UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

GEOPHYSICAL AND LITHOLOGIC LOGS OF HOLES DRILLED IN THE WASATCH PLATEAU AND EMERY COAL FIELDS, JOHNS PEAK AND OLD WOMAN PLATEAU QUADRANGLES, SEVIER COUNTY, UTAH

By

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INTRODUCTION

Fifteen holes, totaling 10,744 feet (figs. 1-5), were rotary drilled in the Wasatch Plateau coal field and two holes, totaling 2,451 feet (fig. 6), were drilled in the Emery coal field for the U.S. Geological Survey in June, July, October, and November 1977. This drilling was done to obtain information on the thickness, quality, and extent of coal and on the lithology of the enclosing rocks in the Blackhawk Formation and the Ferron Sandstone Member of the Mancos Shale, which are Upper Cretaceous units. The overall goal of the project is the evaluation and classification of federally owned mineral lands in the public domain.

Drilling was in the Johns Peak and Old Woman Plateau quadrangles, Sevier County, Utah, using truck-mounted rotary drilling rigs. Drilling mediums were air, air with foam, and mud; air with foam was used most frequently.

Ages, generalized lithologies, and thicknesses of the sedimentary units encountered are shown in figure 7. A summary of information for the 17 drill holes is given in table 1.

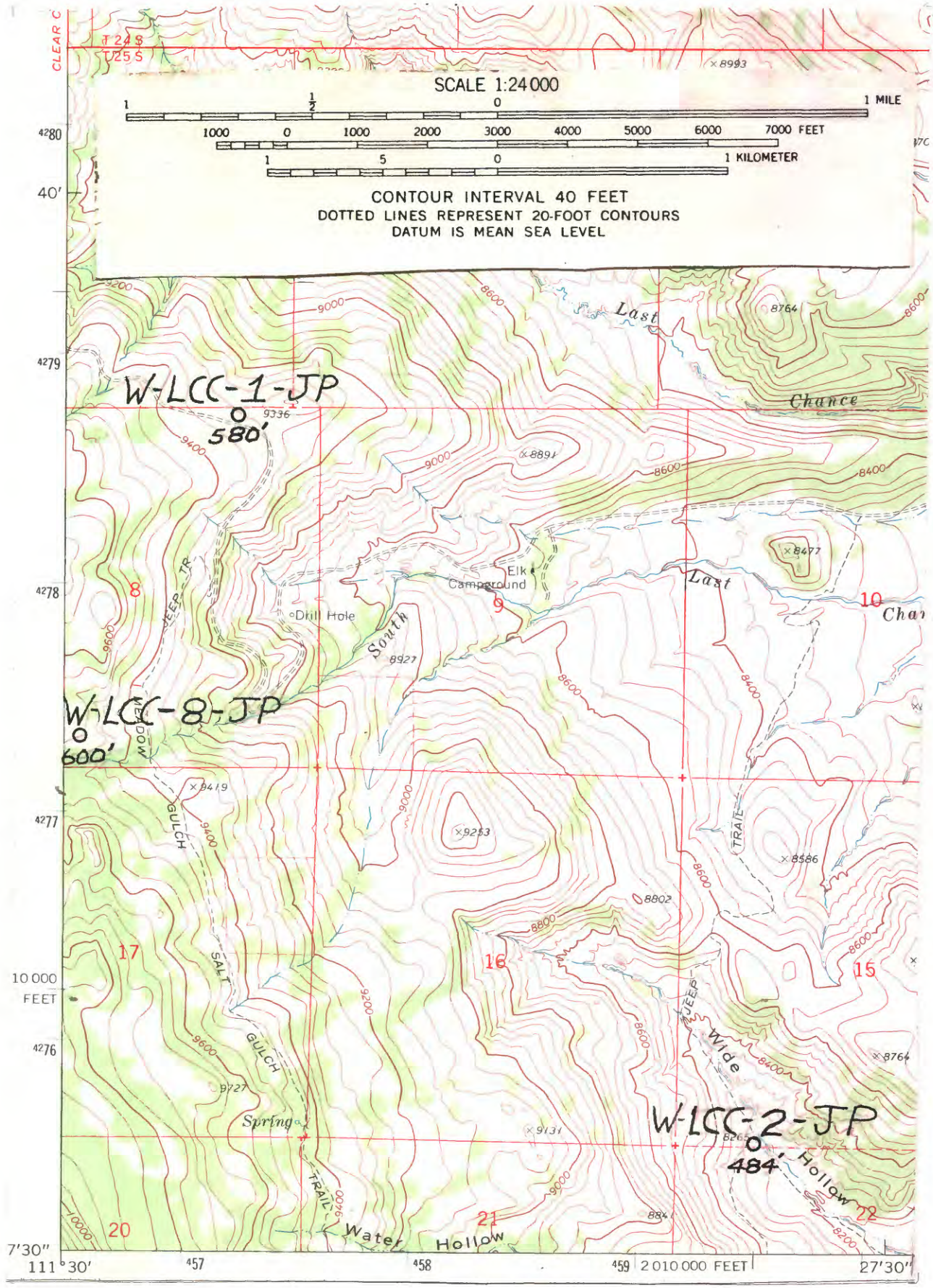
All drill holes were logged by geophysical methods. The suite of logs includes resistivity (RES), natural gamma (G), density (DEN), and caliper (CAL). All except one of the logs were originally run at a scale of 1 inch to 10 feet; the exception was the log for drill-hole W-LCC-10-JP, which was run at 1 inch to 20 feet. For convenience of reproducing this report, the logs were reduced to 1 inch to 50 feet and 1 inch to 100 feet, respectively. All measurements are in feet; to convert to meters, multiply by 0.3048.

Stevens and Harris Drilling Co., Maxfield and Harris Drill Co., and Toler and Harris Drilling Co. drilled holes W-LCC-1-JP through W-LCC-14-OWP under Contract No. 14-08-0001-15778, awarded by the U.S. Geological Survey to McCabe Bros. Drilling, Inc. Uranium Exploration, Inc., under Contract No. 14-08-0001-17140, drilled holes W-LCC-23-OWP through W-LCC-27-OWP. Geophysical logging was done by LEERCO Electric Logging Service, Century Geophysical Corp., and Mineral Services Co. Permission to drill was granted by officials of the Fishlake National Forest, Utah.

REFERENCE

Spieker, E. M., 1931, The Wasatch Plateau coal field, Utah: U.S. Geol. Survey Bull. 819, 210 p.

R. 4 E.



T. 25 S.

Figure 1.--Drill-hole locations in the Wasatch Plateau coal field, southwestern part of the Johns Peak quadrangle, Sevier County, Utah.

