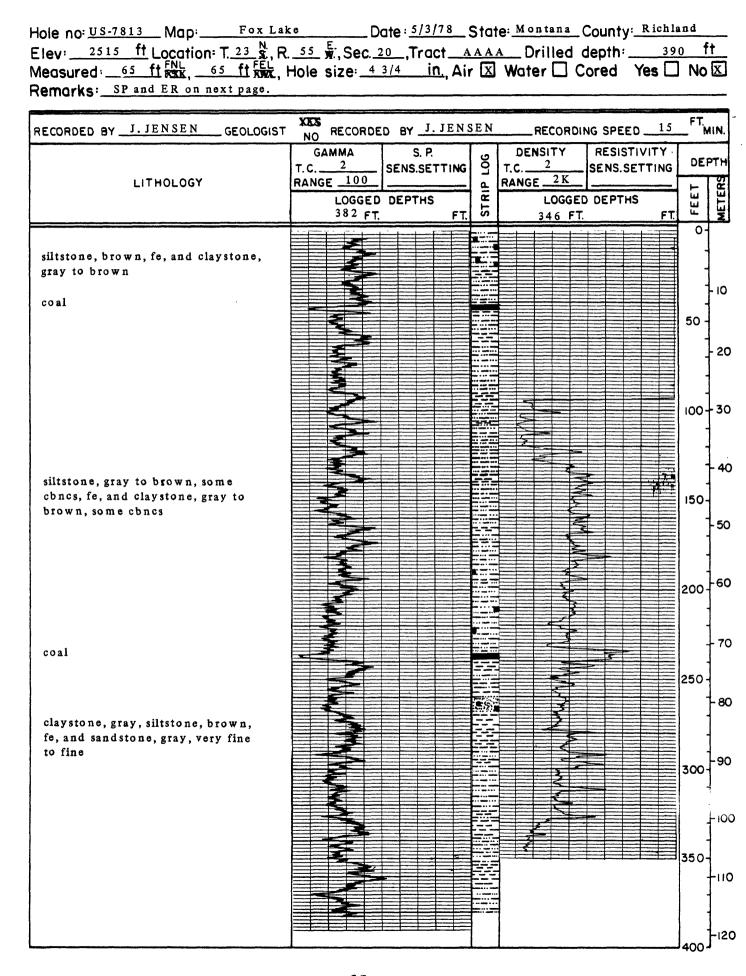
Hole no: US-789 Map: McCone F	leights De	ote: <u>4/24/78</u>	Stat	e: Montana	County: Richla	ind
Elev: <u>2630 ft</u> Location: T <u>21 x</u> , R. Measured: <u>800 ft</u> FSL, 2100 ft FWL, I	<u>56</u> ₩,Sec. <u>8</u> Hole size: <u>4</u>	3 ,Tract <u>G</u> 3/4 in., Air	r \square	C Drilled (Water X C	depth: 41	No X
RECORDED BY K. WILLIAMS GEOLOGIST	XXXX RECORDE	D BY J. JEN	SEN	RECORDI	NG SPEED 20	FT. MIN.
LITHOLOGY	GAMMA T.C RANGE	S. P. SENS.SETTING 20 DEPTHS 410 FT.	TRIP LOG	DENSITY T.C. RANGE	RESISTIVITY SENS.SETTING 20	FEET METERS T
		410 FT.	S			50 - 10 50 - 20 100 - 30 150 - 50 200 - 60 200 - 60 250 - 80
						350-110
		\$				120

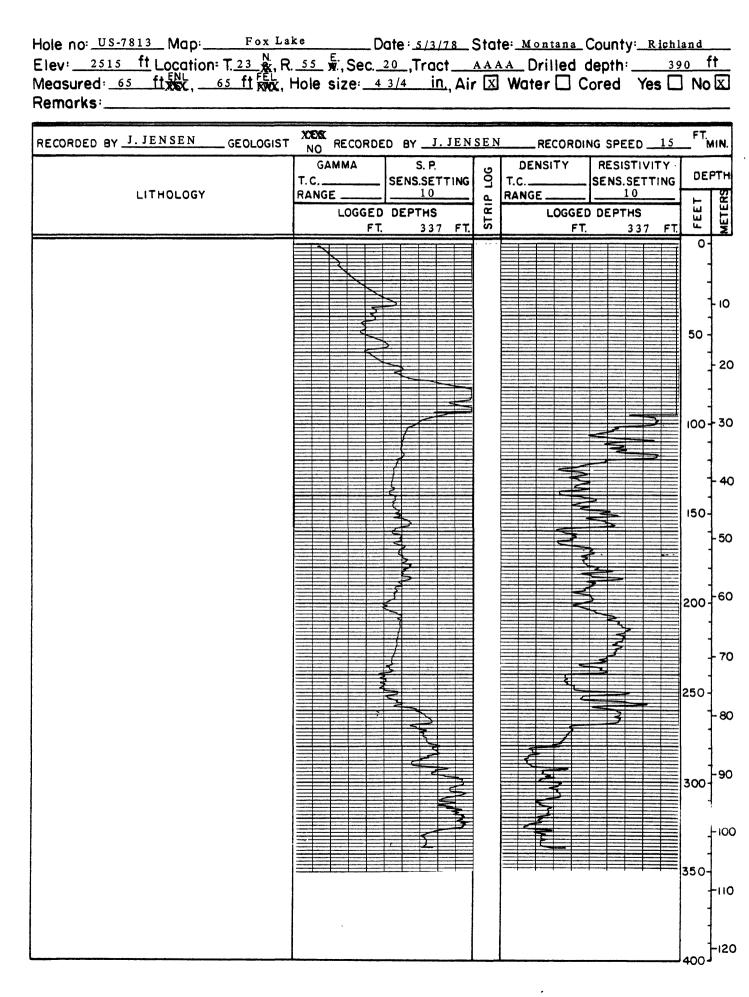
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
						400-	
						450-	-130
						- -	-140
						500-	-150
						-	-160
						550- -	-170
						600-	-180
						-	-190
		-				650 - -	-200
							-210
						700 -	-220
						750-	-230
						-	-240
						800-	-250
						850-	
						-	-260
						_00e	-270

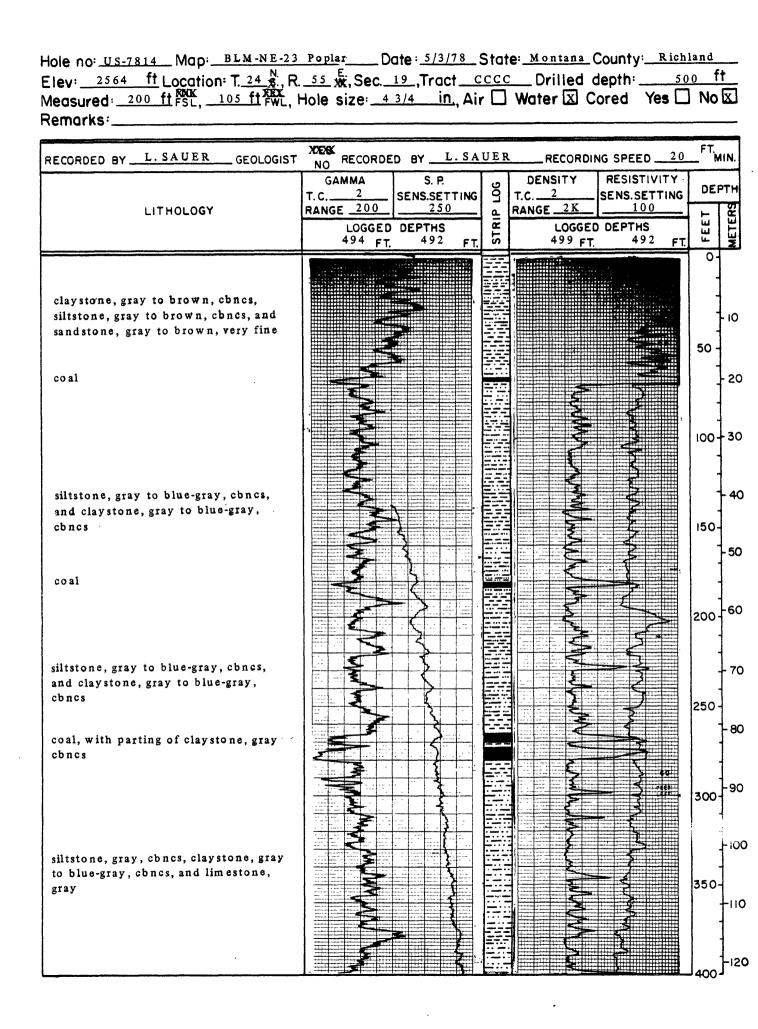


RECORDED BY K. WILLIAMS GEOLOGIS	XXES RECORDE	D BY L. SAU	ER	RECORDING SPEED 20	FT.	NIN
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 250 DEPTHS	TRIP LOG	DENSITY RESISTIVITY	FEET	METFRO
siltstone, brown, fe, and claystone, brown, fe, cbncs			0 0 0		50	
claystone, gray, and siltstone, gray, cbncs					150	- - - - - -
siltstone, gray to green, fe, and claystone, gray to green coal					200	ξ-6
siltstone, gray to green, and claystone, gray to green					250	$\left\{ \right.$
coal					300	1-9
siltstone, gray to green, and claystone, gray to green					350	

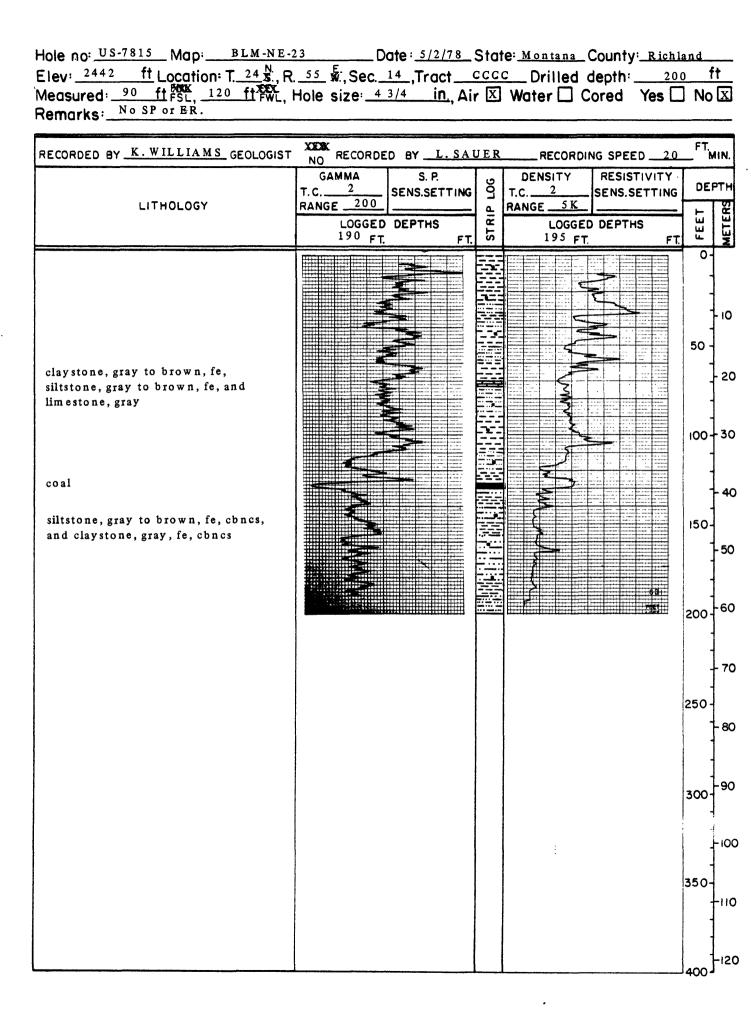


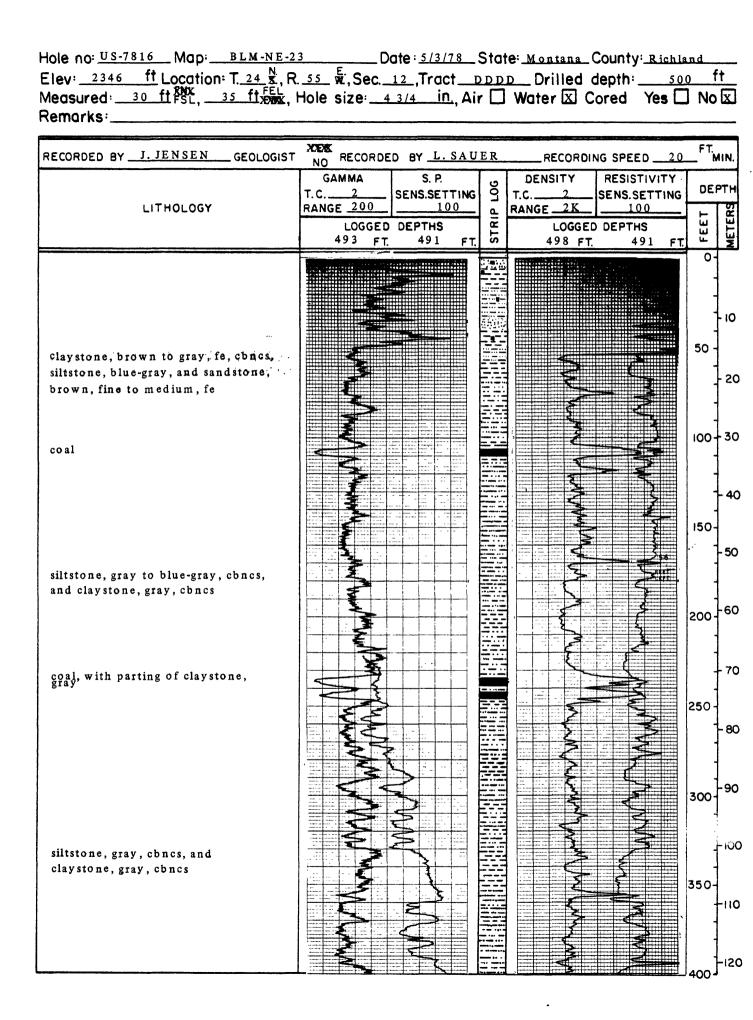




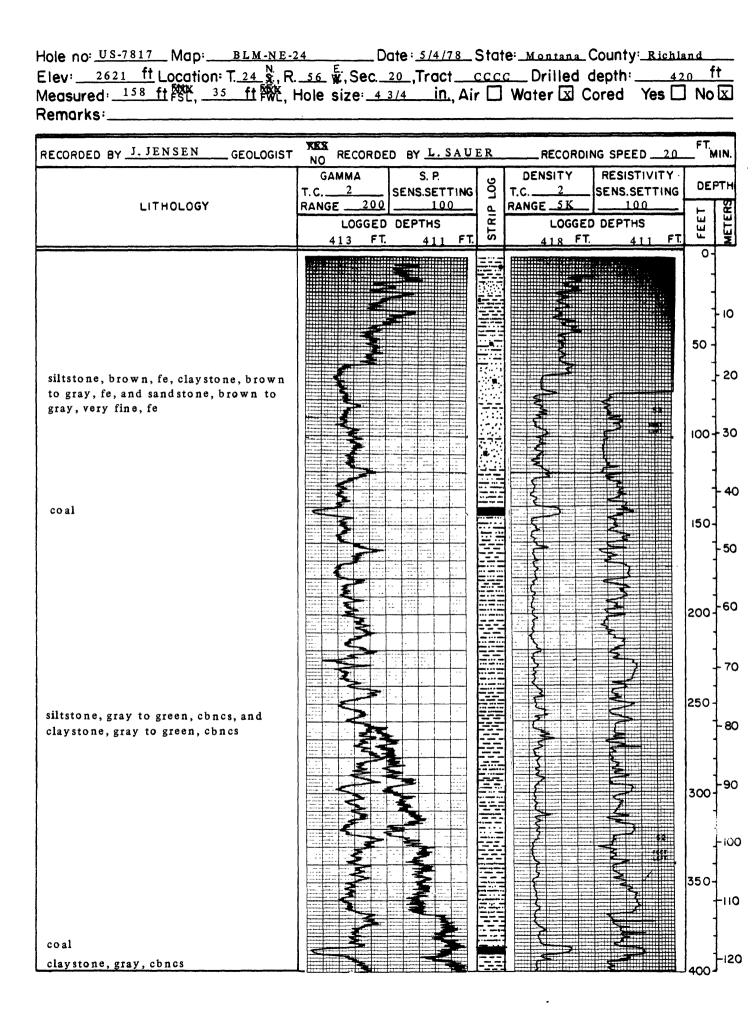


LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray, cbncs, claystone, gray to blue-gray, cbncs, and limestone, gray						400-	-130
coal, with parting claystone, gray, cbncs 4		Ź				-	-140
claystone, gray, concs						500-	
						- 550-	-160 -170
						-	-180
						- 600-	-190
						650 -	_ -200
	***	٠				700 -	-210
						700-	-220
·						750-	-230
						800-	-240
						- -	-250
						850-	-260
						000	-270



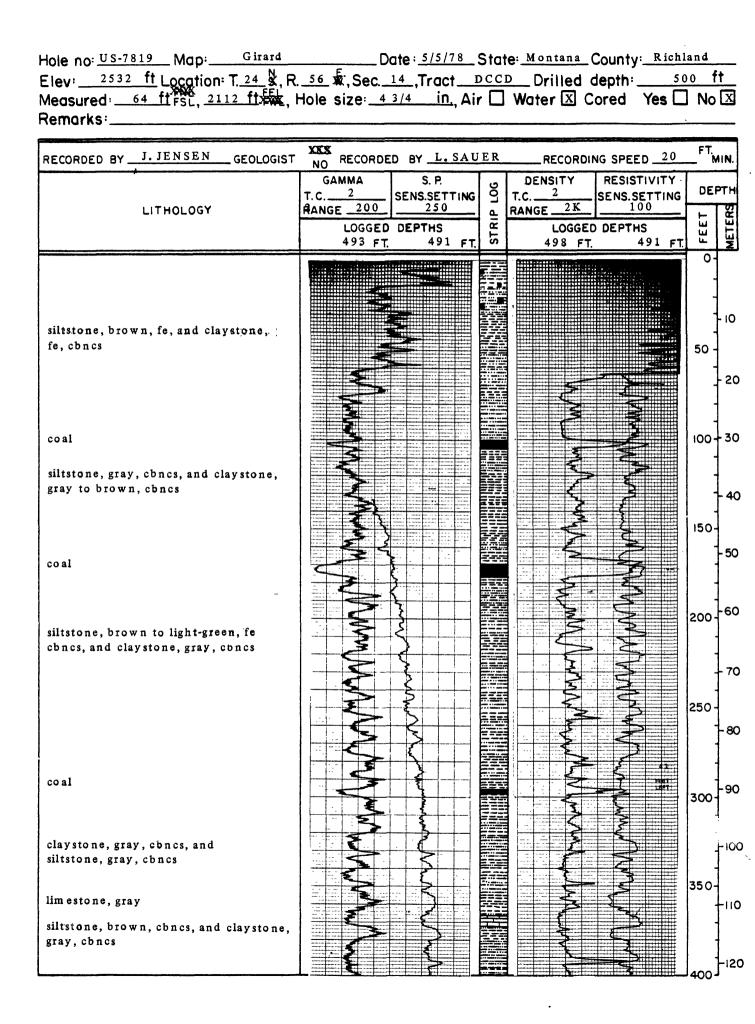


LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray, cbncs, and claystone, gray, cbncs						400-	-130
coal siltstone, gray, concs		* ***********************************				450-	-140
coai c siltstone, gray, chncs	3	5		Ž	-	500-	-150
			-) шишшшшшш		-	-160
					-	550- -	-170
						600-	-180
-						- - 650-	-190
					•	-	-200
	•					700 - -	210
						 7 5 0-	-220
·						-	-240
						800-	-250
·						850-	-260
						900_	-270

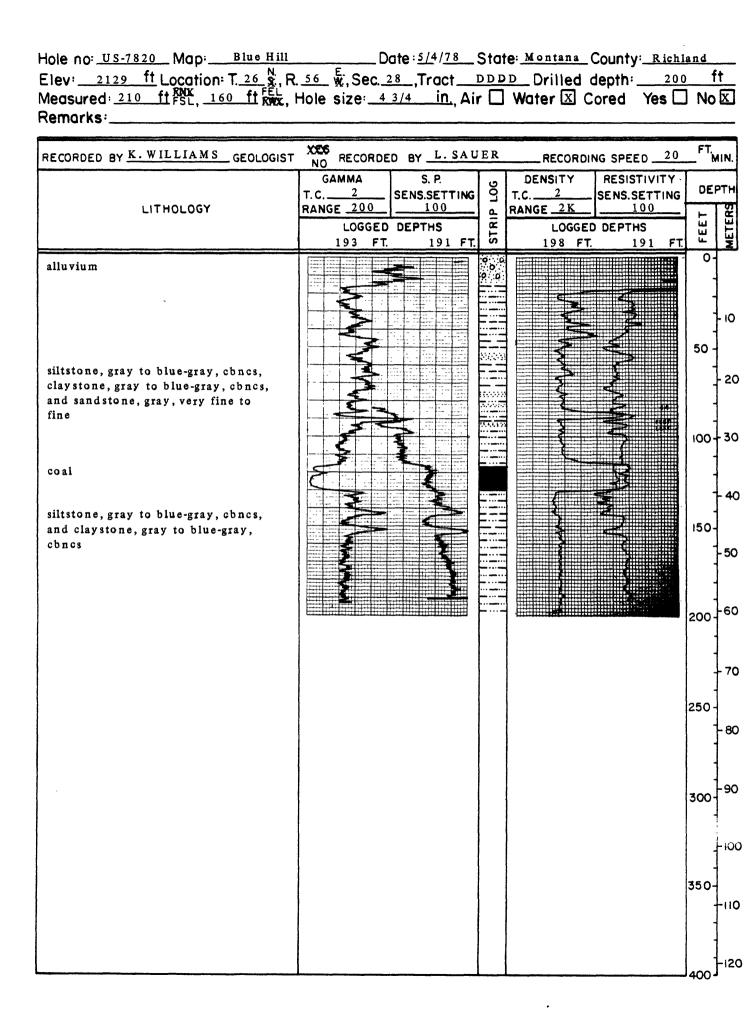


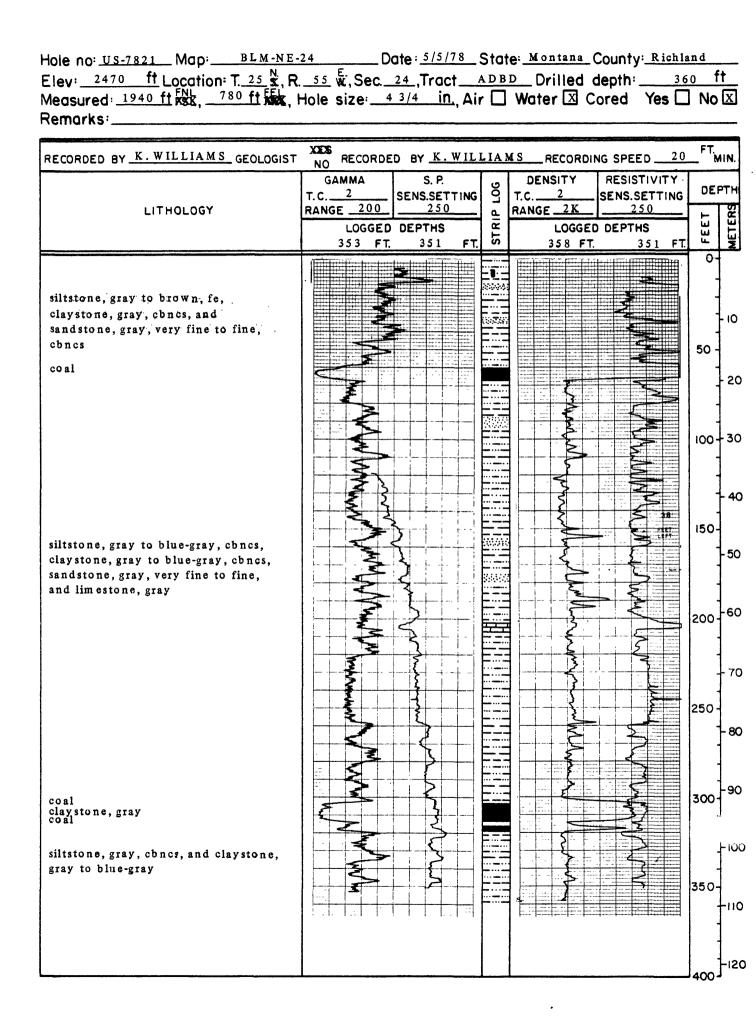
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, clay, cbncs	\$					400-	-130
		<u></u>				- 450- -	-140
						500-	150
					•	-	-160
						550- -	-170
						600-	-180
•						- -	-190
						650- -	-200
	,	•			,	700-	210
		,				-	-220
·					-	750- - -	230
				,		800-	240
						-	250
						850-	-260
						900	-270

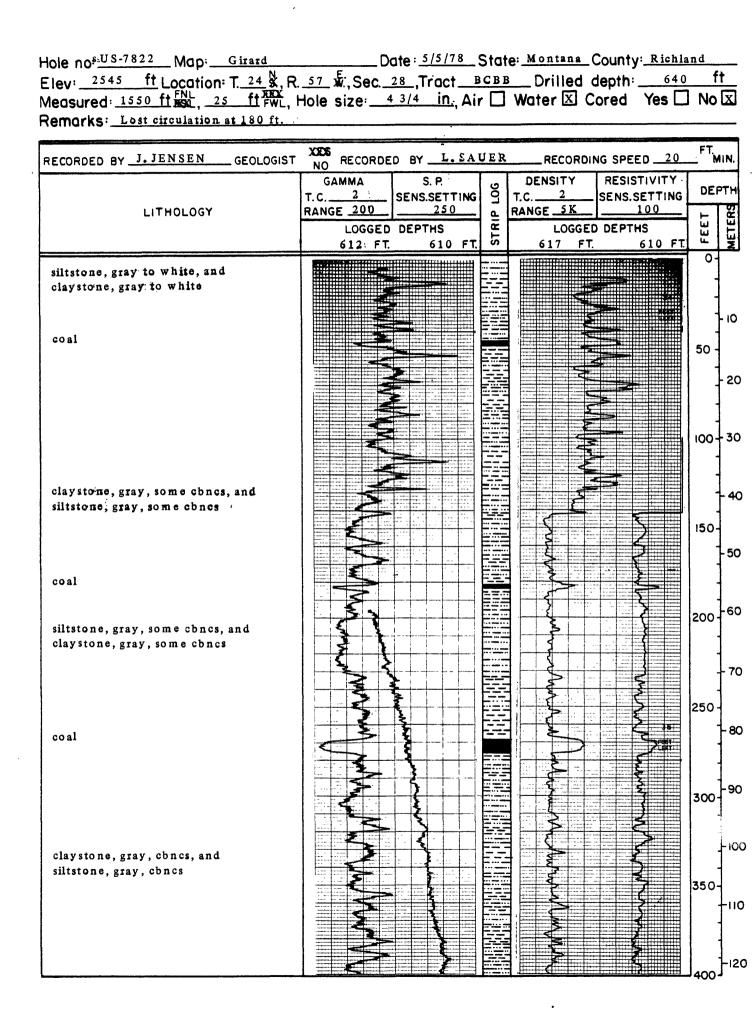
Hole no: <u>US-7818</u> Map: <u>BLM-NE</u> Elev: <u>2324</u> ft Location: T. 25 g., R Measured: <u>10 ft FSL</u> , <u>115 ft FEL</u> , Remarks: <u>No SP</u> .	. <u>55</u> 📆 Sec	20 Tract	DDD	D Drilled depth: 2	8.0	ft
RECORDED BY K. WILLIAMS GEOLOGIST	XXXX NO RECORDE	D BY L. SAU	ER	RECORDING SPEED2	0FT	MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200 LOGGED 271 FT.	S. P. SENS.SETTING DEPTHS FT.	STRIP LOG	DENSITY T.C. 2 RANGE 5K LOGGED DEPTHS 276 FT. 269 F	EET	METERS H
sandstone, brown, very fine to fine. fe, and siltstone, brown, fe coal sandstone, brown, very fine to fine,					50	10
fe, siltstone, gray to light-gray, cbncs, and claystone, gray, interbedded					100	30 -40
coal, with parting claystone, gray					200	- 50
siltstone, gray, claystone, gray, cbncs, and limestone, gray coal siltstone, gray					250	- 70 - 80
					300	-90
					350-	-110
					400-	-120



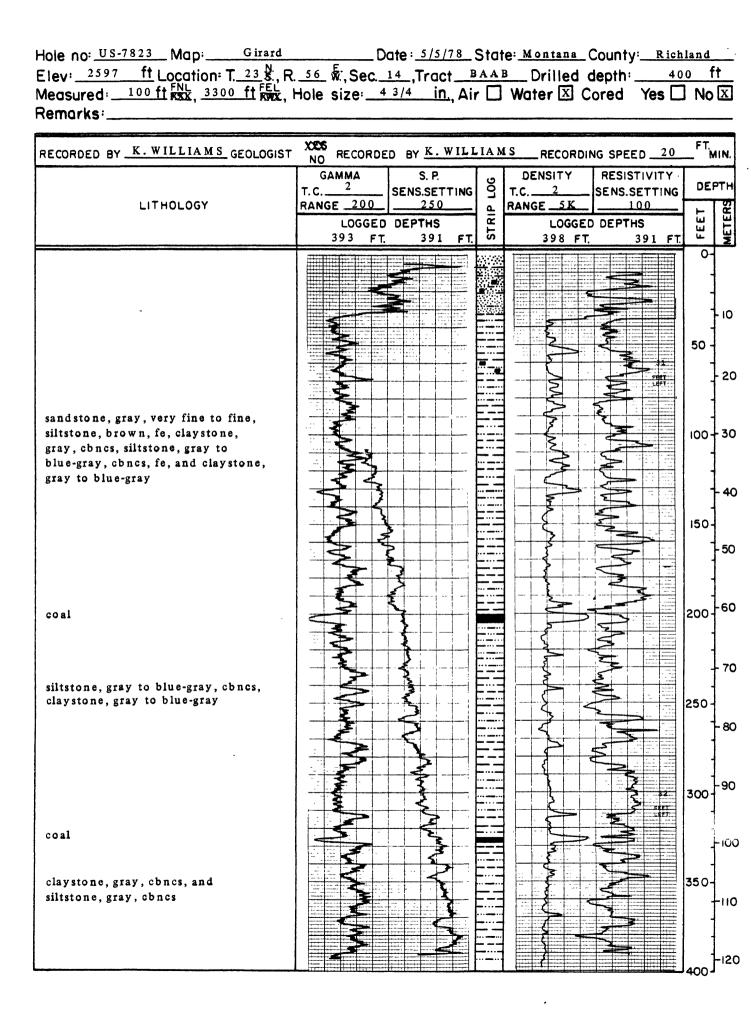
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, gray, cbncs, and siltstone, brown, cbncs coal						400-	-130
claystone, brown to gray, cbncs, siltstone, brown, cbncs					. 📝	450- - -	-140
• T. A			DE POSIÇUE A POS	3.	.	500-	-150
J. T	·				•	- -	-160
						550- -	-170
						600-	-180
		•		·		- -	-190
						650 - - -	- -200
	,					700 -	-210
						-	-220
						750- -	-230
						800-	-240
		•				-	-250
						850- -	-260
						900_	-270

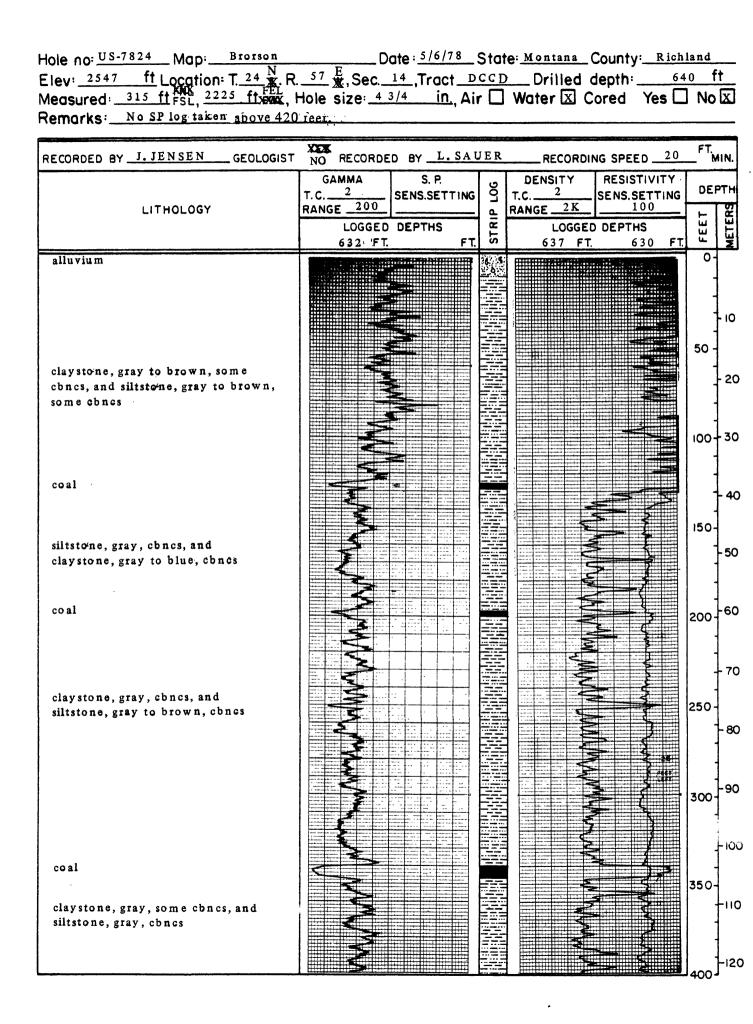




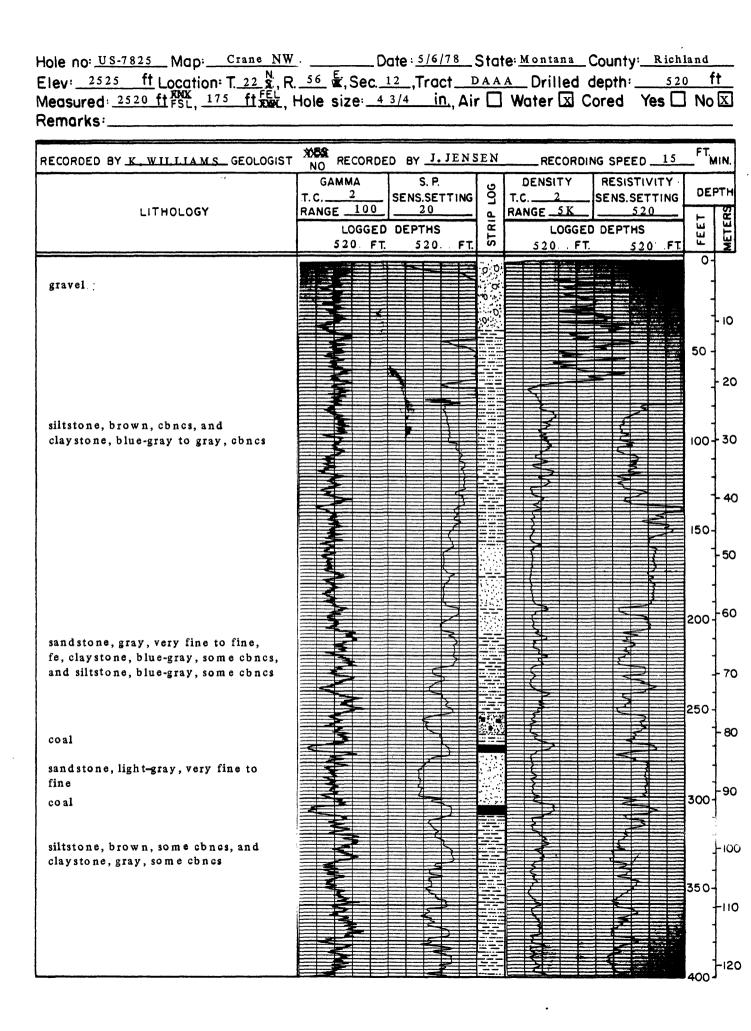


LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, gray, cbncs coal						400-	
						-	-130
·	X	1		MA	\$	450-	140
claystone, gray to brown, cbncs, and siltstone, gray, cbncs						500-	-150
coal siltstone, gray, cbncs, and claystone, gray, cbncs coal, with parting of claystone, gray	3	X				-	-160
siltstone, gray, cbncs, and				W		550- -	-170
claystone, gray to brown, cbncs						600-	-180
							-190
						650 - -	-200
						700-	210
	-	*				-	-220
						750-	-230
						800-	-240
						-	-250
						850	-260
						900.	-270





LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, gray, cbncs, and siltstone, gray, cbncs						400-	-130
siltstone, gray, some cbncs, and						500-	150
claystone, gray, some cbncs coal, with parting of claystone, gray						550-	-160 -170
claystone, gray to brown, cbncs, and siltstone, gray, cbncs				Ž		600-	-180
-						650	-200
						700	-220
·						750-	24(
						850	-250
						900	271

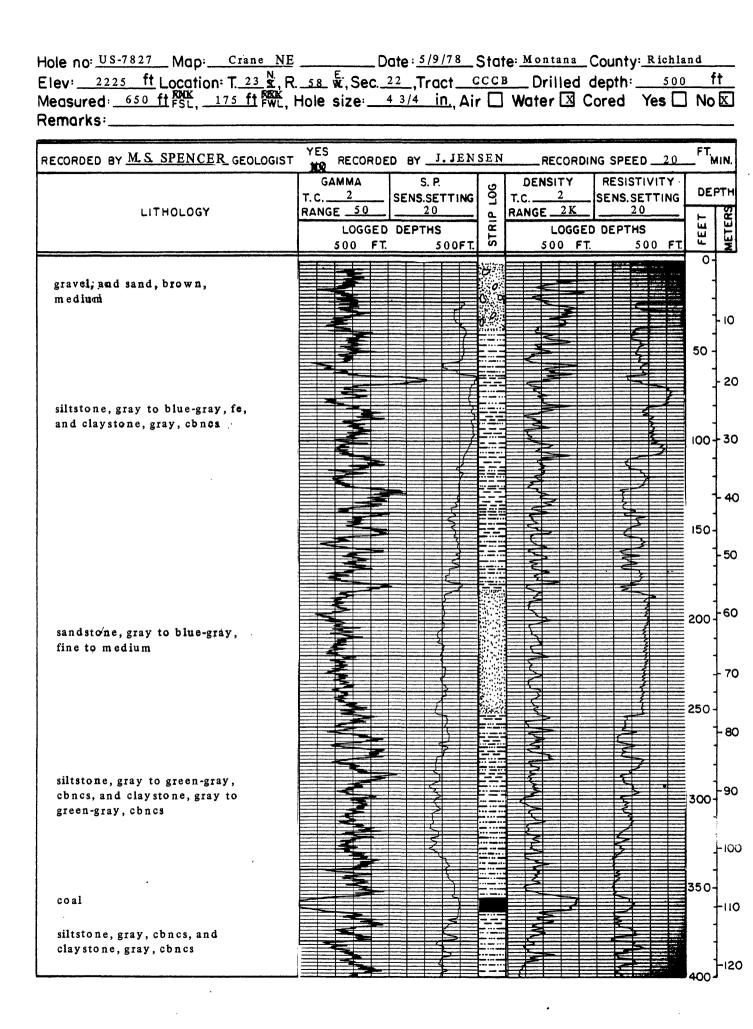


US-<u>7825</u>

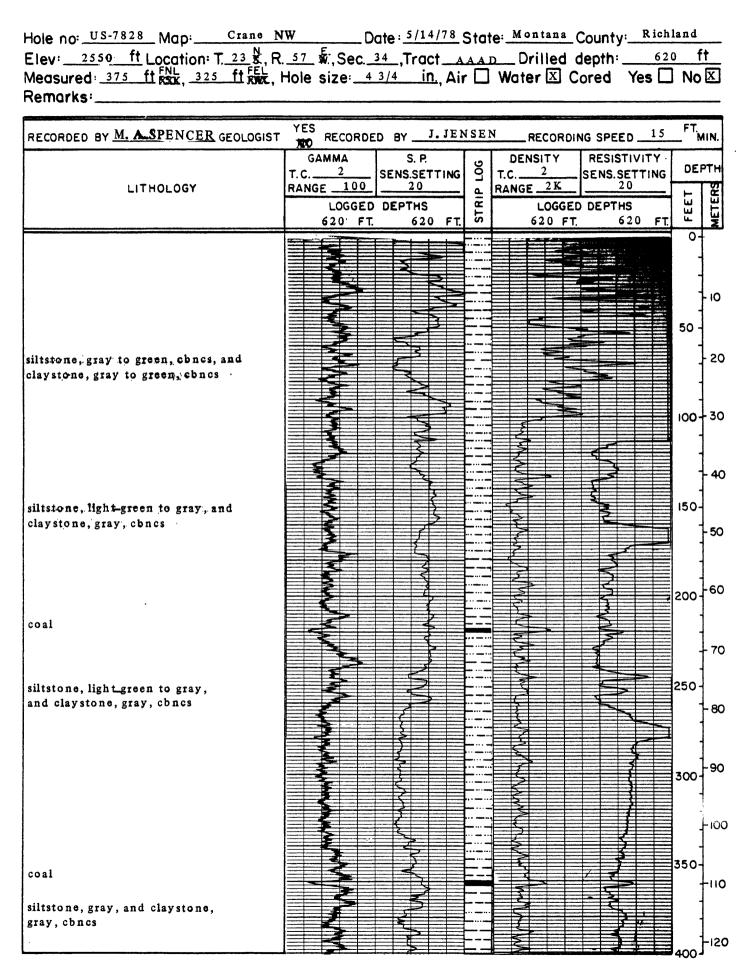
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray, cbncs, and claystone, gray to blue-gray, cbncs		A LANGE MARKET				400- - - - 450-	-130 -140
coal, with parting of claystone, blue-gray siltstone, blue-gray coal (siltstone, gray, and claystone, gray to blue-gray						500-	-150 -160
						550- -	-170
		· .				600-	-180
						650 - -	-1 9 0 - -200
						700-	210
						750-	-220
						800-	-240
						850-	-250 -260
						900	270

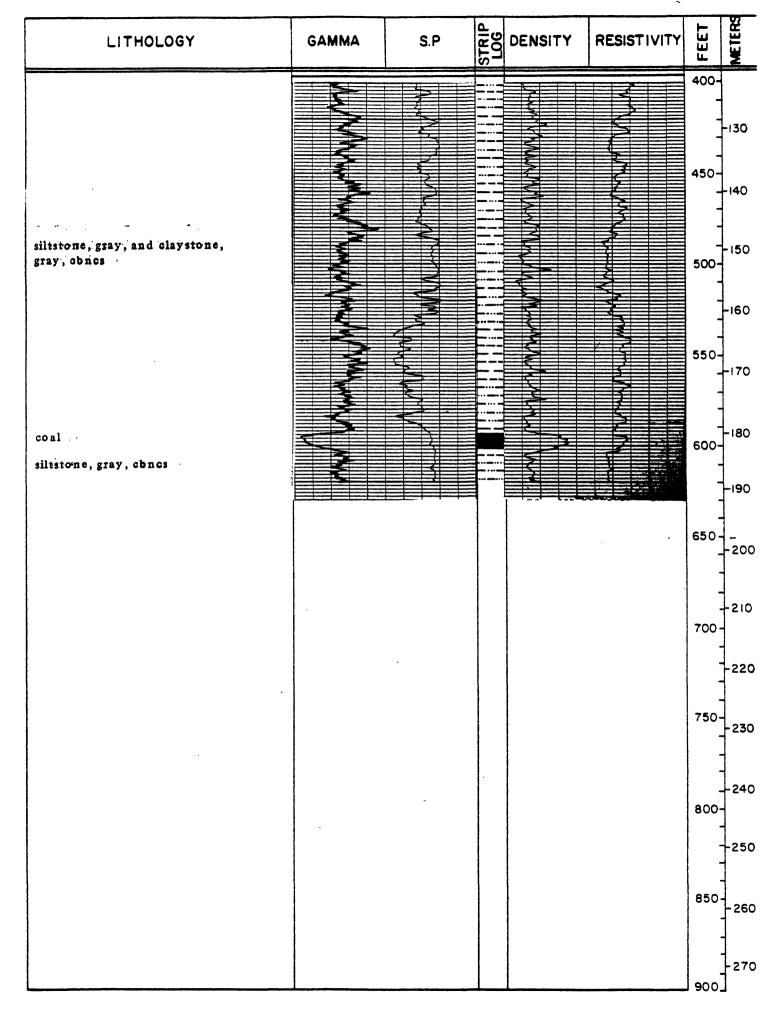
Hole no: US-7826 Map: Brossos	<u>. </u>	ate: 5/9/78	Stat	e: Montana	County: Rich	land	-
Elev: 2382 ft Location: T. 24 st., R. Measured: 72 ft FSC, 140 ft FWC, Remarks:	<u>58</u> 克,Sec Hole size:_ <u>4</u>	33 ,Tract <u>(</u> 3/4 in., Air	- 🗆	©Drilled (Water ⊠ C	depth: 500 cored Yes	o ft No⊠	į
RECORDED BY J. JENSEN GEOLOGIST	XXX RECORDE	D BY J.JEN	SEN	RECORDI	NG SPEED 15	FT. MIN.	
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 20 DEPTHS 500 FT.	STRIP LOG	DENSITY T.C. 2 RANGE 1K LOGGET	RESISTIVITY SENS.SETTING 20 DEPTHS 500 FT	FEET G METERS 1	
alluvium claystone, white to grayish-brown,						0 1 10	
some cbncs, siltstone, gray, some cbncs, and sandstone, gray, very fine to fine, fe						50 - 20	
claystone, gray to light-brown, some cbncs, siltstone, gray, some cbncs, limestone, light-gray, and sandstone, gray, very fine to fine						150-	0
coal		3				200-60	5
claystone, gray, some cbncs, and siltstone, gray to grayish-green, some cbncs	3					250 - - 80	
coal	3					300-90	c
claystone, gray, some cbncs, and siltstone, gray, some cbncs						350-	
						-12	'n