R. 4 E.

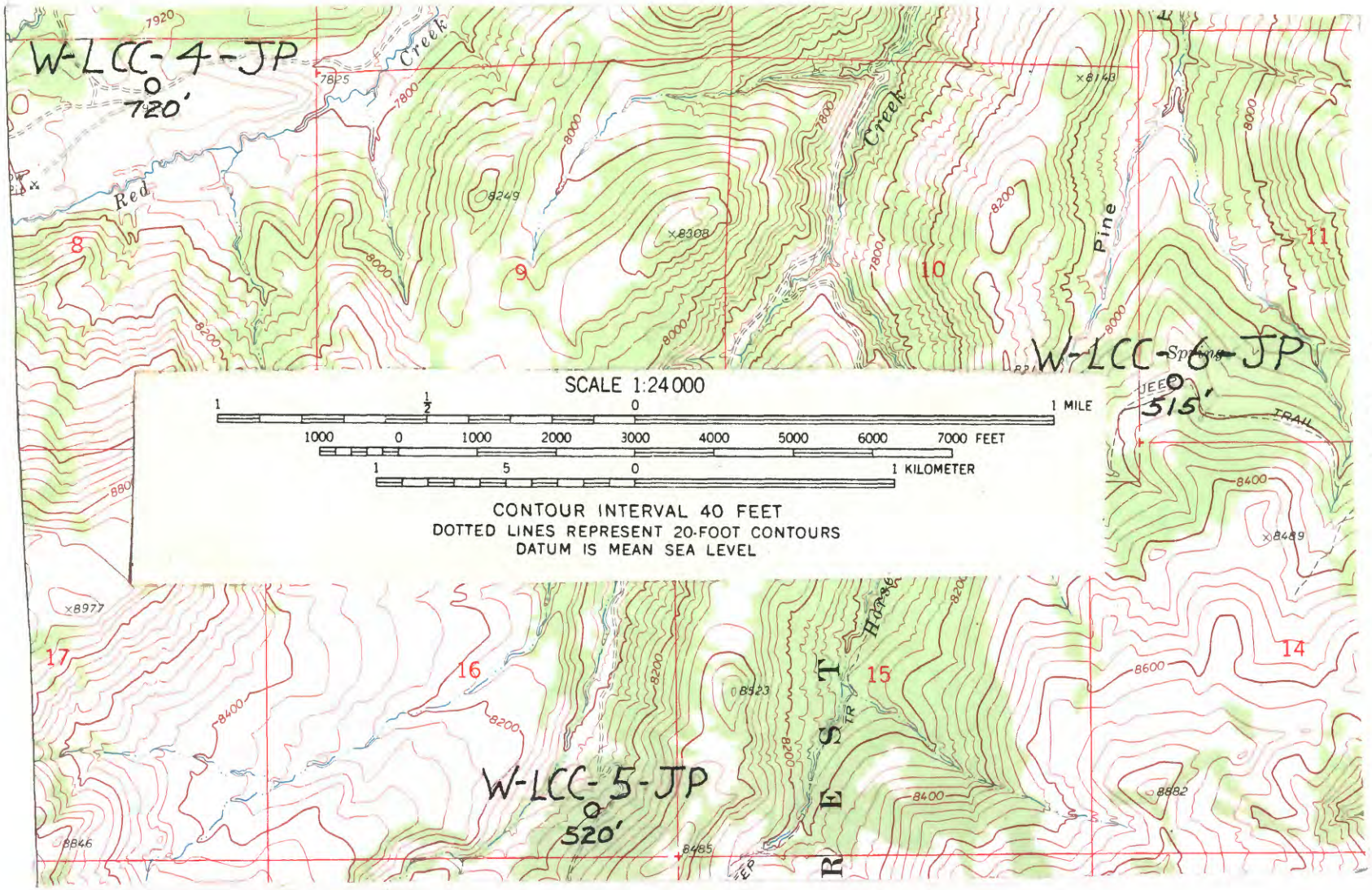
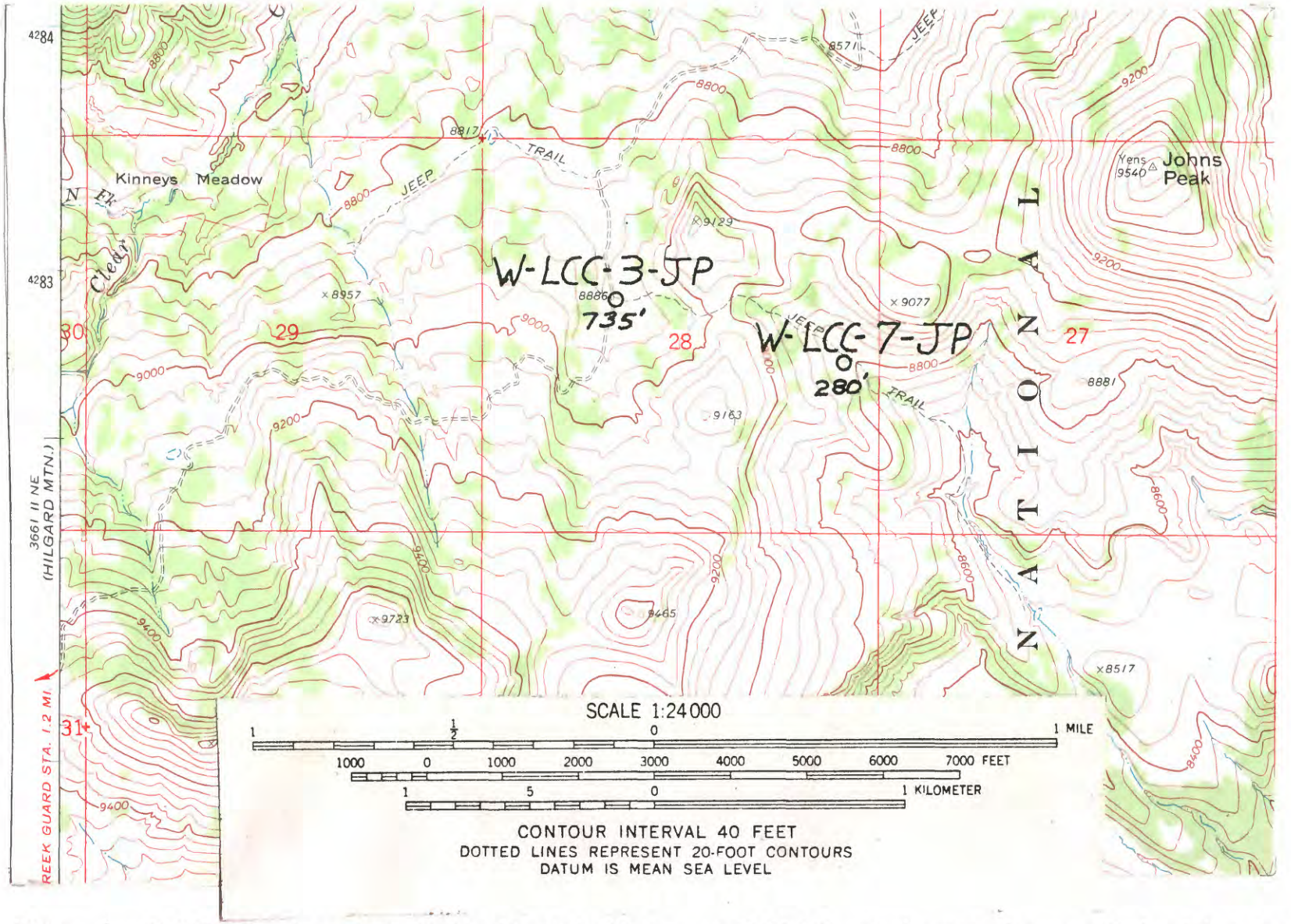


Figure 2.--Drill-hole locations in the Wasatch Plateau coal field, northwestern part of the Johns Peak quadrangle, Sevier County, Utah.

R. 4 E.



T. 24 S.

Figure 3.--Drill-hole locations in the Wasatch Plateau coal field, north-central part of the Johns Peak quadrangle, Sevier County, Utah.