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	F	METERS
siltstone, gray, and claystone, gray coal claystone, gray coal						400- - -	-130
claystone, gray, and siltstone, gray						- -	140
						500- -	-150 -160
,						550-]
·		,				600-	-180
						650 -	-200
·						700-	210
				·		750-	-220
				·		800-	-
						850-	-250 -260
						900	-270



LITHOLOGY	GAMMA	S.P	STRIP	DENSITY	RESISTIVITY	FEET	METERS
						400- - - -	-130
siltstone, gray, cbncs, and claystone, gray, cbncs	3		The state of the s			450-	-140 -150
						500-	-160
						550-	-170
						600-	-190
						650 -	210
					•	700	-220
						750-	-230 -240
							-250
						900	270





Hole-no: US-7829 Map: Dore Elev: 2081 ft Location: T. 25 S. R Measured: 600 ft FSL, 20 ft FWL, Remarks:	 . <u>59</u> ₩,Sec Hole size: <u>4</u>	10 ,Tract 0 3/4 in., Ai	State: <u>Montana</u> CCCB Drilled r	depth: 400 Cored Yes	ft No 🗵
RECORDED BY J. JENSEN GEOLOGIST	XXX NO RECORDS	ED BY J.JE	NSENRECORD	NG SPEED 15	FT. MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 20 DEPTHS	DENSITY T.C. 2 RANGE 2K LOGGE	RESISTIVITY SENS.SETTING 20 D DEPTHS	FEET GAMETERS T
gravel	3	3	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		0-
•	3	7	0.00	3	50 - 10
siltstone, brown, fe, cbncs			- -		100 - 30
					-40
siltstone, gray to blue-gray, cbncs, claystone, gray to blue-gray, cbncs, and sandstone, gray, very fine to fine	3				-50
					200-60
		3		3	70
coal, with parting of claystone, gray, cbncs		}			250
siltstone, gray, cbncs, and claystone, gray, fe, cbncs					300-90
coal siltstone, gray, and claystone,					F100
gray coal					350- -110
siltstone, gray, and claystone, gray					-120

Hole no: US-7830 Map: Crane NE	D	ate: 5/15/78	Stat	e: Montana (County: Rich	land	
Elev: 2289 ft Location: T. 22 N. R.	_58 kt, Sec	6_,Tract_D	DD.	A Drilled	depth:580	o f	
Measured: 575 ft FSL, 195 ft FEL, 195 ft F	Hole size:	4 3/4 In., Air	rЦ	Water △ C	ored Yes ∟) No	区
nemarks						-	
RECORDED BY M. A. SPENCER GEOLOGIST	YES RECORDE	D BY J. JEN	SEN	RECORDII	NG SPEED 15	FT. N	IIN.
	GAMMA T. C. 2 5	S. P. SENS.SETTING	997	DENSITY T.C. 2	RESISTIVITY SENS.SETTING	DE	этн
LITHOLOGY	RANGE _50]		RANGE _2K		1	ERS
	LOGGED 572 FT	DEPTHS FT.	STRIP	LOGGEO 78 FT.) DEPTHS FT.	FEET	METERS
			0 0			0	
gravel, sand, brown, medium, and clay brown			0.0				
Clay 510w II			. 0			-	- 10
			0 0			50 -	
sandstone, yellow-brown to gray,			0			-	
very fine to medium						-	- 20
alayatana hiya saay ah saa			=				
claystone, blue-gray, cbncs						100-	-30
coal			===				
				1		-	- 40
			===			.50	
]		150-	
claystone, gray to blue-gray, cbncs,							- 50
and siltstone, gray to blue-gray,	 			<u>.</u>			
cbncs				1		200-	-60
				<u> </u>			
							70
				<u>.</u>			-
coal						250 -	
siltstone, gray to brown, cbncs,			E	1			- 80
and claystone, white to gray,			==	1			
cbncs						300-	-90
	F		=-				1
							-100
coal							1
				<u> </u>		350-	-110
siltstone, gray, and claystone,				<u> </u>		.	∤ '''
gray, cbncs				‡		.	1
				.		100	-120

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
						400-	-130
siltstone, gray, and claystone, gray.						450- 	-140
						500- - -	-150
coal. claystone, gray, cbncs						550-	-160 -170
						600-	-180
				·		- - 650-	-190 -200
						700-	210
						- - -	-220
						750-	-230 -240
÷						800-	1
				·		850-	-260
						900	270

Hole no: US-7831 Map: Dore	D	ate: <u>5/16/78</u>	Stat	e: Montana (County: Richla	nd	
Elev: 2119 ft Location: T. 26 x, R. Measured: 63 ft FSL, 1930 ft xxxx, I	<u>59</u> ₩., Sec	20 Tract DC	DC	Drilled o	Jepth:500	f	<u>†</u>
Measured: <u>63 II FSC, 1930 II XXX,</u> I Remarks:	Hole size: _4_	3/4 III., AII	' L	water M C	ored Yes L	I INO	IX.
							_
RECORDED BY	NO RECORDE	D BY J. JEN	SEN	RECORDII	NG SPEED 15	FT. N	AIN.
	GAMMA T. C2	S. P. SENS.SETTING	907	DENSITY T.C. 2	RESISTIVITY -		РТН
LITHOLOGY	RANGE 100	20	RIP L	RANGE 2K	10	⊢	<u>π</u>
	LOGGED 500 FT.	DEPTHS 500 FT.	—	LOGGEO 500 FT.	DEPTHS 500 FT	FEET	METERS
						0-	لڪا
						-	
							- 10
						-	[10
						50 -	
siltstone, white to gray, cbncs, fe, and claystone, white to gray,							20
fe						-	
						100-	30
						100-	
						-	
		\$				-	- 40
						150-	
coal						-	- 50
		1			\[\frac{2}{4} \]		
			===				
						200-	-60
siltstone, gray, cbncs, and					3		
claystone, gray to white,			===				70
cbncs							
						250-	
							- 80
		\$				•	
		2	===			300-	-90
						300-	
coal		3			1		
							100
siltstone, gray, cbncs, and	E	\$				350-	
clay stone, gray, cbncs							110
		3	<u> </u>				1
				5			-120
			<u> </u>			400	ر ا

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray, cbncs, and claystone, gray, cbncs						400-	
coal claystone, gray, cbncs, and siltstone,						-	-130
gray, cbncs coal						450- -	140
siltstone, gray, and claystone, gray, chics	3			Ž.		500-	150
						-	-160
						550- -	-170
						600-	-180
·						- -	-190
					•	650 - -	-200
						700 -	210
					•	-	-220
						7 5 0-	-230
						- -008	-240
•						- -	-250
						850-	-260
						900_	-270

Hole no: US-7832 Map: Crane N Elev: 2130 ft Location: T. 22 N, R Measured: 1100 ft FSL, 2725 ft FWL, Remarks:	58 k., Sec	22 Tract_D	СВВ	Drilled	le pth:44	o ft
RECORDED BY M. A. SPENCER GEOLOGIST	YES NOS RECORDS	ED BY K. WILI	IA N	IS RECORDI	NG SPEED20_	FT. MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 100 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 2K	RESISTIVITY - SENS.SETTING 100 DEPTHS	FEET OO METERS I
gravel, and sand, medium to coarse			0.0			50
claystone, gray, cbncs, and siltstone, gray, cbncs						100 30
siltstone, gray, cbncs						150-50
sandstone, gray, very fine, and				***	1 11 11 11 11 11 11 11 11 11 11 11 11 1	200-60
claystone, tan to brown, cbncs coal, with parting claystone, brown, cbncs				**	3	250
						-80
						300 -90
siltstone, gray, cbncs, and claystone, gray, cbncs						350-110
coal						120

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray, cbncs, and claystone, gray, cbncs				3		400-	-130
						450-	-140
						500-	-150
					·	550-	
				·		-	-170 -180
						600-	-190
						650 - -	-200
						700 -	210
						- 750-	-220
						800-	-240
		м				-	-250
						850- -	200
						900_	-270

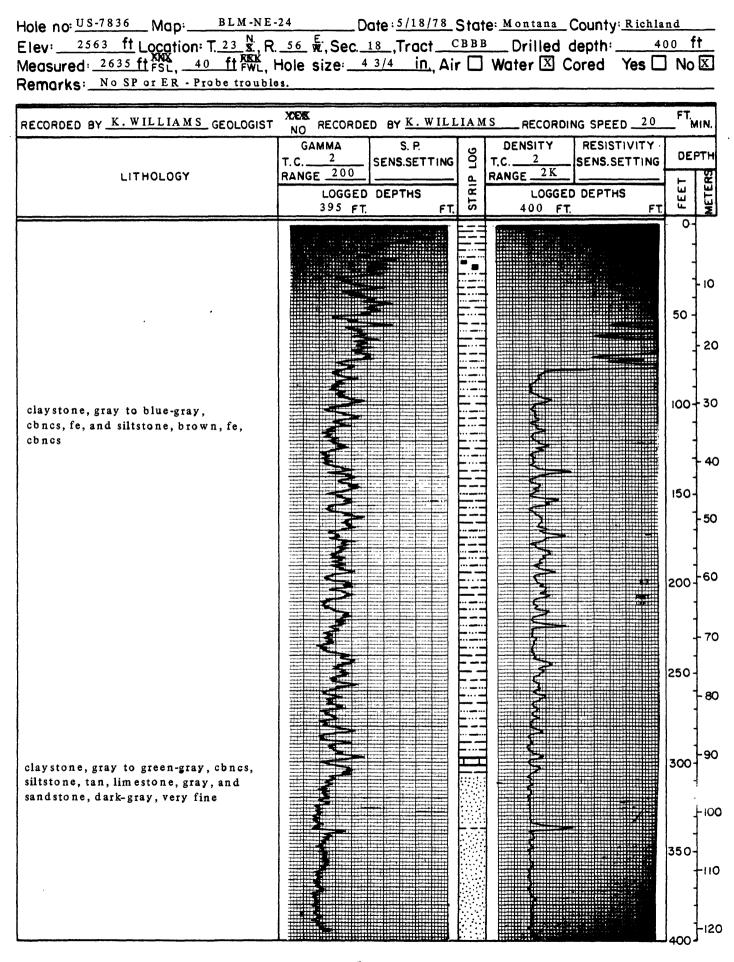
Hole no: US-7833 Map: Bainville	SEC	ate: 5/17/78	State	: Montana (County: Roose	velt
Elev: 2274 ft Location: T. 27 N., R Measured: 620 ft FSL, 1247 ft FWL,	. <u>_59</u> 🕷,Sec	9_,Tract_c	CDA	Drilled o	depth: <u>62</u>	o ft
Measured: 620 ft FSL, 1247 ft FWL,	Hole size: <u>4</u>	3/4 in., Ai	r 🔲 '	Water 🗵 C	ored Yes	No X
Remarks:						
	XXEX					FT
RECORDED BY GEOLOGIST	NO RECORD	ED BY J. JEN	SEN	RECORDII	NG SPEED15	FT. MIN.
	GAMMA	S. P.	907	DENSITY	RESISTIVITY	DEPTH
LITHOLOGY	T.C. 2 RANGE 100	SENS.SETTING 20		T.C. 2 RANGE 2K	SENS.SETTING	1 1
2.11.02001		DEPTHS	ΙæΓ		DEPTHS	FEET METERS
	620 FT		ST	620 FT.		R A
alluvium	The second secon	on the second published products about the second s	o 🔑	AND THE PROPERTY OF THE PROPER		0-
			. [-
			E		M principle of the control of the co	1
and state has been marked in a to						710
sandstone, brown, very fine to fine, fe, cbncs, siltstone, brown			•		Company of the compan	50 -
to gray, and claystone, gray,			•			
fe						- 20
						1 -
						100+30
						1 1
coal.						
Coal.						1-40
						150-
						-50
134.4						200 -60
siltstone, gray, cbncs, and claystone, gray, cbncs						
, , , , , , , , , , , , , , , , , , , ,						
		\$ \$				+ 70
				1		250
				٠		-80
		15	-			
						300-90
		\$ \$				-
	3					
					3	+100
sandstone, blue-gray, very fine to						350-
fine, cbncs, and claystone, gray,						+110
cbncs		4				1 1
siltstone, gray, chncs, fe, and						
claystone, gray, cbncs, fe						400 -120

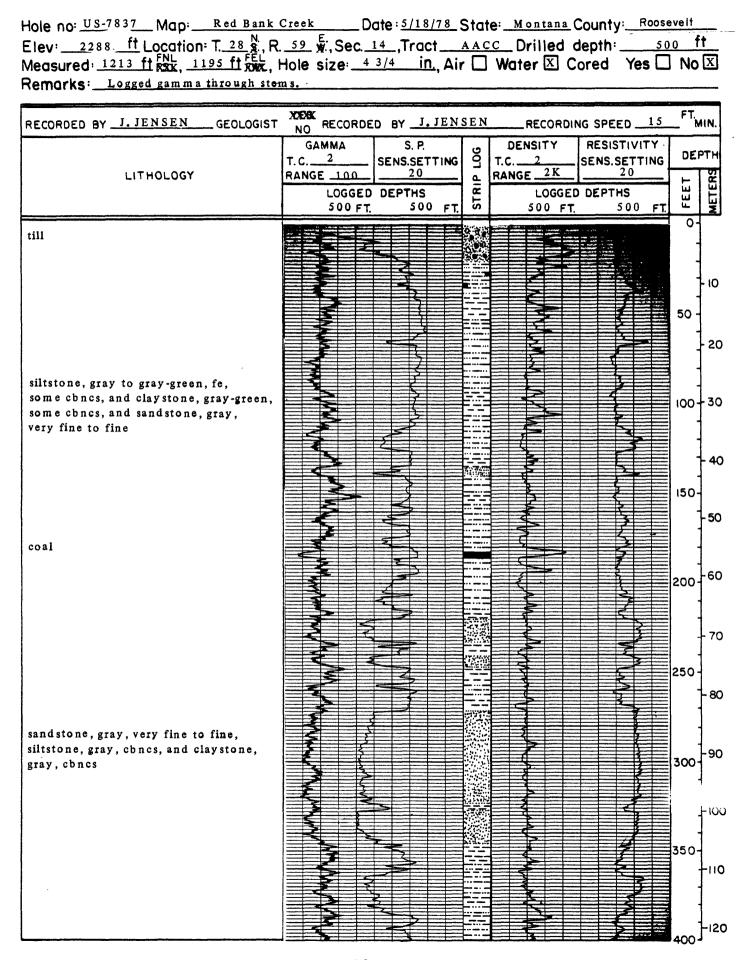
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
					13	400-	
siltstone, gray, cbncs, fe, and claystone, cbncs, fe				\$	E	- -	-130
						450- - -	140
coal						500-	-150
siltstone, gray, cbncs, and claystone, gray, cbncs						-	-160
coal siltstone, gray, cbncs, and claystone,	\$					55 0-	-170
gray, cbncs, and limestone, gray						600-	-180
							-190
						650 650	-20
						700	210
							-22
						750	-23
						800	-24
				÷			25
						850	-26
						900e	-27

Hole no: US-7834 Map: Lambe Elev: 2518 ft Location: T. 22 x, ft Measured: 700 ft RKK, 140 ft FWL,	rt D R55 \&., Sec	oate: 5/16/78 (State BCB	e: <u>Montana</u> Co Drilled de	ounty: <u>Richla</u>	nd 0 f	<u>+</u>
Measured: <u>700 ft ksk, 140 ft fwl,</u> Remarks:	Hole size: 4	3/4 in., Air	· 🗆	Water 🗵 Co	red Yes 🗆	No	X
RECORDED BY K. WILLIAMS GEOLOGIS	XXXX RECORDS	ED BY K. WIL	LIA M	S RECORDING	SPEED 20	_ FT. M	IN.
LITHOLOGY		S. P. SENS.SETTING 100 DEPTHS 392 FT.	STRIP LOG	_ 1	RESISTIVITY ENS.SETTING 50 DEPTHS 392 FT	FEET	METERS T
siltstone, gray, fe, claystone, gray, and sandstone, gray, very fine to fine	394 FT	392 F1.		399 FI.	392 FL	0-	<u>-</u> 10
coal siltstone, gray, cbncs coal	4			Z Ç	-	50 -	- 2
siltstone, gray, cbncs, and claystone, gray, cbncs						100-	- 3
coal						150-	-5
						200 -	-6
sandstone, light-gray, very fine to fine, siltstone, light-gray to gray-blue, cbncs, and claystone, light-						250 -	- 7 - ε
gray, cbncs						300-	-9
coal						- 350-	- 1º
siltstone, light-gray, cbncs, and claystone, light-gray to blue-gray, cbncs	1	2			\$ 	-	-1:

Holes no: US-7835 Map: Bainville							<u> </u>
Elev: 2263 ft Location: T. 27 S., F Measured: 2105 ft FSL, 2047 ft FWL,	R. <u>59</u> <u>₩</u> .,Sec Hole size: <u>4</u>	27 ,Tract <u> </u>	AA	<u>c</u> Drilled ← Water 🏿 C	depth:620 Cored Yes 🗆	No	
Remarks:							
RECORDED BY J. JENSEN GEOLOGIST	XXX RECORDS	D BY J.JEN	SEN	NRECORDI	NG SPEED15_	_ FTN	AIN.
	GAMMA T.C. 2	S. P. SENS.SETTING	907	DENSITY	RESISTIVITY -		РТН
LITHOLOGY	RANGE 100	20	RIP L	RANGE 2K	20	H	ERS
	LOGGED 606: FT	DEPTHS 606 FT.	I ⊨	LOGGE 607 FT	D DEPTHS : 606 FT.	FEET	ME
alluvium			0 0		Company of the Compan	0-	
sandstone, brown to tan, very fine			0 0			-	<u> </u>
to fine, fe, and siltstone, gray,						-	10
						50 -	1
						-	20
coal							1
						100-	30
siltstone, gray, cbncs, claystone,							1
gray, cbncs, and limestone, gray						•	40
						150-	1
coal							50
							4
						200	-60
siltstone, gray, cbncs, and						1	1
claystone, gray, cbncs					*		70
						250	1
						250	-80
sandstone, gray, very fine to fine, and siltstone, gray, cbncs							1
,							-90
				\$.		300	1
							_F100
:]
						350	+110
claystone, gray, fe, cbncs, and siltstone, gray, cbncs							1
			E				1
			<u> </u>			400	7-120

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
sandstone, gray, very fine to fine, claystone, gray, and siltstone, gray						450-	-1 3 0 -1 4 0
coal						500-	-150 -160
siltstone, gray, cones, and claystone, gray, concs						550-	-170
claystone, gray, cbncs						600- -	-180 -190
						650-	_ -200
	,					700-	-210
						750-	-220 -230
				·		800-	-240
						850-	-250
						-	-260 -270
	1,	71	<u> </u>	L		900_	

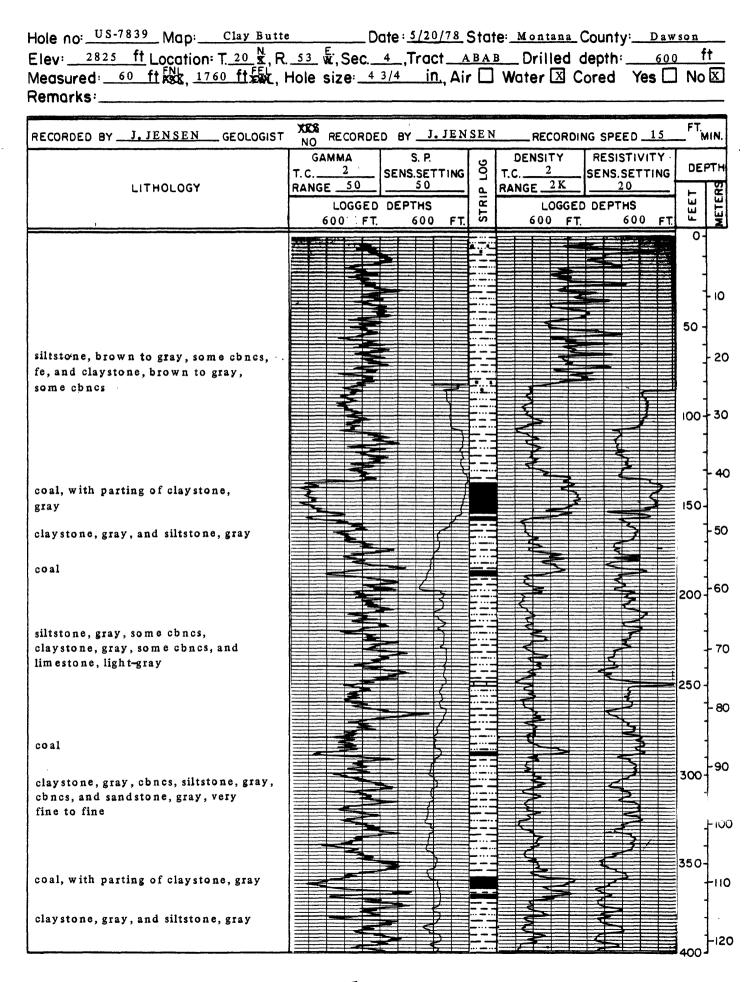




LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray, cbncs, and claystone,				3		400-	170
gray, cbncs	1	Ž				- 450-	-130
coal. siltstone, gray, cbncs, and claystone,					\$.	- - -	-140
gray, cbncs						500- -	-150
						-	-160
						550- - -	-170
						- 600-	-180
						-	-190
						650-	-200
							210
						700	-220
						750-	
·							230
						800	-240
							-250
						850	260
						900	-270

Hole no: US-7838 Map: Sidney S	<u>E</u> D	ate: <u>5/18/78</u>	Stat	e: Montana	County: Richla	nd	
Elev: 2298 ft Location: T. 21 x, R.	_ <u>59_</u> \$\vec	12 ,Tract B	CDE	Drilled	depth: 560	fi	<u> </u>
Measured: <u>2050 ft FRI</u> , <u>850 ft FRI</u> , I		<u>4 3/4 in.,</u> Air		Water ☒ C	fored Yes	No	X
Remarks: <u>No SP - ER logs, trouble wi</u>	th.probe.					·	
	YES					FT	
RECORDED BY M. A. SPENCER GEOLOGIST	NO RECORDE	D BY K. WIL	LIA	M S RECORDI		FT. M	IN.
	GAMMA	S. P.	907	DENSITY	RESISTIVITY	DEP	тн
LITHOLOGY	T.C. 2 RANGE 200	SENS.SETTING		T.C. 2 RANGE 2K	SENS.SETTING		_
21.1102007		DEPTHS	STRIP		DEPTHS	FEET	METERS
	555 FT.		ST	560 FT.		<u>u</u>	X
			==		iota de	어	
					100 100 100 100 100 100 100 100 100 100	1	
			===		41114 - 144	1	
						}	- 10
						50 -	
						-	
			===			+	20
claystone, tan to gray, some cbncs,						4	
siltstone, tan to gray, some cbncs,			E==	3			
and sandstone, gray, very fine						100	.30
• ,						1	•
			===	5]	
		A STATE OF THE STA]	- 40
						150-	
						4	-50
coal			= ==				- 50
					•	4	
						1	-60
						200	•
	8					1	
						1	- 70
			==			1	
			==			250	
						4	- 80
			===			1	
clay stone, gray to gray-green, some			_==			1	
cbncs, siltstone, gray to light-gray, some cbncs, and limestone, gray-				3		700	-90
green	5					300	
						,	
						ł	-100
			E==	 		4	
		+++++		7		350-	
			===			t	-110
						1	
]	
						400	-120

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, light gray to gray					4	400-	-130
coal .					*	450- -	-140
claystone, gray to gray-green, some cbncs, and siltstone, gray,						500-	
some cbncs						550-	-170
						600-	-180
						650	-190 - -200
						700	-210
		·					-220
						750	230
						800	1
						850	260
						900	270

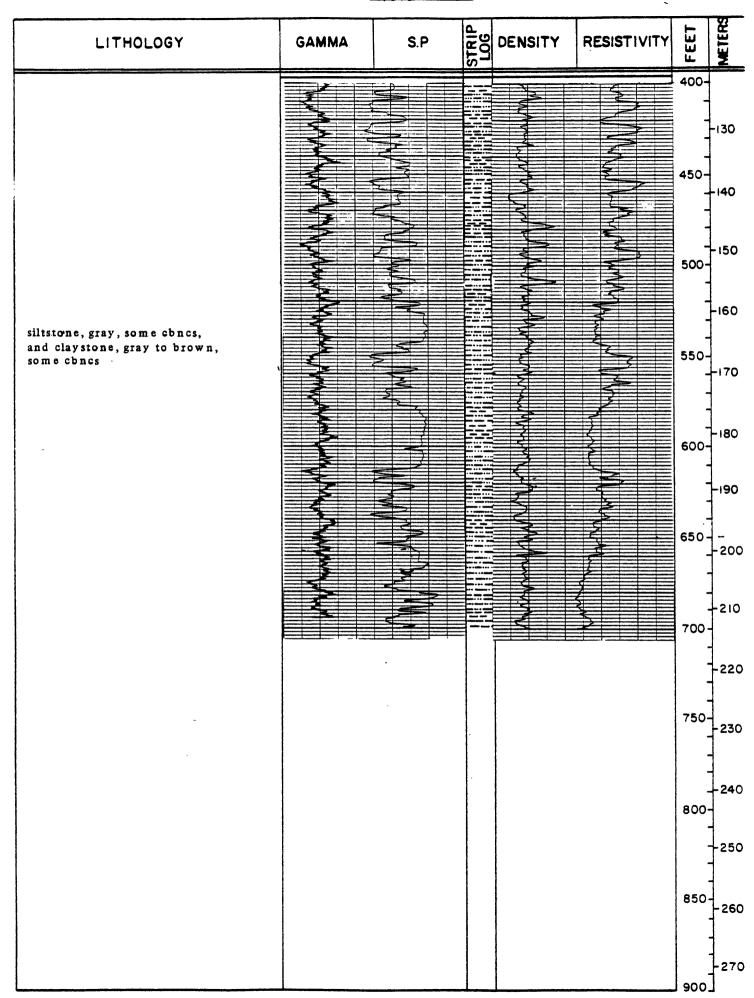


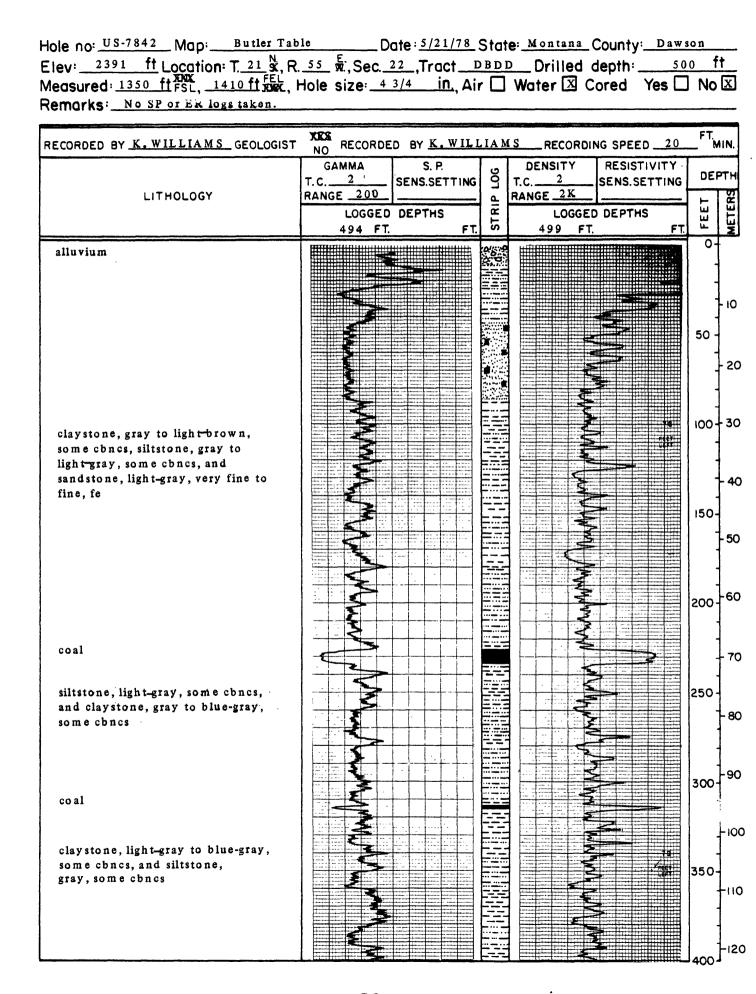
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
					7	400-	-130
silisione, gray, some chics,						450- - - -	-140
and claystone, gray, some cbncs 4				AND THE PROPERTY OF THE PROPER		500- -	-150 -160
						55 0-	-170
						600-	-180
	·					650-	-190 - -200
						-	-210
						-	-220
						750- - - -	-230 -240
						800-	-250
						850- 850-	-260
		78			F	900	-270

Hole no: US-7840 Map: Bloom field Date: 5/19/78 State: Montana County: Dawson Elev: 2751 ft Location: T. 20 x, R. 53 x, Sec. 32 Tract ACCD Drilled depth: 605 Measured: 2400 ft FNL 2050 ft FEL, Hole size: 4 3/4 in., Air □ Water ☒ Cored Yes □ No ☒ Remarks: Moved 199-ft south to avoid clinker - no SP or ER - problems with probe. FT. MIN. NO RECORDED BY K. WILLIAMS XXX RECORDED BY K. WILLIAMS GEOLOGIST RESISTIVITY GAMMA DENSITY DEPTH SENS.SETTING T. C. _ SENS.SETTING T.C._ RANGE _ 2K RANGE 200 LITHOLOGY م Œ LOGGED DEPTHS LOGGED DEPTHS ST 600 FT. FT. 605 FT. 10 siltstone, gray to light-brown, fe, cbncs, and claystone, gray to light-50 brown, fe 20 claystone, gray, cbncs, and siltstone. gray coal 100 + 30 siltstone, gray, fe, and claystone, gray, fe / 40 coal 150claystone, gray to brown, cbncs coal - 50 claystone, light-gray, cbncs, and siltstone, gray, cbncs 200 +60 coal 70 siltstone, gray, cbncs, and claystone, gray, cbncs 250 80 claystone, gray, cbncs, and siltstone, gray, cbncs coal 300 siltstone, gray, cbncs, claystone, gray, cbncs, and sandstone, gray, 350very fine to fine -110

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
					<u> </u>	400- - - - 450-	-130
siltstone, lgray, cbncs, claystone, gray, cb mes, and sandstone, gray, very fine to fine	3					500-	-150 -160
						550- -	
·	\$			3	<u> </u>	600-	-180
						650 -	1
		·				700	210
						7 5 0-	-220 -230
•						800-	-240
						850-	-250 -260
						900	-270

Hole no: US-7841 Map: BLM-N	E-31	_ Date : <u>5/21/</u>	<u>78</u> Stat	e: Montana	County: Daws	o n
Elev: 2619 ft Location: T. 20 X, F Measured: 460 ft FSL, 2112 ft FWL,	R. <u>52</u> ₩,Se	ec8,Tract	CDD	B Drilled	depth:	o ft
Measured: <u>460 fffst, 2112 fffwt,</u> Remarks:	Hole size:	4 3/4 In.	, Air ∐	Water 🖾	Cored Yes L	I No 🗵
Remarks						
RECORDED BY J. JENSEN GEOLOGIS	NO RECO	RDED BY	JENSEN	RECORD	ING SPEED 15	FT. MIN.
	GAMMA	S. P.	1NG 9	DENSITY	RESISTIVITY	DEPTH
LITHOLOGY	T.C. 2 RANGE 10		TING 9	T.C. <u>2</u> RANGE <u>2 K</u>	SENS.SETTING	1
2/11/02001		GED DEPTHS	<u>~</u>		D DEPTHS	FEET
	694	FT. 700	FT. LS	700 F	T. 700 FT.	0-
alluvium, and sandstone, gray, very			13 o			
fine to fine, fe	■€ ,		9.0			4
						+10
claystone, white to gray, some						{
cbncs, fe, and siltstone, gray, some						50 -
cbncs, fe		3				} 20
		14				
coal						-
siltstone, gray, cbncs, and claystone,					4	100 + 30
gray, cbncs					3	1
coal		\$				1.
						14
siltstone, gray, and claystone, gray						150-
coal						-50
claystone, gray, some cbncs, and						1 1
siltstone, gray, some concs						1
						200 -60
				\$		
co al.						1 1
						+7
siltstone, gray, cbncs, and	3					
claystone, gray, cbncs		3				250
1						}8
coal						
						-9
						300
			===			4
siltstone, gray, some cbncs,			===			J-ic
and claystone, gray, some						
cbncs						350-
						+11
	3					1
						1 1
				3		400 -12

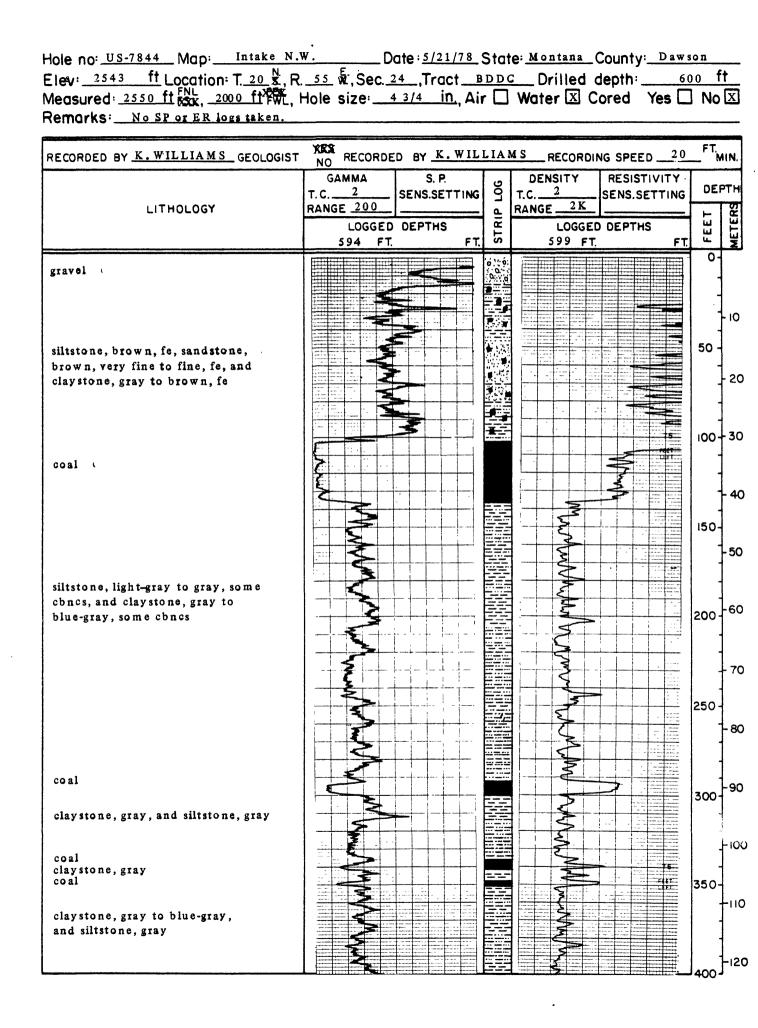




LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, light-gray to blue-gray cbncs, and siltstone, gray, some cbncs						450-	-130
				Ş		500-	-150
						550-	-160 -170
						600-	-180
				,	·	650 -	-190 - -200
	•					700 -	-210
						750-	-220 -230
						800-	-240
	·					850-	-250 -260
,		84		,		-	-270

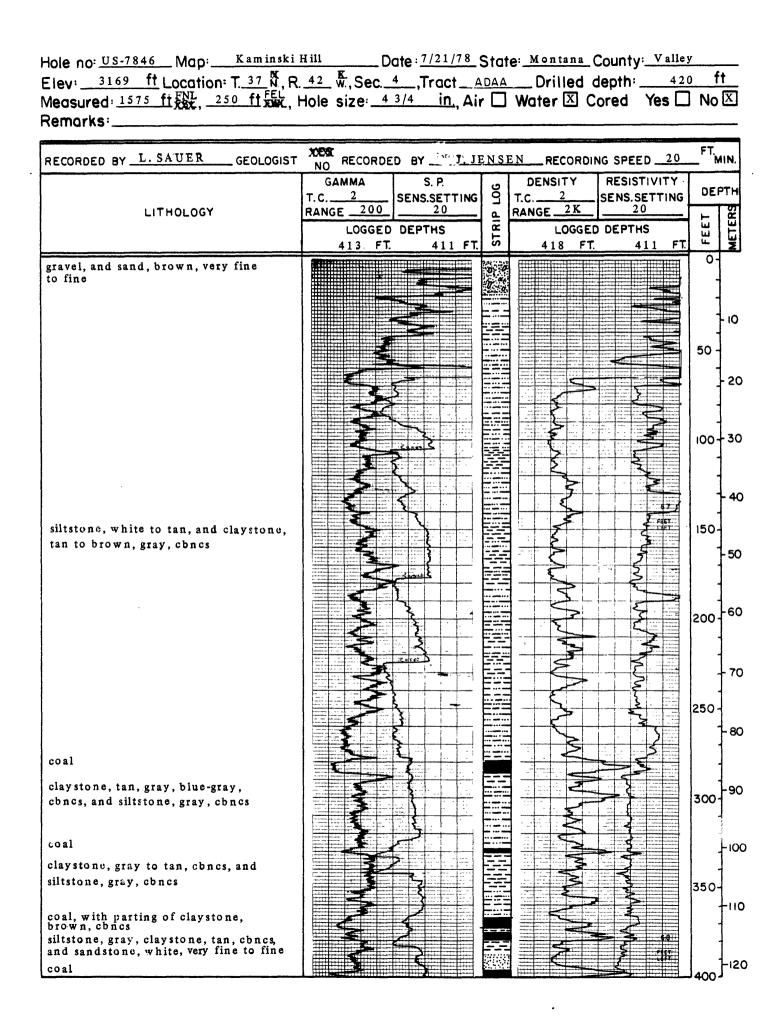
Holesnos US-7843 Map: Crane	NW	Date : <u>5/22/7</u>	<u>8</u> State	e: Montana	.County: <u>Rich</u>	land		
Elev: 2338 ft Location: T. 22 x x x Measured: 1800 ft FSL, 46 ft FWL	R. 57 \$., S	ec. $\frac{26}{1}$, Tract	CBCB	Drilled.	Drilled. depth: 520 1			
Measured: 1800 ft FSL, 46 ft FWL	, Hole size	: <u>4 3/4 in.,</u>	Air 🔲	Water 🗵 (Cored Yes [] No∑		
Remarks:								
RECORDED BY M.A. SPENCER GEOLOGIS	YES T NOT RECO	DRDED BY 1.1E	NSEN	RECORD	ING SPEED15	FT.		
	GAMMA			DENSITY	RESISTIVITY			
	T.C. 2	SENS.SETTI	NG 90	T.C. 2	_SENS.SETTING			
LITHOLOGY	RANGE _1		- d & d	RANGE 2K	20	FEET		
	ľ	GED DEPTHS			D DEPTHS	FEET		
	520	FT. 520 I	FT. S	520 F	T. 520 F1	0-		
		The second secon	= o o :	Property of the Control of the Contr				
till, and gravel	PROPERTY OF THE PROPERTY OF TH			Telephone delication of the control	en Transport y Marie Carlos	1		
			100 g		Laboration of the control of the con			
					Committee of the Commit	ት"		
						- 1		
						50 -		
] ₂		
siltstone, gray, and claystone,				>				
gray to brown, some cbncs						4		
						3 1		
						3 100 + 3		
	3					∄ ┧		
coal						∄ ┤		
claystone, gray, cbncs						∄ ↓4		
coal			===			∄ ↓		
						150-		
						∄ ↓.		
	====] }5		
				\$		∄ ↓		
						∄ ↓		
		2			\$	200 -		
claystone, gray to green, some				2				
cbncs, and siltstone, gray, some	1			₽		∄]		
cbncs	S]];		
						1		
						31		
				2		250		
						∄ ↑{		
						∄ 1		
			===			4		
				= \$] t,		
coal	2	 			3	3001		
			75334.5			3		
sandstone, gray, very fine,						∄ ,		
claystone, gray to dark-gray, and						計 十		
siltstone, gray						∄ ┤		
coal						350-		
					3 13 1] +		
claystone, gray to brown, some						∄ ↓		
cbncs, siltstone, gray, some cbncs,]		
and sandstone, gray, very fine						a		
						1,00 F		

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, gray, cbncs, and siltstone, gray, cbncs coal claystone, gray coal						400-	-130
claystone, gray-green to brown, cbncs, and siltstone, gray, cbncs						-	-140
						500- - -	-150 -160
						550- - -	-170
						600-	-180
					· ·	650 - -	-200
		,				700	210
						750	
						800	1
						850	250
						900e	-270



LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
				J. M. W.		400- - - 450-	-130 -140
claystone, gray to blue-gray, some chics, and siltstone, gray, some chics				A Vandarday		500-	-150 -160
,						550- - - - -	-170 -180
						600-	-190
					·	650-	210
	·					750-	-220
						800-	-240
						850-	-250 -260
						900	-270

Hole no: US-7845 Map: Kaminski	<u>нііі</u> Do	ite: 7/19/78	Stat	e: Montana County: Vall	ey	
Elev: 3126 ft Location: T. 37 %, R Measured: 20 ft ksk, 2300 ft kwk, Remarks:	42_1 k, Sec1 Hole size:	16 ,Tract B 5 in., Air	AAI	B Drilled depth: 260 Water ▼ Cored Yes □	No	<u>†</u>
RECORDED BY L. SAUER GEOLOGIST	XXXX NO RECORDE	O BY J. JEN	SEN	RECORDING SPEED 20	FT N	IIN.
LITHOLOGY	GAMMA	S. P. SENS.SETTING 100	90	DENSITY RESISTIVITY	FEET O	METERS T
gravel, and sandstone, brown, modium siltstone, gray to brown, cbncs, and claystone, gray to black, cbncs coal siltstone, gray to brown, cbncs, and claystone, gray, cbncs			000000000000000000000000000000000000000		100-	-10 -20 -30 -40
		.		·	300-	-90
		S.			350-	-110
					400	-120



LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
sandstone, white, very fine to fine					\$	400- -	-130
						- 450-	
-	·					- - -	-140
						500- -	-150
					·	-	-160
						550- - -	-170
·						600-	-180
						-	-190
						650 - -	-200
						- 700-	210
						- -	-220
						750-	-230
						l .	-240
						800- - -	-250
						- - 850	-260
						-	-270
		Q1				900_	

Hole no: US-7847 Map: Kaminski I	H iii D	ate: 7/22/78	Stat	e: Montana (County: Valle	у	
Elev: 3152 ft Location: T. 37 x, R. Measured: 50 ft FSL, 1930 ft FWL, I Remarks:	42 xx,Sec Hole size:_4	15 ,Tract <u>C</u> 3/4 in., Air	DCD	Drilled of Water ⊠ C	depth: 38 ored Yes	o f No	<u>†</u> 図
RECORDED BY L. SAUER GEOLOGIST	XXIES NO RECORDE	ED BY 1.1EN	SEN	RECORDII	NG SPEED	FT	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200 LOGGED	S. P. SENS.SETTING 250 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 2K LOGGED	RESISTIVITY SENS.SETTING 250 DEPTHS	FEET	METERS T
sand, and gravel	373 FT.	371 FT.	0.000	378 FT.	371 FT	0-	
			0 0	MANA MA		50 -	- 10 - 20
	***************************************				. \$	100-	- 30
siltstone, brown to gray, cbncs and claystone, tan to gray, cbncs						150-	- 40 - 50
				MA AM		200	-60 -70
coal, with parting claystone, gray, cbncs						250 - -	-80
siltstone, gray, cbncs, and claystone, gray, cbncs,)				300-	-90
	* 3	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				350- -	-110
						400	-120