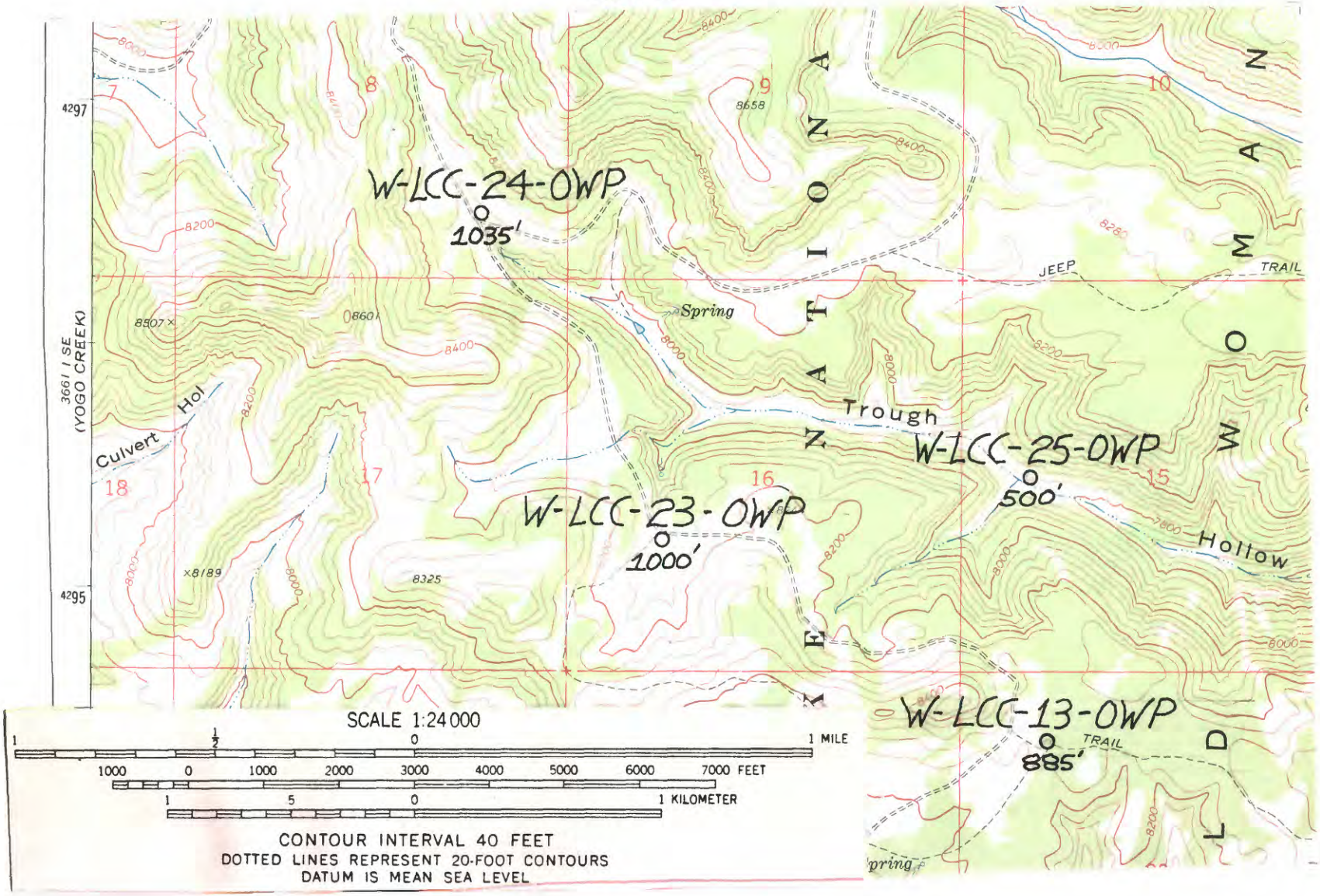


Figure 4.--Drill-hole locations in the Wasatch Plateau coal field, southern part of the Old Woman Plateau quadrangle, Sevier County, Utah.

R. 4 E.

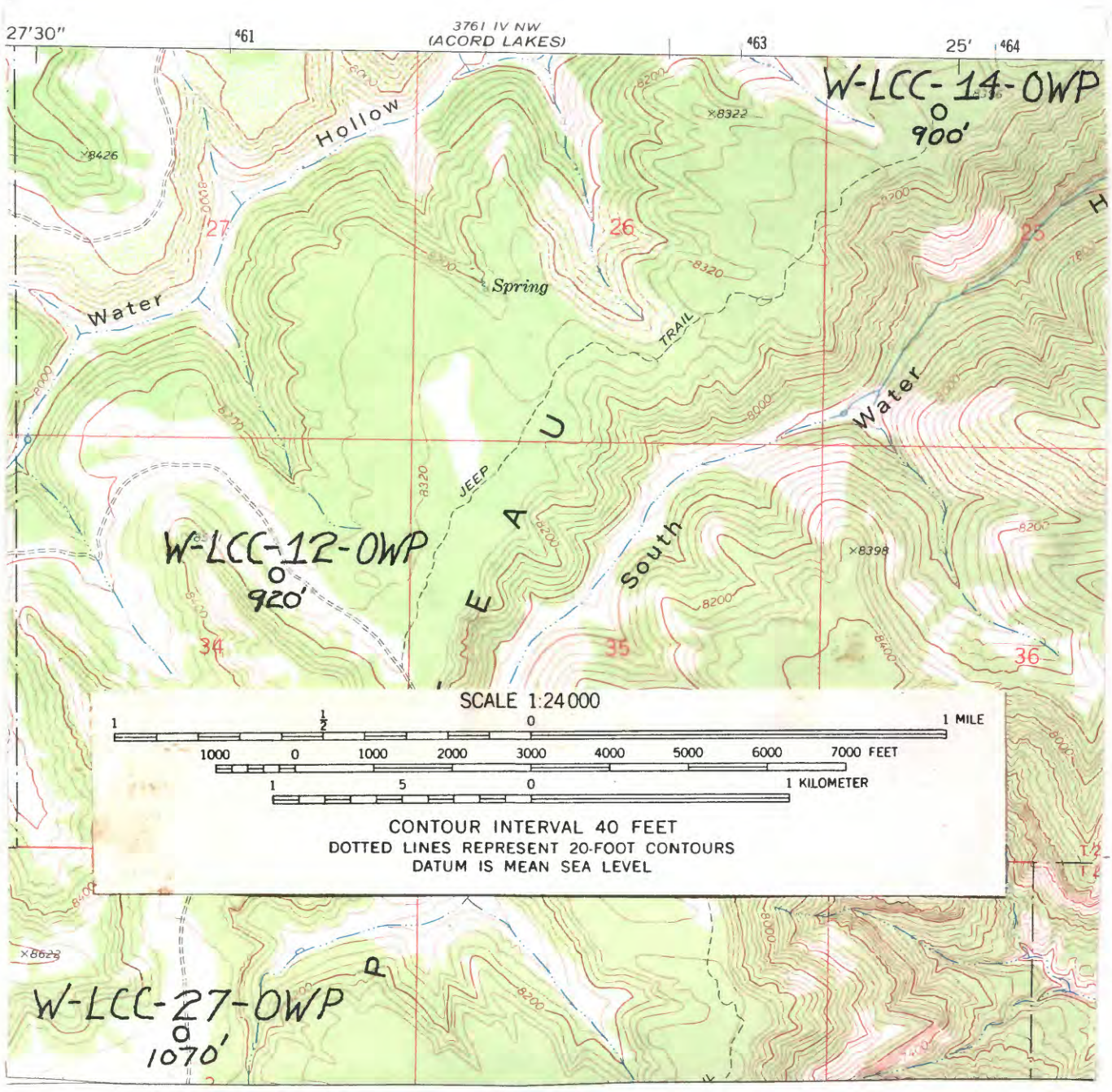


Figure 5.--Drill-hole locations in the Wasatch Plateau coal field, northern part of the Old Woman Plateau quadrangle, Sevier County, Utah.