Hole no: US-7848 Map: Kaminski Hill Date: 7/22/78 State: Montana County: Valley Elev: 2972 ft Location: T. 37 k, R. 42 k, Sec. 2 , Tract BDDC Drilled depth: 240 Measured: 2730 ft FSL, 2200 ft FWL, Hole size: 43/4 in., Air Water X Cored Yes X No Remarks: Cored interval - 82 ft - 92 ft FT. MIN. RECORDED BY J. JENSEN RECORDED BY L. SAUER **GEOLOGIST** GAMMA S. P. DENSITY RESISTIVITY 106 DEPTH T. C. ____2 SENS.SETTING T.C.__ SENS, SETTING RANGE 2K RANGE 200 LITHOLOGY ٩ æ LOGGED DEPTHS LOGGED DEPTHS ST 228 FT. 223 FT. gravel, and sand, brown, fine to medium - 10 50 clay stone, gray, cbncs, and siltstone, gray, cbncs 20 coal, with parting of claystone, gray, cbncs 100 + 30 siltstone, gray to blue-gray, cbncs, and claystone, blue-gray to gray, 1-40 cbncs 150--50 200 +60 sandstone, gray to blue-gray, very fine to medium, cbncs - 70 250 - 80 300 -100 350 -110 400-

Hole no: 05-7849 Map: Raminski Elev: 3136 ft Location: T. 37 x, R. Measured: 100 ft FNL, 75 ft FEL, 1 Remarks: Poor sample recovery after 3	. <u>42</u> %, Sec. <u>15</u> , Tract _ Hole size: <u>4 3/4</u> in., A	AAA	A Drilled o	lepth: 34	o ft
RECORDED BY L. SAUER GEOLOGIST	XXES NO RECORDED BY J. JE	NSEN	RECORDIN	NG SPEED 15	FT. MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 50 LOGGED DEPTHS 340 FT. F	TRIP	RANGE	RESISTIVITY SENS.SETTING DEPTHS FT	EET ETERS HE
gravel, sand, brown, medium, and clay, light-tan		0.0		· · .	0-
claystone, gray and tan, cbncs, and siltstone, tan					50 -
coal.					100-30
siltstone, gray to blue-gray, and					150
claystone, tan, gray, blue-gray, cbncs				· -	200-60
					250 - 80
coal, with parting of claystone, dark-gray, cbncs sandstone, gray, very fine to					300-90
fine, and claystone, gray, cbncs		100 100 100 100 100 100 100 100 100 100			350-
					110

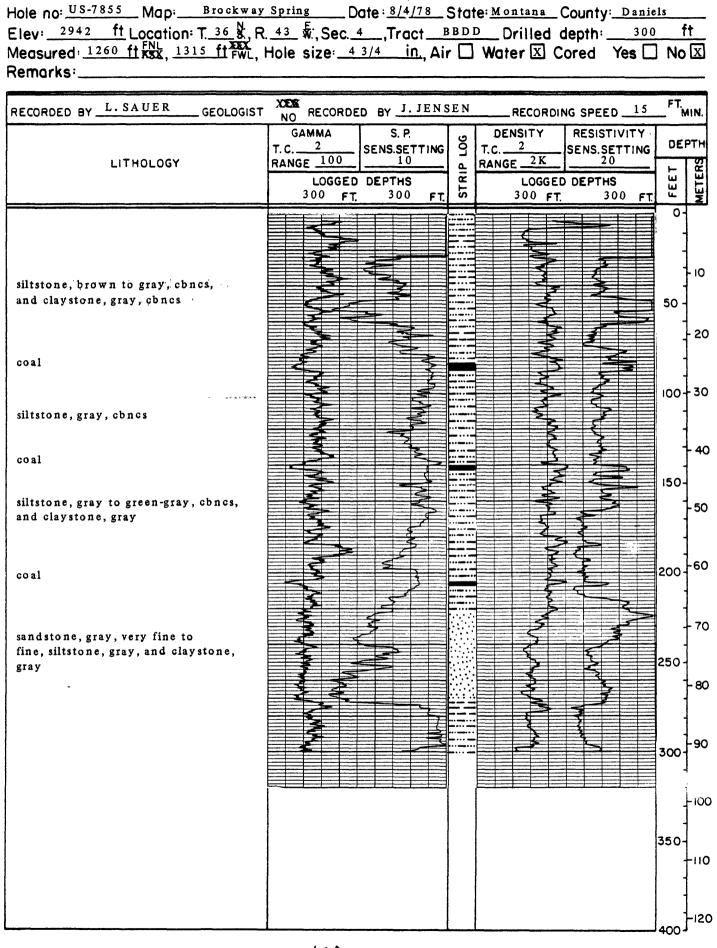
Hole no: US-7850 Map: Blockway						f+
Elev: 3090 ft Location: T. 37 st, R. Measured: 1400 ft FXX, 90 ft FXX, IR. Remarks:	Hole size: 4	3/4 in., Ai	r 🗆	Water 🗵 Cored Yes [] No	
RECORDED BY L. SAUER GEOLOGIST	XXEX NO RECORDE	D BY J. JEN	ISE	N RECORDING SPEED 15	FT.	MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 50	S. P. SENS.SETTING 50 DEPTHS 235 FT.	TRIP	DENSITY T.C. 2 RANGE 2K COGGED DEPTHS 192 FT. 235 F	EET	METERS T
			0 0		0	
gravel, and sand, brown, fine to medium			0 0 0 0		50	10
			o.		100	30
siltstone, tan, fe, and claystone, gray to brown, cbncs					150	- 40 - 50
					200	-60
					250	70
					300	-90
			o designativo del la companya del designativo del la companya del designativo del la companya		350	110
	0.5				400	-120

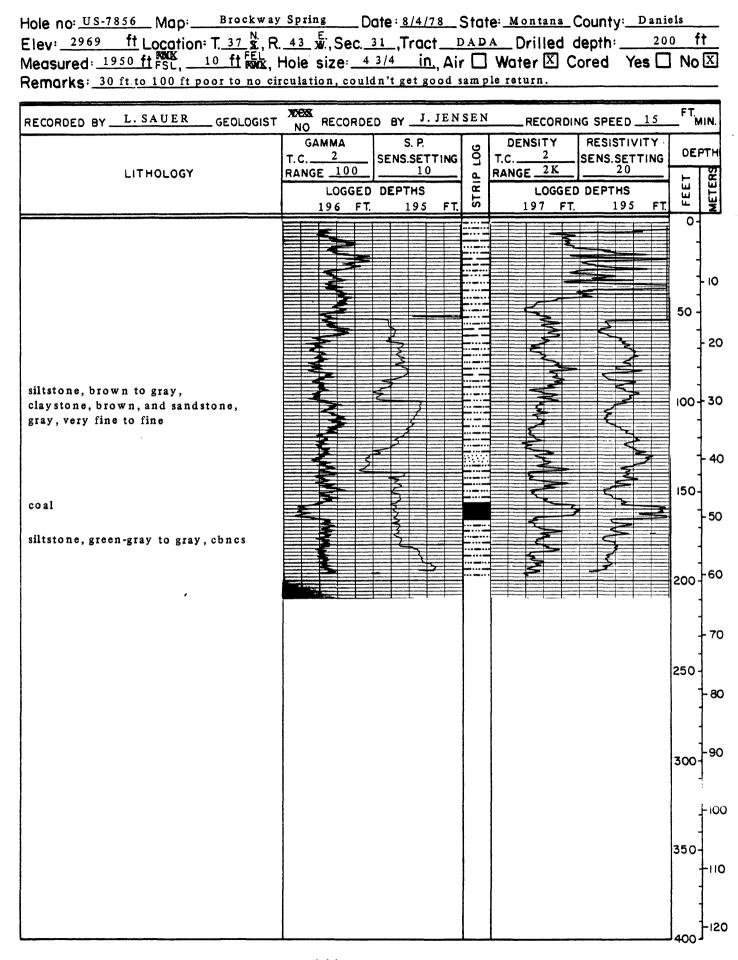
Hole no: US-7851 Map: Brockway Spring Date: 8/2/78 State: Montana County: Daniels Elev: 3069 ft Location: T. 37 x, R. 43 x, Sec. 30 , Tract BCDB Drilled depth: 240 Measured: 2220 ft FNL, 745 ft FWL, Hole size: 43/4 in., Air Water & Cored Yes No & Remarks: Logged gamma through rods. FT. RECORDED BY L. SAUER RECORDED BY J. JENSEN **GEOLOGIST** RECORDING SPEED __15 GAMMA S. P. DENSITY RESISTIVITY DEPTH T. C. ____2 SENS.SETTING T.C. 2 SENS.SETTING RANGE 100 RANGE 2K LITHOLOGY م ~ LOGGED DEPTHS LOGGED DEPTHS ST ο . 0 gravel, and sand, brown, fine to . 0 - 10 medium ٠٥. : 50 - 20 100 + 30 siltstone, dark-gray to brown, and claystone, light-gray - 40 coal claystone, gray, cbncs, and siltstone, dark-gray, cbncs 150-- 50 claystone, gray, cbncs, and siltstone, gray 200 +60 - 70 250 - 80 300 350--110

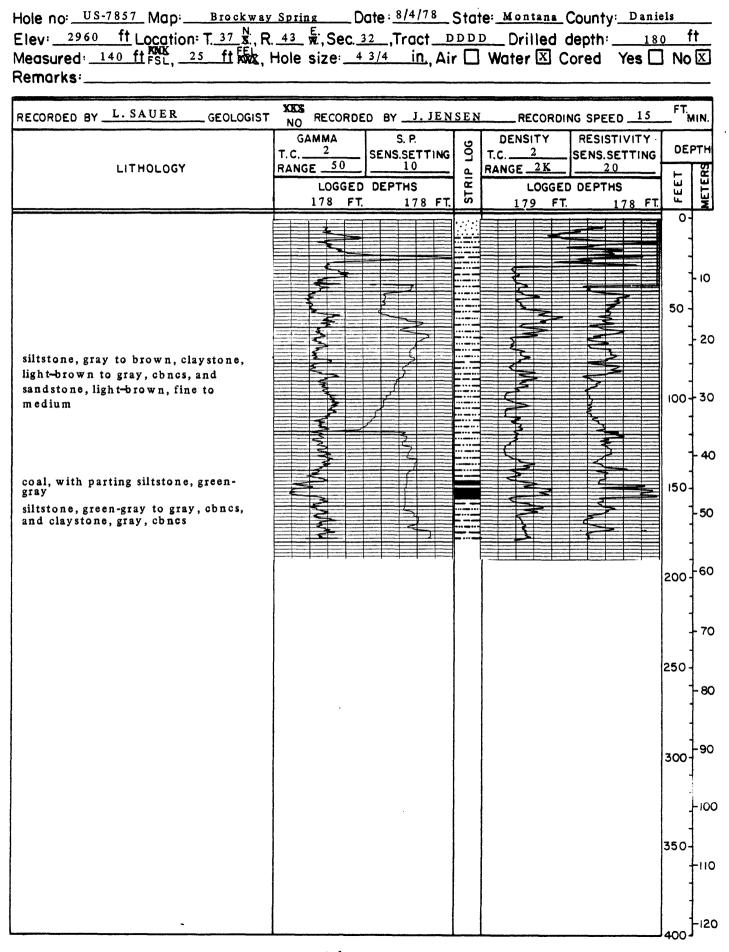
Hole no: US-7852 Map: Brockway	Spring D	ate: <u>8/2/78</u>	Stat	e: Montana Co	unty: Danie	18	
Elev: 2945 ft Location: T. 37 x, R Measured: 2580 ft FXX, 1960 ft FWL, Remarks:	. <u>43</u> \$.,Sec Hole size:_4_	6,Tract 3/4in., Air	BDCC	Drilled de Water ☒ Cor	pth: 280 red Yes	No	t X
RECORDED BY L. SAUER GEOLOGIST	XXES NO RECORDE	D BYJ.JEN	ISEI	NRECORDING	SPEED 15	FT. _ N	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 50	S. P. SENS.SETTING 50 DEPTHS	90-	DENSITY F	RESISTIVITY ENS.SETTING 20 DEPTHS 280 FT.	FEET	- 1
claystone, gray, cbncs, and siltstone, gray to dark-brown, cbncs						50 -	- 10 - 20
coal, with parting of siltstone, gray cbncs siltstone, gray, cbncs coal siltstone, gray, cbncs, and claystone,						- 100- - -	- 30
gray, cbncs coal, with parting of claystone, gray, cbncs siltstone, gray, cbncs, and claystone, gray, cbncs						- - 150- -	- 40 - 50
siltstone, gray, sandstone, gray-green,	3					- - 200 - -	-60
very fine to fine, and claystone, gray, cbncs		5				- - - 250 -	- 70 - 80
						300 -	-90
						350-	-110
						400	-12

Hole no: US-7853 Map: Brockway	Spring	_Date:_	8/2/78	_Stat	e: Montan	2 County	: Danie	1s	
Elev: 3129 ft Location: T. 37 x, R. Measured: 15 ft FSL, 130 ft FWL, I	. <u>43</u> ₩, Se	$C. \frac{7}{43/4},$	ract_	cccc	Drilled	d depth:	3 6 (Yor □) f	<u>†</u>
Niedsured:FSL,FWL, I Remarks:	TOIR SIZE	4 3/4	<u>,</u> A	با ۱۲	water 🖭	Corea	162	140	<u>د</u>
	XXEX							FT	_
RECORDED BY L. SAUER GEOLOGIST	NO RECOR			NSEN		RDING SPEE		_ FT. M	IIN.
	GAMMA T. C2	SENS	S. P. S.SETTIN	007	DENSITY	ISENS.S	TIVITY SETTING	DEF	
LITHOLOGY	RANGE _50	ED DEP	20 THS	RIP	RANGE 2K	ED DEPTH		FEET	METERS
	360		360 F	! -	360		60 FT.		ME
			7	•	3			0	
gravel, and sand, gray, fine to				9 9	3			-	
medium				0 0				1	- 10
					\$			50	
				00				1	- 20
			\$		3			-	
							3	100-	- 30
			\$			45		-	
		4	1			\$]	
siltstone, brown to olive-gray, and claystone, olive-gray to					\{\}			-	- 40
dark-gray								150-	
					\$			1	- 50
				===		3		4	
						3		200-	-60
			3			8		•	
coal								-	- 70
claystone, green-gray to gray,								_	
and siltstone, gray					\$	4		- 250 -	- 80
	E		1					_	Γ^{∞}
coal							` `	-	
claystone, green-gray to gray,	3				3			300-	-90
siltstone, gray to brown, and sandstone, gray, very fine to fine						\$		-	ţ
								-	100
								- -350	
									110
			+ + = +	≓ 				-	
								-	-120
	<u> </u>				l			400-	,

Hole no: US-7854 Map: Kaminski I	Hill D	ate: <u>8/3/78</u>	Stat	e: Montana	County:_	V alle	у	
Elev: 3022 ft Location: T. 37 x, R. Measured: 1950 ft RSX, 320 ft RXX, I Remarks:	42 ₩,Sec.2 Hole size:_4	²⁶ ,Tract <u>A</u> ^{3/4} in., Ai	r \square	Drilled Water 🗵	depth: Cored Y 	260 (es 🗆	No	<u>r</u>
RECORDED BY L. SAUER GEOLOGIST	XXX NO RECORDE	D 8Y	SEN	RECORD	ING SPEED	15	FT. _ M	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGED 260 FT.	S. P. SENS.SETTING 20 DEPTHS 260 FT.	TRIP	DENSITY T.C. 2 RANGE 2K LOGGE 260 F	RESISTIVE SENS.SET 20 ED DEPTHS T. 26		FEET	- 1
claystone, tan to brown, cbncs, and siltstone, gray to brown							50 -	- 10 - 20
siltstone, gray, cbncs, and claystone, gray, cbncs							100 - - -	- 30 - 40
coal							150-	- 50
sandstone, gray, very fine, siltstone, gray, and claystone, gray to green-gray, cbncs					3		1	-60
coal siltstone, gray, cbncs, and claystone, gray, cbncs						7	250 -	- 70 - 80
							300-	-90
						17	350-	-110
							₁₀₀]	-120

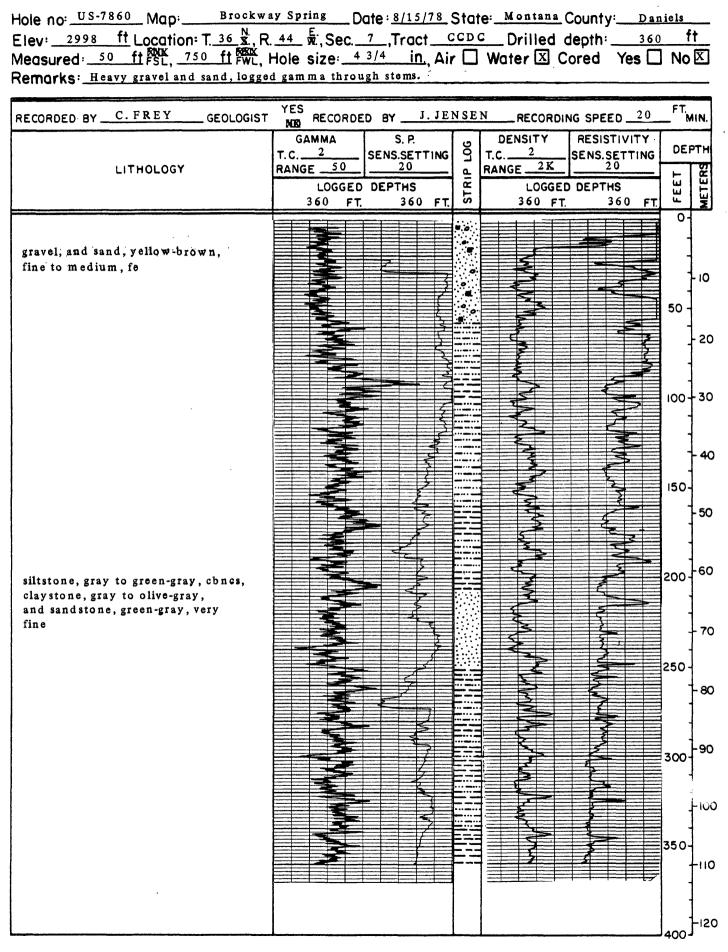


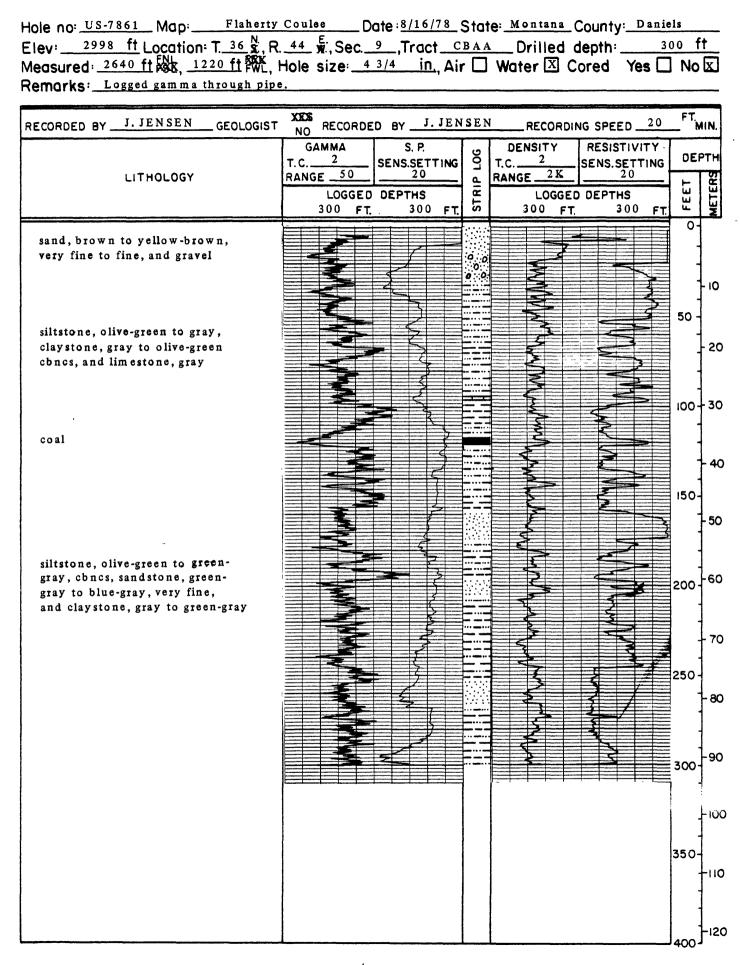




Sandstone, brown, fine to medium, locally conglomeratic, silistone, tan to gray, and claystone, light-gray to tan coal coal claystone, gray and dark-brown, chnes, and silistone, gray and dark-brown, cbnes, and silistone, gray and dark-brown, cbnes claystone, gray, and silistone, gray, coal, with parting of claystone, gray, and silistone, gray and silistone, gray coal claystone, gray, and silistone, gray coal elaystone, gray, and silistone, gray coal elaystone, gray, and silistone, gray	Hole no: US-7858 Map: Brockway	Spring D	ate: <u>8/5/78</u>	Stat	e: Montana	County: Danie	ls	
Sandstone, brown, fine to medium, locally conglomeratic, silistone, tan to gray, and claystone, gray and dark-brown, cbnes, and silistone, gray and dark-brown, cbnes, and silistone, gray, and silistone, gray and dark-brown, cbnes, and silistone, gray, and silistone, gray and dark-brown, cbnes, and silistone, gray, and silistone, gray and dark-brown, cbnes, gray, and silistone, gray and dark-brown, cbnes, gray, and silistone, gray and dark-brown, gray, and silistone, gray and		Hole size: 4	33 ,Tract <u>D</u> 3/4 in., Air	r 🗆	Drilled Water ☒ (depth: 30 Cored Yes	o f	X
SAMMA S.P. T.C. 2 SENS.SETTING PANGE 2S SENS	RECORDED BY L. SAUER GEOLOGIST		D BY J. JEN	SEN	RECORD	ING SPEED	FT	AIN.
sandstone, brown, fine to medium, locally conglomeratic, siltstone, tan to gray, and claystone, light-gray to tan coal claystone, gray and dark-brown, cbncs, and siltstone, gray and dark-brown, cbncs, and siltstone, gray and dark-brown, cbncs coal, with parting of claystone, gray, cbncs coal, with parting of claystone, gray, coal claystone, gray, and siltstone, gray coal claystone, gray, and siltstone, gray coal claystone, gray, and siltstone, gray	LITHOLOGY	T.C. 2 RANGE 50 LOGGED	SENS.SETTING 20 DEPTHS	TRIP	T.C. 2 RANGE 2K LOGGE	SENS.SETTING 20	FEET	РТН
coal claystone, gray and dark-brown, cbncs, and siltstone, gray and dark-brown, cbncs coal, with parting of claystone, gray, cbncs claystone, gray, and siltstone, gray coal claystone, gray, and siltstone, gray coal claystone, gray, and siltstone, gray coal claystone, gray, and siltstone, gray	locally conglomeratic, siltstone, tan to gray, and claystone, light-			0.0			50 -	
coal, with parting of claystone, gray, cbncs claystone, gray, and siltstone, gray coal elaystone, gray, and siltstone, gray 300-90	claystone, gray and dark-brown,						150-	- 40
coal, with parting of claystone, gray, chocs claystone, gray, and siltstone, gray coal elaystone, gray, and siltstone, gray 300 350-	1						200	
elaystone, gray, and siltstone, gray 300 90 350	cbncs claystone, gray, and siltstone, gray						250	- 70 - 80
350- 					₹.	E	300	-90
	,						350	110

Hole no: US-7859 Map: Flaherty C	Coulee D	ate: <u>8/6/78</u>	Stat	e: Montana	_County	: Danie	ls
Elev: 3034 ft Location: T. 36 $\frac{N}{x}$, R. Measured: 34 ft FSL, 29 ft FWL, I	44 M., Sec.	8,Tract_ <u>c</u> /4in_, Ai	r 🗆	Drilled Water ≅	depth: Cored	3 2 0 Yes	ft No ⊠
Remarks:	XXXS NO RECORDE	D BYJ. JEN	SEN	RECORD	ING SPEE	D 15	FT. MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 50	S. P. SENS.SETTING DEPTHS FT.	TRIP LOG	DENSITY T.C. 2 RANGE 1K	RESIS SENS.S	ETTING	FEET GAMETERS T
gravel, sand, brown, fine to medium, and clay, gray to white			0 0 0				50 - 20
claystone, gray, cbncs, and							150-
siltstone, gray, cbncs					·	-	200 -60
coal						12	250 - 250 -
siltstone, brown-gray to green-gray, and sandstone, green-gray, very fine to fine							300 - 90
						,	
							-110
					·		400 -120

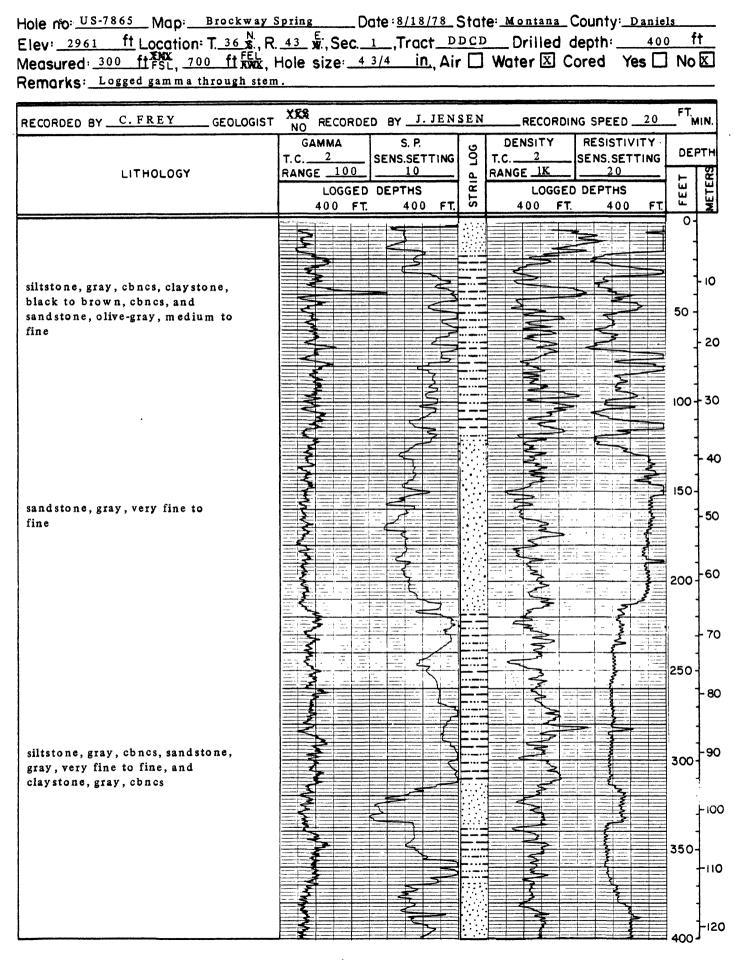




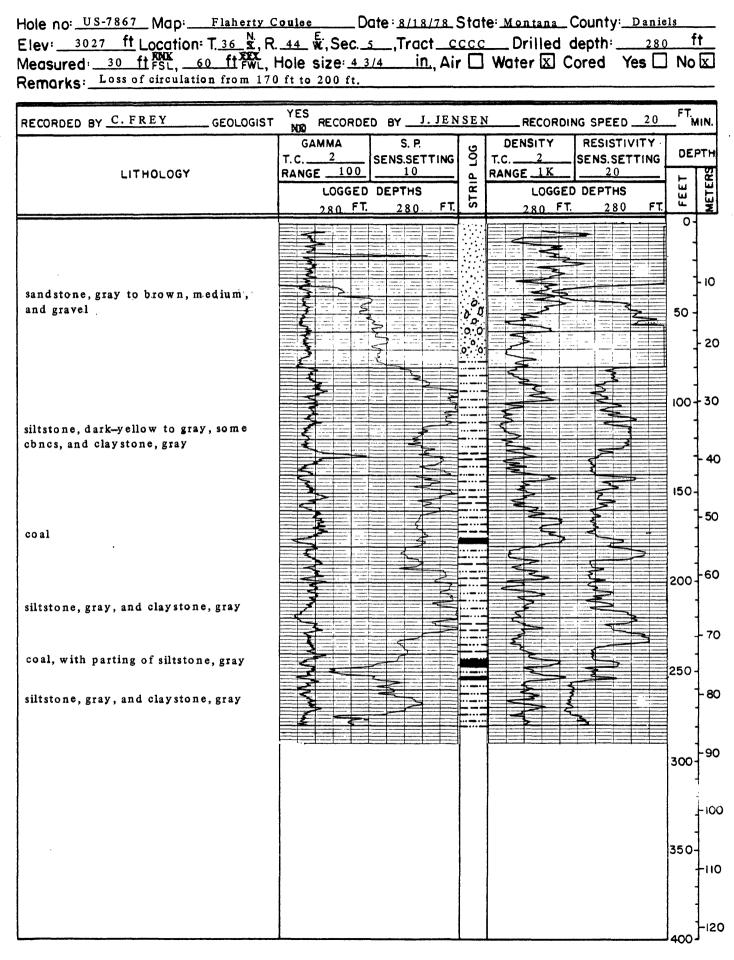
Hole no: US-7862 Map: Flaherty	Coulee	ate: 8/16/78	Stat	e: Montana	.County:_	Danie	ls	
Elev: 2923 ft Location: T. 37 N., R Measured: 307 ft FSL, 880 ft FWL, Remarks:	R. <u>44</u> ₩., Sec Hole size: <u></u>	31 ,Tract <u>0</u> 3/4 in., Air	r 🔲	©Drilled Water∑	depth: _ Cored `	200 Yes 🗆	No	<u>†</u>
RECORDED BY C. FREY GEOLOGIST	YES RECORDS	ED BY J. JEN	SEN	RECORD	ING SPEED	20	FT.	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGED 200 FT	S. P. SENS.SETTING 10 DEPTHS 200 FT.	TRIP	DENSITY T.C. 2 RANGE 1K LOGGE 200 F	RESISTI SENS.SE 20 ED DEPTHS	TTING	FEET O	
gravel, and sand, yellow-brown, very fine, and claystone, gray, cbncs			.9.0				0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	- 10
claystone, gray, cbncs, and siltstone, green-gray to gray, cbncs							100-	- 30
coal sandstone, green-gray, very fine to fine, cbncs, and claystone, green-gray, cbncs							150-	- 40 - 50
							- - 002	-60
						2	- - 250 -	- 70 - 80
						2	300-	- 9 0
						3	550-	-100
							400	-120

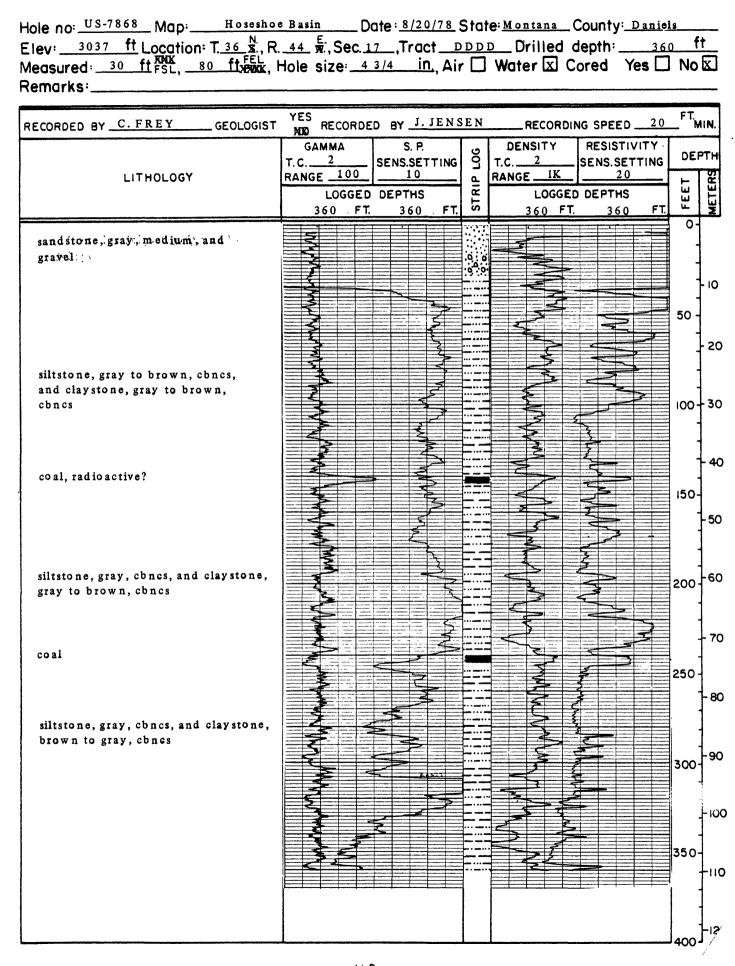
Hole no: US-7863 Map: Flaherty C	Coulee	ote: 8/17/78	Stat	e: Montana	_County:	Daniel	ls	
Elev: 3007 ft Location: T. 36 x, R. Measured: 65 ft kx, 60 ft kx, 1 Remarks:	. <u>44</u> 克,Sec Hole size: <u>_4</u>	5 ,Tract B 3/4 in., Air	BBB r 🔲	Drilled Water ☒	depth:_ Cored	300 Yes	No.	<u>†</u>
RECORDED BY C. FREY GEOLOGIST	YES NO RECORD	ED BY J. JEN	SEN	RECORD	ING SPEE	20	_ FT. M	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 50	S. P. SENS.SETTING 20 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 1K	RESIST SENS.SE 20 ED DEPTHS	TTING	FEET	METERS T
gravel, sand, tan, fine to medium, and clay, gray			ġ.			<i>x</i>	50	- 10 - 20
siltstone, gray, cbncs, and claystone, gray and yellow-orange coal	3						100-	- 30
siltstone, gray, and claystone, gray, cbncs		7 7 7 7 7 7 7 7 7 7					150-	- 40 - 50
							- 200 - -	-60
coal sandstone, gray-green, very fine to		* * * * * * * * * *					- 250 -	70
fine, and claystone, gray, cbncs					***************************************		300-	- 80 - 90
							350-	-100
							400	-120

Hole no: US-7864 Map: Brockway	Spring D	ate: 8/17/78	Stat	e: Montana	County: Da	niels	
Elev: 2970 ft Location: T. 37 N., R. Measured: 2020 ft FEX. 50 ft RWX., 1	43 w, Sec	26 ,Tract <u>A</u>	D D A	Drilled	depth:	300 N	ft ाष्ट्री
Measurea: <u>2020 II</u> ps <u>v</u> x, <u>30 II</u> psvx, 1 Remarks:	noie size: _+_	3/4 III. , Alf	<u>ں</u>	water 🖾 C	,ored les	IN 140	
	VEC			A to the label of		CT	-
RECORDED BY C. FREY GEOLOGIST		D BY J. JEN	SEN		ING SPEED		MIN.
	GAMMA T. C2	S. P. SENS.SETTING	100	DENSITY	RESISTIVIT	1 -	EPTH
LITHOLOGY	RANGE 100	10	RIP L	RANGE 1K	20	 	12
	LOGGED 300 FT.	DEPTHS 300 FT.	STR	LOGGE 300 FT	D DEPTHS	FT. L	METERS
gravel			. 0			i o	
			o 0				1
							10
siltstone, gray, cbncs, sandstone,						▋	1
gray, very fine, and claystone, gray, cbncs						50	1
		-3					20
							-
						*	30
						\$ 100	'] 30
coal							1
							+40
siltstone, gray to green-gray,						150	,1
and sandstone, green-gray, very	3						-50
							f 30
				1			1
						200	9-60
			::::::::::::::::::::::::::::::::::::::			\$	4
coal							1
siltstone, gray, cbncs, and claystone, green-gray, cbncs					3		70
coal					2 3 2 3	250	, -
siltstone, gray, cbncs, and	*						-80
claystone, olive-green, cbncs		7	===	3			1
		5]
						300	-90
						+=	4
							-100
							+
						350	ì
							†110
							1
						100	120



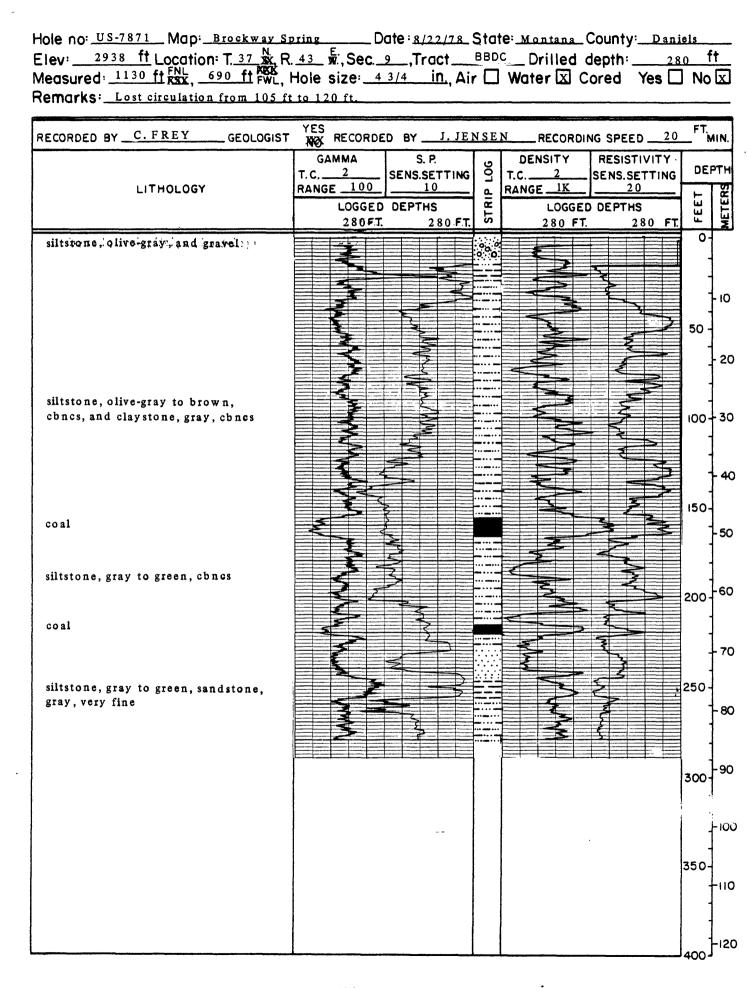
Elev: 3019 ft Location: T. 36 x., R. Measured: 70 ft ksx., 580 ft ksx., 1 Remarks:	_43 克,Sec Hole size:_4_	1,Tract_ <u>A</u> 3/4in., Air	A A I	BDrilled depth: Water \(\overline{\colored} \) Cored Yes	240 ff No	
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	O BY	SEN	RECORDING SPEED	QFT.	N.
LITHOLOGY	GAMMA T.C2 RANGE100 LOGGED 240 FT.	S. P. SENS.SETTING 10 DEPTHS 240 FT.	STRIP LOG	DENSITY RESISTIVITY	G DEP	METERS I
claystone, light gray, and volcanic					립어	
sandstone, gray, medium, and gravel			0 0			10
					50 -	20
siltstone, gray, some cbncs, claystone, gray, some cbncs					100	30
coal claystone, gray, and siltstone, gray					150-	- 40
siltstone, gray, and claystone,						- 50
gray co al					200-	-60
claystone, gray, and siltstone, gray					250	- 70
					1 1	- 80
					300	-90
						-100
					350-	-11C
						-120

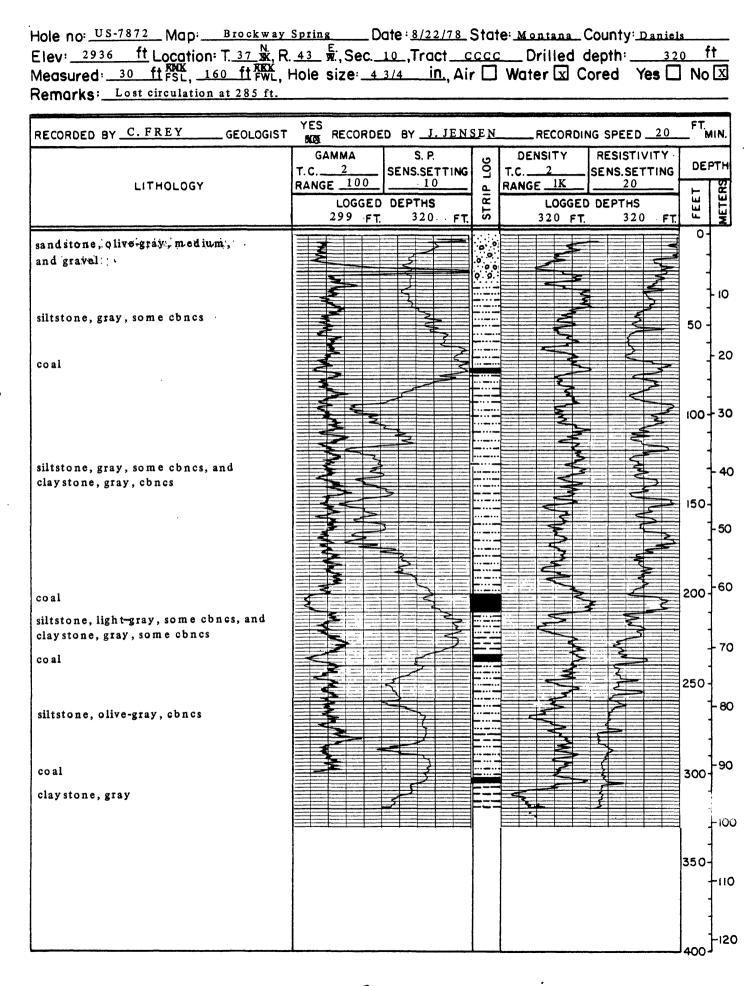




	Spring Date: 8/21/78 State: Montana County: Dan	
Elev: <u>2850 ft</u> Location: T <u>. 37 st.,</u> F Measured: <u>1600 ft</u> FSL, <u>280 ft fo</u> t, Remarks:	. 43 \$\vec{\mathbb{K}}, \text{Sec. 11 ,TractDADD_Drilled depth:32 Hole size: _43/4 in., Air \(\text{ Water \(\text{\text{X}}\) Cored Yes \(\text{\text{Ves.}}\)	0 ft □ No⊠
RECORDED BY C. FREY GEOLOGIST	YES RECORDED BY J. JENSEN RECORDING SPEED 20	FT.
LITHOLOGY	GAMMA S. P. DENSITY RESISTIVITY T.C. 2 RANGE 100 10 20	EET CERS
sandstone, gray, medium, and 'e gravel::		0-1
siltstone, gray, some cbncs, and		50 -
claystone, gray, som e cbncs		100 - 30
coal, with parting of siltstone, gray claystone, gray, some cbncs,		150-
siltstone, gray, some cbncs coal, with parting of claystone, gray		200
siltstone, dark-green to gray, some cbncs, and sandstone, dark-green to		250
gray, very fine, some cbncs		300-90
		-10
		350-
		J ₄₀₀ -12

GAMMA 2 GE 100 LOGGE 360 F	SENS.	P. SETTING 10 HS 60 FT.	TRIP	DENSITY T.C. 2 RANGE 1 LOG 360	SENS.	NG DE SO	- 0
			000			50	20
						250	50
							300

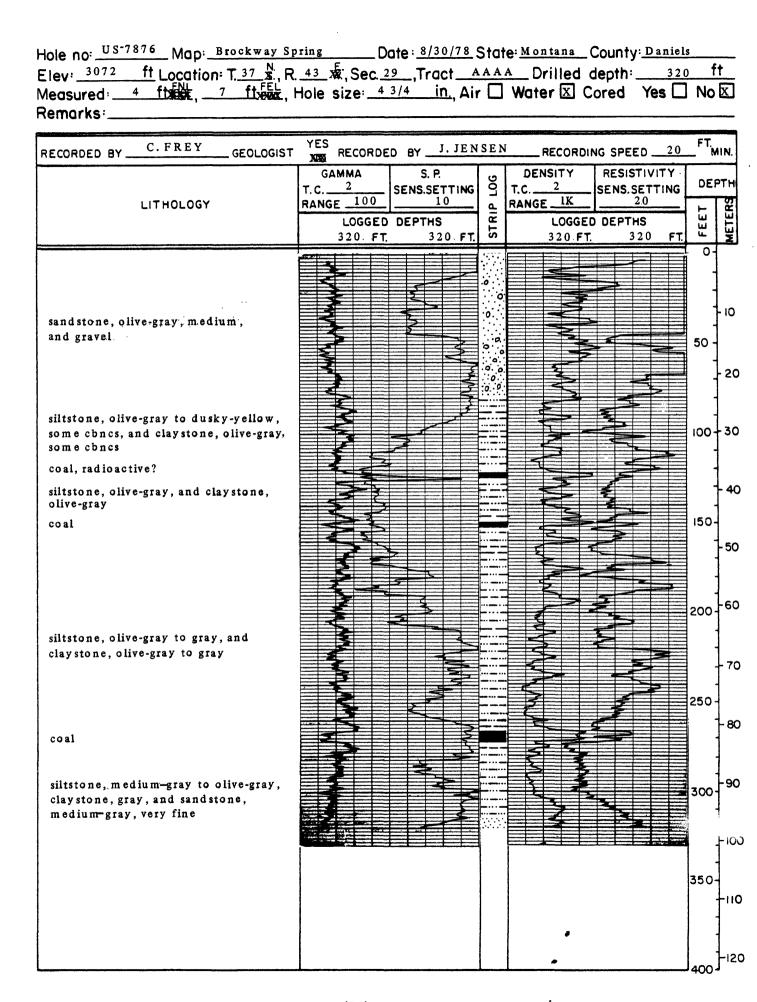


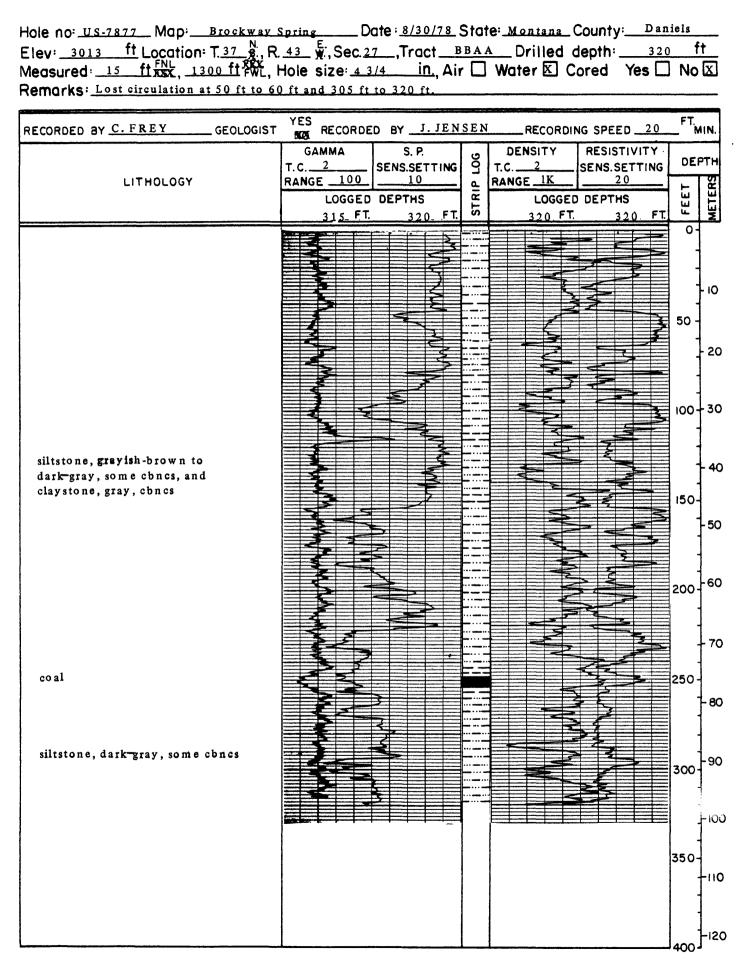


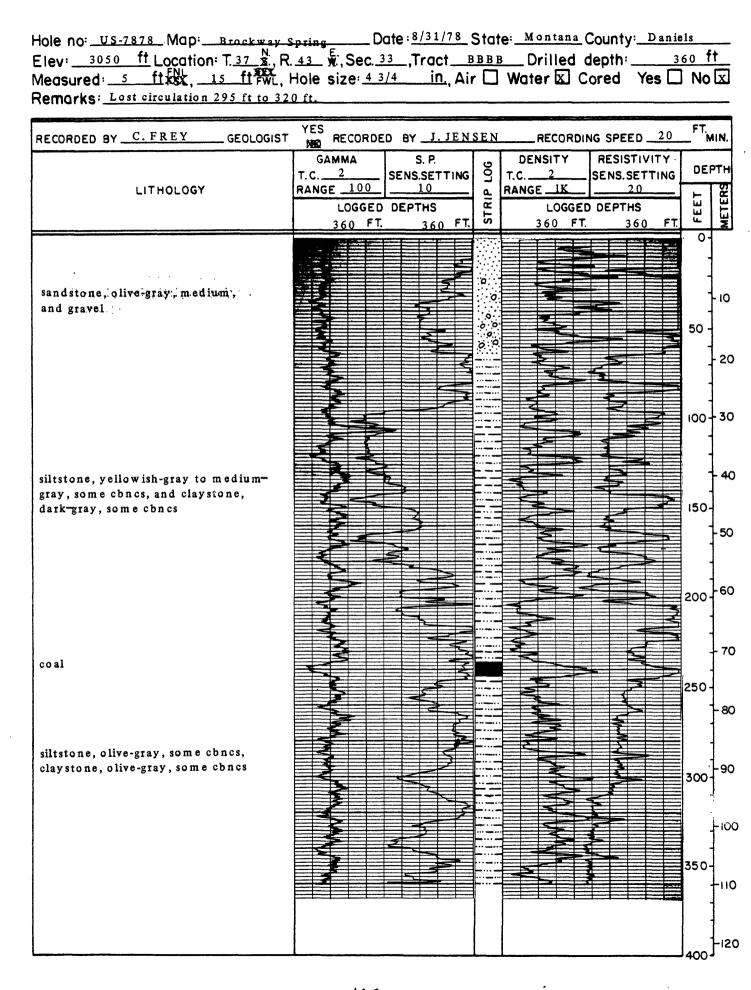
Elev: 3050 ft Location: T. 37 x, R	av Spring Date: 8/23/78 State: Montana County: Daniels R. 43 x, Sec. 8 , Tract DCCD Drilled depth: 360 Hole size: 43/4 in., Air Water Cored Yes Cored estems.	ft
RECORDED BY C. FREY GEOLOGIST	YES RECORDED BY J. JENSEN RECORDING SPEED 20	FT.
LITHOLOGY	GAMMA	FEET GO METERS T
claystone, olive-gray, some cbncs, and siltstone, olive-gray, some cbncs claystone, greenish-gray, some cbncs, and siltstone, greenish-gray, some cbncs, and siltstone, greenish-gray, some cbncs coal, with partings of claystone, gray claystone, olive-gray, and siltstone, olive-gray		100 - 30 100 - 30 150 - 50 200 - 60 200 - 60 250 - 80 350 - 110
		400

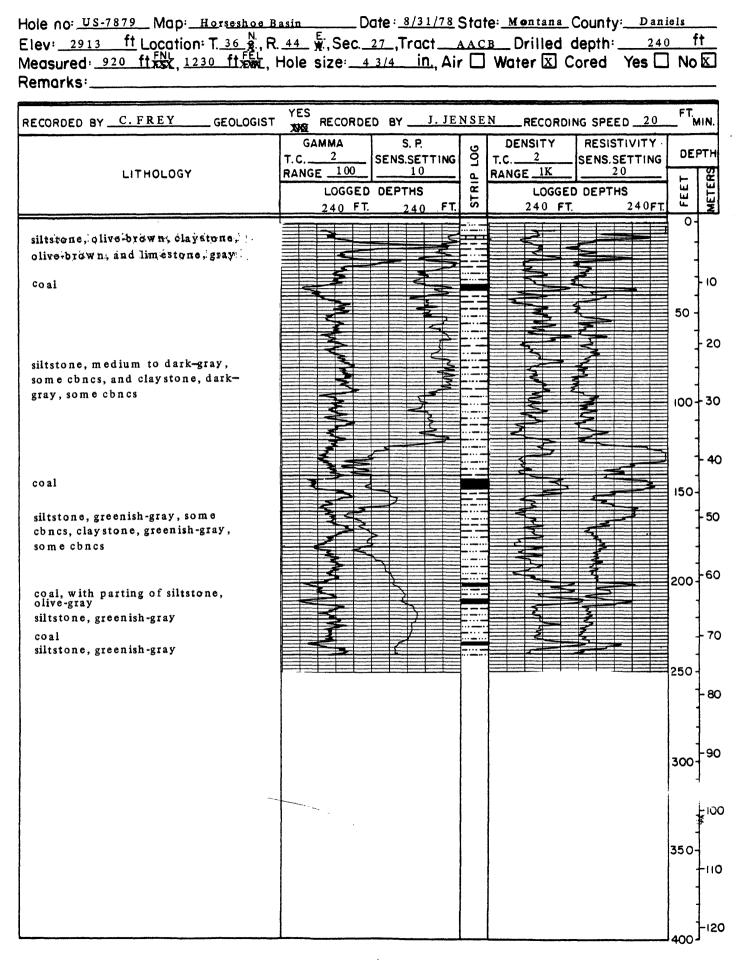
Hole no: US-7874 Map: Brockway	Spring D	ate: 8/29/78	Stat	e: Montana	_County	Danie	ls	
Elev: 2983 ft Location: T. 37 $\overset{\text{N}}{x}$, R. Measured: 15 ft $\overset{\text{FNL}}{R}$, 1350 ft $\overset{\text{FEL}}{R}$, 1	<u>43</u> kk, Sec. 2 Hole size: 4	21 ,Tract <u>A</u> 3/4 <u>in.,</u> Air	r 🗆	A Drilled Water ∑	depth:_ Cored	280 Yes	No.	<u>†</u>
Remarks:	YES	D BY J. JENS	EN	BECOBI	DING SPEE	0 20	FT	IIN
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING	ပ	DENSITY T.C. 2 RANGE 1K		IVITY	DEF	тн
	LOGGED 280 FT.	DEPTHS 280 FT.	 -	LOGG 280 F	ED DEPTH		FEET	METERS
	3		0.00				0-	ŧ
siltstone, olive-brown to yellowish- gray, claystone, olive-brown, with							50 -	- 10
limestone ledge, gray	}				-Z -		4	- 20
coal	\$						100	- 30
	\$	\$					150-	- 40
siltstone, greenish-gray, cbncs,	3					3	1	- 50
claystone, greenish-gray, cbncs	\$	3					200-	-60
co al	3						1	- 70
sand stone, greenish-gray, medium, cbncs, and siltstone, greenish-gray, cbncs				*			250 -	- 80
							300-	-90
								-100
							350-	-110
		-					400	-120

Hole no: US-7875 Map: Brockway S	pring D	ate: 8/30/78	Stat	e: Montana	.County: <u>Danie</u>	ls	
Elev: 3047 ft Location: T. 37 s., R. Measured: 15 ft FNL, 2350 ft FWL, I	. 43 k.,Sec. Hole size: 4	20 ,Tract <u>B</u> 3/4 in., Air	A A A	Drilled Water ☒ (depth: 280 Cored Yes [No	ft 区
Remarks:							
RECORDED BY C. FREY GEOLOGIST	YES XXX RECORDS	D BY J. JEN	SEN	RECORD	ING SPEED 20	FT.	MIN.
	GAMMA T. C2	S. P. SENS.SETTING	907	DENSITY T.C. 2	RESISTIVITY -		РТН
LITHOLOGY	RANGE 100 LOGGED	10 DEPTHS 280 FT.	STRIP	RANGE 1K LOGGE 280 F1	20 ID DEPTHS T. 280 FT.	FEET	METERS
			000			0-	
sandstone, olive-gráy to white, medium, and gravel			0.0				-10
			0			50 -	-
							- 20
						100	30
		\$					
siltstone, olive-gray to dusky-							40
yellow, cbncs, and claystone, olive-gray to dusky-yellow, cbncs			7,4,7,4			150	- 50
					*		1
		\$			7	200	-60
coal							70
siltstone, olive-gray, some concs, and sandstone, olive-gray, medium,				Ş	3	250	1
some cbncs							-80
							-90
						300	1
							-100
						350-	-110
							1
						400	-120









Hole no: US-7880 Map: Horseshoe	BasinD	ate: <u>9/1/78</u>	Stat	e: Montana	County: Danie	ls	
Elev: 2845 ft Location: T.36 kg, R. Measured: 2601 ft FNL, 2460 ft FNL, HR	45 🕷, Sec. 1 Hole size: 4	9,Tract_ <u>BD</u> 3/4in., Air	D D	Drilled Water ☒ (depth: 20 Cored Yes	o 1 No	†
RECORDED BY C. FREY GEOLOGIST	YES NAK RECORDE	D BY J. JENS	EN	RECORD	NG SPEED 20	FT.	AIN.
LITHOLOGY	GAMMA T.C2 RANGE <u>100</u>	S. P. SENS.SETTING 10 DEPTHS	STRIP LOG	DENSITY T.C. 2 RANGE 1K	RESISTIVITY SENS.SETTING 20 D DEPTHS		METERS T
siltstone, olive-gray to dark-gray, calcareous, some cbncs, and claystone, olive-gray sandstone, greenish-gray, medium, limestone ledge, gray, and claystone, greenish-gray coal siltstone, olive-gray to medium-gray some cbncs coal, with parting of siltstone, greenish-gray siltstone, greenish-gray, cbncs, and sandstone, medium-gray, very fine, cbncs						50 -	- 10 - 20 - 30 - 40
						350- 350-	-90 -100 -110

LITHOLOGY T.C. 2 RANGE 100 LOGGED DEPT 360 FT. sandstone, olive-gray, medium,	S. P. .SETTING	DENSITY T.C. 2 RANGE 1K LOGGET	RESISTIVITY SENS.SETTING 20	DEPTH
sandstone, olive-gray, medium,		290 FT.	DEPTHS 290 FT	FEET METERS
siltstone, pale-olive to dusky-yellow, calcareous, some cbncs				100 - 30 100 - 30 150 50
			2 2 3 3 3 3 3 3 3 3 3 3	250-
				300-90
				350-

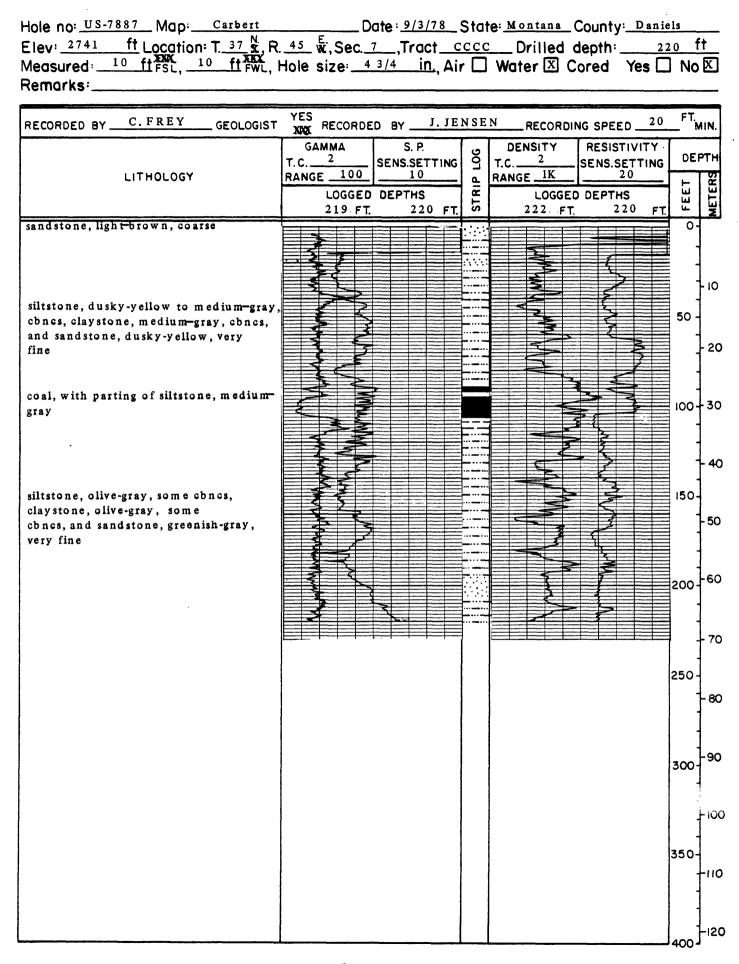
Remarks:	YES RECORDS	ED BY J.JEN	ISEN	TRECORDIT	NG SPEED 20	FT.	MIN.
LITHOLOGY	GAMMA T.C2 RANGE100	S. P. SENS.SETTING 10 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 1K	RESISTIVITY SENS.SETTING 20 DEPTHS 260 FT	EET	
siltstone, medium-gray to greenish- gray, cbncs, and claystone, gray coal siltstone, medium-gray to olive-gray, cbncs, claystone, medium-gray to olive-gray, cbncs, and sandstone, greenish-gray, very fine coal claystone, olive-green, and siltstone, olive-green coal siltstone, greenish-gray, and sandstone, greenish-gray, very fine						150-	-10 -20 -30 -40 -50 -60
						300	-90
						350	-110
						1000	-12

Hole no: US-7883 Map: Peerless	D	ate: <u>9/2/78</u>	Stat	e: Montana	County: D	aniels	
Elev: 2878 ft Location: T. 36 x, R. Measured: 57 ft FSL, 45 ft FM, H. Remarks:	45 x, Sec. 3	29 ,Tract <u>D</u> 3/4 in., Aiı	r 🔲	Drilled (Water ∑ C	depth: cored Yes	300 S N	ft lo 🗵
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BY J. JEN	SEN	RECORDI	NG SPEED	20_F	T. MIN.
LITHOLOGY	GAMMA T.C2 RANGE100	S. P. SENS.SETTING 10 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 1K	RESISTIVIT SENS.SETTI 20 D DEPTHS 300	ING D	WETERS HAda
siltstone, medium-gray to olive-gray, cbncs, sandstone, brown, very fine, and claystone, dark-gray coal siltstone, dark-gray to olive-gray, cbncs, and claystone, olive-gray, cbncs coal, with parting of claystone, olive-gray siltstone, olive-gray, some cbncs, and claystone, olive-gray, some cbncs sandstone, medium-gray, very fine siltstone, olive-gray, some cbncs, and claystone, olive-gray, some cbncs, and claystone, olive-gray, some cbncs						50	20 30 40 0 50 60 70 80 0 90
						40	0 -120

Hole no: US-7884 Map: Flaherty C	oulee D	ate: 9/2/78	Stat	e: Montana County	<u>Danie</u>	18	
Elev: 2790 ft Location: T. 37 %, R. Measured: 2570 ft RSC, 400 ft FEL, Remarks:	. <u>44 x.·</u> ,Sec Hole size: <u>_4</u>	18 ,Tract	, DD	c_Drilled depth:_ Water⊠ Cored	280 Yes □	No	<u>†</u> 🔯
RECORDED BY C. FREY GEOLOGIST	YES RECORDS	ED BYJ.JEN	SEN	N RECORDING SPEE	D <u>20</u>	FT.	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 10 DEPTHS	TRIP LOG	DENSITY RESIST T.C. 2 SENS.S RANGE 1K 20 LOGGED DEPTH	ETTING	FEET	
siltstone, olive-gray to dark-gray, concs, and claystone, gray, concs sandstone, medium-gray, medium, calcareous cement coal siltstone, medium-gray, and claystone,						50 -	- 10 - 20
medium-gray coal						100-	- 30
siltstone, medium-gray coal						150-	- 40 - 50
siltstone, medium-gray, claystone, greenish-gray, and sandstone, medium-gray, very fine						200 - - - - 250 -	-60 - 70
						-	- 80
						300-	-90
					177	- 350-	-100 -110
,	<u></u>					4 0 0	-120

Hole no: <u>US-7885</u> Map: <u>Carbert</u>	Do	ate: <u>9/3/78</u>	Stat	e: Montana (County: <u>Dani</u>	els	
Elev: 2757 ft Location: T. 37 x, R. Measured: 40 ft FSL, 480 ft xxx., I	<u>44</u> 🛱 , Sec	1_,Tract_D	DDO	Drilled	depth:22(<u>f</u>	<u>t</u>
	Hole size: 4	3/4 in., Air	· 🗆	Water 🗵 C	ored Yes	No	X
Remarks:							
RECORDED BY C. FREY GEOLOGIST	YES NO RECORDE	D BY J. JE	NSE	NRECORDII	NG SPEED 20	_ FT. N	IIN.
	GAMMA 2	S. P.	907	DENSITY T.C. 2	RESISTIVITY	DEF	тн
LITHOLOGY	T.C RANGE	SENS.SETTING		RANGE 1K	SENS.SETTING		
		DEPTHS	STRIP	8	DEPTHS	FEET	METERS
	220 FT.	220 FT.	S	220 FT.	220 FT.	٥	Σ
_							
siltstone, pale-olive to medium_gray,						-	
cbncs, and claystone, medium-gray to						-	- 10
brown, cbncs			===			-	
					1	50 -	
						-	- 20
coal	1	2				-	
siltstone, medium-gray, cbncs			===		> ,		
coal						100-	-30
claystone, medium-gray, and						_	
siltstone, olive-gray coal						-	
siltstone, greenish-gray, and		_3				-	40
claystone, medium-gray						-	
coal		2				150-	
siltstone, olive-gray, sandstone,		<i>Z</i>		5	F	_	-50
medium-gray, fine, and claystone,							
olive-gray						-	
coal, with parting of claystone, olive-gray						200-	-60
siltstone, olive-gray						-	İ
						-	70
							["
					ļ	250 -	
					ļ	-	- 80
					ļ		
					İ		1
						700	-90
						300-	
							-100
						-	1
						3 50-	1
			l				110
							100
			l	l		400	-120

Hole no: US-7886 Map: Carbert Elev: 2658 ft Location: T.37 x, R. Measured: 30 ft FSL, 30 ft FWL, I	45 W. Sec	5 Tract C	ccc	Drilled depth: 180	, ,	ft S
Remarks:						
RECORDED BY GEOLOGIST	YES NOS RECORDE	D BY	ENSI	EN RECORDING SPEED 20	FT.	MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGED 178 FT.	S. P. SENS.SETTING 10 DEPTHS 180FT.	STRIP LOG	DENSITY RESISTIVITY	EET	METERS H
sandstone, olive-gray, medium, and gravel			: · · o :		0.	
siltstone, dusky-yellow to medium- gray, cbncs, and claystone, medium- gray, cbncs					50	-10
coal, with parting of siltstone, olive- gray siltstone, olive-gray, claystone, olive-					100	30
gray, and sandstone, medium-gray, very fine					150-	40
siltstone, olive-gray, some cbncs, and claystone, olive-gray, some cbncs					· · · · · · · · · · · · · · · · · · ·	-50
					200	-60 -70
					250 - -	-80
					300-	-90
					350-	110
					400	-120



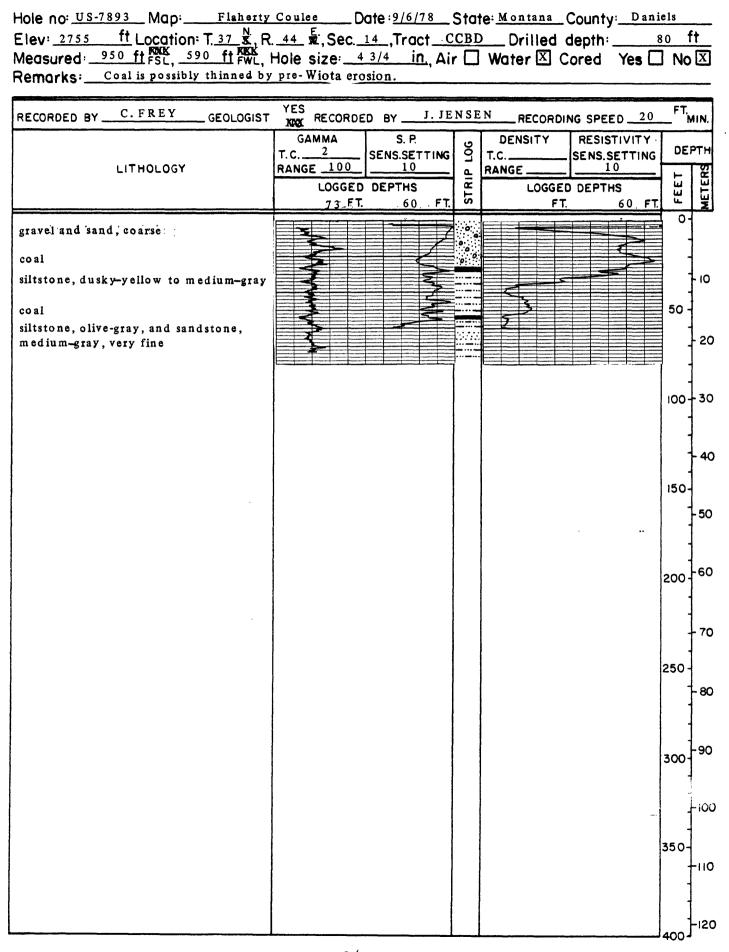
Elev: 2666 ft Location: T. 37 x, R.	Date: 9/4/78 State: Montana County: Dani . 45 \$\frac{\mathbb{E}}{\mathbb{W}}\$, Sec. 7 , Tract \(\text{DDDD} \) Drilled depth: \(\text{16} \) Hole size: \(\frac{4}{3}/4 \) in., Air \(\text{DWater} \) Water \(\text{X} \) Cored Yes \(\text{D} \)	o ft
RECORDED BY C. FREY GEOLOGIST	CAMMA CONTRACTOR CONTR	FT. MIN.
LITHOLOGY	T.C. 2 SENS.SETTING CONTROL	FEET O METERS T
sand stone, olive-gray, coarse, and gravel claystone, pale-olive, cbncs, and siltstone, olive-gray, cbncs coal siltstone, medium-gray to greenish-gray, claystone, olive-gray, and sandstone, medium-gray, very fine coal, with parting of siltstone, greenish-gray siltstone, greenish-gray, cbncs coal, with parting of claystone, olive-gray siltstone, greenish-gray		0 - 10 - 10 - 10 - 12 - 12 - 12 - 12 - 1

Hole no: US-7889 Map: Carbert	Date	9/4/78 S	tate	: Montana	County: Danie	els	.
Elev: 2729 ft Location: T. 37 s., R. Measured: 1960 ft sx., 225 ft sw., Remarks:	45 ₩, Sec. 5 Hole size: 4 3/	_,Tract <u>BC</u> 4in_, Air	ВС	Drilled Water 🗵 C	depth: 34	No	<u>t</u> 図
RECORDED BY C. FREY GEOLOGIST	YES RECORDED	BY J. JENS	ΕN	RECORDI	NG SPEED 20	_ FT. _ M	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGED D 340 FT.	10 FPTHS		DENSITY T.C. 2 RANGE 1K LOGGE 340 FT	RESISTIVITY SENS.SETTING 20 DEPTHS 340 FT	FEET	- 1
siltstone, olive-gray, and sandstone, medium-gray, very fine to fine coal claystone, olive-gray coal siltstone, greenish-gray, cbncs, and claystone, greenish-gray, cbncs coal siltstone, greenish-gray, and sandstone, medium-gray, very fine sandstone, olive-gray to medium-gray, very fine to fine, and claystone, olive-gray, some cbncs						50 -	- 10
				3		- 350-	-110
	/					400	-120

Hole no: US-7890 Map: Carbert	De	ate: <u>9/4/78</u>	Stat	e: Montana	County: Danie	ls	
Elev: 2780 ft Location: T. 37 N. R. Measured: 830 ft FM., 50 ft FM., 1		Tract A.	ADA X	Drilled @ Water [] C	depth: 24	0 f	† 区
Remarks:							
RECORDED BY C. FREY GEOLOGIST	YES NO RECORDE	D 8Y	ISEN	N RECORDI	NG SPEED 20	FT	AIN.
LITHOLOGY	GAMMA T.C2 RANGE	S. P. SENS.SETTING 10	_	DENSITY T.C. 2 RANGE 2K	RESISTIVITY SENS.SETTING	DE	РТН
		DEPTHS 238 FT.	STRIP		D DEPTHS 238 FT.	FEET	METERS
siltstone, olivo-gráy to dusky-yoliow,						0-	
catcaté o ús		T			3	-	-10
					3	50 - - -	- 20
sandstone, light-olive-brown to dusky- yellow, medium, calcareous, and claystone, light-gray						100-	30
coal claystone, light-gray, and siltstone, medium-gray						- - - 150-	40
coal						-	- 50
siltstone, light-gray to medium-gray, and claystone, light-gray						200 -	-60
coal siltstone, medium—gray	3					-	70
						250 - -	-80
					,	300	-90
						-	-100
						350- -	110
						400	-120

ECORDED BY C. FREY GEOLOGIST	YES RECO	RDE) BY		J. JE	NSE	N	REC	ORDIN		PEED .		_ FT.	AIN
LITHOLOGY	GAMMA T.C2 RANGE1		SENS	S. P. .SET 10	TING	_ ,	T.C.	ENSIT		i	SISTIV S.SET		DE	-
LITACLOGI	LOG		DEP	THS	FT.	2	MAIL				PTHS	FT.	FEET	METER
		=											0-	
siltstene, light-olive-brówn to dusky-y yellow, chńcs, claystone, dusky-yelfow, chńcs													-	- 10
coal siltstone, olive-gray to medium -g ray,													50 - -	
cbncs, claystone, gray, cbncs coal														2
siltstone, greenish-gray to medium— gray, cbncs									F				100	- 3
coal, with parting of siltstone, olive-gray													-	}
claystone, medium-gray, cbncs, and				\$	1				3	\\$	₹		150	-5
siltstone, greenish-gray to medium- gray, cbncs				2							<i>5</i>		200	- -
co al			3					3						-
iltstone, olive-gray, and claystone, olive-gray								₹	_ <u>}</u> }		2		250	+ 7
coal		¥	I							4	<i>,</i> }			+ 8
siltstone, greenish-gray								۶					300	-6
] - -
													350	1

Hole no: US-7892 Map: Carbert	D	ate: 9/5/78	Stat	e: Montana	County:	Danie	18	
Elev: 2830 ft Location: T. 37 x, R. Measured: 100 ft FSL, 50 ft FWL, I Remarks:	.44 xī,Sec Hole size:_4	1 ,Tract <u>C</u> 3/4 in., Air	r 🗆	Water ⊠ C	depth:_ Cored	Yes 🗆	No	<u>\frac{1}{\text{\tin}\exititt{\text{\tin}\text{\tex{\ti}\}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}}</u>
RECORDED BY C. FREY GEOLOGIST	YES RECORDS	D BY	NSE	N RECORDI	NG SPEE	0 20	_ FT N	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGEE	DEPTHS	LRIP	DENSITY T.C. 2 RANGE 1K LOGGE 320 FT	RESIST SENS.SE 20 D DEPTHS	TTING		METERS 3
							0-	لگ
gravel:: ‹			9 9 9 0		*		50 -	- 10 - 20
siltstone, dusky-yellow to olive-gray, cbncs, claystone, medium-gray, cbncs, and sandstone, dusky-yellow, very fine	Ž						100-	- 30
coal siltstone, medium-gray, sandstone, medium-gray, very fine						.	150-	- 40 - 50
coal, with parting of siltstone, medium-gray		}					- - 200 -	-60
siltstone, medium-gray, claystone, medium-gray coal	3					2	250 -	70
claystone, medium-gray, and siltstone, olive-gray coal, with parting of claystone, medium-gray		3						- 80
claystone, olive-gray to medium-gray, siltstone, olive-gray, and sandstone, greenish-gray, very fine							300 - 300 -	90
							-350-	-10
							- 400	-12



Hole no: US-7894 Map: Flaherty C							
Elev: 2855 ft Location: T. 37 N., R. Measured: 520 ft FSL, 675 ft FSL, 1	Hole size: 4	<u>3/4 in.</u> Ai	r 🗆	Water 🔲 C	ored Yes [80 1 No	
Remarks: Abandoned hole, 80 ft of gr	avel. No Fort U	Jnion penetra	ted.	No geophysica	il logs run.		
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	:D BY		RECORDI	NG SPEED	FT.	MIN.
LITHOLOGY	GAMMA T.C RANGE	S. P. SENS.SETTING	. –	DENSITY T.CRANGE	RESISTIVITY SENS.SETTING	OE	PTH
		DEPTHS FT.	STRIP		D DEPTHS	FEET	METERS
			0 0			0-	Ī
			0.0			.	-
gravel			30				 10
		-	S			50 -	1
			000			-	- 20
							1
						100	+ 30
							1
							14
						150-	- 50
							f 30
							-60
						200	``
							 70
						250	
						250] -80
							1
·						300	-90
							-
							-10
						350-	1
							+11
							1
						400	-12

Hole no: US-7895 Map: Carbert		ate: 9/6/78	Stat	e: <u>Montana</u> County: <u>Dani</u>	els	
Elev: 2761 ft Location: T. 37 s., R Measured: 2525 ft FSL, 2175 ft FWL,	. <u>45</u> ₩, Sec Hole size: 4	30 ,Tract <u>C.</u> 3/4 in Air	A A B	Drilled depth:	80 f	
Remarks:		,				_
RECORDED BY C. FREY GEOLOGIST	YES RECORD	ED BY J. JENS	EN	RECORDING SPEED20	FT. M	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 10	RIP LOG	DENSITY RESISTIVITY T.C. 2 SENS.SETTING RANGE 1K 20	DEF	тΗ
	LOGGED	DEPTHS		LOGGED DEPTHS 180 FT. 180 FT	FEET	METERS
siltstone, olive-gray to dusky- yellow, concs coal					0-	
						- 10
siltstone, olive-gray to gray, cbncs,				3 3	50 -	- 20
claystone, medium-gray, cbncs, and sandstone, light-gray	Š				100	- 30
coal, with parting of siltstone, gray				\$ 3		- 40
siltstone, olive-gray to medium-gray, and sandstone, medium-gray, very fine					150-	- 50
		and and the contract of the co			200-	-60
						- 70
					250 -	- 80
					300-	- 9 0
						-10
					350-	-110
					400	-12

Hole no: US-7896 Map: Carbert	D	ate: <u>9/6/78</u>	Stat	e: Montana	County: <u>Dani</u>	els	
Elev: 2759 ft Location: T. 37 & R. Measured: 50 ft FSt, 2555 ft FWC, I Remarks:	45 ½, Sec Hole size:_4	21 ,Tract 3/4 in., Ai	r 🗆	Drilled (Water 🗵 C	depth: 2 Fored Yes C	80 f	T X
RECORDED BYC. FREY GEOLOGIST	YES RECORDE	D BY J. JEN	SEN	RECORDI	NG SPEED 20	FT. N	AIN.
LITHOLOGY		S. P. SENS.SETTING 10 DEPTHS 192 FT.	TRIP I	DENSITY T.C. 2 RANGE 1K LOGGEE 280 FT.	RESISTIVITY SENS.SETTING 20 D DEPTHS 192 FT	FEET	METERS 3
sandstone, olive-gray, very fine, calcareous, siltstone, olive-gray to medium—gray, and claystone, olive-gray to dark—gray coal, with partings of siltstone, gray siltstone, olive-gray, sandstone, medium—gray, very fine, and claystone, olive-gray coal claystone, olive-gray, siltstone, olive-gray to medium—gray, and sandstone, medium—gray, very fine coal siltstone, olive-gray to medium—gray, and sandstone, medium—gray, very fine						150-	-10 -20 -30 -40 -50 -70
						300-	-90
			~			350-	-110 -110

Hole no: US-7897 Map: Carbert	D	ate: <u>9/7/78</u>	Stat	e:Montana County: Dan	iels	
Elev: 2729 ft Location: T. 36 x, R. Measured: 10 ft RSX, 30 ft FEL, I	45 \$, Sec Hole size:_4	<u>4</u> ,Tract <u>A</u> 3/4 in., Air	A A .	Mater ⊠ Cored Yes [220] N o	ft
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	O BY J. JEN	SEN	RECORDING SPEED20	FT.	MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGED 173 FT.	S. P. SENS.SETTING 10 DEPTHS 173 FT.	TRIP I	DENSITY T.C. 2 RANGE 1K LOGGED DEPTHS 173 FT. 173 F	EET	METERS H
sand stone, olive-gray, coarse, and gravel	Ž	F	0 0 0		0	
siltstone, pale-olive to medium-gray, cbncs, and claystone, olive-gray, cbncs					50	20
coal					100	30
siltstone, olive-gray, cbncs, claystone, olive-gray, cbncs, limestone, tan, and sandstone, greenish-gray, medium					150	40
					200	-60
				·	250	- 70 - 80
					300	-90
					350	-110
					400	-120

Hole no: US-7898 Map: Carbert	D	ate: 9/14/78	Stat	e: Montana	County: Dan	iels	
Elev: 2681 ft Location: T. 37 &, R Measured: 2650 ft FNL, 2590 ft FNL,	. <u>45</u> ₩, Sec	15 Tract D	ВВВ	Drilled	depth: 260	1 1	<u>।</u>
Measured: <u>2650 11 kg/k</u> , <u>2590 11 kg/k</u> , Remarks:	Hole size: 4	3/4 In., Ai	rلا	Water 🖾 C	fored Yes L	I NO	
remurks.							_
RECORDED BY C. FREY GEOLOGIST	YES NO RECORDE	D BY J. JEN	SEN	RECORDI	NG SPEED 20	_ FT.	AIN.
LITHOLOGY	GAMMA T. C2	S. P. SENS.SETTING	RIP LOG	DENSITY RESISTIVITY T.C. 2 SENS.SETTING		DE	РТН
	RANGE 50			RANGE 1K	10	-	2
	LOGGED 260 FT.	DEPTHS FT.	ı	LOGGEI 260 FT	D DEPTHS 212 FT	FEET	METERS
							-10
siltstone, olive-gray to light-gray, cbncs, claystone, green-gray to			==			5 0	
olive, calcareous, and sandstone,					* }	50 ·	
gray, very fine							- 20
							1
						100	30
coal, with partings claystone, olive, gray, concs							1
, , , , , , , , , , , , , , , , , , , ,							40
,							4
			===			150	1
							-50
							1
					}	200	-60
siltstone, gray to green-gray, cbncs,				3			-
sandstone, gray, very fine, and claystone, olive-gray to brown,							70
cbncs			===				Ţ 10
				3		250	-
							-80
							-
						700	-90
						300]
							100
							1
						350	$\frac{1}{2}$
							1110
]
							-120
	<u> </u>		<u> </u>			400ء	د

Hole no: US-7899 Map: Four Butte Elev: 2632 ft Location: T. 37 8., R.	45 E Sec	ate: <u>9/16/78</u>	Stat	e: <u>Montana</u> (County: Danie	1s 40 f	
Measured: 2270 ft xx, 200 ft xx, 1	Hole size: 4	3/4 in., Ai	r 🗆	Water ⊠ C	ored Yes	No	X
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BY	NSE	N RECORDI	NG SPEED 20	FT.	AIN.
LITHOLOGY		S. P. SENS.SETTING 250 DEPTHS	RIP		RESISTIVITY SENS.SETTING		METERS H
	335 FT.	333 FT.	S	340 FT.	333 FT.	0-	Ž
siltstone, olive-gray to dusky-yellow, cbncs, sandstone, olive-gray, very fine, and claystone, olive-gray, cbncs						50 -	- 10 - 20
coal, with four partings of siltstone, medium-gray						100-	- 30
claystone, olive-gray, siltstone, olive-gray, and sandstone, medium-gray, fine coal						150-	- 40 -50
siltstone, olive-gray, sandstone, greenish- gray, fine, and claystone, olive-gray						200 -	-60
coal siltstone, olive-gray coal, with parting of siltstone, olive- gray						- - 250 -	70
siltstone, greenish-gray, and					*	-	- 80
sandstone, greenish-gray, fine						300-	-90
	4				\$	-	-100
						350- -	-110
						400	-120

Hole no: US-78100 Map: Four Buttes	8 N.W. De	ate: <u>9/17/78</u>	Stat	e: <u>Montana</u> County: <u>Da</u>	niels	
Elev: 2633 ft Location: T. 37 s., R. Measured: 2480 ft FSL, 33 ft FWL, I Remarks:	45_\$Sec1	3Tract	СВВ	BDrilled depth:2	60	ft X
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BY J. JEN	SEN	RECORDING SPEED2	0FT.	MIN.
LITHOLOGY	RANGE	S. P. SENS.SETTING 500 DEPTHS 250 FT.	TRIP	DENSITY T.C. 2 RANGE 2K LOGGED DEPTHS 258 FT. 250 F	·	METERS I
sandstone, light-elive-brown,					0	
medium, calcareous siltstone, dusky-yellow to medium- gray, cbncs, and claystone coal siltstone, dusky-yellow to medium-gray coal, with partings of siltstone,					50	10
medium_gray					100	30
siltstone, greenish-gray, and sand stone, medium-gray, fine					150	- 40
siltstone, medium-gray coal claystone, olive-gray, and siltstone, medium-gray coal					200	-60
siltstone, greenish-gray to olive-gray, cbncs, and sandstone, medium-gray to greenish-gray, cbncs					250	70
					300	-90
					350-	-110
					400	-120

Hole no: US-78101 Map: Carbe	Dit D	ate: <u>9/26/78</u>	Stat	e: Montana	County:	Danie	<u>ls</u>	
Elev: 2610 ft Location: T. 37 st., R. Measured: 55 ft Rsx, 40 ft FWL, HRENDERS	45 w, Sec lole size:_4	10 ,Tract <u>B</u> 3/4 in., Ai	BBB r 🔲	Drilled Water 🗔 C	depth: Cored Ye	200 es 🗆	No No	<u>†</u>
RECORDED BY GEOLOGIST	YES RECORDE	D 8Y <u>J.JE</u>	NSE	N RECORDI	NG SPEED.	20	FT. _ M	IN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGED 200 FT.	S. P. SENS.SETTING 10 DEPTHS 200 FT.	TRIP I	DENSITY T.C. 2 RANGE 1K LOGGE 200 FT	RESISTIV SENS.SET 20 D DEPTHS 200		FEET	
siltstone, light-olive-gray, cbncs, and claystone, light-gray							0+	- 10
claystone, light-gray to greenish-gray, concs siltstone, medium-gray, concs, and claystone, medium-gray, concs	Ž						50 -	- 20
coal siltstone, greenish-gray, and			7.7.7.				100	- 30
sandstone, medium-gray, very fine				\$			150-	- 40
sandstone, medium-gray, very fine, and siltstone, greenish-gray to medium-gray						•	200 -	- 50 - 60
							1	- 70
							250 - - -	- 80
							300-	-90
							350-	-100
							400	-110

Hole no: US-78102 Map: Flaherty C	oulee D	ate: <u>9/28/78</u>	Stat	e: Montana	County:_	Danie	ls	
Elev: 2834 ft Location: T. 37 N., R. Measured: 35 ft FNL, 45 ft FWL, I Remarks: Gamma needs to be shifted d	Hole size: 4	35 ,Tract <u>B</u> 3/4 in., Ai	BBB r 🔲	Drilled Water 🗵 C	depth:_ Cored `	3.0 Yes □	n f	<u>†</u>
RECORDED BY C. FREY GEOLOGIST	YES RECORDS	D BY J.JEN	SEN	LRECORDI	NG SPEED	20	FT.	AIN.
LITHOLOGY	GAMMA T.C2 RANGE100 LOGGED 240.FT	S. P. SENS.SETTING 10 DEPTHS 242 FT.	TRIP I	DENSITY T.C2 RANGEIK LOGGE	RESISTI SENS.SE 20 DEPTHS	TTING	FEET O	METERS H
sandstone, olive-gray, medium to coarse: siltstone, gray to grayish-yellow, and claystone, light-gray sandstone, medium-gray to mottled-yellow, fine to medium-grained coal, radioactive? with parting of claystone, medium-gray siltstone, medium-gray to olive-gray, and claystone, medium-gray to olive-gray olive-gray							50 -	- 10 - 20
							300-	-90
							350-	-110
							400	-120

Hole no: US-78103 Map: Carbo						
Elev: 2836 ft Location: T. 37 x, R. Measured: 38 ft FSL, 35 ft FXX, I	_44 克,Sec Hole size:_4_	26 ,Tract <u>D</u> 3/4 in., Air	DDI	DDrilled depth: Water⊠ Cored Ye	240 f s □ No	<u>†</u> 🔯
RECORDED BY C. FREY GEOLOGIST	YES NXX RECORD	ED BY J. JEN	SEN	RECORDING SPEED _	20FT.	AIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 10 DEPTHS	TRIP LOG	DENSITY T.C. 2 SENS.SETT RANGE 1K 20 LOGGED DEPTHS 240 FT. 240	ITY .	METERS T
sandstone, olive-gray, coarse					01	
					50 -	- 20
siltstone, light-gray to medium-gray, and claystone, light-gray to medium- gray					100-	30
coal, with parting of siltstone, medium- gray siltstone, medium-gray coal					150-	- 40 - 50
siltstone, light-gray, and claystone, light -g ray					200-	-60
					250 -	- 70 - 80
					300-	-90
					350-	-10
	14:	8			400	-12