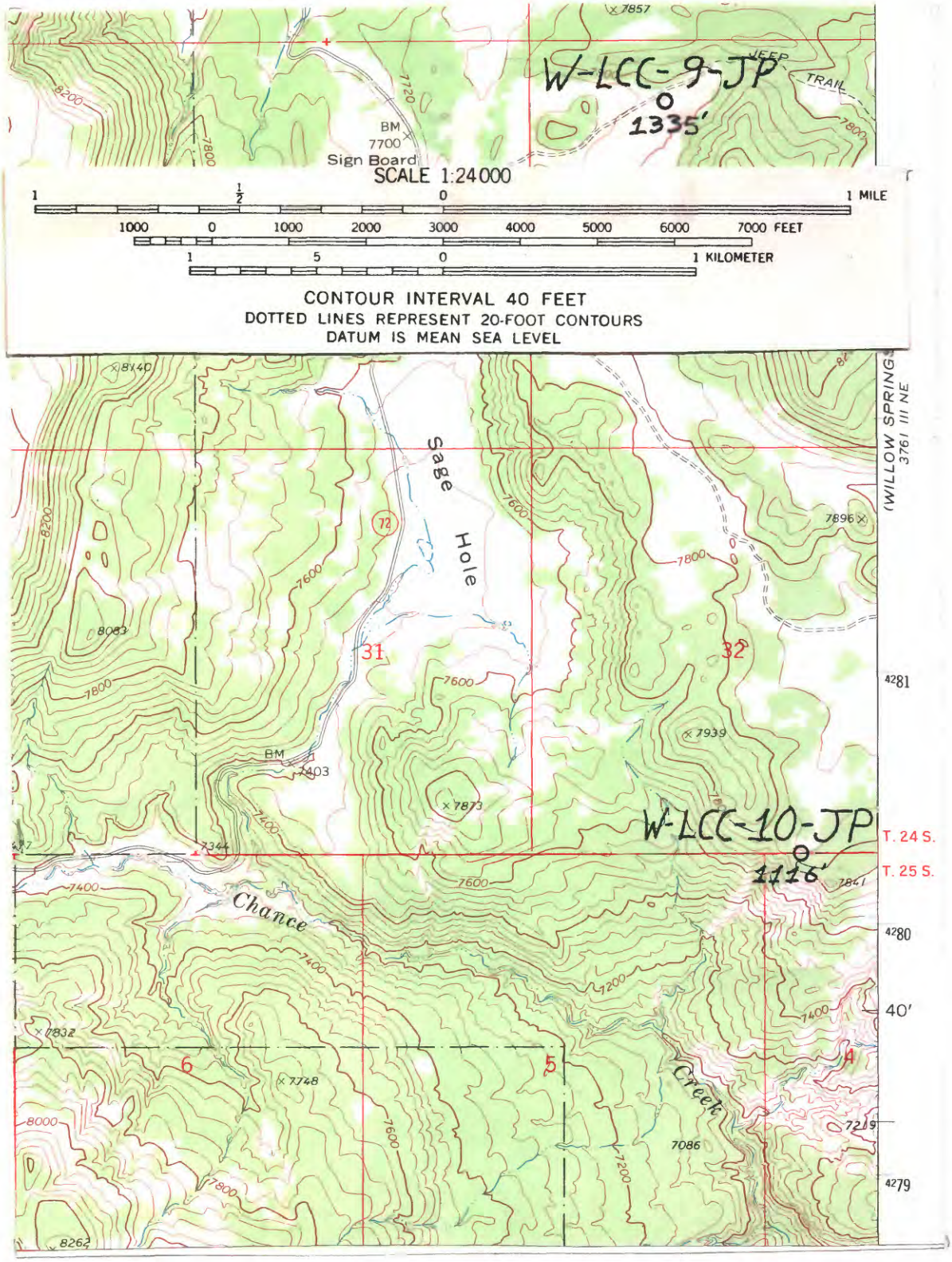
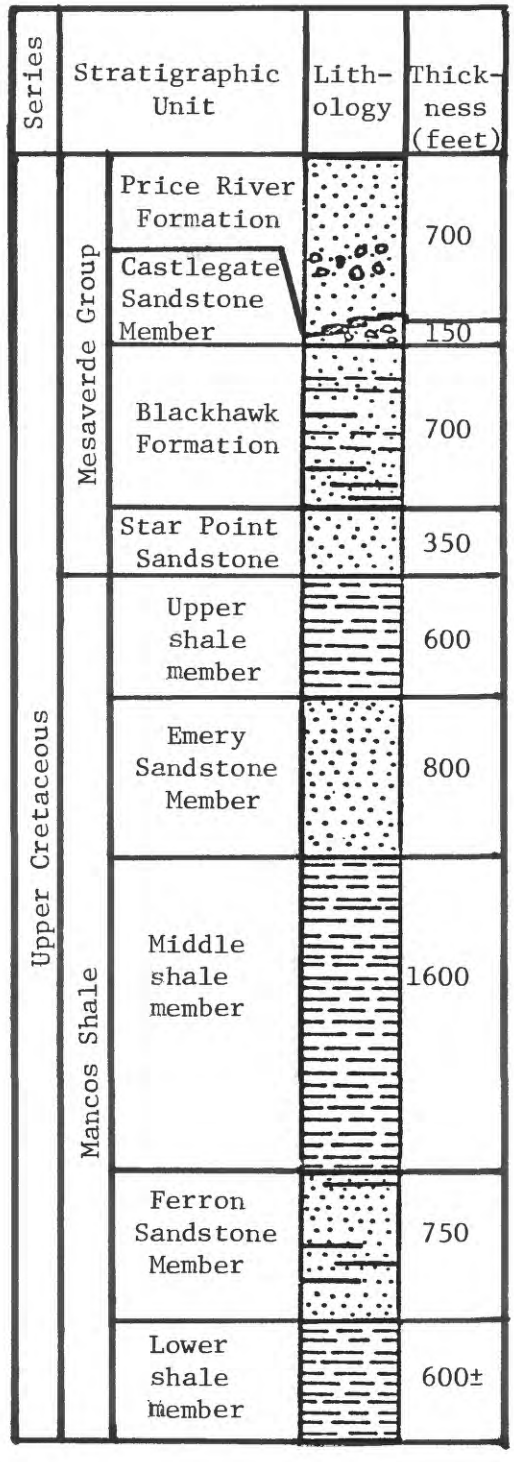


Figure 6.--Drill-hole locations in the Emery coal field, eastern part of the Johns Peak quadrangle, Sevier County, Utah.



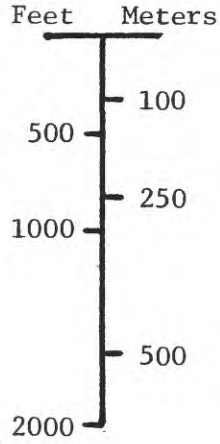


Figure 7.--Columnar section of rocks in the Wasatch Plateau and Emery coal fields, Sevier County, Utah. (Modified from Spieker, 1931, plate 3.)

Table 1.--Summary of information for 17 drill holes in the Wasatch Plateau and Emery coal fields, Sevier County, Utah

[FEL, from east line; FWL, from west line; FNL, from north line; FSL, from south line]

Drill-hole No.	Quadrangle name	Location	Depth drilled (feet)	Depth logged (feet)
Wasatch Plateau coal field (figs. 1-5)				
W-LCC-1-JP-----	Johns Peak	T. 25 S., R. 4 E., sec. 8 1,175 ft FEL, 100 ft FNL	580	254
W-LCC-2-JP-----	---do-----	T. 25 S., R. 4 E., sec. 15 1,100 ft FWL, 50 ft FSL	484	480
W-LCC-3-JP-----	---do-----	T. 24 S., R. 4 E., sec. 28 2,150 ft FNL, 1,750 ft FWL	735	710
W-LCC-4-JP-----	---do-----	T. 24 S., R. 4 E., sec. 8 600 ft FNL, 2,075 ft FEL	720	709
W-LCC-5-JP-----	---do----	T. 24 S., R. 4 E., sec. 16 1,100 ft FEL, 600 ft FSL	520	516
W-LCC-6-JP-----	---do-----	T. 24 S., R. 4 E., sec. 11 450 ft FWL, 775 ft FSL	515	513
W-LCC-7-JP-----	---do-----	T. 24 S., R. 4 E., sec. 28 450 ft FEL, 2,250 ft FSL	280	280
W-LCC-8-JP-----	---do-----	T. 25 S., R. 4 E., sec. 8 450 ft FSL, 3,425 ft FEL	600	---
W-LCC-12-OWP---	Old Woman Plateau	T. 22 S., R. 4 E., sec. 34 1,700 ft FEL, 1,700 FNL	920	898
W-LCC-13-OWP---	---do----	T. 23 S., R. 4 E., sec. 22 1,150 ft FWL, 925 ft FNL	885	885
W-LCC-14-OWP---	---do----	T. 22 S., R. 4 E., sec. 25 1,425 ft FWL, 4,225 ft FSL	900	900
W-LCC-23-OWP---	---do----	T. 23 S., R. 4 E., sec. 16 1,250 ft FWL, 1,750 ft FSL	1,000	975
W-LCC-24-OWP---	---do----	T. 23 S., R. 4 E., sec. 8 1,150 ft FEL, 850 ft FSL	1,035	1,012
W-LCC-25-OWP---	---do----	T. 23 S., R. 4 E., sec. 15 900 ft FWL, 2,625 ft FNL	500	485
W-LCC-27-OWP---	---do----	T. 23 S., R. 4 E., sec. 3 3,000 ft FEL, 2,350 ft FNL	1,070	1,070

Table 1.--Summary of information for 17 drill holes in the Wasatch Plateau and Emery coal fields, Sevier County, Utah--continued

Drill-hole No.	Quadrangle name	Location	Depth drilled (feet)	Depth logged (feet)
		Emery coal field (fig. 6)		
W-LCC-9-JP-----	Johns Peak	T. 24 S., R. 5 E., sec. 29 775 ft FNL, 1,750 ft FWL	1,335	1,330
W-LCC-10-JP---- (gamma log)	---do-----	T. 25 S., R. 5 E., sec. 4 450 ft FWL, 0 ft FNL	1,116	1,116
W-LCC-10 JP---- (density log)	---do-----	--------do----------	--do--	1,092

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DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-1-JP Quadrangle Johns Peak Date logged 7/18/77 Elev. 9,320'

Location: T. 25 S., R. 4 E., sec. 8, 1,175' FEL 100' FNL

Drilled depth 580' Logged depth 254' Drilling medium foam Fluid level dry

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale

Gamma (G): T.C. 2 sec. Scale 250 = 25 cps/in.

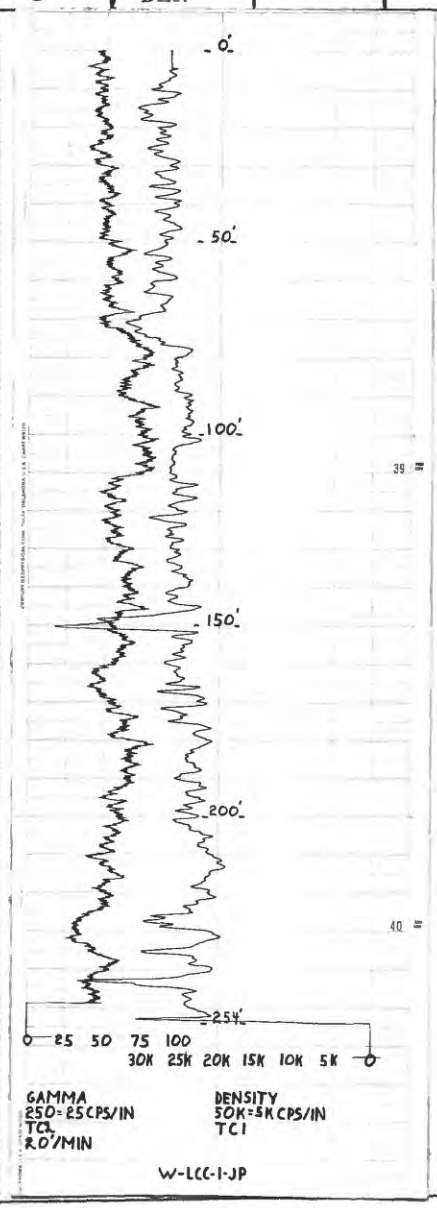
Density (DEN): T.C. 1 sec. Scale 50K = 5K cps/in. from 254' to 0'

Scale cps/in. from to

Caliper (CAL): Scale from to

Remarks: Hole bridged over at 254'. No coal encountered in this hole.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
0-420	Landslide deposit - soil; siltstone, red, calcareous; shale and mudstone, pink to red; sandstone, pink, tan, medium- to coarse-grained; basalt boulders and other igneous rocks		G DEN



Hole No. W-LCC-1-JP (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS			
			G	DEN		
0-420	Landslide deposit - soil; siltstone, red, calcareous; shale and mudstone, pink to red; sandstone, pink, tan, medium- to coarse-grained; basalt boulders and other igneous rocks					
420-580	Sandstone, gray, medium- to fine-grained [Star Point Sandstone]					

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DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-2-JP Quadrangle Johns Peak Date logged 7/28/77 Elev. 8,265'

Location: T. 25 S., R. 4 E., sec. 15, 1,100' FWL 50' FSL

Drilled depth 484' Logged depth 480' Drilling medium air Fluid level 38'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 50 Ω/5 in

Gamma (G): T.C. 2 sec. Scale 250 = 25 cps/in.

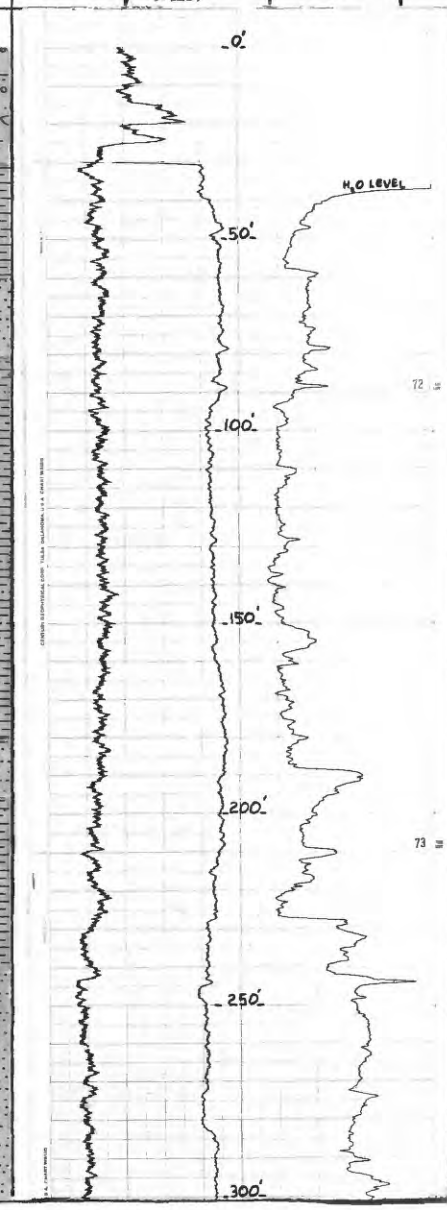
Density (DEN): T.C. 1 sec. Scale 25K = 2.5K cps/in. from 480' to 0'

Scale _____ cps/in. from _____ to _____

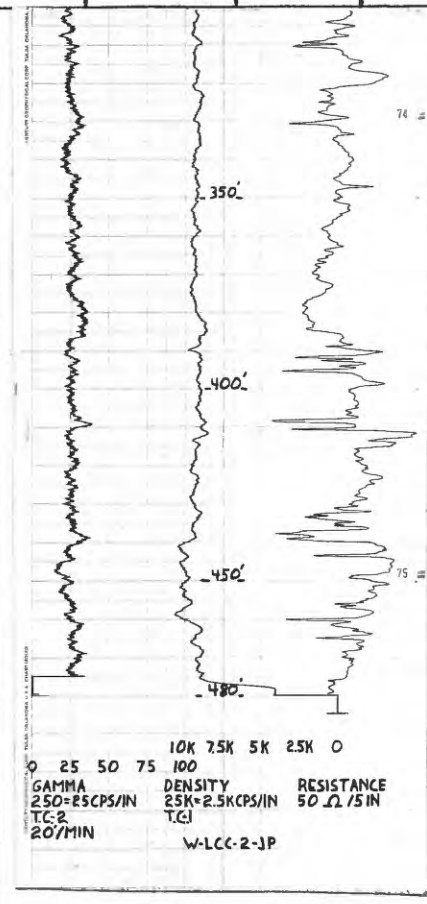
Caliper (CAL): Scale _____ from _____ to _____

Remarks: No coal was encountered in this hole.