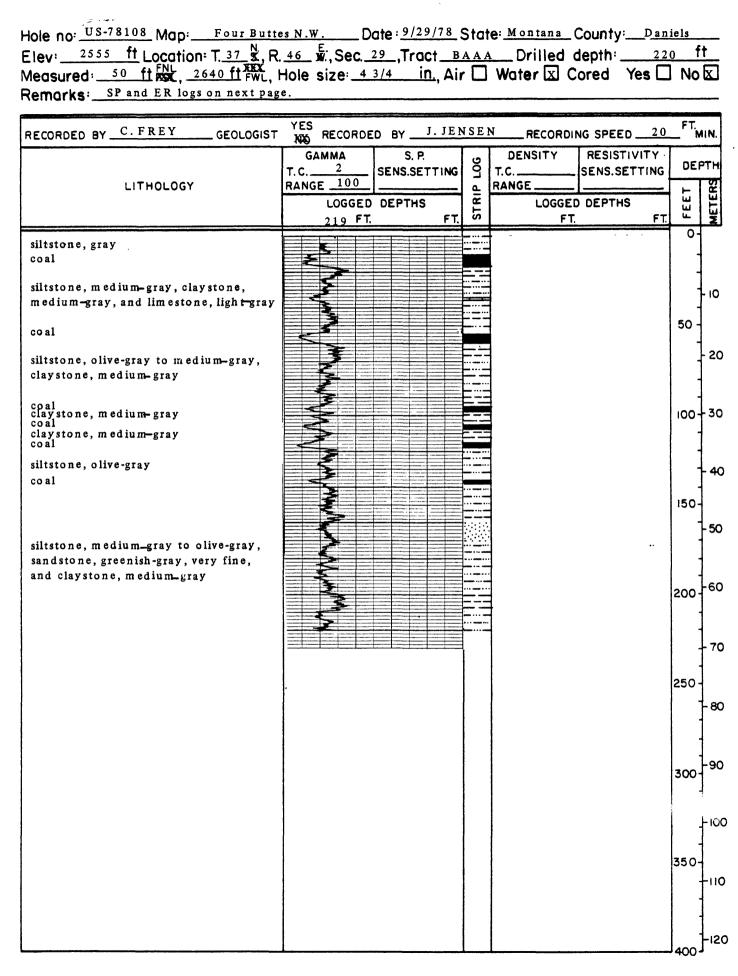
Hole no: US-78104 Map: Carbert	D	ate: 9/28/78	Stat	e: Montana	County: Dan	iels	
Elev: 2809 ft Location: T. 37 x, R. Measured: 23 ft FSL, 4 ft FSL, 4 ft FSL,	<u>44</u> \$.,Sec	23_,Tract_ <u>D</u> 3/4 in Δi	DDI	DDrilled	depth:	180 1	ft राष्ट्रा
Remarks: Probe stuck in hole, got it o	ut and reamed	out hole.		- Water 🗀 🔻			
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BY J. JEN	SEN	RECORD	ING SPEED 20	FT.	MIN.
	GAMMA T.C2	S. P. SENS.SETTING	1	DENSITY T.C. 2	RESISTIVITY	1 0-	РТН
LITHOLOGY	RANGE	DEPTHS	STRIP	RANGEIK	D DEPTHS	FEET	METERS
	80 <u>FT</u>	FT.	S	180 F	Γ. <u></u> Γ 1		
sandstone, olive-gray to olive-brown, coarse						0.	
·							10
						50 -	
							- 20
siltstone, gray to yellow, cbncs					Š	100	30
							40
						150-	- 50
						200	-60
							70
						250-	- 80
							-~
						300-	-90
						-	-100
						350-	
							-110
	14	9				400	-120
	17	•					

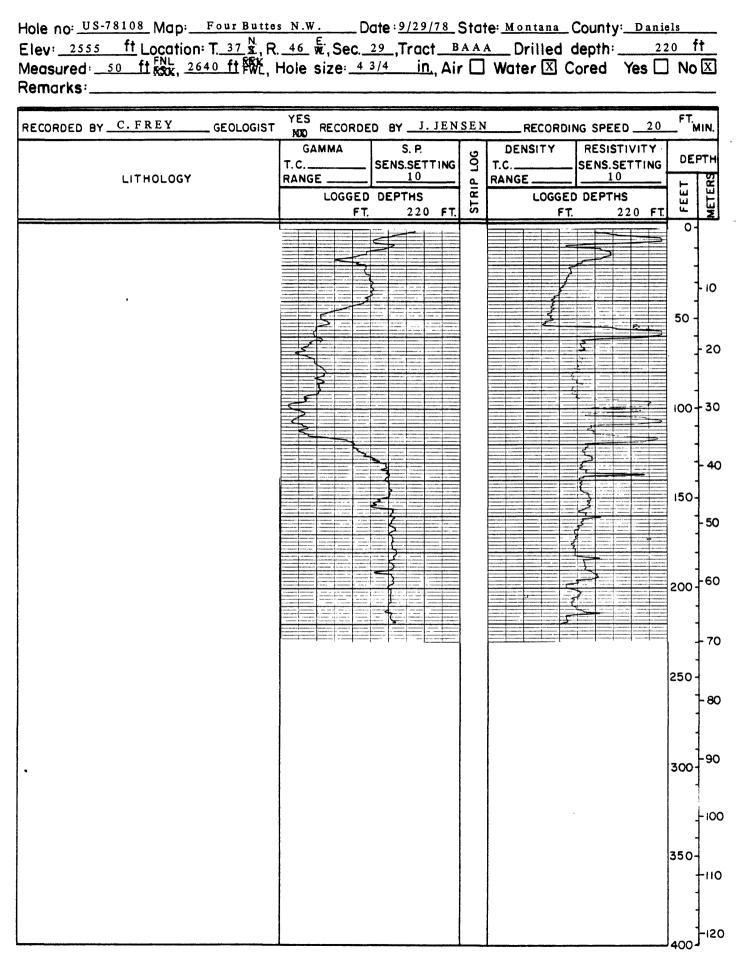
Hole no: US-78105 Map: Carbert	D	ate: 9/28/78	Stat	e: Montana County: Dani	els	
Elev: 2715 ft Location: T. 37 %, R. Measured: 2500 ft FNL 35 ft FEL 1	<u>45</u> ₩.,Sec	32_,Tract	ADD	D Drilled depth:1	80	<u>ft</u>
Measured: 2500 ft RSX, 35 ft RMX Remarks: Lost circulation at 25 ft	Hole size:_4_	3/4 <u>In.,</u> Ai	rЦ	Water M Cored Yes	_ INC	لكاد
Remarks. Lost encuration at 25 ft						
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BY J. JEN	SEN	RECORDING SPEED2	FT.	MIN.
	GAMMA	S. P.	907	DENSITY RESISTIVITY	1 00	PTH
LITHOLOGY	T.C. 2 RANGE 100	SENS.SETTING) d	T.C. 2 SENS.SETTING RANGE 1K 20	'├──	- 1
	LOGGED	DEPTHS	E E	LOGGED DEPTHS	FEET	METERS
sandstone, olive-gray, fine	180 FT.	180 FT.		180 FT. 180 F	 	
34.143.0 103, 41.10 13.14					1	1
						1
siltstone, yellowish-gray, cbncs, and claystone, medium-gray, cbncs						10
		\$			50	4
co a 1						<u> </u> 20
		7]
siltstone, medium-gray, some cbncs						-
	3				100	30
						1
sandstone, medium-gray to white,						+40
fine					150	1
						50
						-
			: · · · ·			1
			1		200	-60
						1
						1 70
						1.
					250	+
						1-80
						-90
					300	1
						-
						-100
					350	
						+110
						1
						1
	L		<u> </u>	<u> </u>	_1400	-120

RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BY J. JEN	SEN	RECORD	ING SPEED 20	FT	AIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 10	RIP LOG	DENSITY T.C RANGE	RESISTIVITY - SENS.SETTING 20	DE	ERS HT9
	LOGGED 280 FT.	DEPTHS 280 FT.	1 ⊢	LOGGE F	D DEPTHS T. 280 FT	FEET	METE
sandstone, light-olive-gray, very fine, and siltstone, yellowish-gray,						0-	
and claystone, dark-gray coal						-	- 10
siltstone, light-olive-gray coal						50 - -	- 20
claystone, medium-gray, sandstone, light-olive-gray, very fine to fine,	ŧ	4 7 3				100-	-30
and siltstone, medium-gray	3	Ž					- 40
coal siltstone, light-gray to gray, and clay stone, brownish-gray		3				150-	- 50
coal, with parting of siltstone, gray siltstone, olive-gray, and claystone, olive-gray coal					7	200-	-60
siltstone, light—olive-gray, and claystone, medium—gray		3					70
						250 -	- 80
						300	-90
							! - -
						350-	-110
			1			1.	1

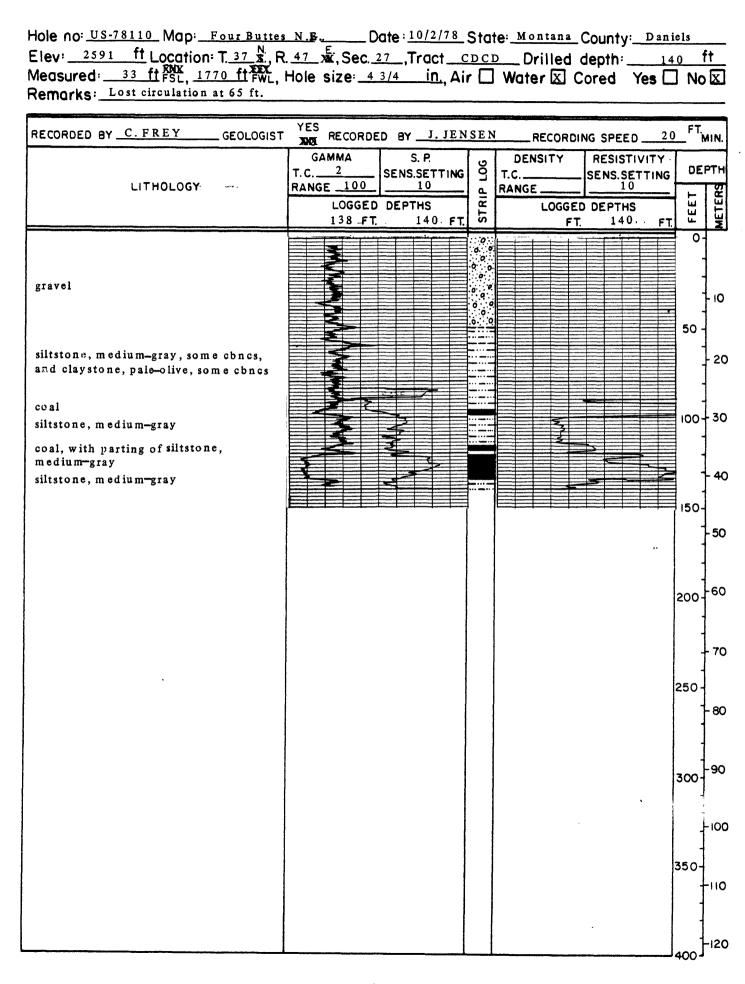
Hole no: US-78106 Map: Carbert	D	ate: <u>9/28/78</u>	Stat	e: Montana	County:	Dan	iels	
Elev: 2770 ft Location: T. 37 N., R. Measured: 1270 ft FSL, 2040 ft FSL, 1884, Remarks:	<u>45</u> xw.,Sec Hole size: <u>4</u>	22 ,Tract <u>D</u> 3/4 in., Air	CBA	Drilled (Water 🗵 C	depth: _ ored	280 Yes 🗆	No	<u>†</u>
RECORDED BY C. FREY GEOLOGIST	YES NO RECORDE	D BYJ.JE1	ISE	N RECORDI	NG SPEE	20	_ FT N	IIN.
LITHOLOGY	GAMMA T.C RANGE	S. P. SENS.SETTING	907	0.51.0.51	RESIST	VITY .	DEF	РТН
		DEPTHS FT.	TRI		DEPTHS	FT.	FEET	METERS
							0-	
							4	- 10
							50 -	
							•	- 20
							100-	- 30
							4 4 4	- 4 0
				\$			150-	- 50
							200-	-60
							,	- 70
							250 - -	- 80
				4			300-	- 9 0
							ا زُ	-100
							350-	-110
							-	-120
							لـ 400	

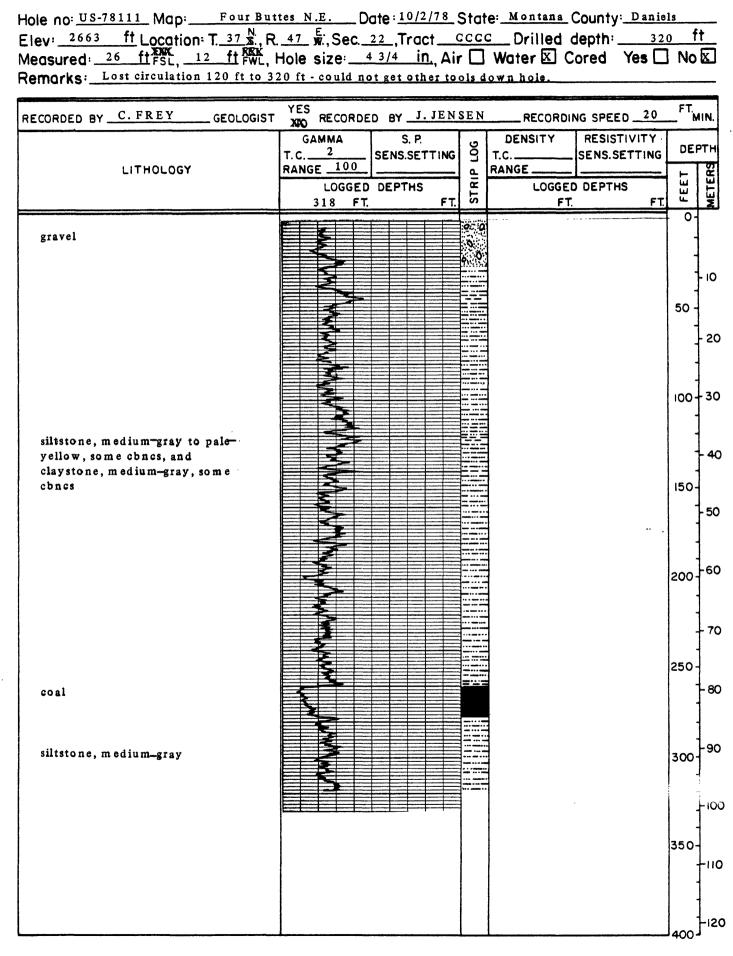
Hole no: <u>US-78107</u> Map: <u>Carbert</u> Elev: <u>2675</u> ft Location: T. 37 S., R.	D	ate: <u>9/28/78</u>	Stat	e: Montana	_Count	y: <u>Danie</u>	ls	
Elev: <u>2073</u> 11 Location: 1. <u>37 \$.</u> R. Measured: <u>50</u> ft \$ \$. <u>25</u> ft \$ \$. R.	-45 w., Sec Hole size:_4	35_,1 ractE 3/4in., Ai	r 🗆	Water 🗵	Cored	Yes	No	X
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BY J.JEN	SEN	RECOR	DING SPE	ED 20	FT.	HN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 10 DEPTHS	TRIP LOG	DENSITY T.C2 RANGE _1K	RESIS	STIVITY SETTING		METERS T
sandstone, olive-gray, yery fine		280		7.8U		40V	0-	لگ
siltstone, olive-gray to dusky-yellow; cbncs, and claystone, medium-gray, cbncs coal siltstone, dusky-yellow to medium — gray, and claystone, medium							50 -	- 10 - 20
coal, with partings of siltstone, medium-gray							100-	
siltstone, medium-gray to greenish-gray, some cbncs, and claystone, olive-gray,							150-	- 40
some chncs	***			Ž.			- 200	-50 -60
siltstone, olive-gray to medium-gray, and claystone, medium-gray coal				2			, ,	- 70
siltstone, greenish-gray							250 - -	- 80
							300-	-90
							1	-100
							350-	-110
							400	-120

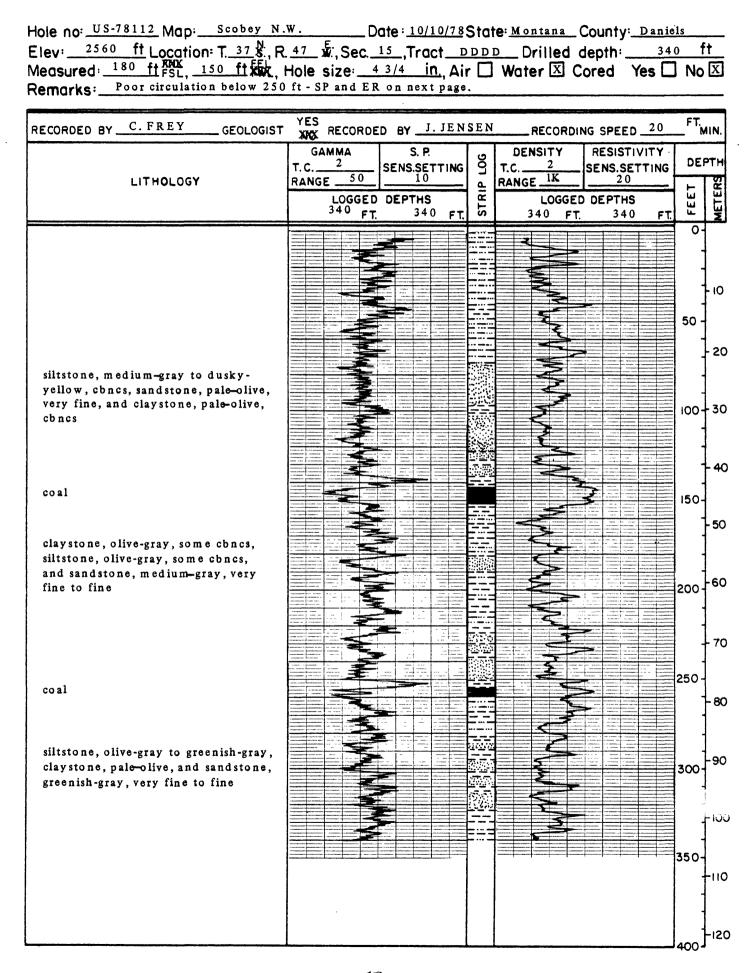


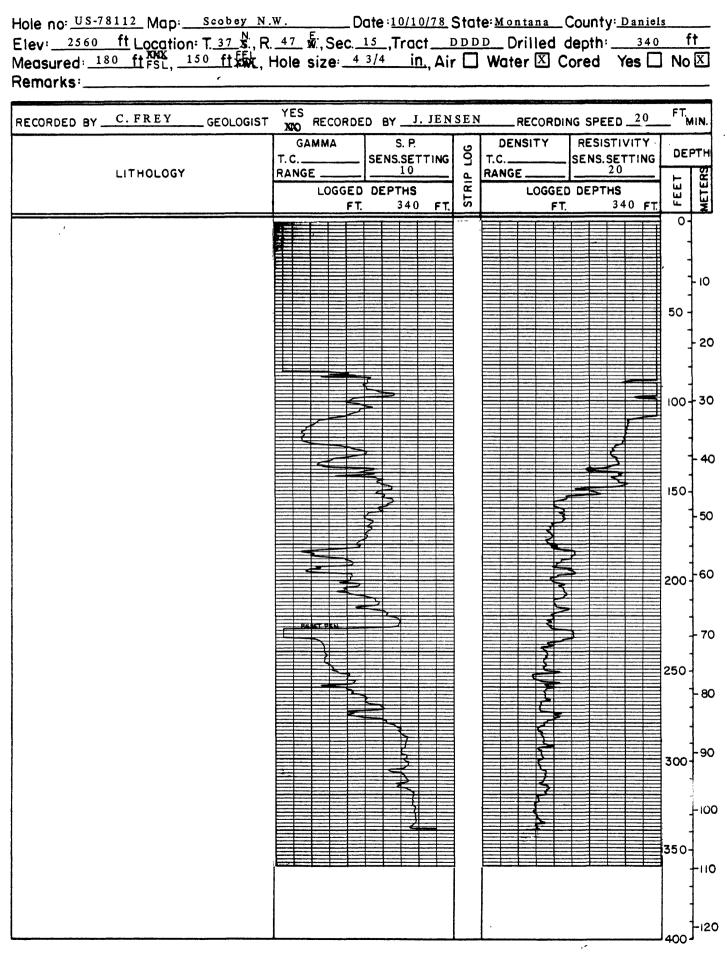


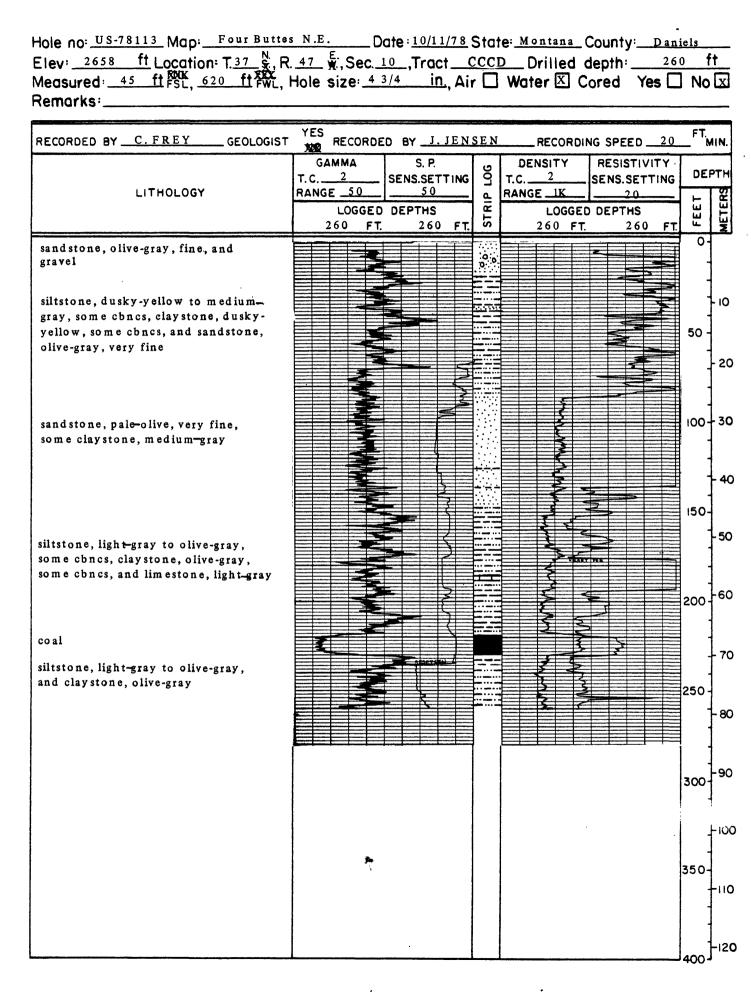
Hole no: US-78109 Map: Four Buttes N.W. Date: 10/2/78 State: Montana County: Daniels Elev: 2582 ft Location: T. 37 %, R. 46 xx, Sec. 28 , Tract BDAA Drilled depth: 220 Measured: 1600 ft FWL, 2380 ft FWL, Hole size: 43/4 in, Air Water X Cored Yes No X Remarks: Moved hole 200 ft north of original location. Lost circulation at 125 ft. YES RECORDED BY J. JENSEN FT. RECORDED BY C. FREY **GEOLOGIST** RECORDING SPEED _ GAMMA DENSITY RESISTIVITY DEPTH T.C. 2 SENS.SETTING SENS. SETTING T.C._ RANGE 100 LITHOLOGY RANGE . ٥ Œ LOGGED DEPTHS LOGGED DEPTHS ST 216 FT. 180 - . 180 siltstone, medium gray to duskyyellow, sandstone, dusky-yellow, 10 fine and claystone, light-olive 50 coal, with parting of siltstone, light-gray 20 100 + 30 siltstone, medium-gray, and claystone, medium-gray 150 claystone, medium-gray coal - 50 claystone, medium-gray, and 500 +60 siltstone, light-gray to medium-gray 70 250 350





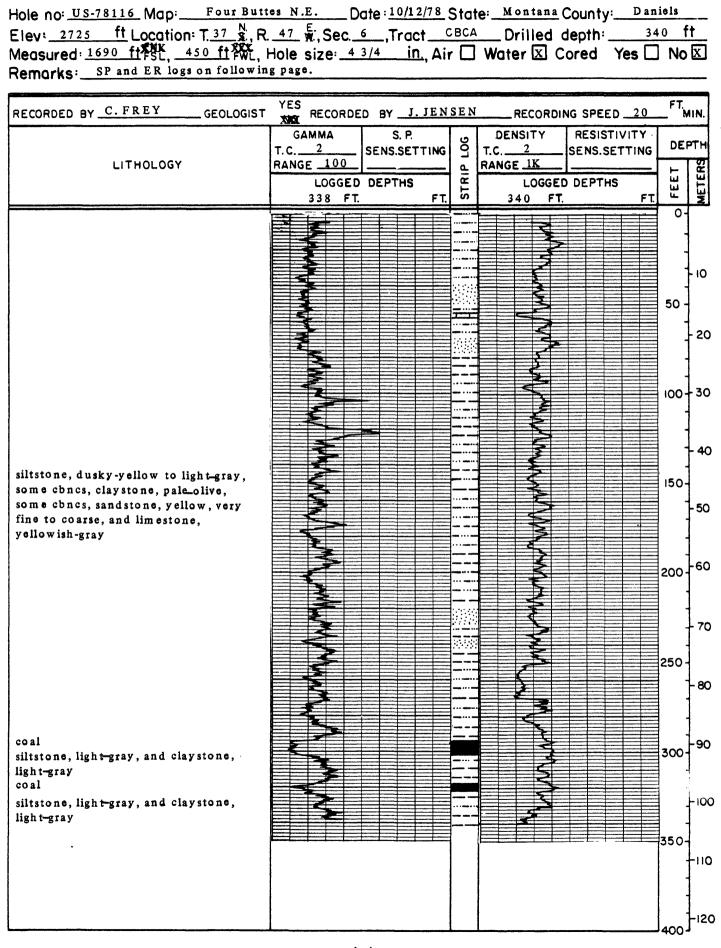




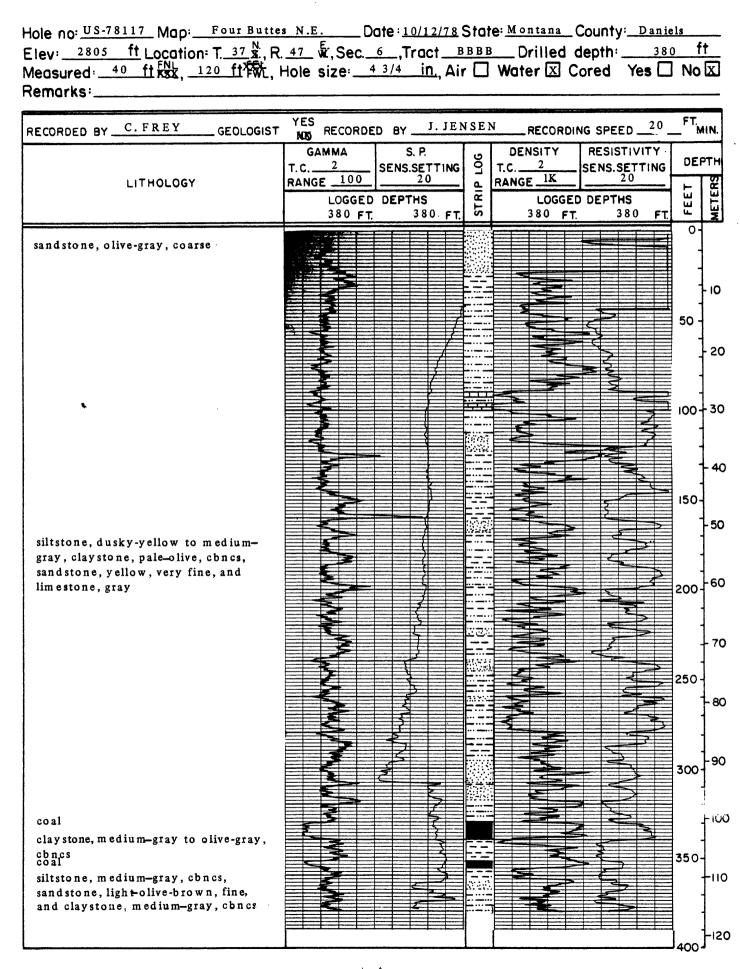


Hole no: <u>US-78114</u> Map: <u>Four Butte</u> Elev: <u>2722</u> ft Location: T. <u>37</u> k, R. Measured: <u>55</u> ft FSL, <u>26</u> ft FWL, I Remarks:	<u>47</u> 💆 Sec4	Tract_Co	CCC	Drilled	depth:38	10 ft
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BY J.JENS	SEN	RECORD	NG SPEED 20	FT. MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 20 DEPTHS	9	DENSITY T.C. 2 RANGE 1K	RESISTIVITY SENS.SETTING 20 D DEPTHS	FEET METERS HAD
sandstone, gray, coarse, and gravel	380 FT.	380 FT.	S.	380 F7	380 FT.	어
siltstone, dusky-yellow to pale-olive, some cbncs, claystone, medium-gray, some cbncs, and sandstone, pale-olive, very fine						100 - 30
						200-60
·						250 - 80
siltstone, medium_gray to greenish- gray, some cbncs, claystone, medium—						300-90
gray to greenish-gray, some cbncs, and sandstone, medium-gray, very fine to fine						350-
						-120

RECORDED BY C. FREY GEOLOGIST		ED BY J.JEN	SEN		NG SPEED		_ FT. _ M	HN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGED 320 FT	S. P. SENS.SETTING 20 DEPTHS 320 FT.	TRIP	DENSITY T.C. 2 RANGE 1K LOGGET 320 FT	RESISTIVE SENS.SET 20 DEPTHS 32		FEET	METERS T
sandstone, gray, coarse, and gravel siltstone, dusky-yellow, some cbncs, and claystone, pale-olive to olive- gray coal claystone, medium-gray, and siltstone, medium-gray coal	**************************************		9.50			>	50 -	- 10
claystone, medium-gray, siltstone, medium-gray, and sandstone, medium-gray, very fine						A	150-	- 44 - 50
							- 2 5 0 -	- 7 ⁽
coal siltstone, medium_gray, and sandstone, medium_gray, very fine			200				300 - -	-9(-10
						•	350- -	-11
								-12

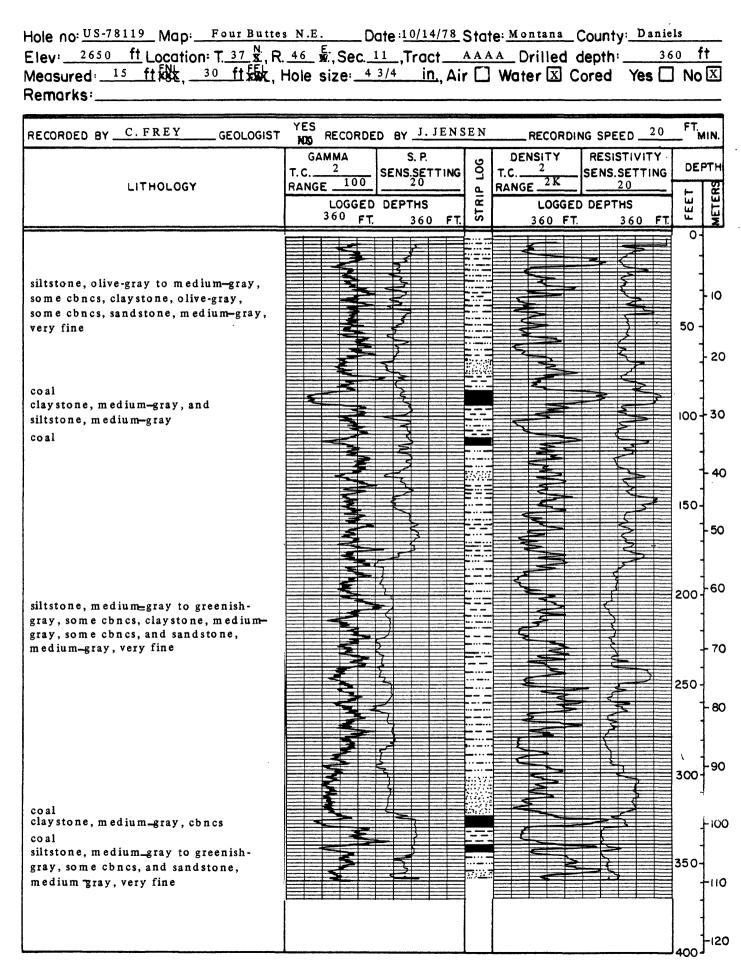


Remarks:			VEC														c T	
RECORDED BY	C. FREY	GEOLOGIST		RECO	RDE			JEN									FT.	AIN.
	LITHOLOGY		T.C RANG					ING	RIF	T.C. RAN	GE.	LOGG	s	ENS		TING	FEET Q	METERS T
					FT.		340	FT.	_				FT.		340	FT.		
							\nearrow					Ì	2				0-	
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													2					10
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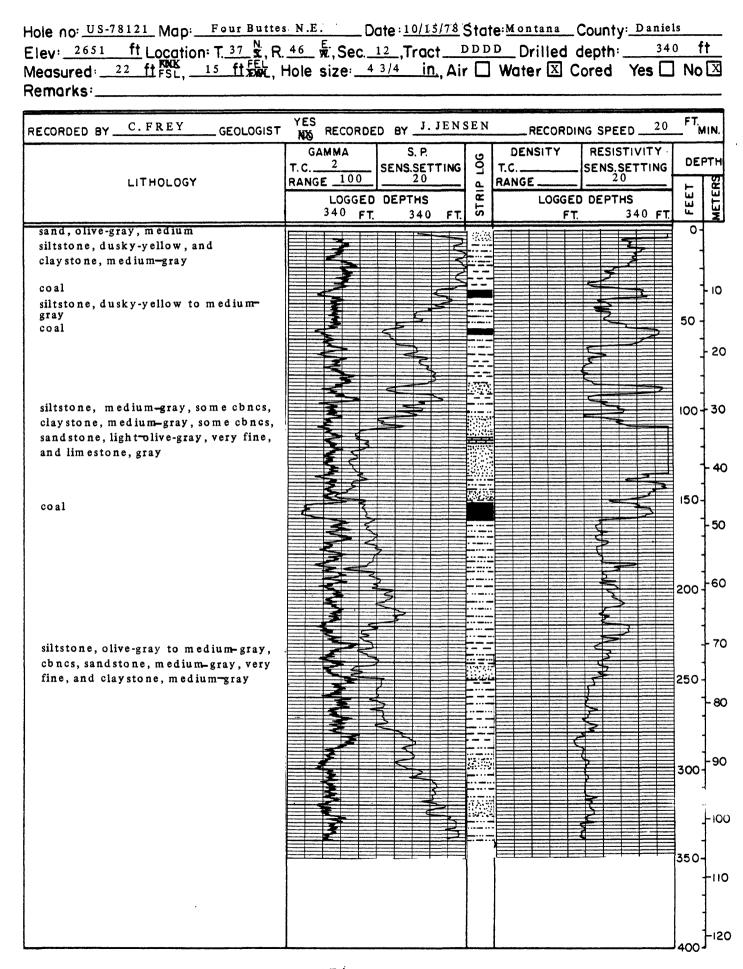


Hole no: US-78118 Map: Four Buttes N.E. Date: 10/1/78 State: Montana County: Daniels Elev: 2787 ft Location: T. 37 N., R.46 N., Sec. 1 , Tract BBBA Drilled depth: 340 ft Measured: 20 ft No. 470 ft FWL, Hole size: 43/4 in., Air Water X Cored Yes No. X Remarks: No sample return after 250 ft. SP and ER on next page. NO RECORDED BY _____ J. JENSEN YES FT. MIN. RECORDED BY ____C. FREY _ GEOLOGIST RECORDING SPEED GAMMA S. P. DENSITY RESISTIVITY P00 DEPTH T.C.___2 T.C. 2 SENS.SETTING SENS. SETTING RANGE 100 RANGE 1K LITHOLOGY ٥ FEET Œ LOGGED DEPTHS LOGGED DEPTHS 340 FT. FT. 302 FT sandstone, dusky-yellow, medium to 50 20 siltstone, dusky-yellow to greenishyellow, and claystone, greenishy ello w 100+30 coal - 40 150-7-50 siltstone, dusky-yellow to medium-gray, 500 +60 some cbncs, and claystone, mediumgray, some cbncs - 70 250 80 coal siltstone, medium-gray, and claystone, medium-gray coal 300 siltstone, gray to medium-gray, claystone, gray -100 350--110

Hole no: US-78118 Map: Four Buttes	N.E. D	ate: 10/1/78	Stat	e: Montana	County	Danie	ls	
Elev: <u>2787</u> ft Location: T. <u>37</u> N., R. Measured: <u>20</u> ft FNL, <u>470</u> ft FWL, I Remarks:	<u>46_</u> w.,Sec Hole size: <u>_4</u> 	1,1ract1 3/4in_,Aii	r 🗆	Water 🗵 C	depin: fored	340 Yes □	No	X
RECORDED BY C. FREY GEOLOGIST	YES RECORDS	O BY J.JENS	SEN	RECORDI	NG SPEE	D 20	_ FT. M	AIN.
LITHOLOGY	GAMMA T.C RANGE	S. P. SENS.SETTING 10 DEPTHS	RIP LOG	DENSITY T.C RANGE	RESIS SENS.S 2 DEPTH	TIVITY .	DEF	
			5				0-	
							50 -	- 10 - 20
			=				100-	- 30
			Ē				150-	- 40 - 50
			i				200 -	-60
-		\$			λ λ		250 -	- 70 - 80
	***************************************		:				300-	-90
						-	350-	-100
							400	-120

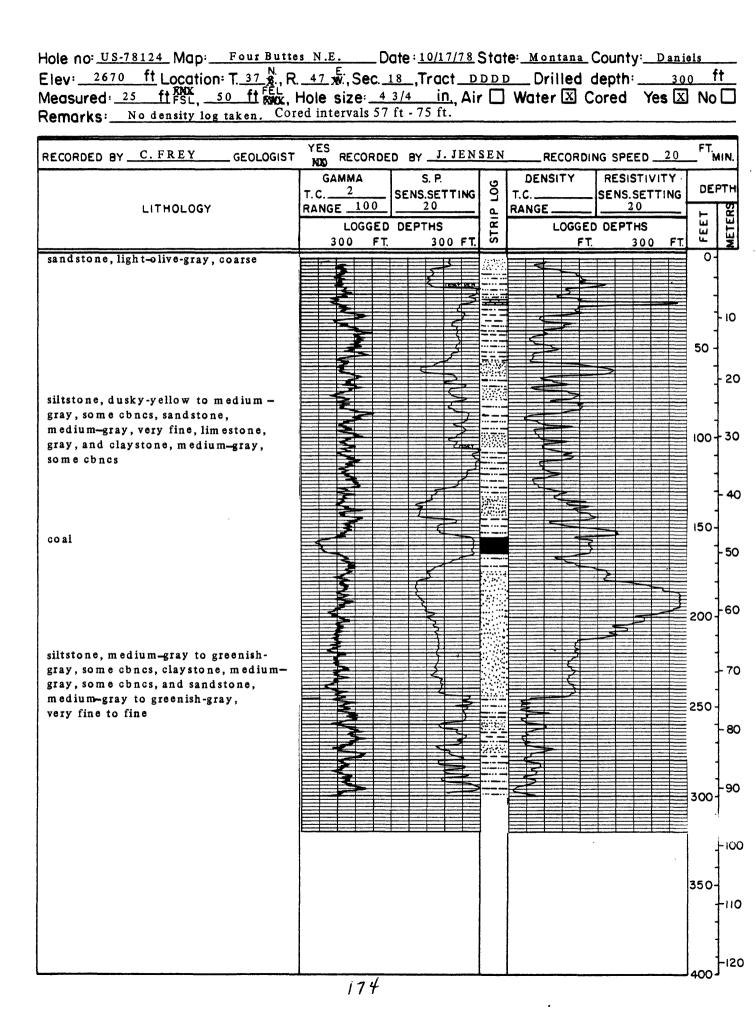


Hole no: US-78120 Map: Four Butte	s N.E.)ate: 10/14/78	State	: Montana	_County: Danie	ls fa
Elev: 2567 ft Location: T. 37 x, R Measured: 20 ft FSL, 980 ft FWL, Remarks:	46_ xī.,Sec Hole size:_4	13 ,Tract <u>C</u> 3/4 in., Air	r 🗆	Drilled Water ⊠	depth: 340 Cored Yes	o ft No⊠
RECORDED BY C. FREY GEOLOGIST	YES RECORD	ED BY J.JEN	SEN	RECORE	DING SPEED 20	FT. MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGEE 300 FT	S. P. SENS.SETTING 20 DEPTHS 300 FT.	TRIP	DENSITY T.C. 2 RANGE 2K LOGG 300 F	RESISTIVITY SENS.SETTING 20 ED DEPTHS	FEET METERS T
gravel	300 F	, 3 00 F1.	(A)	300 F	T. 300 FT.	0-
siltstone, dusky-yellow, sandstone, dusky-yellow, very fine						50 -
coal with parting of claystone, medium_gray						- 20
						100 - 30
siltstone, medium-gray to olive-gray, some cbncs, sandstone, medium-gray, very fine, and claystone, medium- gray, some cbncs						-50
						200 - 60
						250 -
coal, with parting of claystone, olive-gray			==== ==== =====		2	300 -90
siltstone, greenish-gray, sandstone, medium-gray, very fine, and claystone, medium-gray						-100
						350-
						-120 400



LITHOLOGY	GAMMA T. C2	S. P.				FT.		
2111102031	RANGE 10	SENS.SETT		DENSITY T.C RANGE	RESISTIVITY - SENS.SETTING 20	<u> </u>	PTH	
		GED DEPTHS FT. 360	STRIP	LOGGI	ED DEPTHS T. 360 FT.	FEET	METER	
siltstone, dusky-yellow to medium- gray, some cbncs, sandstone, light- blive-gray, very fine, limestone, coale-olive, and claystone, medium- gray to light-olive-gray coal siltstone, light-to-medium-gray, some cbncs, sandstone, olive-gray, very fine to fine, limestone, medium-gray, and claystone, light-gray to medium- gray, some cbncs						50 100 200 250	10 20 30 40 50 70 80 90	
						350	+10 +11	

Hole no: US-78123 Map: Four Butte								
Elev: 2631 ft Location: T. 37 x, R. Measured: 55 ft FSL, 27 ft FEL, 1	. <u>47</u> \$,Sec Hole size:_4	17 ,Tract 3/4 in., Ai	p D D	DD Drilled Water ☒ (depth: Cored	260 Yes □	No	<u>†</u>
Remarks: No density log taken.								_
RECORDED BY C. FREY GEOLOGIST	YES RECORDE	D BYJ.JE	NSE	N RECORD	NG SPE	ED 20	FT	AIN.
	GAMMA T. C2	S. P. SENS.SETTING	907	DENSITY T.C.	1	TIVITY SETTING		РТН
LITHOLOGY	RANGE 100	DEPTHS	R P	RANGE	D DEPTI	0 HS	FEET	METERS
The state of the s	260 FT.		-	FT		60 FT.	O FE	¥
sandstone, light_olive-gray, coarse, and gravel		\$	Do.				-	
siltstone, dusky-yellow to medium — gray, and claystone, medium—gray coal, with parting of siltstone,								
medium-gray		E	===					- 10
			===				50 -	
							-	- 20
		3	*******					
siltstone, medium-gray, some cbncs, claystone, medium-gray, some cbncs,							100-	30
and sandstone, medium-gray, very fine			===				-	
		3					-	- 40
	}	2					150-	
	\$ 2	2					-	- 50
coal		£					- -	-
siltstone, light-olive-gray, some					*		200-	-60
cbncs, claystone, light-olive-gray, some cbncs, and sandstone, greenish-							-	
gray, very fine							-	70
					7		250-	
			2:.33.X				-	- 80
							-	
				•			300-	-90
							-	! !
							-	-100
							350-	
							-	-110
							-	
							400-	-120
	173	ı						