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
0- 30 Alluvium - unconsolidated gravel, sand, silt, and clay		G DEN RES
30- 60 Siltstone, gray, shaly. (Upper shale member of Mancos Shale - "Masuk" shale)		
60- 80 Sandstone, gray, very fine grained to fine-grained, poorly sorted, angular to subangular		
80-180 Siltstone, gray, sandy		
180-195 Sandstone, gray, fine-grained to very fine grained		
195-240 Siltstone, gray, sandy		
240-484 Sandstone, gray, fine-grained to very fine grained, poorly sorted, angular- to subangular-grained (Emery Sandstone Member of Mancos Shale)		



Hole No. W-LCC-2-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
240-484 Sandstone, gray, fine-grained to very fine grained, poorly sorted, angular- to subangular-grained [Emery Sandstone Member of Mancos Shale]		

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DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-3-JP Quadrangle Johns Peak Date logged 7/20/77 Elev. 8,886'

Location: T. 24 S., R. 4 E., sec. 28, 2,150' FNL 1,750' FWL

Drilled depth 735' Logged depth 710' Drilling medium foam Fluid level 413'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 500 Ω/5 in

Gamma (G): T.C. 2 sec. Scale 250 = 25 cps/in.

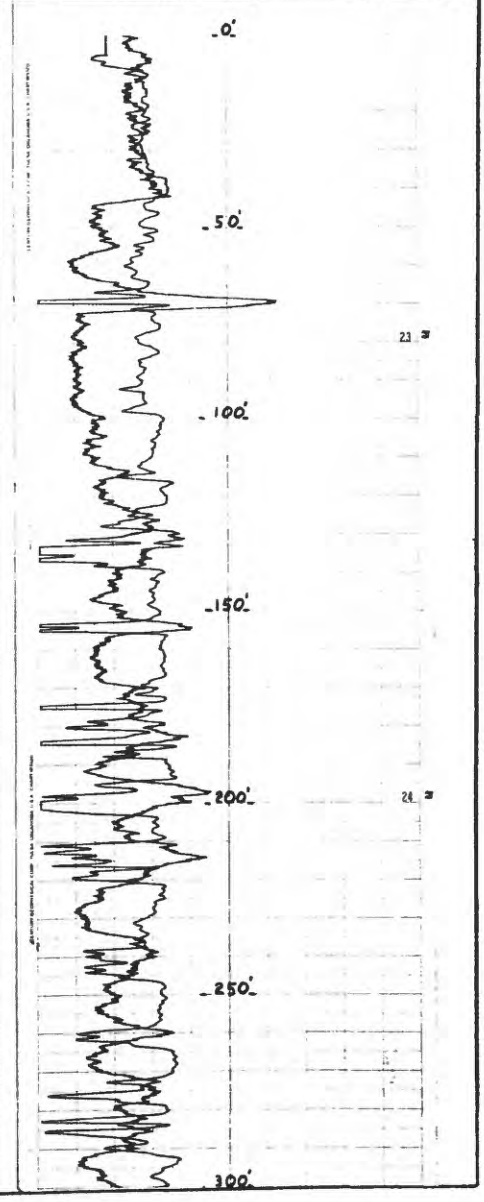
Density (DEN): T.C. 1 sec. Scale 25K = 2.5K cps/in. from 710' to 413'

Scale 50K = 5K cps/in. from 413' to 0'

Caliper (CAL): Scale _____ from _____ to _____

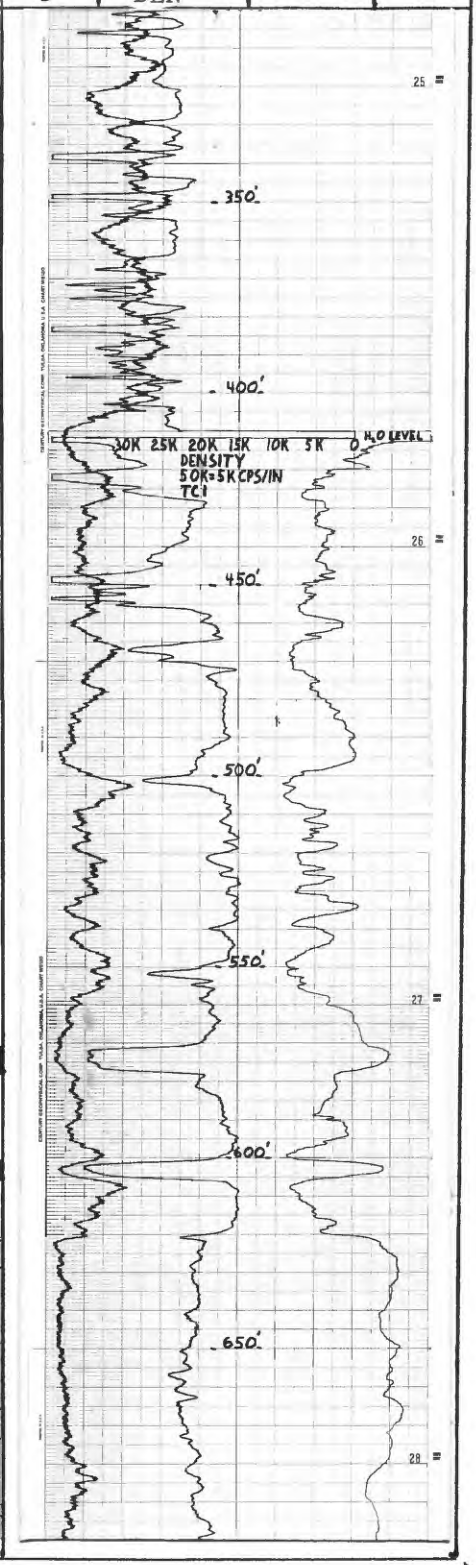
Remarks: _____

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
No samples were collected or described.		G DEN



Hole No. W-LCC-3-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS



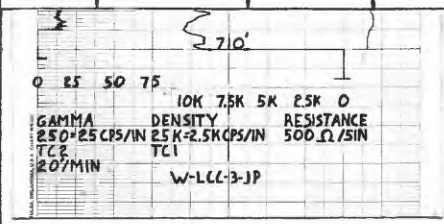
571-577.5 Coal (Upper Last Chance Creek bed)

601-605.5 Coal (Last Chance Creek bed)

621 Top of Star Point Sandstone

Hole No. W-LCC-3-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS			
		G	DEN		



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DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-4-JP Quadrangle Johns Peak Date logged 7/22/77 Elev. 7,935'

Location: T. 24 S., R. 4 E., sec. 8, 600' FNL 2,075' FEL

Drilled depth 720' Logged depth 709' Drilling medium foam Fluid level 334'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 500 Ω/5 in

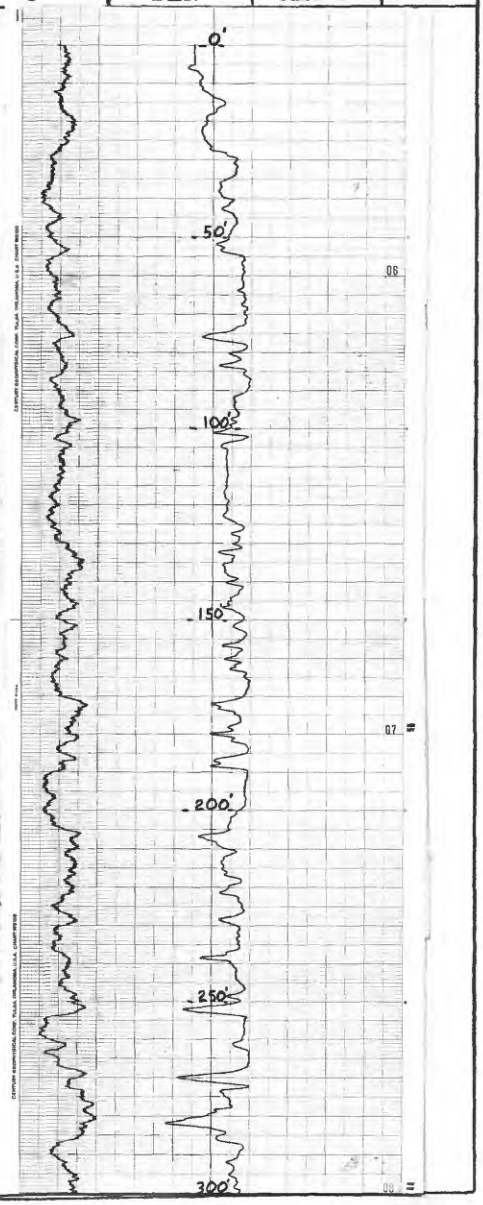
Gamma (G): T.C. 2 sec. Scale 500 = 50 cps/in.

Density (DEN): T.C. 1 sec. Scale 25K = 2.5K cps/in. from 709' to 334'

Scale 100K = 10K cps/in. from 334' to 0'

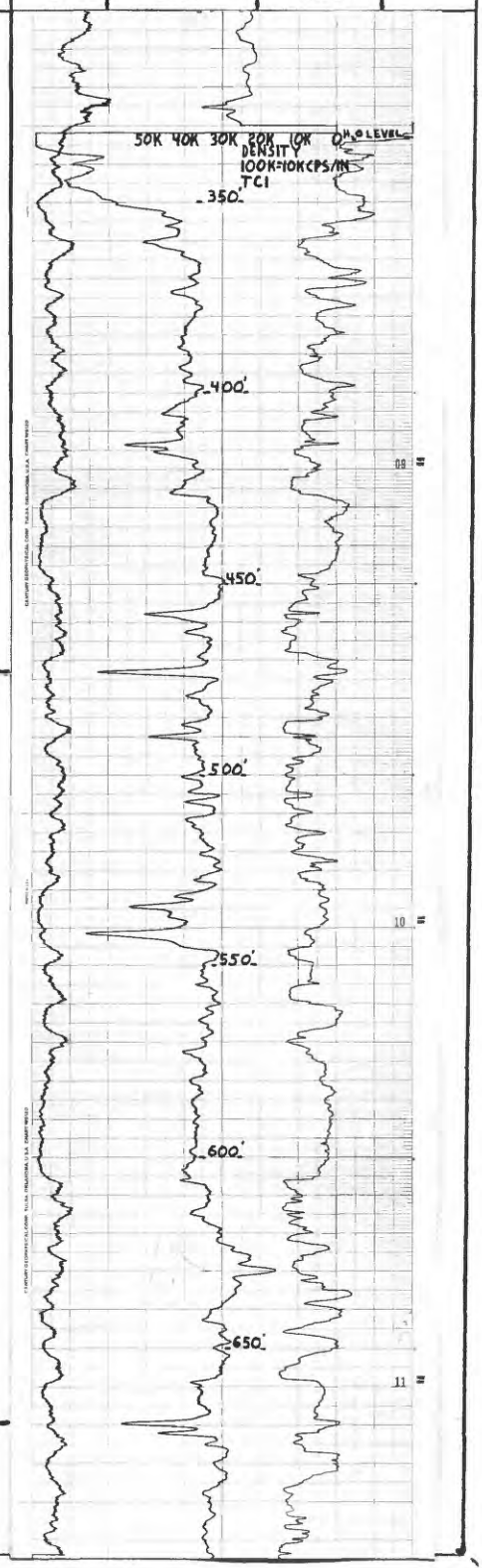
Caliper (CAL): Scale _____ from _____ to _____

Remarks: _____

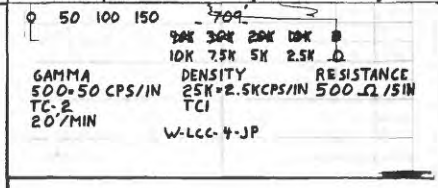
LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
No samples were collected or described.		

Hole No. W-LCC-4-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
		G DEN RES
472.5-473.5 Coal		
669 -670 Coal		



Hole No. W-LCC-4-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
710 Top of Star Point Sandstone		

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DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-5-JP Quadrangle Johns Peak Date logged 7/22/77 Elev. 8,200'

Location: T. 24 S., R. 4 E., sec. 16, 1,100' FEL 600' FSL

Drilled depth 520' Logged depth 516' Drilling medium mud Fluid level 431'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 100 Ω/5 in

Gamma (G): T.C. 2 sec. Scale 500 = 50 cps/in.

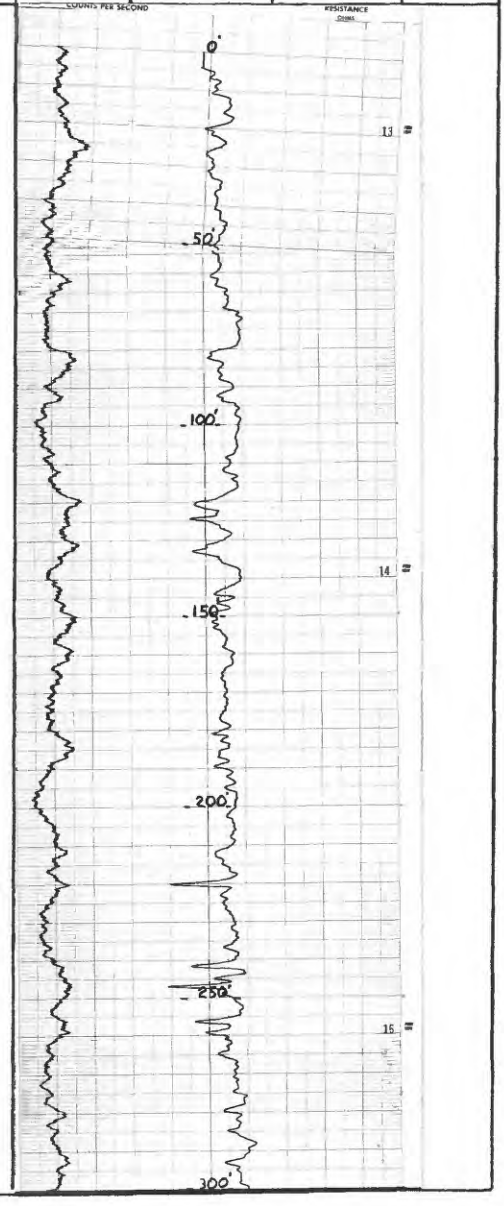
Density (DEN): T.C. 1 sec. Scale 25K = 2.5K cps/in. from 516' to 431'

Scale 100K = 10K cps/in. from 431' to 0'

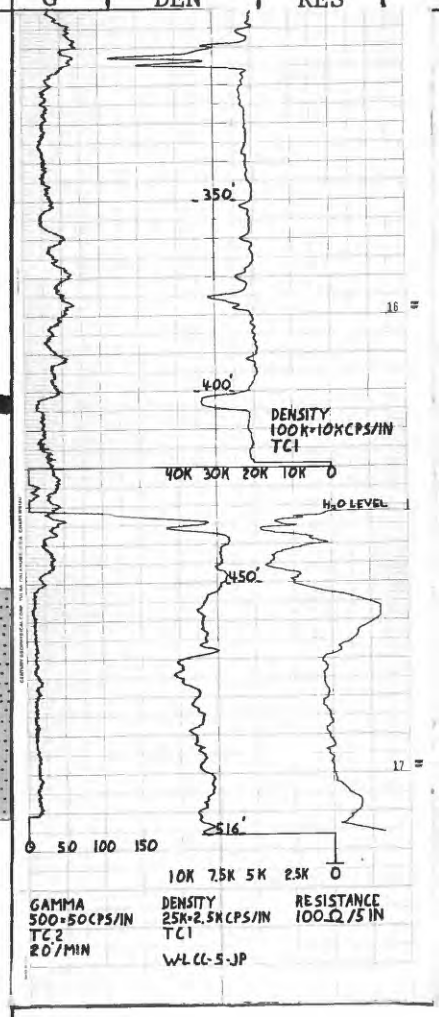
Caliper (CAL): Scale _____ from _____ to _____

Remarks: _____

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
No samples were collected or described.		G / DEN / RES



Hole No. W-LCC-5-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
401-405 Coal (Upper Last Chance Creek bed?) 451 Top of Star Point Sandstone		

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-6-JP Quadrangle Johns Peak Date logged 7/20/77 Elev. 8,190'

Location: T. 24 S., R. 4 E., sec. 11, 450' NWL 775' FSL

Drilled depth 515' Logged depth 513' Drilling medium foam Fluid level 361'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 500 Ω/5 in

Gamma (G): T.C. 2 sec. Scale 250 = 25 cps/in.