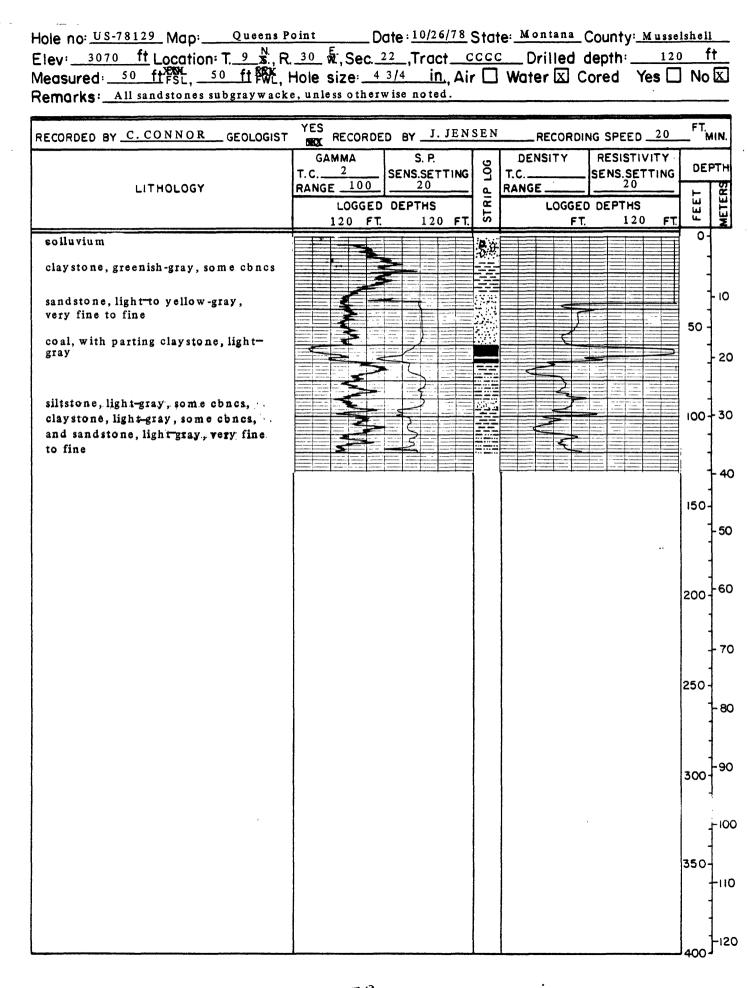
Measured: 900 ft FSL, 2450 ft RWX, Hole size: 43/4 in, Air X Water Cored Yes No X Remarks: Logged gamma through stems, no other logs taken.	Hole no: US-78125 Map: Four Buttes								-
Menorred: 900 ff FC, 2450 ff Ed, Hole size: 43/4 in, Air \(\) Water \(\) Cored \(\) Yes \(\) No \(\) Remarks: \(\) Logged gamma through stems, no other logs taken. RECORDED BY C.FREY GEOLOGIST \(\) GEOLOGIST \(\) No \(\) SENS.SETTING \(\) SENS.SETTING \(\) ANGE \(\) 100 \(\) SENS.SETTING \(\) ANGE \(\) LOGGED DEPTHS \(\) 137 \(\) FT. \(\) T.C. \(\) 100 \(\) SENS.SETTING \(\) ANGE \(\) LOGGED DEPTHS \(\) T.C. \(\) 17 \(\) SENS.SETTING \(\)	Elev: 2597 ft Location: T. 37 x, R.	_47_ v.,Sec	20_,Tract	CBC	Drilled	depth:	140	ft	
RECORDED BY C. FREY GEOLOGIST YES RECORDED BY J. JENSEN RECORDING SPEED 20 FT. MIN. LITHOLOGY GEOLOGIST YES SENS. SETTING T.C. 2 SENS.	Measured: 900 ft FSL, 2450 ft RWX, 1	Hole size: 4	3/4 in. Air	X	Water 🗆 C	ored	Yes 🗆	No 🗵	
LITHOLOGY ANGE 100 LOGGED DEPTHS T. 2 RANGE 100							 		
LITHOLOGY ANGE 100 LOGGED DEPTHS T. 2 RANGE 100							Augusta Company		4
LITHOLOGY ANGE 100 LOGGED DEPTHS T. 2 RANGE 100	RECORDED BY C. FREY GEOLOGIST	YES RECORDS	D BY J. JEN	SEN	RECORDI	NG SPEE	D 20	_FT. MIN.	
LITHOLOGY T.C. SENS.SETTINO RANGE TO SENS.S						RESIST	TIVITY -		ı
coal siltstone, dusky-yellow to medium-gray, sandstone, medium-gray, some cbncs coal siltstone, medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal siltstone, dusky-yellow to medium to olive-gray, some cbncs coal silt		T.C. 2	1	0	T.C				1
siltstone, dusky-yellow to medium—gray, sandstone, medium—gray, very fine, and clay stone, medium—sray coal siltstone, medium to olive-gray, some chanes 200 -60 -70 -80 -80 -100 -100 -100 -100	LITHOLOGY			ď		<u> </u>		- R	1
siltstone, dusky-yellow to medium—gray, sandstone, medium—gray, very fine, and clay stone, medium—sray coal siltstone, medium to olive-gray, some chanes 200 -60 -70 -80 -80 -100 -100 -100 -100				ST R			1	33 13	
siltstone, dusky-yellow to medium-gray, sandstone, medium- gray, very fine, and claystone, medium-gray coal siltstone, medium to olive-gray, some cbncs 100 - 30 200 - 60 200 - 60 300 - 90 110 350 - 110		137 Pt.	P i.	<u> </u>	P 1,		<u> </u>		ز
silistone, dusky-yellow to medium gray, sandstone, medium gray, sandstone, medium gray, sandstone, medium to olive-gray, some chnes coal silistone, medium to olive-gray, some chnes 200 -60 -70 250 -80 300 -90 -100							1		
silistone, dusky-yellow to medium—gray, sandstone, medium—gray, very fine, and claystone, medium—gray and claystone, medium—stay and claystone, medium to olive-gray, some obnes 100 - 30 100 - 30 150 - 40 200 - 60 - 70 250 - 80 300 - 90 - 100 350 - 110							1]	
silistone, dusky-yellow to medium—gray, sandstone, medium—gray, very fine, and claystone, medium—gray and claystone, medium—stay and claystone, medium to olive-gray, some obnes 100 - 30 100 - 30 150 - 40 200 - 60 - 70 250 - 80 300 - 90 - 100 350 - 110				V				٠, ا	
gray, very fine, and claystone, medium-gray coal siltstone, medium to olive-gray, some obnox 200 - 60 200 - 60 300 - 90 - 100 350 - 110				===			1	1,0	,
medium—gray coal siltstone, medium to olive-gray, some obnes 150 200 60 300 90 -100				===				50 -	
coal siltstone, medium to olive-gray, some chics -40 200 -60 -70 250 -80 350 -90 -100								4	
siltstone, medium to olive-gray, some chars 150-50 200-60 -70 250-100 350-110								+ 20	3
siltstone, medium to olive-gray, some chars 150-50 200-60 -70 250-100 350-110				J.W.				4	
siltstone, medium to olive-gray, some chars 150-50 200-60 -70 250-100 350-110								4	
siltstone, medium to olive-gray, some chics -40 150 -50 200 -60 350 -100 350 -110	1							100 + 30)
some chines 150	co aı							1	
150 - 50 200 - 60 - 70 250 - 80 300 - 90 - 100 350 - 110								1	
200 = 60 200 = 60 70 250 = 80 300 = 90 -100 350 = 110	some cbncs	5						+41	0
200 = 60 200 = 60 70 250 = 80 300 = 90 -100 350 = 110								_ {	
200 - 60 - 70 250 - 80 - 80 - 100 - 110								150-	
200 - 70 250 - 80 300 - 90 350- - 110								7-50)
200 - 70 250 - 80 300 - 90 350- - 110							.	1	
200 - 70 250 - 80 300 - 90 350- - 110								1	
250 -80 300 -90 -100 350 -110								200 - 60)
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Hole no: US-78126 Map: Waco 2 N.E. (P.M.) Date: 10/25/78 State: Montana County: Musselshell Elev: 3345 ft Location: T. 8 N., R. 31 W., Sec. 20 , Tract DCDA Drilled depth: 161 ft Measured: 400 ft FSL, 1450 ft FSL, Hole size: 43/4 in., Air Water X Cored Yes No X Remarks: All sandstones are subgraywacke unless otherwise noted - no density logs taken. NOS RECORDED BY J. JENSEN RECORDED BY C. CONNOR _ GEOLOGIST GAMMA S. P. DENSITY RESISTIVITY 9 T.C. DEPTH T.C. 2 SENS.SETTING SENS.SETTING RANGE 100 RANGE -LITHOLOGY م Œ LOGGED DEPTHS LOGGED DEPTHS ST claystone, light_gray co al siltstone, light-gray, and 10 claystone, light-gray 50 coal 20 100 + 30 siltstone, light-gray, some cbncs, claystone, blue-gray, some cbncs, and sandstone, blue-gray, very 150-200 - 60 - 70 250 -80 300 -100 350-176

Elev: 3560 ft Location: T. 8 x, R. 31 x, Sec. 30 , Tract CDAB Drilled depth: Measured: 1040 ft FSL, 2050 ft FWL, Hole size: 4 3/4 in, Air Water X Cored Yes No X Remarks: All sandstone subgray wackes unless otherwise noted - no density log. RECORDED BY J. JENSEN FT. MIN. YES RECORDED BY C. CONNOR **GEOLOGIST** RECORDING SPEED _ GAMMA RESISTIVITY S. P. 907 DEPTH T.C. ____2 SENS.SETTING SENS.SETTING T.C._ RANGE 100 LITHOLOGY RANGE_ ٩ æ LOGGED DEPTHS LOGGED DEPTHS ST 320 FT. 320 FT 320 FT FT. ō siltstone, yellowish-green, claystone. light-gray, and sandstone, yellowishbrown, fine 10 co al 50 clay stone, light-gray, siltstone, lightgray, and sandstone, light-gray, fine 20 coal 100+30 1. 40 siltstone, light-gray, some cbncs, .150 and claystone, light-gray 50 200 -60 70 250 coal 80 claystone, light-gray, and siltstone, light-gray 90 coal 300 siltstone, light-gray, and claystone, light-gray -100 350 -110 171

Hole no: US-78127 Map: Waco 2 N.W. (P.M.) Date: 10/25/78 State: Montana County: Musselshell

Hole no: US-78128 Map: Waco 2 N.W. (P.M.) Date: 10/25/78 State: Montana County: Musselshell Elev: 3420 ft Location: T. 8 N., R. 30 E., Sec. 26 , Tract DACB Drilled depth: 100 ft Measured: 1800 ft FSL, 1270 ft FSL, Hole size: 4 3/4 in, Air Water X Cored Yes No X Remarks: All sandstone subgray wacke unless otherwise noted - no density log. NO RECORDED BY J. JENSEN YES RECORDED BY C. CONNOR **GEOLOGIST** RECORDING SPEED _ **GAMMA** S. P. DENSITY RESISTIVITY DEPTH T. C. ____2_ SENS.SETTING T.C. . SENS.SETTING RANGE 50 20 20 LITHOLOGY RANGE . ٩ æ LOGGED DEPTHS LOGGED DEPTHS 100 FT. 100 FT. FT sandstone, yellow, very fine, siltstone, yellowish-gray, and claystone, yellow and gray coal 50 claystone, blue-gray, and - 20 siltstone, light-gray 100+30 150 -60 200 70 250 - 80 300 350--110

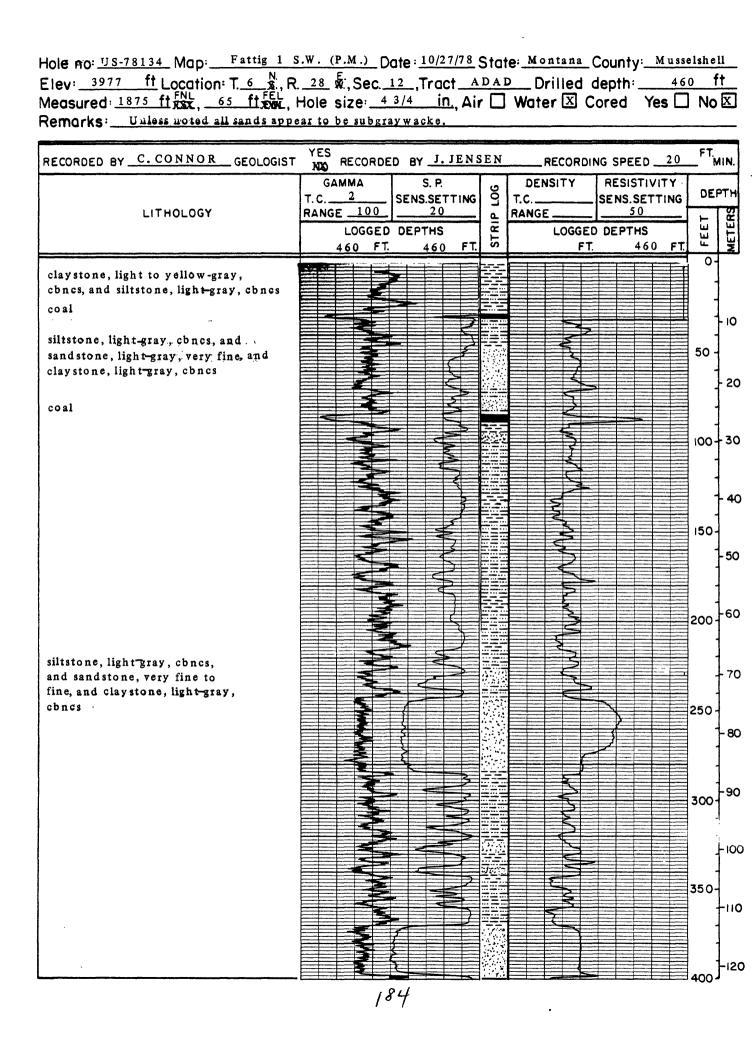


Hole no: US-78130 Map: Waco 2 N.W. (P.M.) Date: 10/26/78 State: Montana County: Musselshell Elev: 3160 ft Location: T. 9 &, R. 30 &, Sec. 34 , Tract DDBA Drilled depth: 300 Measured: 1100 ft FSI 910 ft FSI. 910 ft FSI. Hole size: 4 3/4 in. Air Water X Cored Yes No X Remarks: All sandstone subgraywacke unless otherwise noted - no density log. FT. RECORDED BY J. JENSEN RECORDED BY C. CONNOR **GEOLOGIST** RECORDING SPEED __20 RESISTIVITY GAMMA S. P. 907 DEPTH T.C.___2 T.C._ SENS.SETTING SENS.SETTING RANGE _100 5.0 LITHOLOGY RANGE . ٩ $\bar{\epsilon}$ LOGGED DEPTHS LOGGED DEPTHS ST 300 FT. FT. 300 - 10 50 20 siltstone, gray-green, claystone, 100 + 30 gray-green to blue-gray, and sandstone, yellowish-gray, very fine 40 150--50 coal siltstone, light-gray, some cbncs, 200 1-60 claystone, light-gray, some cbncs, and sandstone, gray, fine to medium 70 coal 250 siltstone, medium-gray, claystone, medium-gray, and sandstone, 80 medium-gray, very fine 300 100 350--110 180

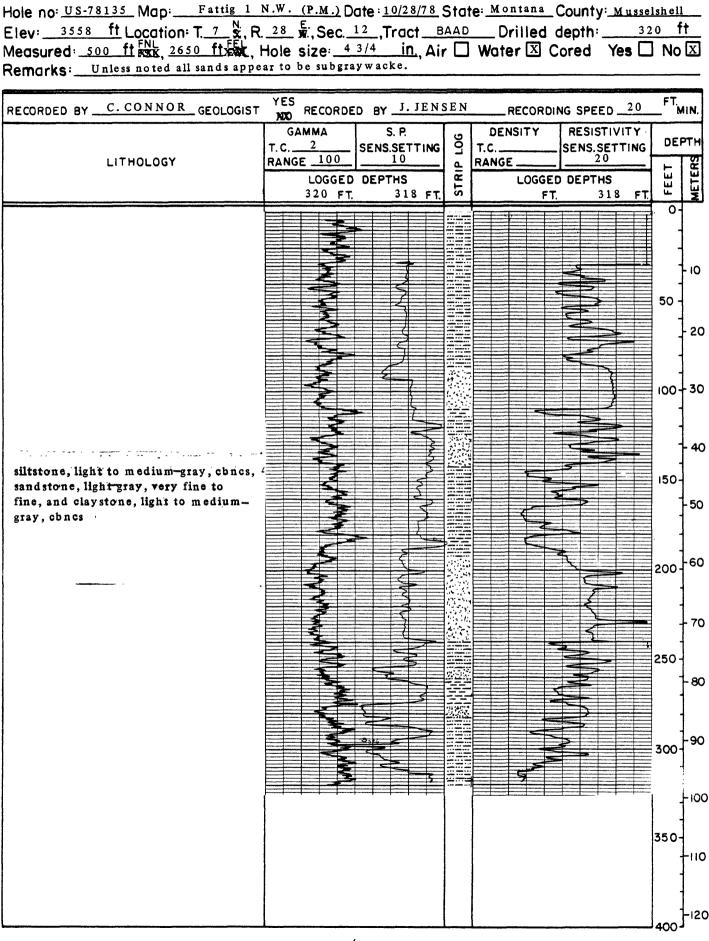
Hole no: US-78131 Map: Musselsh	e l l	D	ate : <u>1</u>	0/2	6/78	Stat	e : <u>M</u> o	ntana	Cc	ount	y: <u>_</u>	lussel	shell	
Elev: 3080 ft Location: T. 9 x, R	29	ர்,Sec	14,7	rac	:t_D	AD A	<u> </u>	rilled	de de	pth	·	385	f	<u>†</u>
Measured: 1700 ft FSL, 95 ft km, 1	Hole	size: 4	3/4	15	<u>1.,</u> Air	ا ′	Wate	er 🖾	Co	red	Ye	es 📙	No	X
Remarks: Onless noted an sands appe	arto	De subgra	iy w a c	K.										
RECORDED BY C. CONNOR GEOLOGIST	YES	RECORDE	D BY	J.	JENS	EN		RECOR	RDING	SPE	ED.	20	FT. N	IIN.
	G/	AMMA		S. P.				NSITY		RESI				
LITHOLOGY	T.C.	2 E 100	SENS	SET 20	TING	_	T.C		s	ENS.	SET 50	TING		ЭΤΗ
ELLHOEOGI	KANG	LOGGED	DEP.			RIP	RANG		SED (=	FEET	METERS
		3/85 FT.		3 8 <i>5</i>	FT.	ST			FT.		385	FT.		¥
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siltstone, gray, claystone,		3	=					\$						- 50
gray, cbncs, and sandstone, gray, very fine		3	F					7						
		3	3					5					-	
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		\$	$\equiv \frac{1}{2}$					₽					-	
		3						₹					-	70
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		€											300-	
			1					₹						:
coal				X				\(\)					-	F 100
claystone, gray, siltstone, gray,								\₹					-	
and sandstone, gray, very fine		1						2					350-	
													-	110
coal silfstone, gray			\$			9							-	
													-	Liza
						<u> </u>						픨	400-	-120

Hole no: US-78132 Map: Musse	lshell	D	ate : <u>1</u>	0/2	7/78	Stat	e: _M	ontar	1 a_	Cor	inty	/:_ <u>N</u>	[usse]	shell	
Elev: $\frac{2990}{100}$ ft Location: T. $\frac{9}{100}$ N. R. Measured: $\frac{2350}{100}$ ft FSL, $\frac{1760}{100}$ ft FSL, I	29	\sqrt{Sec} .	$\frac{2}{3/4}$,7	rac	ct	BA	B [rille	ed o	dep	th:		400) f	<u>†</u>
Remarks: Unless noted all sands appear	101 e to be	subgray	wack	<u> </u> e.	L, All	r L	wat	er ⊔	A C	ore	ea.	TE	:5 ∟	INO	ك
															_
RECORDED BY C. CONNOR GEOLOGIST	YES MXX	RECORDE	D BY	<u>J.</u>	JEN	SEN	······································	RECO	RDI	NG :	SPE	ED_	20	_ FTN	IIN.
		1MMA 2	ľ	S. P.	TING	907	DE T.C	NSIT		1			ITY -	DEF	
LITHOLOGY	RANG	E 100		20		RIP L	RANG			35	N3.3	50			· Ł
		LOGGED) FT.	! ⊢		LOC	GE!		PTI	4S 00	FT.	FEET	METERS
						145 A							Ħ	0-	لگ
sandstone, yellow-gray, fine, and claystone, yellow-gray		#												j	
		5													
coal					1	2000		<u>र</u>	Ť					-	- 10
siltstone, light-gray to green-gray, cbncs, claystone, light-gray, cbncs,					\P			Ţ						50 -	
and sandstone, light-gray, fine to medium		3												1	- 20
coal sandstone, light gray, fine to medium coal		3			7	¥#35								-	
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					1			\$						100-	- 30
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siltstone, light-gray to green-gray, cbncs, claystone, light-gray, cbncs,														150-	
and sandstone, light-gray, fine to				ξ				3							-50
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														200-	-60
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		\$													-80
		\$		I										-	
sand stone, green-gray, fine		<i>_</i>		È		1		4						-	-90
		1		\$				\Rightarrow						300-	
		I I	Ì			() () () ()									
claystone, gray, cbncs		\$												-	-100
coal		\$		5										- -350	
alayatana aray ahnaa u				$\frac{2}{2}$		1870°		\$							-110
claystone, gray, cbncs, siltstone, gray, cbncs, and sandstone, gray,		3				-		2						-	
fine		B												•	
					E									400	-120

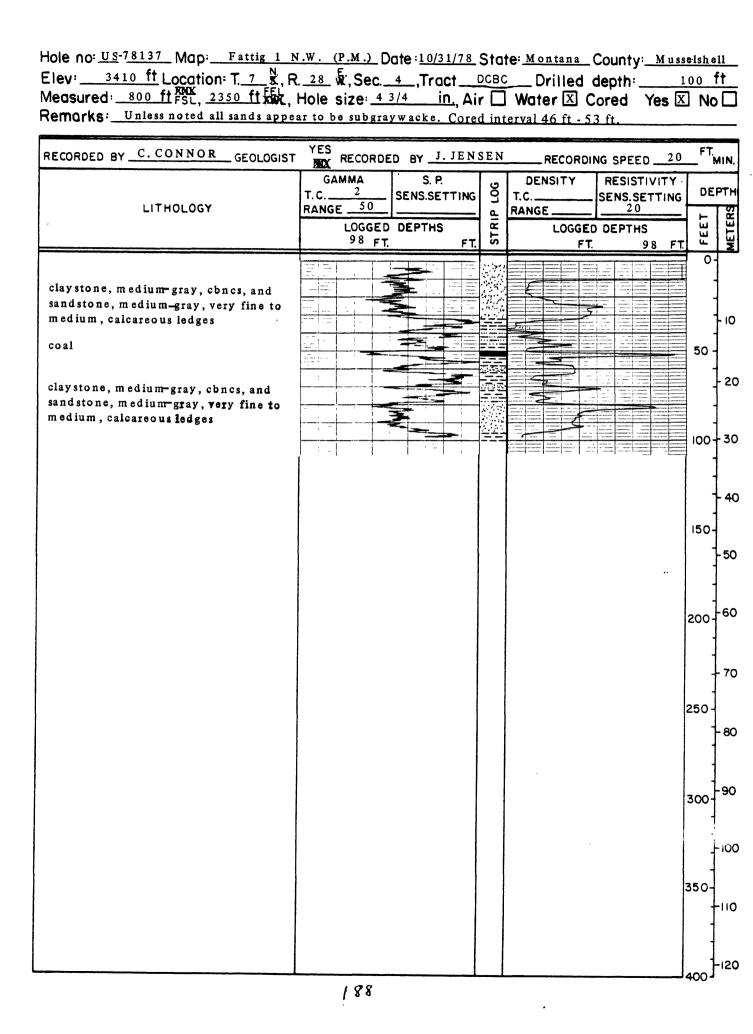
Hole no: US-78133 Map: Musselsh	tell D	ate: 10/27/78	Stat	e: Montana	County: Mussel	shell	
Elev: 3189 ft Location: T. 9 8, R. Measured: 50 ft FSL, 75 ft FWL, I Remarks: Unless noted all sands appear	. <u>29</u> w.,Sec Hole size: <u>4</u> r to be subgray	8 ,Tract C 3/4 in., Air wacke.	· 🗆	©Drilled Water ☒ C	depth: <u>10</u> Cored Yes [No	X
RECORDED BY C. CONNOR GEOLOGIST	YES RECORDE	D BY J. JENS	SEN	RECORDI	NG SPEED 20	FTM	IN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 20 DEPTHS	RIP LOG	DENSITY T.C RANGE	RESISTIVITY SENS.SETTING 20 DEPTHS	FEET	1
	100 FT.		ST	FT		0-	¥
siltstone, gray to blue-gray, cbncs, claystone, yellow-gray to gray, cbncs, and sandstone, green-gray to yellow-gray, very fine to fine						50 -	- 10 - 20
						100	- 30
·					-	150-	- 40 - 50
						200	-60
						250 -	- 70 - 80
						300	-90
						350- -	-100 -110
						400	-120



LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, light gray, cbncs, and sandstone, gray, very fine to fine and claystone, light gray, cbncs						400- - - - 450-	-130
					·	500-	-150
		·				- - 550-	-160
						1	170
-						600-	180
						- 650 -	200
						700 -	210
-		•				- -	-220
·						750- - -	-230
						800-	-240
						- - 850-	-250 -260
		185				900_	-270



Hole no: US-78136 Map: Fattig 1 N.W. (P.M.) Date: 10/29/78 State: Montana County: Musselshell Elev: 3425 ft Location: T. 7 x, R. 28 x, Sec. 2 , Tract BCBD Drilled depth: 140 ft Measured: 2500 ft FNL, 500 ft FWL, Hole size: 4 3/4 in., Air Water X Cored Yes X No Remarks: Unless noted all sands appear to be subgraywacke. Cored interval 98 ft - 115 ft. RECORDED BY J. JENSEN YES RECORDED BY C. CONNOR **GEOLOGIST** RECORDING SPEED GAMMA DENSITY RESISTIVITY S. P. DEPTH T.C. ____2 T.C._ SENS.SETTING SENS.SETTING RANGE 100 20 LITHOLOGY RANGE . ٥ FEET Œ LOGGED DEPTHS LOGGED DEPTHS ST 140 FT. - 10 50 20 siltstone, green-gray, cbncs, and sandstone, yellow to blue-gray, very fine to medium, and claystone, blue-gray, cbncs 100+30 150 50 200 -60 - 70 250 - 80 300 350-



Hole no: US-78138 Map: Fattig 2 S	.E. (P.M.) D	ate: 10/21/78	Stat	e: Montana County: Muss	elshell
Elev: 3495 ft Location: T. 7 N, R Measured: 600 ft FNL, 2340 ft FEL, Remarks:	. 28 ¥.,Sec Hole size:_4	18 ,Tract <u>A</u> 3/4 <u>in.,</u> Air	ВВС	Drilled depth: 3 Water ☑ Cored Yes [00 ft ☐ No ⊠
RECORDED BY R. PEDERSON GEOLOGIST	YES NO RECORDE	D BY J. JEN	SEN	RECORDING SPEED2	O FT.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING 10	IIP LOG	DENSITY RESISTIVITY T.C. SENS.SETTING RANGE 50	DEPT
	LOGGED 300 FT.	DEPTHS 300 FT.	STRIP	LOGGED DEPTHS FT. 300 F	FEET VETERS
,	\$				50 -
siltstone, medium-gray to tan, cbncs, claystone, gray to brownishtan, cbncs, and sandstone, medium-gray to tan, very fine to medium			を		100 - 3
co al			参加		150-
					200
siltstone, medium—gray to tan, cbncs, claystone, gray to brownish-tan, cbncs, and sandstone, medium—gray to tan, very fine to medium	1				250 - 250 -
	*				300-9
					350-
					J ₄₀₀ }' ²

Hole no: US-78139 Map: Fattig 2 S.	E. (P.M.) D	ate:10/31/78	Stat	e: Montana	County: Mussel	shell
Elev: 3578 ft Location: T. 7 x, R. Measured: 1970 ft FSL, 2070 ft FWL, H	. <u>27</u> xx, Sec. <u>2</u>	24 ,Tract	CAI	Drilled O	depth: 400	
Remarks:	11016 3126	<u></u>		Wulei izi C	Oled les 🗆	140 (2)
	YES					FT
RECORDED BY R. PEDERSON GEOLOGIST	NECOR DE	D BY J. JENS	EN	,	NG SPEED	_FT.
	GAMMA T. C2	S. P. SENS.SETTING	907	DENSITY T.C. 2	RESISTIVITY .	DEPTH
LiTHOLOGY	RANGE 100	10	RIP I	RANGE 1K	50	F. E.
	LOGGED 400 FT.	DEPTHS 400 FT.	i -	400 FT.	D DEPTHS 400 FT	FEET
Colluvium			,00°			0-
Contavian			0 0			1
						-10
						50 -
						4
						20
						1
						100-30
siltstone, tan to medium-gray, cbncs,						1
						1 40
						- {
						150-
claystone, medium-to dark-gray, cbncs, and sandstone, medium-gray		\$				-50
to greenish-gray, very fine to fine						+
		Ś				200 -60
,						120
						70
						250
						-80
			835.5			-90
		4				300
						:
						-100
						350-
coal						+110
siltstone, medium=to dark-gray, cbncs,						1
and sandstone, medium-gray, very fine to fine						-120
		1 0	otte.			400]

Hole no: US-78140 Map: Fattig 1 S	S.W. (P.M.) D	ate: 11/8/78	Sta	te: Montana	County:	Musse	elshe	11
Elev: 3465 ft Location: T. 7 xx. R	. 28 x Sec.	10 Tract C	BAC	Drilled	depth:	20	0 1	ft
Measured: 2260 ft FSL, 930 ft FWL, Remarks: Hole Bridged at 85 ft for E		3/4 III., Ali	r Ш ——	water 🗵 C	ored	Yes ∟	ON	· [X]
RECORDED BY C. CONNOR GEOLOGIST	YES	D BYJ.JEN	ISE	N PECOPO	NG SPEEI	2.0	FT.	MIN.
GEOCOGIST	GAMMA T.C. 2	S. P. SENS.SETTING	G	DENSITY	IVITY ·		РТН	
LITHOLOGY	RANGE 100	10	STRIP L	RANGE 2K		50		
	198 FT.	DEPTHS 84 FT.	STF	198 FT	D DEPTHS	6 4 FT.	FEET	METERS
alluvium			0.0				0-	
gravel			0.0				-	
							-	-10
				\$		\$	50 - -	1
siltstone, light-green, claystone,			. 7.				-	- 20
light gray, cbncs, and sandstone, light gray, very fine								
							100-	30
							-	
coal			7/50. 				· -	40
				<u> </u>			150- -	- 50
siltstone, light-green, claystone, light-gray, cbncs, and sandstone,							-	-30
light-gray, very fine				3				-60
							200-	
							-	70
							250 - -	- 80
							•	
								-90
							300-	
							ا ل	! - 100
			,				-	
							350- -	-110
							-	
							-	-120
						لل	400	,

Hole no: US-78141 Map: Fattig 2 N.W. (P.M.) Date: 11/30/78 State: Montana County: Musselshell Elev: 3406 ft Location: T. 8 N., R. 26 N., Sec. 14 , Tract CDDD Drilled depth: 100 ft Measured: 45 ft FSL, 2475 ft FWL, Hole size: 43/4 in., Air Water X Cored Yes X No Remarks: Cored interval 23 ft - 31 ft. RECORDED BY J. JENSEN FT. MIN. RECORDED BY R. PEDERSON GEOLOGIST RECORDING SPEED 20 GAMMA S. P. DENSITY RESISTIVITY DEPTH T.C. ____2 T.C. ____2 SENS.SETTING SENS. SETTING RANGE _ 2K LITHOLOGY 20 50 RIP LOGGED DEPTHS LOGGED DEPTHS ST 98 FT. 98 FT sandstone, brown, very fine to fine. and claystone, medium-to dark-gray coal - 10 50 claystone, medium-to dark-gray, and sandstone, light-brown, very - 20 fine to fine, fe 100 + 30 - 40 150 - 50 200 70 250 300 350-192

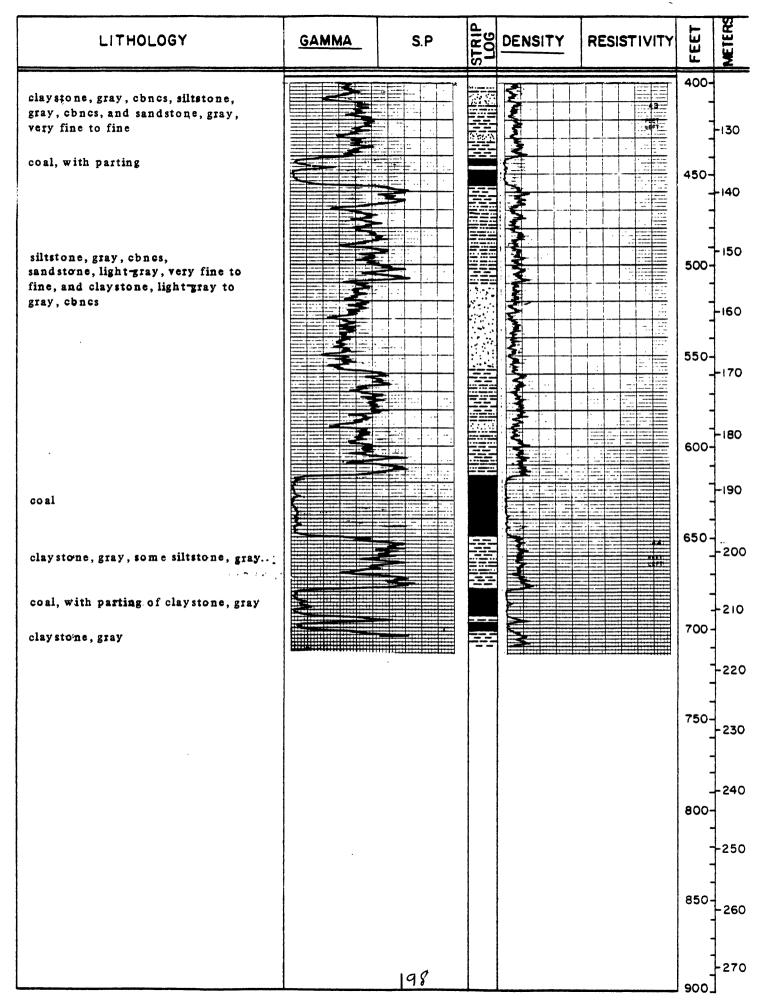
Hole no: US-78142 Map: Fattig 2 N.W. (P.M.) Date: 11/30/78 State: Montana County: Musselshell Elev: 3342 ft Location: T. 8 %, R. 26 k, Sec. 36 , Tract AACA Drilled depth: 200 ft Measured: 875 ft RXX 690 ft RXX Hole size: 4 3/4 in. Air Water X Cored Yes No X Remarks: Circulation lost within first 50 ft; possible washouts on density log. YES RECORDED BY J. JENSEN RECORDED BY R. PEDERSON GEOLOGIST RECORDING SPEED __ GAMMA DENSITY RESISTIVITY S. P. DEPTH T.C. ____2 T.C. ____2 SENS.SETTING SENS.SETTING RANGE IK RANGE 100 LITHOLOGY ۵. FEET \bar{z} LOGGED DEPTHS LOGGED DEPTHS ST 193 FT. 191 FT. 193 FT. 193 FT alluvium , d . 50 20 100 + 30 siltstone, medium-gray, cbncs, fissle, and sandstone, medium-gray, very fine, and claystone, medium-40 gray to greenish-gray, cbncs 150 50 200 -60 - 70 250 - 80 300 350--110 193

Hole no: US-78143 Map: Fattig 2 N	.E. (P.M.) D	ate: 11/30/78	Stat	e: Montana County: Musse	lsh ell	<u></u>
Elev: 3470 ft Location: T. 7 x, R. Measured: 1500 ft FRL, 560 ft FEL, 1500 ft RWC, 1	. <u>27</u> x, Sec	<u>4</u> ,Tract/	ADAE	Drilled depth:	00 1	<u>†</u>
Remarks:	101e 512e					
RECORDED BY R. PEDERSON GEOLOGIST	YES RECORDS	D BY J. JEN	SEN	RECORDING SPEED2)FT.	NIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100 LOGGED 100 FT.	S. P. SENS.SETTING 20 DEPTHS 99 FT.	STRIP LOG	DENSITY RESISTIVITY T.C. 2 SENS.SETTING RANGE 2K 50 LOGGED DEPTHS 100 FT. 100 FT	EET	METERS T
alluvium			0		0-	
siltstone, medium-gray, cbncs, and sandstone, tan, very fine to medium, and claystone, medium-gray, cbncs coal			6.00 6.00		50 -	- 10
fissle, and claystone, medium-gray	1				100-	30
					150-	- 40
					200	-60
					250 -	70
				-	300-	-90
					350-	110
					400	-120

Hole no: US-78144 Map: Fattig 2 N	.E. D	ate: 12/1/78	Stat	e: Montana	County: Musse	lsh eli	<u>.</u>
Elev: 3520 ft Location: T. 7 N., R Measured: 1220 ft FNL, 200 ft FWL, Remarks: SP on next page.	Hole size: 4	3/4 in., Air	, []	Water 🗵 C	ored Yes	No	 X
RECORDED BY R. PEDERSON GEOLOGIST	YES RECORDE	ED BY J. JENS	EN	RECORDI	NG SPEED 20	FT. N	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING DEPTHS	RIP LOG	DENSITY T.C. 2 RANGE 2K	RESISTIVITY SENS.SETTING 50 DEPTHS	İ	METERS T
	240 FT.		_	238 FT.		Q FE	¥
colluvium , alluvium	1 E					-	- 10
. الريبو المها						50 -	- 20
					3	100-	- 30
siltstone, medium—gray, cbncs, fissle, and claystone, medium—gray, cbncs, and sandstone, medium—gray, very fine to fine	Š					150- -	- 40 - 50
coal						200 -	-60
siltstone, medium-gray, and clay sto ne, medium-gray to brown, cbncs						250 -	- 70
		•				-	- 80
						300-	-90
						750	-100
						350-	-110
						400	-120

Hole no: US-78144 Map: Fattig 2 N.	E. (P.M.) D	ate: 12/1/78	Stat	e: Montana	County: Musse	lshel	
Elev: 3520 ft Location: T. 7 x, R. Measured: 1220 ft FML, 200 ft FWL, I Remarks:	. <u>27</u> &,Sec Hole size: <u>4</u>	10 ,Tract <u>B</u> 3/4 in., Air	BCC r 🔲	United € Water ☑ C	depth: 240 cored Yes [No	
RECORDED BY R. PEDERSON GEOLOGIST	YES RECORDE	D BY J. JENS	EN	RECORDI	NG SPEED 20	FT	AIN.
LITHOLOGY	GAMMA T. C	S. P. SENS.SETTING 20	S. P. DENSITY RESISTI		RESISTIVITY SENS. SETTING	DE	РТН
	LOGGED FT.	DEPTHS 236 FT.	STRIP	LOGGEI FT.	DEPTHS FT.	FEET	METERS
						50 - 100 - 200 - 350 -	-10 -20 -30 -40 -50 -60 -70 -90
	1 00				,	400	-120

Hole no: US-78145 Map: Decker	C	ate: 9/27/78	Stat	e: Montana (County: Big Ho	orn f	
Elev: 3760 ft Location: T. 8 S., R. Measured: 3950 ft FSL, 2300 ft FWL,	. <u>40 </u>	20 ,1rdC1 1 3/4in, Δi	r 🗆	Water 🖾 C	ored Yes	No	<u>X</u>
Remarks: Lost circulation at 620 ft no	return to 715	ft, logged thr	ough	rods, no sour	ce on density to	ool.	
	vee				•	FT	_
RECORDED BY K. WILLIAMS GEOLOGIST		ED BY L. SAT	JER		NG SPEED 20	_ FT. M	IIN.
	GAMMA T.C. 2	S. P. SENS.SETTING	99	DENSITY	RESISTIVITY SENS.SETTING	DEF	тн
LITHOLOGY	RANGE 100			RANGE 50	<u> </u>	H	R
	LOGGET	DEPTHS FT.	STRIP	LOGGEO 710 FT.	DEPTHS FT.	FEET	METERS
	***************************************					0-	
			V 4 X]	
							- 10
							, ,
						50 -	
			7.	1		-	- 20
		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	17	3		-	
			74			100-	- 30
			アイイイ				
			77				
sandstone, gray, very fine, and siltstone, gray			V.	1 3			- 40
siltstone, gray			7			150-	
			77			-	-50
			71	\(\xi_{\text{3}}\)]
		HE				-	
	3		1/1			200-	-60
		Tanasa Sanasa	70				
			17	***************************************		٠.	70
			VV	3		-	
			7/	\$		250 - -	
							-80
				3		-	
claystone, gray, cbncs, siltstone, gray, cbncs, and sandstone, gray,				3		300-	-90
very fine							
				3			-100
coal]
						350-	1
claystone, gray, cbncs, siltstone,							-110
gray, cbnes, and sandstone, gray, very fine				3			
							-120
						400	1
	19	/					



Hole no: US-78146 Map: Decker	D	ate: 9/29/78	Stat	e: Montana	County: Big I	lorn	
Elev: 3671 ft Location: T. 9 s., R.	40 %, Sec	5_,Tract_D	ADO	Drilled	depth:560	- f	<u>†</u>
Measured: 1450 ft FSL, 625 ft FEL, 1800, 1	Hole size: 4	3/4 III., AI	r L	water 🚨 (Lorea tes L	INO	E.
Nemarks							_
RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDE	D BY <u>L.SA</u>	JER	RECORD	ING SPEED 20	FT. N	IIN.
	GAMMA T. C2	S. P. SENS.SETTING	907	DENSITY T.C. 2	RESISTIVITY SENS.SETTING	DEI	РТН
LITHOLOGY	RANGE _200_	250		RANGE 2K	250	-	8
	LOGGED 553 FT.	DEPTHS 551 FT.	STRIP	LOGGE 558 F1	D DEPTHS	FEET	METERS
sandstone, light-brown to yellow, very fine to fine, fe						0-	
very line, to line, io						-	
				\$		-	- 10
	3		1			50 -	
			(*). A			-	-
			==			-	- 20
siltstone, light gray, claystone,	3					100-	30
light-gray, some cbncs, and sandstone, light-gray, very fine	The second of th		薑				
to fine		5					40
						150-	
		-5		\$			- 50
	3	-					"
]
coal	ξ	.				200	-60
							1
		2		7			70
siltstone, light-brown	1	- 1				250]
coal, with parting of siltstone,	F						-80
light-gray		5					1
				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			-90
		1		1 3		300	1 30
siltstone, light-gray, and claystone, light-gray, some cbncs		•			13-11-11-11-11-11-11-11-11-11-11-11-11-1		,
		3		3			100
		Passes -		}		350	4
			崖				+110
coal							1
claystone, light gray, concs					*	100	-120
L				والمسطونة المسطو		400 ل	4

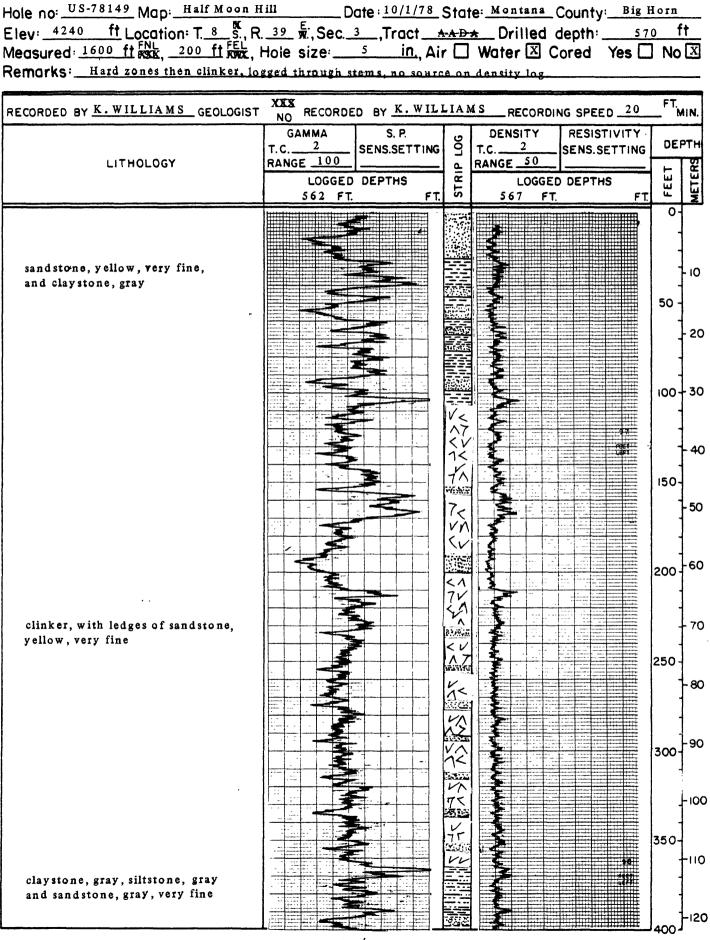
LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
sandstone, light-gray, very fine, claystone, light-gray, and siltstone, light-gray coal, with parting of claystone, light-gray claystone, light-gray, some cbncs, and siltstone, light-gray						450- 	-130 -140 -150 -160
						- - - 650 -	-190 -200
						700 -	-210
·	•					750- - - - 800-	-230 -240 -250
		200				850- 	-260 -270

Hole no: US-78147 Map: Half Moon	Hill Do	te: 9/30/78	Stat	e: Montana	County: Big H	orn	
Elev: 4114 ft Location: T. 8 S., R.	39 K., Sec. 1	3_,Tract_B	ввс	Drilled	depth: 510	f	<u>t</u>
Measured: 500 ft Fax, 100 ft FWL, I	Hole size: 4	3/4 <u>in.,</u> Air		Water 🗓	Cored Yes L	No	X.
Remarks: Logged with pit over hole.							
RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDE	BY L.SA	UE	RECORD	DING SPEED 20	FT	IIN.
	GAMMA	S. P.	100	DENSITY	RESISTIVITY	DEF	I
LITHOLOGY	T.C. 2 RANGE 200	SENS.SETTING 250		T.C. 2 RANGE 2K	SENS.SETTING		
	LOGGED		STRIP		ED DEPTHS	FEET	METERS
	505 FT.	503 FT.		510 F	T. 503 FT.	0-	٦
sandstone, lightbrown	12111111111111111111111111111111111111						
							_
claystone, gray, siltstone,						-	- 10
gray, and sandstone, light— gray, very fine						50 -	
					F	-	- 20
				\		-	
						-	
				\$		100-	- 30
		2		1		-	
				\ \ \{\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \	* - - - - - - - - -	-	- 40
coal		5		3		150-	
						-	- 50
				3	2	-	[
				3			1
		2		S	}	200-	-60
claystone, gray to dark-gray,				3			1
and siltstone, gray to dark-gray, some cbncs		3			\$		70
		\$		2			
				3		250-	1
		}		1			-80
					7111		-
				- \		-	-90
		1		محم		300]
sandstone, light-gray, very fine		<u> </u>		\$	}		; ; ;
		1		\			100
		\$		\$		350-]
			3			ı	-110
					}		1
siltstone, gray							-120
					<u> </u>	400	۔ احر
	201						

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	NE LE KE
siltstone, gray						400-	
coal, with parting of claystone, gray			,			450-	30 40
siltstone, gray		Ì.		2		500-	50 60
						550-	70
·				·		600-	80 90
						650	200
						700-	:10
						750-	20
•						800-	40
						850-	50
		202		•		-2	260

Hole no: US-78148 Map: Half Moon	Hill D	ate: <u>10/1/78</u>	Sta	te: Montana	County: Big I	Horn	
Elev: 4059 ft Location: T. 8 S., R	. <u>39</u> 🕷,Sec	<u>10</u> ,Tract_	ADA	C Drilled	depth:270	1	ft_
Measured: 1750 ft Rak, 340 ft Rak, Remarks: Abandoned 270 ft lost circu					ored Yes L	J No) X
Remarks. Abandoned 270 It lost then	iation still in c	ilikei - no ge	орну	sical logs.			
RECORDED BY K. WILLIAMS GEOLOGIST	XXIOS NO RECORDE	D BY		RECORDI	NG SPEED	FT.	MIN.
	GAMMA	S. P.	ي [DENSITY	RESISTIVITY .	3-	PTH
LITHOLOGY	T.C	SENS.SETTING		T.C	SENS.SETTING	-	
	LOGGED	DEPTHS	STRIP	LOGGE	D DEPTHS	FEET	METERS
	FT.	F [*]	r. S	FT.	FT	0	
						.	-
claystone, gray, siltstone, gray,							1
clinker, and sandstone, gray,	'						<u>} 10</u>
very fine		-	74			50]
							} 20
							1 20
			===]
			32	,		100	-30
			1/5				1
			11/2				1 40
			71				T 47
			147			150	1
			7<1	d)			-50
			11		••]
clinker			\ \ \ \				-60
			CA	1		200	100
			>1 \ \ \ \ \ \ \ \ \ \ \ \ \ \				1
			7 V < A				70
			VX				1
			>V V V V V			250	1
			<u> </u>	Ŕ			7-80
							1
						300	}-9c
							1
							Lica
		•					100
						350-	-
							+11C
							1
		203					-120
		203		<u> </u>		ممه ل	اء ا

.



LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, gray, siltstone, gray, and sandstone, gray, very fine						450-	-130 -140
coal, with parting of claystone, gray claystone, brown, and sandstone, gray, very fine						500-	-150 -160 -170
						- 600- - -	-180
						- -	 -200 -210
·				•		750-	-220 -230
						800-	-240 -250
		205				850- - - -	-270

Hole no: US-78150 Map: BLM-NE-3	<u> </u>	ate: <u>10/11/78</u>	Stat	e: Montana	County: Daw:	son	
Elev: 2771 ft Location: T. 18 N., R	. <u>52</u> ₩., Sec	18_,Tract_D	DD	Drilled	depth:	500	<u>ft</u>
Measured: 25 ft FSL, 15 ft FEL,		<u>5 in.,</u> Aiı	r 🗆	Water 🗵 (Cored Yes [] No	X
Remarks: SP malfunction at 210 ft.			****				
RECORDED BY A. Banet GEOLOGIST	YES	D BY L.SAU	ER	RECORD	ING SPEED 20	FT.	MIN.
	GAMMA	S. P.	507	DENSITY	RESISTIVITY		PTH
LITHOLOGY	T.C. 2 RANGE 200	SENS.SETTING 100		T.C. $\frac{2}{2K}$	SENS.SETTING	 	
		DEPTHS	₩.		D DEPTHS	FEET	METERS
	595 FT.	592 FT.	ST	600 FT	T. 592 FT	•	
	-					7 0.	1
			===	3		'	1
]
·							10
siltstone, light-brown to gray, cbncs						50 -	4
Concs						.	-
			==				20
							1
			=:=		\$ }	1	┪
				3	1 1	100	 30
				4	1 3 4		1
coal : (]
	 			\$	1 5		 40
		2				150	1
siltstone, medium-gray to	5 1	-		1	113		- 50
green-gray, cbncs, and claystone, medium to green-gray, cbncs							F 30
medium to green-gray, cones		3			4		-
				│			-60
		1		W.		200	T 60
					+ 4		1
	3 3			\$] 70
coal			==	₹] ′°
		₹	==	5	+	250	1
siltstone, medium-gray, cbncs,		\$					-80
and claystone, medium-to					3		1 ~~
greenish-gray, cbncs				\$ \$	13		1
		-		کے ایا			-90
coal		3		\$		300	1
		3					4
siltstone, medium-gray, cbncs,		3					Fioo
and claystone, medium-to greenish-gray, concs			==	\$			1
greenish-gray, concs					7907	350	4
							+110
			===				1
coal			===				1
claystone, gray			==	5			-120
					للتالك السالم	400	_

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, gray, and siltstone, medium-gray						- 400- - -	-130
siltstone, medium-gray to dark-gray						450- - -	-140
					Ž Ž	500- - -	-150 -160
siltstone, gray, and claystone, light_gray to medium-gray	\$					550- - -	-170
	3				7 #	600-	-180
						- 650 -	-190 -200
						700	210
						750-	-220
						800-	240
						-	250
						850-	-260
		207				900	270

Elev: 2751 ft Location: T. 18 x., R. Measured: 165 ft FSL, 95 ft FEL, Remarks:	Hole size:	5 in., Ai	r 🗍	Water ⊠ C	ored Yes	ft No ₪
RECORDED BY R. PEDERSON GEOLOGIST	YES RECORDE	D BY L. SAU	ER	RECORDI	NG SPEED 20	FT.
LITHOLOGY	GAMMA T.C. 2 RANGE 200 LOGGED 394 FT.	S. P. SENS.SETTING 250 DEPTHS 392 FT.	TRIP I	DENSITY T.C. 2 RANGE 2K LOGGEI 399 FT.	RESISTIVITY SENS.SETTING 100 DEPTHS 392 FT	FEET
siltstone, gray, cbncs, claystone,						50
gray, cbncs, and sandstone, gray, very fine						150-5
coal claystone, gray coal		\$				200
siltstone, gray, cbncs, claystone, gray, cbncs, and sandstone, gray, fine						250 -
siltstone, gray, cbncs, and claystone, gray, cbncs						300
siltstone, gray, cbncs, and claystone, gray, cbncs						350-
coal siltstone, gray, cbncs, and claystone, gray, cbncs	\$	\$				†1 1 1 1

Hole no: US-78152 Map: BLM-NE-3	9D	ate : 10/11/78	Stat	e: Montana County: Day	vson	
Elev: 2696 ft Location: T. 17 N., R. Measured: 55 ft FNL, 5 ft FR., 15 Remarks:	_52 \mu. Sec. 2	0_,Tract_A	AA	A_Drilled depth:2	40 f	<u>†</u>
RECORDED BY R. PEDERSON GEOLOGIST	YES NO RECORDE	D BY L. SAU	ER	RECORDING SPEED20	FT.	IN.
LITHOLOGY	GAMMA T. C. 2 RANGE 200 LOGGED 233 FT.	S. P. SENS.SETTING 100 DEPTHS 231 FT.	STRIP LOG	DENSITY T.C. 2 RANGE 2K COGGED DEPTHS 238 FT. 231 F		
siltstone, gray-green to brown, cbncs, and claystone, gray to green, cbncs, coal siltstone, gray, cbncs, and claystone, gray, cbncs, and sandstone, gray, very fine					50	- 10

Hole no: US-78153 Map: BLM-NE-	3 1 D	ate: 10/11/78	Stat	e: Montana (County: Daw:	on	
Flev: 2740* ft Location: T. 18 8. R	8. 52 k. Sec. 2	.TractI	DDD	D_ Drilled (depth:500	<u>†</u>	<u>t</u>
Measured: 15 ft FSL, 40 ft RMX,	Hole size:	5 in., Air	<u>ا</u> ا	Water ☒ C	ored Yes ∐	No	X.
Remarks: <u>Elevation estimated from Gl</u> SP malfunction at 198 ft.	endive AwiS; Si	3013-13250-000	and	I IIII II conto	ur interval		_
RECORDED BY K. WILLIAMS GEOLOGIST	XXES RECORDE	D BY L. SAU	ER	RECORDI	NG SPEED 20	_ FT. M	IIN.
	GAMMA T.C. 2	S. P. SENS.SETTING	907	DENSITY T.C. 2	RESISTIVITY -	DEF	этн
LITHOLOGY	RANGE 200	100	ے ا	RANGE 2K	100	-	ERS
	LOGGED 494 FT.	DEPTHS 492 FT.	STR	LOGGE1 499 FT.	DEPTHS 492 FT.	FEET	METE
gravel, and sandstone, white and			ં. જ		2	0	
black, medium, fe					Bitty to the total and the total and	_	
claystone, gray, cbncs coal						-	-10
CO 21			===			50 -	
						"	
						-	20
siltstone, gray to brown, some							1
cbncs, and claystone, gray			===	\$		100-	30
						-	1
						-	1
] .	1-40
						150-	-
coal, with parting of claystone, gray			===			-	50
, , , , , , , , , , , , , , , , , , , ,]
							}
		E 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1 - 1		1 3		200	-60
siltstone, gray—to blue-gray, some cbncs, and claystone, gray—to							1
blue-gray, some cbncs							70
		3					1
coal						250	1
siltstone, gray-to blue-gray, some							7-80
cbncs, and claystone, gray-to			昌				1
blue-gray, some cbns				 		300	-90
coal .						1300]
siltstone, gray-to blue-gray, some							1
cbncs, and claystone, gray-to blue-gray, some cbncs							10
						350	
·							+110
							+
			E	3 3			1_
			E			J ₄₀₀]-12

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray-to blue-gray, some cbncs, and claystone, blue-to blue-gray, some cbncs						400- - - - 450-	-130
						500-	- 150
						- 550-	-160 -170
						600-	-180
·						- - -	-190
						650 - - -	 -200
		•				700 - -	-210
						- 750-	
·				-		800-	-240
						-	-250
						850- - - -	-260 -270
		211				900_	

Hole no: <u>US-78154</u> Map: <u>BLM-NE-39</u>	Date: 10/11/78	State: Montana County: Dawson
Flev: $2790*$ ft location: T 17 $\%$ R	52 F. Sec. 10 Tract	CCDD Drilled depth: 600 ft
Measured 8 ff FSL, 1060 ff FWL,	Hole size: 4 3/4 In., Ai	ir Water Cored Yes No X
Remarks: Bievarion estimated from Gle	Andra AMIS; Scale 1:250,000	
RECORDED BY L. SAUER GEOLOGIST	NO RECORDED BY L. S.A.	AUER RECORDING SPEED 20 FT. MIN.
	GAMMA S. P.	DENSITY RESISTIVITY
LITHOLOGY	T.C. 2 SENS.SETTING RANGE 200 100	T.C. 2 SENS. SETTING DEPTH
	LOGGED DEPTHS	LOGGED DEPTHS
	594 FT. 592 FT	599 FT. 592 FT. L
		10
		50 -
		20
	Reviset	
	Reac	100 - 30
siltstone, gray to green-gray,		4
cbncs, claystone, gray to green- gray, cbncs, and sandstone,	Pa-364	
gray, very fine to fine		150-
		-50
		200 -64
	RetSet	17
	To the same of the	250
coal		-8
COAL		
siltstone, greenish-gray, cbncs,		
claystone, blue-gray to gray,		300-
cbncs, and sandstone, gray, very fine		
9 -		
		350-
		J ₄₀₀ J-12
	212	

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, greenish-gray, cbncs,						-	-130 -140 -150
claystone, blue-gray to gray, cbncs, and sandstone, gray, very fine						500- - - - 550-	-160 -170
·						600-	-180
				•		-	 -200 -210
		*				-	-220
·	·					750- - - - 800-	-230 -240
		,				850-	-250 -260
		213				1	-270

Hole no: <u>US-78155</u> Map: <u>BLM-NE-3</u>						
Elev: 2680* ft Location: T. 17 St., R.	_52 \v., Sec3	Tract_I	CCC	Drilled depth: 26		ft 🔛
Measured: 40 ft FSL, 2620 ft kwx, I Remarks: Elevation estimated from GI	Hole SIZE: endive AMS: si	3 III., Air	r 🗀	Water \(\times\) Cored Yes L	טא ר) (<u>)</u>
Remarks:			,, <u>.</u>	o it contour interval.		_
RECORDED BY A. BANET GEOLOGIST	YES RECORDE	D BY L.SA	UER	RECORDING SPEED 20	FT.	MIN.
	GAMMA	S. P.		DENSITY RESISTIVITY		1
LITHOLOGY	T.C. 2 RANGE 200	SENS.SETTING	, –	T.C. 2 SENS.SETTING RANGE 2K 100		
		DEPTHS	TRIP	LOGGED DEPTHS	FEET	METERS
	254 FT.	252 FT.	ST	259 FT. 252 F	, u	
·	Š				50	10
siltstone, medium-gray to brown, cbncs, and claystone, medium-gray, cbncs, and sandstone, gray, very fine coal siltstone, medium-to dark-gray, and claystone, medium-to dark-gray		\$ \$ \$colses			100	-30
					150	- 40 - 50
					200	-60
					250	- 80
					300	-90
					350	-110
		214			400	-120

100 - 30 - 40 150 - 50 200 - 60 - 70 250 - 80 300 - 90 - 100 350 - 110	Hole no: US-78156 Map: BLM-NE-3	9D	ate: 10/12/78	Stat	e: Montana	County:	Daws	o n	
RECORDED BY K. WILLIAMS GEOLOGIST NO RECORDED BY L. SAUER RECORDING SPEED 20 FT MIN. CAMMA S. S. P. T. C. 2 SENSETTING 100 PT MIN. LOGGED DEPTHS 106 FT 104 FT 11 FT 104 FT 11 FT 104 FT 100	Elev: <u>2691 ft</u> Location: T <u>17 %</u> , R. Measured: <u>15 ft</u> FSL, <u>650 ft</u> FWL, H	52 克,Sec Hole size:	18 ,Tract	ccc r 🔲	DDrilled Water ☒ (depth:_ Cored	Yes 🗆	0 f No	X
ELITHOLOGY C. 2 SENSETTING RANGE 20 100 20 20 20 20 20 2	Remarks: Lost circulation at 105 ft.	SP malfunctio	n at 42 ft.						
LITHOLOGY C.C. SENS.SETTINO 20 100 20 20 20 20 20 2	RECORDED BY K. WILLIAMS GEOLOGIST	XXX RECORDE	D BY L.SAU	ER	RECORD			FT. M	IN.
sandstone, gray to brown, very fine to fine, and clay stone, gray to brown, choes 100 - 30 100 - 30 200 - 60 300 - 90 110	LITHOLOGY	T.C. 2 RANGE 200 LOGGED	SENS.SETTING 100 DEPTHS	rRIP	T.C. 2 RANGE 2 K LOGGE	SENS.SE	TTING		
400	fine to fine, and claystone, gray		104 FT.	S				50 - 100 - 15	-10 -20 -30 -40 -50 -60 -70

Hole no: US-78157 Map: BLM-NE Elev: 2555 ft Location: T. 17 N, f Measured: 100 ft FSL, 215 ft FSL, Remarks: SP malfunction at 57 ft	R. <u>53</u> ∰.,Sec Hole size:	30_,Tract!	D D D	D Drilled	depth:50	o ft
RECORDED BY A. BANET GEOLOGIS		D BY L.SAU	ER	RECORDI	NG SPEED 20	FT. MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 100 DEPTHS	STRIP LOG	DENSITY T.C. 2 RANGE 2K	RESISTIVITY SENS.SETTING 100 DEPTHS 492 FT	FEET AMETERS T
siltstone, medium-to dark-gray, cbncs, claystone, medium-to dark-gray, very fine coal siltstone, medium-gray, and claystone, medium-gray coal siltstone, medium-gray to tan, cbncs, and sandstone, gray, very fine to fine	494 FT	492 FT.	S	499 FT		100 - 30 100 - 30 150 - 50 200 - 60
						30090
						350-
					E A A A A A A A A A A A A A A A A A A A	-12

LITHOLOGY	GA M MA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, medium to dark-gray, claystone, medium-gray to tan, cbncs, and sandstone, gray, very fine to fine						450-	-130 -140
claystone, medium-gray	3	3				500-	-150
	·					550-	-160 -170
-						600- -	
						650 - -	-190 -200
						700-	-210
·						750-	-220 -230
			k			800- - -	-240 -250
						- 850-	
		217			······································	900	-270

Hole no: US-78158 Map: BLM-NE-	39 D	ate: <u>10/13/78</u>	Stat	e: Montana (County: Daw	so n	
Claus 2590* ft pageing: T 17 N. D.	52 E S00	34 ,TractD	DD	D_ Drilled o	lepth:18	0 f	<u>t</u>
Measured: 15 ft FSL, 65 ft FWL, Elevation estimated from G	Hole size: 4	3/4 in., Air		Water 🗵 C	ored Yes ∐	No	X
Remarks:	lendive AMS, s	cale 1.230,000	J, 10	o it contour i	irtervar.		
RECORDED BY K. WILLIAMS GEOLOGIST		D BY L.SAU	ER		NG SPEED 20	_ FT. M	IIN.
	GAMMA T. C	S. P. SENS.SETTING	907	DENSITY T.C. 2	RESISTIVITY SENS.SETTING	DEF	- 1
LITHOLOGY	ı	DEPTHS	STRIP	}	DEPTHS	FEET	METERS
	175 FT.	173 FT.	05	180 FT.	173 FT.	0-	لقــ
siltstone, blue-green to gray, cbncs, claystone, blue-green to gray, cbncs, and sandstone, white and black, fine coal siltstone, light-gray, cbncs, and claystone, gray to green, cbncs coal siltstone, light-gray, cbncs, and claystone, gray to green, cbncs						50 - 100 - 150 - 25	- 10 ⁻ - 20 - 30 - 40 - 50 - 70 - 80
						300 - -	-90
							-100
						35 0-	-110
		7,0				400	-120

Hole no: US-78159 Mgp: BLM-NE-39 Date: 10/13/78 State: Montana County: Dawson Elev: 2750 ft Location: T. 17 x, R. 52 x, Sec. 24 , Tract CABC Drilled depth: 200 ft Measured: 2297 ft FSL, 1372 ft FWL, Hole size: 5 in., Air Water X Cored Yes No X Remarks: Elevation estimated from Glendive AMS; scale 1:250,000, 100 ft contour interval. RECORDED BY L. SAUER YES FT. RECORDED BY A. BANET RECORDING SPEED __20 **GEOLOGIST** GAMMA S. P. DENSITY RESISTIVITY DEPTH T.C. 2 SENS.SETTING T.C._ SENS.SETTING RANGE 200 250 RANGE __200 LITHOLOGY ٩ FEET Œ LOGGED DEPTHS LOGGED DEPTHS ST 194 FT. 192 199 FT. siltstone, brown to dark-gray, cbncs, and claystone, medium-gray to darkgray, cbncs coal 50 -20 100 + 30 siltstone, brown to dark-gray, cbncs, claystone, medium-gray to dark-gray, cbncs, and sandstone, brown, very fine 150-50 |soo |-60 70 250 80 350

Hole no: US-78160 Map: BLM-NE-39	D	ate: 10/13/	<u>78</u> Stat	e: Montana C	County: Daws	on	
Elev: 2640 ft Location: T. 17 N., R.	<u>52</u> ₩.,Sec	32 ,Tract	DDD	Drilled d	epth:25	0 f	<u>t</u>
Measured: 12 ft FSL, 108 ft FML, H	ole size: 4 3	<u>3/4 in.,</u>	Air 🔲	Water 🗵 Co	ored Yes	No	X
Remarks: Log recorded through drill pig	pe, no source	on density	section	•			
RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDE	D BY L.S.	AUER	RECORDIN	G SPEED 20	_ FT. N	AIN.
	GAMMA T. C2	S. P.	SA LOG	DENSITY	RESISTIVITY	DEI	РТН
LITHOLOGY	T.C	SENS.SETTI		T.C. 2 RANGE 500	SENS.SETTING		
Ī	LOGGED	DEPTHS	STRIP		DEPTHS	FEET	METERS
1	210 FT.		FT. O	215 FT.	FT.		Ž
gravel, brown, and silt, brown siltstone, gray to blue-gray, cbncs, and sandstone, light-gray, very fine to fine, some calcareous material coal siltstone, gray to blue-gray, cbncs coal siltstone, gray to blue-gray, cbncs						50 - 100 - 200 -	-10 -20 -30 -40
-							-100
					•	-	1
						350-	1
							1110
		220				400	-120

Hole no: <u>US-78161</u> Map: <u>BLM-NE</u> -	Date: 10/13/78 State: Montana County:	Dawson
Elev: <u>2796 ft</u> Location: T <u>. 16</u> 🕱, R.	52 kt, Sec. 6 , Tract DDDD Drilled depth:	320 ††
Measured: 38 ft FSC, 126 ft Max, 1	lole size: 4 3/4 in., Air □ Water ☒ Cored	Yes ☐ No ☒
Remarks: SP malfunction at 50 ft.		
RECORDED BY A. BANET GEOLOGIST	YES RECORDED BY L. SAUER RECORDING SPEE	DFT.
	GAMMA S. P. DENSITY RESIST T.C. 2 SENS.SETTING 9 T.C. 2 SENS.SE	I DEDTU
LITHOLOGY		LITTING
	LOGGED DEPTHS 🖺 LOGGED DEPTHS	1 - 1,11
	313 FT. 312 FT. 6 318 FT. 31	12 FT. 4 3
•		50 -
siltstone, tan to medium-gray, cbncs, and claystone, dark-yellow to medium-gray, cbncs		-20
		100 - 30
coal		150
siltstone, tan to medium-gray, cbncs, and claystone, dark-yellow		200 -60
to medium-gray, cbncs coal		250-
siltstone, medium-to dark-gray, cbncs coal siltstone, medium-to dark-gray, cbncs		300 -90
		1 100
		350-
	221	400

RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDE	D BY L.SAU	E R	RECORDI	NG SPEED 20	_ FT.	MIN
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 100	1P LOG	DENSITY T.C. 2 RANGE 5 K	RESISTIVITY - SENS.SETTING 100	DE	
	LOGGED 273 FT.	DEPTHS 271 FT.	F.R.		D DEPTHS 271 FT	FEET	001770
gravel, and sandstone, brown, very fine siltstone, gray, cbncs, claystone, blue-gray to gray, cbncs, and sandstone, gray, very fine to fine			0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	A MILIAN LAND AND AND AND AND AND AND AND AND AND		50	
coal siltstone, gray, cbncs, and claystone, gray, cbncs coal siltstone, gray, cbncs, and claystone, gray, cbncs						250	
						300	-9
						350-	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

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Hole no: US-78163 Map: Pleasant Vi	<u>ew</u> D	ate: 10/13/78	Stat	te: Montana County: Dav	7 5 0 n	
Elev: 2555 ft Location: T. 16 s., R. Measured: 233 ft FSL, 242 ft FWL, B. Remarks: SP malfunction at 126 ft.	_53 k,Sec Hole size:	24 ,Tract <u>6</u> 5 <u>in.,</u> Ai	r 🗆	Drilled depth: 10 Water 🗵 Cored Yes (50 □ No	ft o 🗵
RECORDED BY A. BANET GEOLOGIST	YES	D BY K.WIL	TIAN	M.SRECORDING SPEED	FT.	MIN.
LITHOLOGY	GAMMA T.C, 2 RANGE 200	S. P. SENS.SETTING 100 DEPTHS	TRIP LOG	DENSITY T.C. 2 RESISTIVITY SENS.SETTING LOGGED DEPTHS		METERS H
siltstone, medium—gray to yellow, cbncs, and claystone, medium—gray to tan, cbncs coal, with a parting of claystone, gray claystone, medium—to dark—gray coal claystone, medium—to dark—gray		2.3			50 100 200 250 350	30

Hole no: US-78164 Map: Poverty Fla	t West D	ate: 10/14/78	Stat	e: Montana County: Dav	son	
Elev: 2576 ft Location: T. 16 N., R. Measured: 66 ft FSL, 240 ft FWL, I	53 \$ Sec. :	14 Tract	ccc	Drilled depth: 2	20	it IXI
Remarks: SP log malfunction.						
RECORDED BY K. WILLIAMS GEOLOGIST	XXES NO RECORDE	D BY L.SAU	JER	RECORDING SPEED 20	FT.	MIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 250 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 5K LOGGED DEPTHS 214 FT. 207 F	EET	METERS T
sandstone, brown, very fine					0.	-10
siltstone, gray, cbncs, and claystone, gray, cbncs					50	- 20
					100	30
coal, with parting of claystone, gray siltstone, gray, cbncs coal					150	- 40 - 50
siltstone, gray, cbncs, sandstone, gray, very fine to fine, and claystone, gray, cbncs					200	1
					250	- 70 - 80
				·	300	-90
,				·	350	-110
)) 4			400	-120

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Hole no: US-78165 Map: BLM-NE-3	<u> </u>	ate: <u>10/14/78</u> :	Stat	e: Montana	County: Daws	on	
Elev: $\frac{2510*}{}$ ft Location: T. $\frac{16}{}$ R.	_53 \mathbb{E}, Sec	10 ,Tract C	CDC	Drilled	depth:160	f	
Measured: <u>55 ft FSL, 733 ft FWL,</u> t	Hole size:	<u>5</u> <u>in.,</u> Aiı	, 🔲	Water 🖾 C	Cored Yes	No	X
Remarks: Logged through drill rods, rescale 1:250,000, 100 ft cor	tour interval	ensity section.	Ele	vation estima	ted from Glend	ive A	. <u>M</u> S
RECORDED BY A. BANET GEOLOGIST		D BY L.SAU	ER	RECORDI	NG SPEED	FT	IIN.
	GAMMA T.C2	S. P. SENS.SETTING		DENSITY T.C. 2	RESISTIVITY SENS.SETTING	DEF	
LITHOLOGY		DEPTHS	TRI		D DEPTHS	FEET	METERS
	153 FT.	FT.	8	158 FT	, FT.	0-	
siltstone, medium-gray, concs, and claystone, tan to medium-gray,	3					4	
cbncs						50 -	- 10
coal	3				\$ 8	-	- 20
siltstone, medium-gray, cbncs						-	
coal, with parting of claystone, gray				\$		100-	- 30
claystone, medium—gray, siltstone, gray coal				*			- 40
claystone, medium—gray, and siltstone, gray				*		150-	- 50
					 - - - - - - - - - - - - 	-	
						- 200-	-60
				·		, -	
						250	70
						250 - - -	-80
						_	
						300 - -	-90
						-	100
						350-	
						-	-110
							-120

Remarks: Hole logged through drill p AMS; scale 1:250,000, 100 RECORDED BY L. SAUER GEOLOGIST) ft contour int NOSS NO RECORDE	D BY L.SA	UER	RECORDI	NG SPEED 20	ST.	
LITHOLOGY	GAMMA T.C. 2 RANGE 100	S. P. SENS.SETTING	STRIP LOG	DENSITY T.C. 2 RANGE 50	SENS.SETTING	ET	METERS T
	270 FT.	DEPTHS FT.	STF	275 FT.	FT.	FEET	WE
gravel, and sandstone, tan, very fine to coarse			0000000			0-	- 10
siltstone, gray, and sandstone, gray, very fine to fine coal						50 -	- 20
				To the state of th		100-	-30 -40
siltstone, gray, cbncs, claystone, gray, cbncs, and sandstone, gray, very fine to fine						150- - -	
coal						200 -	-60
cloustone grow to see a						- 250	70
claystone, gray to green-gray, cbncs, and siltstone, gray to green-gray, cbncs							- 80
						300-	-90
						-	-100
					-	350- - -	110
		26				400	-120

Elev: 2600* ft Location: T.17 & R.53 & S.Sec. 6 Tract BBBB Orilled depth 500 ft Measured 55 ft Mex. 25 ft Mex. hole size 3 in. Air Water & Cored Yes No Exemprise: Elevisorion estimated from Glenuiva Amazi 1250. Juliu scale, 100 ft contour interval. SP malfunction. RECORDED BY A. BANET GEOLOGIST RESERVED BY L. SAUER RECORDING SPEED 20 FTMIN EXEMPLY AMAZI 1250. Juliu scale, 100 ft Contour interval. RECORDED BY A. BANET GEOLOGIST RESERVED BY L. SAUER RECORDING SPEED 20 FTMIN EXEMPLY AMAZI 100 DEPTH S. S.P. C. 2 SENS.SETTING RANGE 230 LOGGED DEPTHS S.S.P. T. S.T. F. T. F. T. S.T. SENS.SETTING B. S.P. T. S.P. S.P. T. S.P. S.P. T. S.P. S.P	Hole no: US-78167 Map: BLM-NE-3	<u>9</u> D	ate: 10/15/78	Stat	e: Montana	County: Daw	so n	
Meagured: 35 ft feet, 23 ft feet, 10 ft feet and 12	Elev: 2600* ft Location: T. 17 N., R.	_ <u>53</u> \$\overline{\pi}, Sec	6_,Tract1	ввві	Drilled	depth: 600	f	
RECORDED BY A. BANET GEOLOGIST YES RECORDED BY L. SAUER RECORDING SPEED 20 FT.M.N. GAMMA S. P. T. C. 2 SENS.SETTING RANGE SK. 1100 TO THE RANGE SK. 1100	Measured: 55 ft FNL, 25 ft FWL, 1	Hole size:	<u>5 in.,</u> Ai	r 🗆	Water 🗵 (Cored Yes] No	X
RECORDED BY A. BANET GEOLOGIST YES RECORDED BY I. SAUER RECORDING SPEED 20 FTMM. LITHOLOGY T.C. 2 SENS.SETTING T.C. 2 SENS.SETTING T.C. 2 SENS.SETTING SAT SET ST ST ST ST ST ST ST ST ST ST ST ST ST	Remarks: Elevation estimated from Gle	ndive Aws: 1:	250,000 scale	. 100) ft contour in	iterval.		
Coal Coal		YES	D BY L. SA	UER	950090	NC SPEED 20	FT.	ALNI
LITHOLOGY T.C. 2 SENSETTING ARANGE 200 SETTING ARANGE 350 SETTING ARA	RECORDED BY GEOLOGIST			1				1174.
siltstone, tan to medium gray, choses coal coal coal coal coal coal coal coal		T.C. 2	1	9	T.C. 2	SENS.SETTING	DEF	
siltstone, tan to medium-gray, obnos coal siltstone, tan to medium-gray, obnos siltstone, tan to medium-gray, obnos coal coal coal siltstone, tan to medium-gray, obnos coal coal coal siltstone, tan to medium-gray, obnos coal siltstone, tan to medium-gray, obnos coal coal	LITHOLOGY		DEGTHE	ط <u>ہ</u>			ET	ERS
siltstone, tan to medium-gray, obnos coal siltstone, tan to medium-gray, obnos siltstone, tan to medium-gray, obnos coal coal coal siltstone, tan to medium-gray, obnos coal coal coal siltstone, tan to medium-gray, obnos coal siltstone, tan to medium-gray, obnos coal coal				ı 🛏	I	_	7.	MET
siltstone, tan to medium-gray, chans, and claystone, medium-to dark-gray, chans, and claystone, medium-to dark-gray, chans siltstone, tan to medium-gray, chans, and claystone, medium to dark-gray, chans coal siltstone, tan to medium-gray, chans, and claystone, medium to dark-gray, chans coal siltstone, tan to medium-gray, chans, and claystone, medium-to dark-gray, chans, and claystone, medium-to dark-gray, chans coal							0-	
siltstone, tan to medium-gray, chans, and claystone, medium-to dark-gray, chans, and claystone, medium-to dark-gray, chans siltstone, tan to medium-gray, chans, and claystone, medium to dark-gray, chans coal siltstone, tan to medium-gray, chans, and claystone, medium to dark-gray, chans coal siltstone, tan to medium-gray, chans, and claystone, medium-to dark-gray, chans, and claystone, medium-to dark-gray, chans coal								
siltstone, tan to medium-gray, chans, and claystone, medium-to dark-gray, chans, and claystone, medium-to dark-gray, chans siltstone, tan to medium-gray, chans, and claystone, medium to dark-gray, chans coal siltstone, tan to medium-gray, chans, and claystone, medium to dark-gray, chans coal siltstone, tan to medium-gray, chans, and claystone, medium-to dark-gray, chans, and claystone, medium-to dark-gray, chans coal]	
coal coal	siltstone tan to madium-vrav							- 10
siltstone, tan to medium-gray, cbncs, and claystone, medium to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs							50 -	
coal siltstone, tan to medium-gray, chos, and claystone, medium to dark-gray, chos coal siltstone, tan to medium-gray, chos, and claystone, medium to dark-gray, chos, and claystone, medium-to dark-gray, chos, and claystone, medium-to dark-gray, chos	dark-gray, cbncs			===		\$		20
siltstone, tan to medium-gray, chncs, and claystone, medium to dark-gray, cbncs, and claystone, medium to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs.			A STATE OF THE STA					20
siltstone, tan to medium-gray, chncs, and claystone, medium to dark-gray, cbncs, and claystone, medium to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs.								
siltstone, tan to medium-gray, chors, and claystone, medium to dark-gray, chors, and claystone, medium-gray, chors, and claystone, medium-gray, chors, and claystone, medium-to dark-gray, chors, and claystone, medium-to dark-gray, chors	coal						100-	- 30
siltstone, tan to medium-gray, chors, and claystone, medium to dark-gray, chors, and claystone, medium-gray, chors, and claystone, medium-gray, chors, and claystone, medium-to dark-gray, chors, and claystone, medium-to dark-gray, chors						3		
siltstone, tan to medium-gray, chors, and claystone, medium to dark-gray, chors, and claystone, medium-gray, chors, and claystone, medium-gray, chors, and claystone, medium-to dark-gray, chors, and claystone, medium-to dark-gray, chors					1			
siltstone, tan to medium-gray, cbncs, and claystone, medium to dark-gray, cbncs coal siltstone, tan to medium-gray, cbncs coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal					्रे इ		1	- 40
siltstone, tan to medium-gray, cbncs, and claystone, medium to dark-gray, cbncs coal siltstone, tan to medium-gray, cbncs coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal					3		150	
siltstone, tan to medium-gray, cbncs, and claystone, medium to dark-gray, cbncs coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal								
coal coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal							-	- 30
coal coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal								
coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal					\$	13	200	-60
coal siltstone, tan to medium-gray, concerns, and claystone, medium-to dark-gray, concess coal	1						[200]	
coal siltstone, tan to medium-gray, chncs, and claystone, medium-to dark-gray, cbncs coal	, cara g, , co							
coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	E	1	15	1 1	- 70
coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal					\$		250	
coal siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs coal					\{\}	3	250	
siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs								- 80
siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs						+2		
siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs						15 4		-90
siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs			-		3		300	
siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs	coal			===				! •
siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs	Coal					13		100
siltstone, tan to medium-gray, cbncs, and claystone, medium-to dark-gray, cbncs					1 1 1 1 1 1 1 1 1 1			
cbncs, and claystone, medium-to dark-gray, cbncs					1 1		1 1	
dark-gray, cbncs coal		5		E	\$]	["
400				===				
400 J	 coal							-12
			227				ل 400	ļ

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, dark—gray to gray, and siltstone, medium—gray						400-	-130
coal						450-	-140 -150
claystone, dark-gray to gray, and silestone, medium-gray					3	500-	-160
coal claystone, dark-gray to gray, and siltstone, medium-gray						550- - - -	-170 -180
·						600- - - -	-190
						650 - - - -	-200 -210
				·		700-	-220
						750- - - -	-230 -240
						800-	-250
		228				900.	-270

		D BY L. SA	,		IG SPEED	FT.	MIL
LITHOLOGY	GAMMA T.C. 2 RANGE 200 LOGGED 293 FT.	S. P. SENS.SETTING DEPTHS FT.	TRIP	RANGE 5 K	RESISTIVITY SENS.SETTING 250 DEPTHS 291 FT	EET	PT
ndstone, brown						0	1
aystone, brown, cbncs				g d			$\frac{1}{2}$
al, with parting of claystone, gray						50	4-1-1-4-4-1
aystone, gray, cbncs						100	-
tal itstone, gray, cbncs, claystone, gray, oncs, and sandstone, interbedded, ay to brown, very fine to fine bal itstone, gray, cbncs, claystone, gray, oncs, and sandstone, interbedded,						150	#-4-4-4h
eay to brown, very fine to fine oal iltstone, gray, cbncs, claystone, gray, bncs, and sandstone, interbedded,				JAN MANAGARA	50	200	
ray to brown, very fine to fine oal iltstone, gray, cbncs, claystone,						250	-
ray, cbncs, and sandstone, nterbedded, gray to brown, very fine of fine	3					300	
						350	

Hole no: US-78169 Map: Poverty Flat	West Date: 10/15/78	Stat	e: Montana County: Daw:	on	
Elev: 2730 ft Location: T. 17 X, R	. 53 W, Sec. 26 , Tract D	DDI	Drilled depth: 300	7 815	ft_
Measured: 300 ft FSL, 10 ft FSL,	Hole size:In., Air		Water La Corea Yes La	או ה	, LJ
internar					_
RECORDED BY A. BANET GEOLOGIST	YES RECORDED BY L. SAT	UER	RECORDING SPEED20	FT.	MIN.
	GAMMA S. P. T.C. 2 SENS.SETTING	700	DENSITY RESISTIVITY T.C. 2 SENS.SETTING		РТН
LITHOLOGY	RANGE _200100	RIP L	RANGE 2K 100		2
	LOGGED DEPTHS 290 FT. 288 FT.	l	LOGGED DEPTHS 295 FT. 288 FT	FEE	METERS
siltstone, tan to brown, and				0.	T
claystone, tannish-brown to gray					1
coal			< 3		10
siltstone, gray, and claystone, gray					1
coal				50]
		====			20
					1
		==		100	30
siltstone, medium-gray to brown,					-
and claystone, medium-to dark-gray, cbncs]
					1 40
				150	┨
coal					50
					4
				200	-60
siltstone, medium-to dark-gray,				200]
cbncs					1
					70
coal, with parting claystone, gray				250	1
					+80
siltstone, medium-to dark-gray, cbncs coal					1
siltstone, medium-to dark-gray, cbncs					-90
				300] "
					1100
				350	1
			,		+110
					1
					-120
	170	L		400 لـ	٠-٠
	230				

Hole no: US-78170 Map: Poverty Fla							
Elev: <u>2573 ft</u> Location: T <u>17 X</u> , R Measured: <u>138 ft</u> FSL, <u>48 ft</u> FWL, I Remarks:	53 &,Sec Hole size:_4	22 ,Tract	r 🗆	EDrilled (Water ⊠ C	depth: 30 fored Yes C	0 T	<u>T</u>
RECORDED BY K. WILLIAMS GEOLOGIST	XXXX RECORDE	D BY L. SAU	ΕR	RECORDII	NG SPEED 20	FT	AIN.
, LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 10 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 2K LOGGET 298 FT.	RESISTIVITY SENS.SETTING 100 DEPTHS 291 FT		METERS T
gravel, and sandstone, very fine to fine, brown			0 0 0			0-	ō
siltstone, brown to gray, cbncs, fe, and claystone, brown to gray						50 -	- 20
coal						100	30
siltstone, gray, cbncs, and claystone, gray to blue-gray, cbncs						150-	- 50
coal) } }					200	1
claystone, gray, cbncs, and siltstone, gray, cbncs	Ź					250	- 7(- 80
		Š				300	-90
•							- - -
						350-	1 - - - 1 1
		23/				400	-12

Hole no: <u>US-78171</u> Map: <u>Poverty Flat</u> Elev: <u>2705</u> ft Location: T. <u>17</u> x, R.	s East D	ate: 10/16/78	Stat	e: Montana County:	Dawson 340	1 ft	-
Heasured: 5 ft FSX, 1600 ft FEL	-34 W,Sec Hole size:_4	3/4 in., Ai	r 🗆	Water 🗵 Cored	Yes 🗆	No 🗵	j
RECORDED BY A. BANET GEOLOGIST	YES RECORDE	D BY L. SAU	ER	RECORDING SPEE	D 20	FT, MIN.	
LITHOLOGY	GAMMA T.C. 2 RANGE 200 LOGGED 333 FT.	S. P. SENS.SETTING DEPTHS FT.	TRIP	LOGGED DEPTH	ETTING 50	METERS HAND	Н
siltstone, medium-gray to tan, claystone, medium-to dark-gray, cbncs, and limestone, gray siltstone, medium-to dark-gray, and claystone, medium-to dark-gray coal siltstone, medium-to dark-gray, and claystone, medium-to dark-gray, and claystone, medium-to dark-gray						200 - 60 200 - 60 250 - 80 350 - 10	000000000000000000000000000000000000000

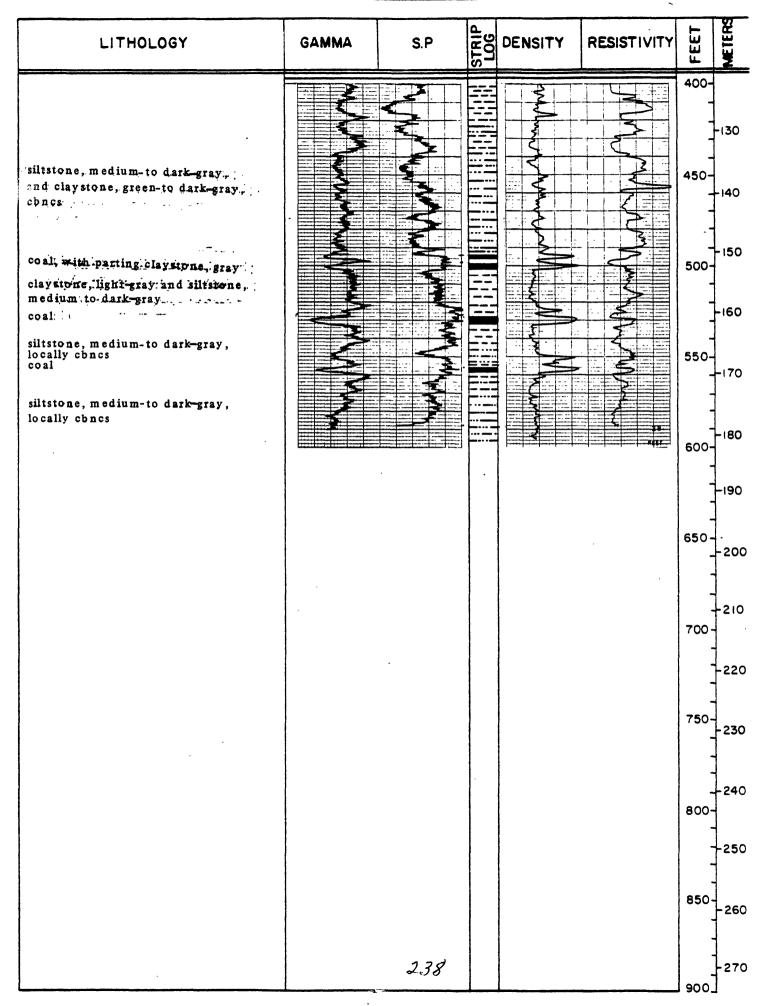
Hole no: <u>US-78172</u> Map: <u>Poverty Fla</u> Elev: <u>2607</u> ft Location: T. 17 S., F Measured: <u>850</u> ft FSL, 2500 ft FEL, Remarks:	. 54 w. Sec. 12 Tract_	DCBC Drille	ed depth:33	No l	X
RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDED BY L. SA	UER RECO	RDING SPEED 20	FT.	N.
LITHOLOGY	GAMMA S. P. SENS.SETTIN 100	a RANGE 2	SENS.SETTING 250 GGED DEPTHS	FEET O	
sandstone, light-gray to white, claystone, gray to blue-gray, and siltstone, gray, cbncs coal sandstone, light-gray to white, claystone, gray to blue-gray, siltstone, gray, cbncs, and limestone, light-gray coal, with parting claystone, gray claystone, gray, cbncs coal, with parting claystone, gray very fine to fine coal claystone, light-gray, and sandstone, gray, very fine to fine coal				150-	10
	233			400	

Hole no: US-78173 Map: Morgan Cree Elev: 2750 ft Location: T. 17 S., R Measured: 700 ft FSL, 1000 ft FWL, I	Ek School D 54 K, Sec. Hole size:	ate: 10/16/78 5 2 ,Tract	Stat	e: <u>Montana</u> (Drilled (Water X C	County: Daws depth: 520 ored Yes	on f No	<u>†</u>
Remarks:	YES RECORDE	D BY L.SAU	ER	RECORDII	NG SPEED 20	FT. M	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 100 DEPTHS	STRIP LOG	DENSITY T.C. 2 RANGE 2K	RESISTIVITY SENS.SETTING 250 DEPTHS	FEET	
	513 FT.		ST	518 FT.			ME
claystone, medium-to dark-gray, locally cbncs, and siltstone, medium-gray				May May May May May May May May May May		50 -	- 10 - 20 - 30 - 40
co al						200 - - - -	-60 -70
claystone, medium-to dark-gray, locally cbncs, and siltstone, medium- gray, limestone, light-gray		NAMA (250 - - -	- 80
coal					1 1 1 1 1 1 1 1 1 1	300- -	-90
claystone, medium-to dark-gray, locally cbncs, and siltstone, medium- gray	\$			The state of the s		- - 350-	-110
coal, with parting claystone, medium—gray claystone, medium-to dark-gray		3				-	-120
			===			400-	1 .20

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
coal claystone, dark-gray coal siltstone, gray-green				A A A A A A A A A A A A A A A A A A A		400-	-130
coal				200		450-	-140
claystone, dark-gray, and siltstone, light-gray						- 500-	-150
						-	-160
					`	550- -	-170
						600-	-180
						- -	-190
						650 - -	-200
`						700 - -	-210
`		•				- - 750-	-220
·						-	-230 -240
						800-	-250
						- 850-	
		235				900_	-270

Remarks:	XXX	D BY L.SAU	IER	PECOGOLI	NG SPEED 20	FT.	AIN
RECORDED BY A. WIDDIAM GEOLOGIS	GAMMA	S. P.		DENSITY	RESISTIVITY		
LITHOLOGY	T.C. 2 RANGE 200	SENS.SETTING		T.C. 2 RANGE 5 K	SENS.SETTING	DE	
		DEPTHS FT.	STRIP	LOGGED 315 FT.	DEPTHS 308 FT	FEET	METERS
			<u> </u>			0-	
						_	
			==			-	- 10
claystone, light-gray, cbncs,						50 -	
siltstone, brown, fe, and sandstone,						-	- 20
blue to light-gray, very fine						-	
				3		100-	30
						-	
						_	40
coal						150-	
claystone, light-gray, and			薑			130-	- 50
sandstone, light-gray, very fine] ~
•]
coal, with parting of claystone, gray				3		200	-60
claystone, gray, siltstone, gray,							}
sandstone, sandstone, gray, very fine, and limestone, gray							 70
				\$		250	1
coal siltstone, gray, claystone, gray,							-80
and sandstone, gray, very fine							-
coal claystone, gray, and siltstone,					*	300	-90
gray							1
							-10
						75.	1
						350	 -
							1
							12
		236	<u> </u>	<u></u>		400	ء' ل

Hole no: US-78175 Map: Kolberg Rain Elev: 2405 ft Location: T. 18 S., R Measured: 2050 ft FNL, 750 ft FWL Remarks:	. 55 W. Sec. 2	Tract_B	CDB	Drilled of	lepth:600	f	<u>t</u>
RECORDED BY A. BANET GEOLOGIST	YES RECORDE	D BY L.SAI	JER	RECORDI	NG SPEED 20	FT.	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 100 DEPTHS	TRIP LOG	DENSITY T.C. 2 RANGE 2K.	RESISTIVITY SENS.SETTING 100 DEPTHS \$88 FT		METERS 7
gravel, tan			# Pa			0-	
siltstone, tan-to dark-gray, concs, and claystone, medium-to greenish-gray, concs						50 -	- 10 - 20
coal, with parting claystone, dark- gray				*		100-	30
		2-9t		halman man		150-	- 40
siltstone, medium-to dark-gray, and claystone greenish-gray						200 -	-60 -70
·						250 - -	- 84
				St. Drown		300	-90
coal, with parting claystone, dark-gray		2.5				350-	- iC
siltstone, medium-to dark-gray, and claystone, green-to dark-gray, cbncs coal						•	†''
siltstone, medium-to dark-gray, and claystone, green-to dark-gray, cbncs			====			400	-12



Hole no: US-78176 Map: Kolberg Ra	Date: 10/17/78	Stat	e: Montana County: Daw	so n	
Elev: 2450 ft Location: T. 18 S., R. Measured: 60 ft FSE, 500 ft FSE, 1 Remarks:	<u>55 & Sec. 22 Tract A</u>	AAB	Drilled depth: 4	00 <u>f</u> □ No	
RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDED BY L. SAU	ER	RECORDING SPEED 20	FT.	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200 SENS.SETTING 100 LOGGED DEPTHS 393 FT. 391 FT.	STRIP LOG	DENSITY T.C. 2 RANGE 2K LOGGED DEPTHS 398 FT. 391 F	FEET =	
sandstone, brown, very fine and fine, fe coal claystone, blue to dark—gray, silty, sandstone, gray to blue-gray, very fine, and siltstone, gray to dark—gray			398 FT. 391 FT	50 - 150 - 250 - 350 -	-10 -20 -30 -40 -50 -60 -70 -80 -90 -100
	239	<u> </u>		400	-120

•

Hole no: <u>US-78177</u> Map: <u>Kolberg R</u>					
Elev: 2405 ft Location: T. 18 %, F	≀. <u>55</u> ж., Sec	12 ,Tract_	CCC	BDrilled depth:	100 ft
Measured: 650 ft FSL, 150 ft FWL, Remarks: SP malfunction.	Hole size:	4 3/4 In., Ai	r L	Water W Cored Yes	□ No ⊠
Remarks. St manufection.					
RECORDED BY A. BANET GEOLOGIST	YES RECORDS	D BY L.SA	UER	RECORDING SPEED	20 FT. MIN.
	GAMMA	S. P.	T	DENSITY RESISTIVIT	Y. DERTH
LITHOLOGY	T.C. 2 RANGE 200	SENS.SETTING		T.C. 2 SENS.SETTI	140
	LOGGED	DEPTHS	STRIP	LOGGED DEPTHS	FEET WETERS
	93 FT.	FT.	S	98 FT. 91	FT. 4 3
siltstone, tan to gray, and claystone,					
medium-to light gray					1 10
coal					50 -
			幸幸		■ 1 4
claystone, light-to medium-gray			薑		1 20
lim estone, light-gray					
					100 - 30
					1 1
					1 40
					150-
					-50
					. 1
]
					200-60
					70
					250-
					1-80
					-90
					300
					-100
					350-
		240			

Hole no: US-78178 Map: Kolberg R	anch D	ate:10/18/78	Stat	e: Montana	County: Daw	so n
Elev: 2506 ft Location: T.18 N., R Measured: 12 ft FSL, 36 ft FWL,	. <u>55 </u>	<u>4 ,</u> Tract <u> </u>	r 🔲	<u>C</u> Drilled (Water ⊠ C	depth: 420 Fored Yes [ft No 🖾
Remarks: Logged open hole.		-				
RECORDED BY K. WILLIAMS GEOLOGIST	XXXXX RECORDE	D BY L. SAU	ΕR	RECORDI	NG SPEED 20	FT. MIN.
	GAMMA T.C2	S. P. SENS.SETTING	G	DENSITY T.C. 2	RESISTIVITY .	DEDTU
LITHOLOGY	RANGE 200 LOGGED	DEPTHS	R P	RANGE 50	D DEPTHS	FEET
	414 FT.	FT.	ST	419 FT	FT.	0-1 E M
sandstone, brown, very fine to fine gravel			ه ه			
				3		
						}10
siltstone, brown	1					50 -
						20
•			0 0			100 - 30
			0	3		
gravel			00			1 40
			0,,4		4	150-
				***************************************		1-50
				4]
						200-60
			E	\$		
				1		70
				\$		250
coal trace at 270 ft				\$		-80
claystone, blue-gray to gray, cbncs, and siltstone, gray						
						300 -90
coal trace at 336 ft						-100
Coar trace at 330 ft						350-
						-110
			===			-120
	A CHARLES TO SECTION	2 6 1	·			د 400

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, blue-gray to gray, cbncs, and siltstone, gray						400-	
						- -	-130
						450- -	140
						-	-150
						500- -	
						-	-160
						550- -	-170
						-	-180
						600-	
						-	-190
						650- -	-200
	,						210
						700 -	
		,				-	-220
						750- -	-230
						-	240
						800-	1
						-	-250
						850- -	- 560
		242				900	270

Hole no: US-78179 Map: Kolberg Ra	Date: 10/18/78	Stat	te: <u>Montana</u> County: <u>Dav</u>	vson
Elev: 2502 ft Location: T. 18 x, R		BCC	C Drilled depth:3	40 ft
Measured: 2500 ft kxx, 30 ft kxx, Remarks:	Hole size: In., Al	r 🛆	water L Cored Yes L	ואסטו ר
rterior no -				
RECORDED BY A. BANET GEOLOGIST	YES RECORDED BY L. SAU	ER	RECORDING SPEED 20	FT. MIN.
	GAMMA S. P.	907	DENSITY RESISTIVITY	
LITHOLOGY	T.C. 2 SENS.SETTING RANGE 200 100		T.C. 2 SENS.SETTING RANGE 2K 100	' L
	LOGGED DEPTHS	STRIP	LOGGED DEPTHS	FEET METERS
	333 FT. 331 FT.	6,	338 FT. 331 F	0-
	544,584,750,750,151,154,154,154,154,154,154,154,154,154	=		
				10
	2.3.			50 -
				20
•		===		100 + 30
				1
				+40
siltstone, medium-to dark-gray,				1 4
and claystone, medium-to dark-gray, cbncs, and limestone, gray				150
				- 50
		==		
				200-60
	\$ \$		3	[200]
				70
		==		250
		==		-80
			5	1 1
coal with parties along the same		==		300-90
coal, with parting, claystone, gray		701		-
siltstone, medium-to dark-gray, and claystone, medium-to dark-gray			* *	-100
,, m verem to burn Bruy		==		
				350-
				1 +110
	·			
		L		120
	243			- 400-

.

Elev: 2233 ft Locotion: T.17 & R. 235 w. Sec. 10. Tract BBBB Drilled depth: 200 ft decoured: 42 ft Rex. 115 ft W. Hole size: 43/4 in. Air Woter Cored Yes No. Recorded by K. WILLIAMS GEOLOGIST NO. RECORDED BY L. SAUER RECORDING SPEED 20 FT. MIN. RECORDED BY K. WILLIAMS GEOLOGIST NO. RECORDED BY L. SAUER RECORDING SPEED 20 FT. MIN. RECORDED BY L. SAUER RECORDING SPEED 20 FT. MIN. RECORDED BY L. SAUER RECORDING SPEED 20 FT. MIN. RECORDED BY L. SAUER RECORDING SPEED 20 FT. MIN. RECORDED BY L. SAUER RECORDING SPEED 20 FT. MIN. RECORDED BY L. SAUER RECORDING SPEED 20 FT. MIN. RECORDING SPE	Hole no: US-78180 Map: Kolberg	Ranch	ate: <u>10/18/78</u> :	Stat	e: Montana County: Daws	o n	
Recorded by K. WILLIAMS. GEOLOGIST NO. RECORDED BY L. SAUER RECORDING SPEED 20 FT. WIN. LITHOLOGY T.C. 2 SENS.SETTING PANCE 200 100 a RANGE 2	Elev: 2253 ft Location: T. 17 x, R	. <u>55</u> ж .,Sec	10_,TractI	BB	B Drilled depth: 20	o ft	_
RECORDED BY K. WILLIAMS. GEOLOGIST NO. RECORDED BY L. SAUER RECORDING SPEED 20 FT. MIN. LITHOLOGY		Hole size:_4_	<u>3/4 in.,</u> Air		Water 🗵 Cored Yes 🗆	No	X.
LITHOLOGY C. 2 SENS.SETTING T. C. 2 S	Remarks: SP malfunction at 50 ft.						
LITHOLOGY C. 2 SENS.SETTING T. C. 2 S	RECORDED BY K. WILLIAMS GEOLOGIST	XXX NO RECORDE	D BY L.SAU	ΕR	RECORDING SPEED 20	FT.	N.
LITHOLOGY RANGE 200 LOGGED DEPTHS 193 FT 188 FT 5 198 FT 191 FT claystone, brown, and sandstone, brown, very fine claystone, gray, cbncs coal claystone, gray, cbncs coal claystone, gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray very fine coal claystone, dark-gray coal claystone, gray, cbncs coal claystone, gray, cbnc		GAMMA		· · · · · ·	1		
siltstone, brown, and sandstone, brown, and sandstone, brown, very fine claystone, gray, cbncs coal claystone, gray, cbncs coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray claystone, dark-gray coal claystone, gray, cbncs coal	LITHOLOGY	T.C. 2	SENS.SETTING		T.C. 2 SENS.SETTING		- 1
siltstone, brown, and sandstone, brown, very fine claystone, gray, cbncs coal claystone, gray, cbncs coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray coal claystone, dark-gray 200 -60 -70 250 -80 300 -90 -100 350 -100	2111102001			RIP	LOGGED DEPTHS	EET	
siltstone, brown, and sandstone, brown, very fine claystone, gray, chocs coal claystone, gray, chocs coal claystone, dark-gray, chocs, and sandstone, gray, very fine coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray		1		LS	198 FT. 191 FT.		Z
brown, very fine claystone, gray, cbncs coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray 200-60 300-90 300-90 300-90	siltstone, brown, and sandstone.			===		01	
claystone, gray, cbncs coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray]	
claystone, gray, cbncs coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray						4.	ıO
coal claystone, gray, cbncs coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray coal claystone, dark-gray 200 -60 70 250 -80	claystone, gray, cbncs						
coal claystone, gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray coal claystone, dark-gray 200-60 70 250-80						50 -	
coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray coal claystone, dark-gray	claystone, gray, cbncs					1 1:	20
claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray 200 - 60 250 - 80 350 - 100 350 - 110	coal]	
claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray 200-60 250-80 300-90	claystone, gray, cbncs			琧			
claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray						100+	30
claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray	coal					1	
coal claystone, dark-gray, cbncs, and sandstone, gray, very fine coal claystone, dark-gray 200 - 60 250 - 90 300 - 90 100 350 - 110						1	
coal clay stone, dark-gray 200 - 60 250 - 80 300 - 90 100 350 - 110	claystone, dark-gray, cbncs, and]	40
clay stone, dark-gray 200 -60 250 -80 3300 -90 -100 3500 -110	sandstone, gray, very fine					150-	
clay stone, dark-gray 200 - 60 - 70 250 - 80 300 - 90 - 100 350 - 110	1			===		l <u>l</u> ,	50
200 - 60 - 70 250 - 80 300 - 90 - 100 350 - 110	coai			==:			00
200 -70 250 -80 300 -90 -100 350 -110	claystone, dark-gray					1 1	
250 - 80 300 - 90 350 - 110				==		200-	60
250 -80 300 -90 350 -110		12.51					
250 -80 300 -90 350 -110							
300 - 90 350 - 110 350 - 120						 	70
300 - 90 350 - 110 350 - 120						1	
300-90							
300 -100 350 -110							80
300 -100 350 -110							
300 -100 350 -110						1	90
350110						300	•
350110							
-110 400					·	1 +	IOC
-110 400							
						1 1	
						1 +	110
					,	1	
							126
		<u> </u>	244			J ₄₀₀ [120

Hole no: US-78181 Map: Kolberg Ra Elev: 2580 ft Location: T.18 S., R. Measured: 1650 ft RSK, 450 ft RSK, 1 Remarks: Hole logged through rods, no	. <u>_55 </u>	8,TractA 5in., Air	DA	CDrilled depth:	₂₂₀ ft □ No 🛭
RECORDED BY A. BANET GEOLOGIST	·	D BY L. SAU	ER	RECORDING SPEED2	
LITHOLOGY	RANGE 100	S. P. SENS.SETTING DEPTHS FT.	STRIP LOG	DENSITY T.C. 2 RANGE 50 LOGGED DEPTHS 215 FT. RESISTIVITY SENS.SETTIN	
gravel and sand claystone, medium—gray to tan coal siltstone, medium—gray coal siltstone, medium—gray to dark— brown, cbncs, and claystone, medium—gray, cbncs coal claystone, gray coal siltstone, medium—gray					50 200 5
					250
					300
				·	350-
		2/5] ₄₀₀ },

Hole no: <u>US-78182</u> Map: <u>Morgan Cre</u> Elev: <u>2510</u> ft Location: T. 18 K, R Measured: <u>25</u> ft FSL, <u>50</u> ft RML, Remarks:	54 k, Sec. 22 Tract DDDD	_Drilled depth:520 ft
RECORDED BYA. BANET GEOLOGIST	YES RECORDED BY L. SAUER	RECORDING SPEEDFT.
LITHOLOGY	GAMMA T.C. 2 SENS.SETTING TRANGE 200 LOGGED DEPTHS 513 FT. 511 FT.	DENSITY RESISTIVITY DEPTH SENS.SETTING 100 LOGGED DEPTHS 518 FT. 511 FT.
siltstone, medium-to dark-gray, cbncs, and claystone, medium-to dark-gray, cbncs		100 - 30 100 - 30 100 - 30 150 - 50 200 - 60 200 - 60 250 - 80
coal		300 90
siltstone, gray, and claystone, light-to dark-gray, and sandstone, gray, very fine to fine		350-
coal siltstone, gray, and claystone, light-to dark-gray		-120

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, medium-gray, claystone, medium-gray, and sandstone, gray, very fine to fine. coal, with parting of claystone, medium-to dark-gray siltstone, medium-gray						450-	-140 -150
	, 		-	¹ Шэн:::К:		- - 550- -	
		**				600-	-180
					,	650-	-190 -200
	,			-		700-	210
·						750-	-220 -230
· -						800-	-240
						850-	-250 -260
		247				900_	-270

Hole no: US-78183 Map: Morgan Cre					
Elev: 2649 ft Location: T. 18 N., R	<u>54</u> ₩, Sec	8,Tract_D	DDG	Drilled depth:	500 ft
Measured: 100 ft FSt, 400 ft FEL,	Hole size:		r. [_]	Water M Cored Yes	L NO M
Remarks: SP log malfunction.					
RECORDED BY L. SAUER GEOLOGIST	NO RECORDE	D BY L.SAU	ER	RECORDING SPEED2	
	GAMMA T.C. 2	S. P. SENS.SETTING	99	DENSITY RESISTIVITY	l ocotul
LITHOLOGY	RANGE 200	SENS.SET TING	RIP L	RANGE 2K 250	- + 8
	LOGGED 493 FT.	DEPTHS FT.	! ⊢	LOGGED DEPTHS	FEET METERS
siltstone, tan to light-gray			====		0
coal		•	====		
					10
siltstone, light-gray, cbncs, claystone, light-to dark-gray, cbncs, and sandstone,					50
gray, very fine					4 4
coal	4				20
					
		:~· -		\$ \$	100 - 30
			===		100 30
•				1 2 1 5	
					+40
					150-
siltstone, light_gray, cbncs, claystone, light-to dark-gray, cbncs,				\$	
and sandstone, gray, very fine	3				-50
			03.60		
					200 -60
				\$	2001
	الحقو الم	·			
					70
	3				
			==	2	250
coal			===	2	1-80
				3	
					-90
					300
siltstone, gray, cbncs, and sandstone, gray, very fine					
sandstone, gray, very line					-100
				3 4	
	1 5		-		350-
					1 110
coal siltstone, gray, cbncs, and sandstone,					
gray, very fine coal					-120
	**************************************	248			400

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray, cbncs, and claystone, gray	3					-400- - - -	-130
siltstone, gray, chncs, and claystone,			A			- 450- - -	140
gray						500-	-150
					·	550-	-160
						-	-170
						600- -	-180 -190
						650 -	-2 0 0
						700-	210
						-	-220
						750- -	-230
		·				800-	240
						- - 850-	250
		249				-	-260 -270
·		A71				900.	7

RECORDED BY L. SAUER GEOLOG		D BY L.SA	UER		NG SPEED 20	FT. W	AIN
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTIN	1 -	T.C. 200 RANGE 2K	RESISTIVITY SENS.SETTING	DEF	-
	LOGGED 595 FT.	DEPTHS 593 F	STRIP	LOGGEI 600 FT.	D DEPTHS 593 FT	FEET	METER
sandstone, gray, fine to medium						. 0-	
and the state of t							
							۱۱
siltstone, gray, cbncs						50 -	
coal							- 2
siltstone, gray, cbncs				1		-	
coal						100-	3
						100	`
						-	
				\			ŀ
						150-	
				1	3	-	ļ.
siltstone, gray, claystone, dark-							-6
gray, and sandstone, gray-green, fine			2003			200-	[
			===	\$			
				1378		-	} ;
						250 -	
						-30	١.
							 `
coal siltstone, gray						-	
coal				*		300-	۶
						-	
siltstone, dark-gray, and claystone, medium-to dark-gray							H
oray orange and the dark gray				F		-	
				1		350-	
coal							ľ
siltstone, brown-to dark-gray,				4			
cbncs						400	Ļ

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, gray to dark-brown cbncs				M		- 400- - -	-130
sandstone, gray, very fine to fine						450- -	140
siltswone, light to greenish gráy; conce.						500-	-150
coal, with parting of claystone, gray siltstone, light to greenish-gray,	3			\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \		- - 550-	-160 -170
cbncs, and sandstone, light-gray, very fine					\$ V *	600-	-180
						-	-190
	,					650 - - -	 -200
<u>.</u>						700 - -	210
						- 750-	1
,						800-	-240
						- -	250
	e.	9 ~ 1				850- - -	-260
		251				900.	270

Hole no: <u>US-78185</u> Map: <u>Stinking Co</u>	ulee D	ate : <u>10/25/78</u> .	Stat	e: Montana	County	: Dawso	n	
Elev: 2663 ft Location: T. 18 s., R Measured: 100 ft FSL, 130 ft FWL,	. <u>53</u> xv., Sec. 2	,TractC	ccc . \Box	Drilled	depth:	600 Yee □	No.	<u>†</u>
Medsured: <u>100 Hrst, 130 Hrwt,</u> Remarks: <u>SP log malfunction at 46 ft</u>		<u> п.,</u> Ап		water & C	oreu			ت —
RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDE	D BY L.SA	UER	RECORDI	NG SPE	ED 20	FT. _ M	IIN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 100		DENSITY T.C. 2 RANGE 2K	2	SETTING	OEF	РΤН
		DEPTHS 591 FT.	STRIP	LOGGE 598 FT	DEPT	HS 591 FT.	FEET	METERS
							0-	
siltstone, tan to dark-yellow				3			1	- 10
Sittstone, tan to data-your							50 -	- 20
				3			1	
				4			100-	- 31
claystone, medium-to dark- gray, and siltstone, medium-				*			-	4
gray							150-	- 50
co al							- - 200	-6
		1		7			-	7
siltstone, medium-to dark-gray, and claystone, medium-to dark- gray, cbncs							250 - -	-8
					1			
					Š		300 <i>-</i>	-9
					.		· .	 - - -
coal claystone, medium-to dark-	# 5				Ę		350-	 - -!!
gray, cbncs							· ·	-12
			[<u>لـ #اللللخج</u>	400-	1

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, light-gray, concs	A Annual			My Jan Joseph My Jan		450-	-130 -140
coal, with parting of claystone, light-gray			The second secon			500-	-150
claystone, green-gray to gray, cbncs, and siltstone, gray-green coal claystone, green-gray to gray, cbncs,						550- - -	-160 -170
and siltstone, gray-green	.			\$		600- -	-180
,						650 - -	
				·		700 -	210
		·				750-	-230
				·		800-	-240 -250
						850-	-260
		253				900.	-270

Hole no: US-78186 Map: BLM-NE-3	<u>1</u> D	ate: 10/26/78	Stat	e: Montana	County: Daw	son	
Elev: <u>2546</u> ft Location: T. 18 x, R. Measured: 960 ft FSL, 600 ft FWL, H Remarks:	_53 k, Sec	20 ,Tract_ 5 in., Ai	CCB r 🗆	D_Drilled Water∑C	depth: 320 Cored Yes	No No	<u>†</u>
RECORDED BY K. WILLIAMS GEOLOGIST	XXXX RECORDE	D BY L.SAU	JER	RECORDI	NG SPEED 20	_ FT	HN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING DEPTHS FT.	TRIP	DENSITY T.C. 2 RANGE 5K LOGGER 318 FT	RESISTIVITY SENS.SETTING 250 D DEPTHS 312 FT		METERS T
claystone, gray to brown, cbncs, sandstone, brown, very fine, and siltstone, gray coal claystone, gray-to blue-gray, cbncs, and sandstone, light-gray, very fine to fine siltstone, light-to blue-gray, claystone, light-to blue-gray, cbncs, and limestone, gray coal claystone, gray-to blue-gray, cbncs						50 - 50 - 50 - 50 - 50 - 50 - 50 - 50 -	- 20 - 30 - 40 - 50 - 60 - 70 - 80 - 90 - 100
		254				400	-120

Hole no: <u>US-78187</u> Map: <u>BLM-NE-3</u>	<u> </u>	ate: 10/26/78	Stat	te: <u>Montana</u> County: <u>Day</u>	vson	
Elev: 2750* ft Location: T. 17 %. R	52 E. Sec.	14 ,Tract_C	DD	D_ Drilled depth:1	40	ft_
Measured: 8 II FSL, 2600 II FWL,	Hole size:	<u> 5 </u>	rШ	Water △ Cored Yes		
Remarks: Elevation estimated from G1 SP malfunction at 56 ft.	endive AMS; 1	:250.000 scale	.10	Oft contour interval,		
RECORDED BY A. BANET_ GEOLOGIST	YES XXX RECORDE	D BY L.SA	UEI	R RECORDING SPEED 2	0FT.	MIN.
	GAMMA	S. P.	99	DENSITY RESISTIVITY		PTH
LITHOLOGY	T.C. 2 RANGE 200	SENS.SETTING		T.C. 2 SENS.SETTIN	<u> </u>	
	LOGGED	DEPTHS	STRIP	LOGGED DEPTHS	FEET	METERS
	133 FT.	131 FT.	S	138 FT, 131 F	T G	
claystone, light-gray to tan, and siltstone, dark-yellow and light-						1
gray			==		1 .	-
coal						10
					50]
siltstone, light-gray to medium-gray						4
coal						1 20
		Re Sea				1
siltstone, light-gray, and		3	53		100	† + 30
claystone, light-gray, cbncs			===		100] "
		3				-
				}		+40
					.50	1
					150	1
] 50
						┨
					200	-60
					200]
]
						70
						1
					250]
] 80
					Ì	-
				•		-90
					300	1
						1
÷						+100
						1
					350-	1
						+110
						-
						-120
				<u> </u>	1400∙	4

Hole no: US-78188 Map: BLM-NE-39	D	ate: <u>10/27/78</u>	Stat	e: Montana	County: Daw:	son	
Elev: 2780* ft Location: T. 15 N., R.	_52 \ ,Sec	18 ,Tract	AAA	Drilled	depth:50	0 1	<u>t</u>
Measured: 19 ft RXX, 46 ft RXX, 1	Hole size:	<u> 5 in.,</u> Ai	r 🔲	Water 🗵 (Cored Yes 🗆	No	X
Remarks: Elevation estimated from Gl SP log malfunction at 102 f	endive AiviS; i	alيى <u>250,000 25:</u>	e.10	0 ft conyour	interval,		
			II E D		2.0	FT.	
RECORDED BY A. BANET GEOLOGIST	MX RECORDE	D BY L.SA	UER		ING SPEED	^	MIN.
	GAMMA T. C2	S. P. SENS.SETTING	907	DENSITY	RESISTIVITY -	DE	РТН
LITHOLOGY	RANGE	100		RANGE 2K	100	 -	2
	1	DEPTHS	STRIP		D DEPTHS	FEET	METERS
	490 FT.	488.F.T.	S	495 F	T. 488 FT.	0.	
						Ĭ .	
			===				
			===				-10
			===				1
						50 -	1
]- 20
			E				
siltstone, tan to medium-gray, and			===		4		4
claystone, tan to medium-gray,						100	30
cbncs					43		1
							1
		Re Se		\$	13		 40
						150	İ
							-50
				\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			{ ~
			77.	1 1 1	171		1
	3			3	1-2	200	-60
					1 2	200]
sandstone, medium-gray, very fine							
							70
coal							1
001		Ra-Sert -		الوا ا		250	1
siltstone, medium-gray, and claystone,		3		\$	3] -80
medium-gray, cbncs			===	\$			
coal							100
		4				300	-90
							-
				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			 100
siltstone, medium-gray, and							1
claystone, medium-gray, cbncs, and limestone, gray					4	350	-
, 0-4/			藍		15		+110
				3	\$		1
coal							1
siltstone, medium-gray, and claystone, medium-gray, cbncs						400	120
		2.56					

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, medium-to greenish-gray, cbncs, and siltstone, gray to gray-green coal				<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>		400-	
claystone, medium-to greenish-gray, cbncs, and siltstone, gray to gray- green						450- -	-140
				\$		500-	-150
					•	-	-160
•						550- - -	-170
·						600- -	-180
					,	650-	
						-	-200 -210
						700 - -	-220
						750-	-230
							-240
						800- - - -	-250
						850 <i>-</i>	-260
		257				900_	-270

Hole no: US-78189 Map: BLM-NE-							
Elev: 2710* ft Location: T.15 N., R. Measured: 336 ft RX., 132 ft RX.	<u>. 52</u> ₩,Sec Hole size:	<u>32 ,</u> Tract 5 in_Δi	AAA r. \square	D_Drilled (Water 🖾 C	depth:5	No No	X
Remarks: Elevation estimated from Glo							_
SP'log malfunction at 78 ft.	XXX	T CAT	TED		20	FT	
RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDE	S.P.		RECORDI	NG SPEED		AIN.
	T.C. 2	SENS.SETTING	907	T.C. 2	SENS. SETTING	DE	PTH
LITHOLOGY	RANGE 200	DEPTHS	STRIP	RANGE 2K	D DEPTHS	FEET	METERS
	493 FT.		ST	498 FT		FE	W
	100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0					0-	
						-	
						-	- 10
siltstone, tan to gray, concs,			===			50 -	
sandstone, brown to gray, very fine to the fine, and claystone, gray			200			-	١
						-	- 20
	2.8						1
coal siltstone, light-to greenish-gray, and						100-	30
claystone, light-to greenish-gray, cbncs		Auser 3		3			1
coal							40
		Re-Sca 2				•	┨ ¨
		N N	E	3	1	150-	1
		₹ .			3		50
		\$		1 1	3		1
siltstone, light-to greenish-gray, and claystone, light-to greenish-		E-300E			3	200	-60
gray, cbncs		\$		\$		200	
	 	May 1	F		3		1
	3	2					70
coal siltstone, light-gray to greenish-gray				~ ~		250	┨
coal		\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		\			- 80
siltstone, light-gray to greenish-gray, and claystone, light-gray coal		ž,		Į. į.	3		1
				₹	13		1
		\$	===	W-M	1	300	 90
		\$			13		1
		1					10
siltstone, light-to greenish-gray, and claystone, light-to greenish-		3				35 O-]
gray, cbncs		3	F		₹	330],,,
			E				1
			E				1
			E	1 3	ES .	400	-12
		258					

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
claystone, green-gray, siltstone, green-gray and gray, sandstone, gray, yery fine to fine, and limestone, gray.						450-	-130 -140
						500-	-150
		;			-	550-	-160
						7 1	-170
						600-	-180
				·	·	650-	-200
						700-	-210
						1 4 1 1	-220
·						750-	-230
						800-	-240
						850-	-250
		د سر ۹				-	-260 -270
		259				ooe	_, 0

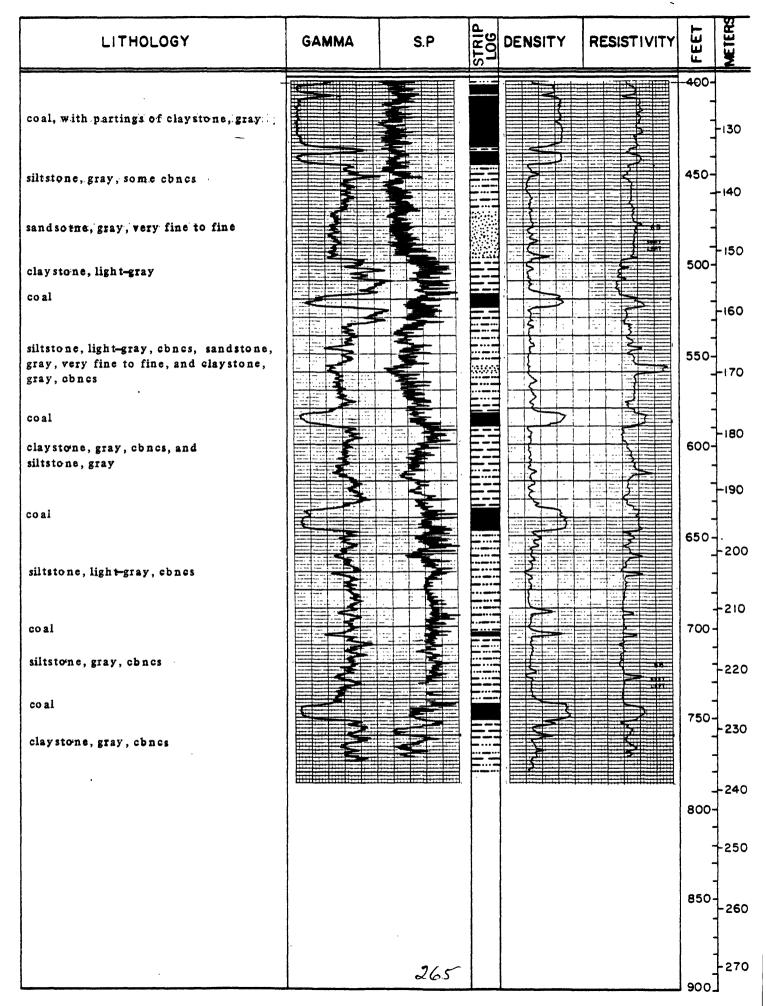
Hole no: <u>US-78190</u> Map: <u>Cook Creek</u>	Butte	ate: 10/28/78	Stat	e: Montana C	County: Rose	bud	
Elev: <u>4104 ft Location: T. 5</u> s., R. Measured: <u>940 ft FSE, 70 ft FWE,</u> H	_ <u>41</u> 页,Sec.2 lole size:	0 ,Tract <u>co</u> 5 <u>in.,</u> Ai	r \square	Drilled d Water⊠ Co	epth: 520 pred Yes 🗵	No l	
Remarks: <u>Cored interval 204.5 ft</u> 2	14:5 ft.						_
RECORDED BY L. SAUER GEOLOGIST	NO RECORDE	D BY L. SA	UER	RECORDIN	G SPEED 20	FT.	IN.
LITHOLOGY	GAMMA T.C. 2 RANGE 200	S. P. SENS.SETTING 100		DENSITY T.C. 2 RANGE 2K	RESISTIVITY SENS.SETTING 100	DEP	ТН
		DEPTHS 511 FT.	STRIP		DEPTHS 511 FT	FEET	METERS
claystone, brown to gray, and sandstone, light_gray, very fine						0-1	
coal			===			}	- 10
siltstone, light-gray, and sandstone, light-gray, very fine				\$		50 -	- 20
co al						1	
siltstone, light-gray,						100	-30
coal						4	- 40
siltstone, dark-gray, claystone, dark- gray, cbncs, and sandstone, gray,				J. W. W.		150-	- 50
very fine to fine						200	-60
						250-	- 70
siltstone, lightgray, claystone, light to dark-gray, cbncs, and sandstone, gray, very fine to fine				\ \{\bar{\chi} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\	3	- 1	- 80
co21	1 5				3	300	-90
						1	ŀιο
siltstone, light-gray, cbncs, sandstone, light-gray, very fine, and claystone, light-gray						350-	-110
		260				400	-12

LITHOLOGY	GAMMA	S.P	STRIP	DENSITY	RESISTIVITY	FEET	METERS
siltstone, light-gray, cbncs, sandstone, light-gray, very fine, and claystone, light-gray						-	-130
coal, with partings of claystone, light gray						450- - -	140
siltstone, light-gray, obnes, and claystone, light-gray						500-	
						550-	-160 -170
						- 600-	-180
. ·						- - 650 -	-190 -
						- - 700 -	-210
•						-	-220
·					-	750- - -	- 2 3 0.
				·		800- -	-240 -250
						850-	-260
	<u>-</u>	261		·		900_	-270

Hole no: US-78191 Map: Cook Creek	Butte D	ate: <u>10/29/78</u>	Stat	e: Montana	County: Rosel	oud	
Elev: 4042 ft Location: T. 5 S., R. Measured: 68 ft M., 1420 ft FWL, I Remarks:	_41 ∰,Sec Hole size:	20 ,Tract 5	r 🗆	B Drilled (Water ∑ C	depth: 560 fored Yes	No No	<u>†</u>
RECORDED BY L. SAUER GEOLOGIST	NO RECORDE	D BY L. SAU	ER	RECORDI	NG SPEED 20	_ FT. M	IIN.
LITHOLOGY		S. P. SENS.SETTING 250 DEPTHS	FRIP	RANGE 2K LOGGE	RESISTIVITY - SENS.SETTING 250 DEPTHS	FEET	- 1
	553 FT.	547 FT.	S	558 FT.	551 FT.	0-	Ī
sandstone, brown, very fine to medium						-	- 10
·						50 -	- 20
siltstone, gray, cbncs, and claystone, light to dark-gray, cbncs					\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	100	- 30
						150-	- 40 - 50
siltstone, dark-gray, cbncs, and sandstone, gray, very fine	W.					200	-60
						250 -	- 70
coal	WAS DE				3	1	- 80 - 90
				77		300	-100
siltstone, light-gray, cbncs						350- -	-110
		262				400	-120

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, light-gray, cbncs		M. M. M.		77.		400-	-130
coal claystone, gray	5	3				450-	-140
coal, with parting of claystone, gray		Thursday.				-	-150
claystone, gray, cbncs						500-	-160
coal claystone, gray						550-	-170
•						1	
						600-	-180 -190
						650-	
				-		-	-210
		•				700-	-220
						750-	-230
•					•	-	-240
						800-	-250
						850-	
	-	9/2					-270
		263				000	

Hole no: US-78192 Map: Birney S Elev: 4014 ft Location: T. 5 S., R	41 E Soo	ate: 10/30/78	Stat	e: Montana County: Ros	ebud	 F †
Measured: 2060 ft FSL, 810 ft FEL, Remarks:	Hole size:		r 🔲	Water 🗵 Cored Yes [X
RECORDED BY K. WILLIAMS GEOLOGIST	NO RECORDE	D BY L.SAU	ER	RECORDING SPEED _20	FT	MIN,
LITHOLOGY	RANGE 200	S. P. SENS.SETTING 250 DEPTHS 772 FT.	TRIP	DENSITY T.C. 2 RANGE 5 K LOGGED DEPTHS 779 FT. 772 F	FEET	METERS T
sandstone, brown, fine to medium					50 -	-10
claystone, light-to medium-gray, cbncs, and siltstone, light-gray, cbncs					- -	20
coal siltstone, light-gray	*				100	30
sandstone, gray, very fine to fine					150-	1
siltstone, light-gray, cbncs, and claystone, medium-gray to dark-gray, cbncs					200	-60
coal					250	- 70 - 80
siltstone, gray, cbncs, and sandstone, very fine to fine, light-gray					300	-90
					s t?	-100
					350	-110
	13	264			400	-120



Hole no: US-78193 Map: Birney S.W	D	ate: 10/31/78	Stat	e: Montana	County: Rose	bud	
Elev: <u>4101</u> ft Location: T. 5 S., R Measured: <u>1900</u> ft FSC, <u>200</u> ft FWC, Remarks:	41_ vv.,Sec2 Hole size:	27 ,Tract <u>(</u> 5 <u>in.,</u> Ai	r	BDrilled Water ∑ (depth: 680 Cored Yes	No	<u>T</u>
RECORDED BY K. WILLIAMS GEOLOGIST	XX RECORDE	D BY L.SAU	ER	RECORD	ING SPEED 20	_ FT. N	AIN.
LITHOLOGY	RANGE _200_	S. P. SENS.SETTING 250	:	DENSITY T.C. 2 RANGE 5K	RESISTIVITY SENS.SETTING 250	DEI	РТН
	LOGGED 673 FT.	DEPTHS 671 FT	STRIP	678 F	D DEPTHS T. 671 FT.	FEET	METERS
sandstone, brown, very fine to fine				***		0-	- 10
				M. W.		50 -	- 20
siltstone, light-gray to brown, cbncs '		2				100-	- 30
coal claystone, gray, cbncs coal		See Sea				150-	- 40 - 50
claystone, gray, cbncs, siltstone, gray, cbncs, and sandstone, light—						200	-60
gray, very fine coal, with parting of claystone, gray		ANN ANN ANN ANN ANN ANN ANN ANN ANN ANN				250 -	- 7C
siltstone, dark-gray, cbncs, and claystone, dark-gray, cbncs				X		300-	-90
coal						350-	-110
siltstone, light-gray, and claystone, gray, chncs						400	-120

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, light -g ray		A A A A A A A A A A A A A A A A A A A				400-	-130
siltstone, light-gray, and claystone, gray, chack and claystone.						450- - -	-140
coal siltstone, ligh t-g ray, cbncs					\$	500-	-150
coal claystone, light-gray coal		The state of the s	===			- - 550-	-160 -170
claystone, light—gray, and siltstone, light—gray)	600-	-180
coal claystone, gray, and siltstone, light-gray						-	-190
sandstone, light-gray, very fine		J.W.				650 -	-200
-				, =		700-	210
- :						750-	-220 -230
						800-	-240
						-	-250
						850	7260
·		267				900.	-270

Hole no: US-78194 Map: Birney S.V	<u>v .</u> D	ate: 11/2/78	Stat	e: Montana	County: Roseb	ud	_
Elev: 4083 ft Location: T. 5 S., R Measured: 1990 ft RSK, 900 ft FWL, I Remarks:	. <u>41</u> ₩.,Sec. <u>3</u>	34_,Tract	BCD	B_Drilled	depth: 560	ft	_
RECORDED BY L. SAUER GEOLOGIST	XXXX NO , RECORDE	D BY L.SA	UER	RECORDI	NG SPEED	FT. MIN	
LITHOLOGY	GAMMA	S. P. SENS.SETTING 250	700	DENCITY	RESISTIVITY SENS.SETTING 250	DEPTI	_
	LOGGED 554 FT.	DEPTHS 552 FT.	STRIP	LOGGET 559 FT.	D DEPTHS	FE	Mr. H
siltstone, light-gray to brown, cbncs, and claystone, brown, cbncs						01	
coal						50	0
siltstone, light gray to brown, cbncs, and claystone, brown, cbncs						} 2	20
coal claystone, gray						100 - 3	30
siltstone, light-to dark-gray, and claystone, light-to dark-gray, cbncs		R. See				150-	4C 5O
coal, with parting of claystone, gray		A CONTRACTOR OF THE CONTRACTOR				200-6	3O
gray		\$				- 7 2 5 0 -	70
claystone, gray to dark-gray, siltstone, light-gray, and sandstone, gray, very fine to fine							3 0
				1		300-9	Ю
coal siltstone, light-gray, cbncs, and	3					+10	00
claystone, light gray, cbncs	3				\frac{1}{2}	350-	ıc
						400	20

LITHOLOGY	GAMMA	S.P	STRIP LOG	DENSITY	RESISTIVITY	FEET	METERS
siltstone, light-gray, cbncs, and claystone, light-gray to dark-gray, cbncs				Menn		- 400- - - - - 450-	-130
coal, with partings of clay stone, light-gray						500-	-150
claystone, gray, cbncs, and siltstone, gray, cbncs				V		550-	-160
						600-	-180
	·					-	-190
ı						650-	-200
						700	210
							-220
·						750-	-230
						800-	240
		•				-	250
						850	260
·		269				900.	-270

Hole no: US-78195 Map: Birney S.W. Date: 11/8/78 State: Montana County: Rosebud Elev: 4138 ft Location: T. 5 S., R. 41 5. Sec. 35 Tract BBAB Drilled depth: 320 ft Measured: 310 ft FNL, 800 ft FWL, Hole size: 5 in. Air Water X Cored Yes No X Remarks: Lost circulation at 100 ft through 120 ft, then again at 200 ft. FT. NO RECORDED BY L. SAUER RECORDED BY K. WILLIAMS GEOLOGIST _RECORDING SPEED _20 S. P. DENSITY RESISTIVITY GAMMA DEPTH T.C. ____2 SENS. SETTING T. C. ... SENS.SETTING RANGE 200 RANGE _5 K LITHOLOGY LOGGED DEPTHS LOGGED DEPTHS ST siltstone, light-brown, and claystone, light-gray, cbncs 50 20 coal 100 + 30 siltstone, light-gray, cbncs, and sandstone, gray to brown, very fine to fine coal, with parting of claystone, gray 150-50 200 +60 siltstone, light-gray, cbncs, and sandstone, gray to brown, very fine to fine 250 80 coal claystone, dark-gray, cbncs, and siltstone, gray, cbncs coal 300claystone, gray, cbncs -100 350--110

Hole no: US-78196 Map: Birney S.W. Date: 12/1/78 State: Montana County: Rosebud Elev: 3453 ft Location: T. 6 S., R. 41 W., Sec. 11 , Tract ABAC Drilled depth: 240 ft Measured: 450 ft FNL, 1740 ft FEL, Hole size: 5 in., Air Water X Cored Yes No X Remarks: Logged through rods, no source on density section. FT. MIN. NO RECORDED BY L. SAUER RECORDED BY K. WILLIAMS GEOLOGIST GAMMA DENSITY RESISTIVITY . S. P. DEPTH T.C. 2 SENS.SETTING T.C.. SENS.SETTING RANGE 100 RANGE 50 LITHOLOGY LOGGED DEPTHS LOGGED DEPTHS ST FT. FT. 234 Alluvium clinker siltstone, gray 10 50 claystone, gray, cbncs, and siltstone, - 20 light-gray co al 100+30 siltstone, light-gray, claystone, gray, and dark-gray, and sandstone, gray, very fine cbncs. coal 150--50 siltstone, light-gray, cbncs, and claystone, gray, cbncs 200 -60 coal claystone, gray, cbncs, and siltstone, light-gray 250 -- 80 300 -100 350 -110