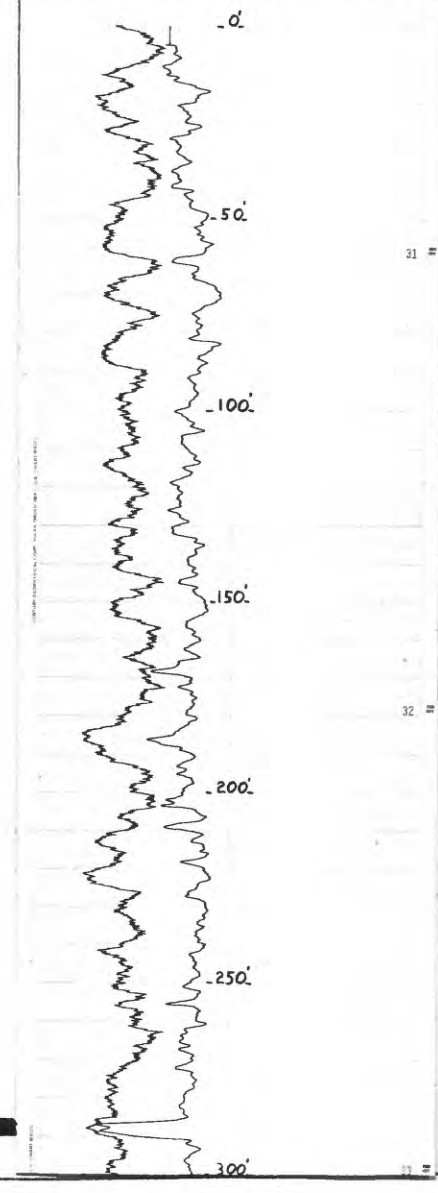
Density (DEN): T.C. 1 sec. Scale 50K = 5 K cps/in. from 513' to 0'

Scale _____ cps/in. from _____ to _____

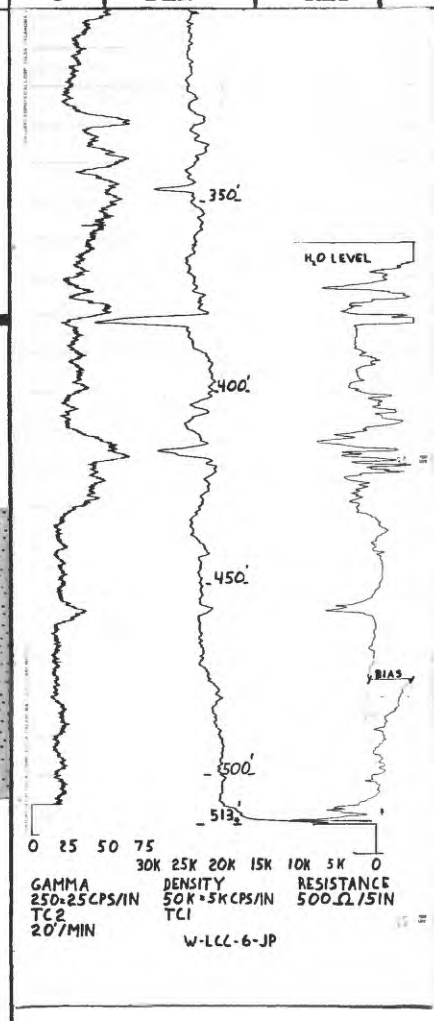
Caliper (CAL): Scale _____ cps/in. from _____ to _____

Remarks: _____

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
		G / DEN / RES
No samples were collected or described.		
286-290 Coal (Ivie bed)		



Hole No. W-LCC-6-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
380-382.5 Coal (Upper Last Chance Creek bed) 430 Top of Star Point Sandstone		

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DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-7-JP Quadrangle Johns Peak Date logged 7/21/77 Elev. 8,820'

Location: T. 24 S., R. 4 E., sec. 28, 450' FEL 2,250' FSL

Drilled depth 280' Logged depth 280' Drilling medium foam Fluid level None

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale

Gamma (G): T.C. 2 sec. Scale 500 = 50 cps/in.

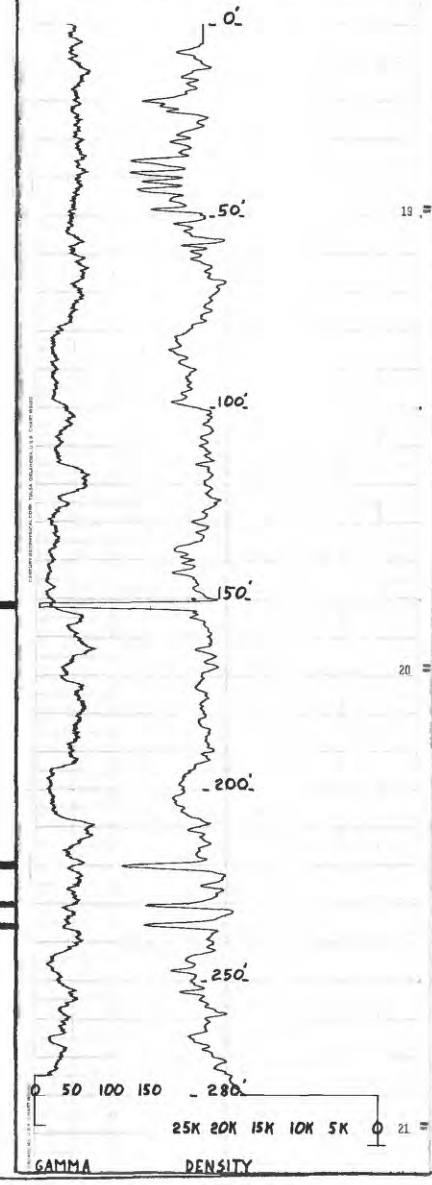
Density (DEN): T.C. 1 sec. Scale 50K = 5K cps/in. from 280' to 0'

Scale cps/in. from to

Caliper (CAL): Scale from to

Remarks: Did not reach Star Point Sandstone

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
151 -152.5 Coal 219.5-221 Coal 229.5-231 Coal 235 -236 Coal		G DEN RES



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DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-8-JP Quadrangle Johns Peak Date logged Not logged Elev. 9,520'

Location: T. 25 S., R. 4 E., sec. 8, 450' FSL 3,425 FEL

Drilled depth 600' Logged depth Not logged Drilling medium foam Fluid level --

Geophysical logs: Logging speed _____ ft/min

Resistivity (RES): Scale _____

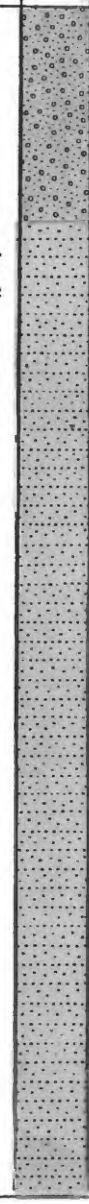
Gamma (G): T.C. _____ sec. Scale _____ cps/in.

Density (DEN): T.C. _____ sec. Scale _____ cps/in. from _____ to _____

Scale _____ cps/in. from _____ to _____

Caliper (CAL): Scale _____ from _____ to _____

Remarks: No log was run on this hole due to caving problems.

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
0-40	Conglomerate, tan, pebbles of quartzite, chert, and minor amounts of other rocks		
40-600	Sandstone, tan to gray, very coarse to conglomeratic. Probably belongs to Price River Formation and to the Castlegate Sandstone Member of the Price River Formation		

Hole No. W-LCC-8-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
40-600 Sandstone, tan to gray, very coarse to conglomeratic. Probably belongs to Price River Formation and to the Castlegate Sandstone Member of the Price River Formation		

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-9-JP Quadrangle Johns Peak Date logged 7/10/77 Elev. 7,780'

Location: T. 24 S., R. 5 E., sec. 29, 775' FNL 1,750' FWL

Drilled depth 1,335' Logged depth 1,330' Drilling medium air Fluid level 180'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 500 Ω/5 in

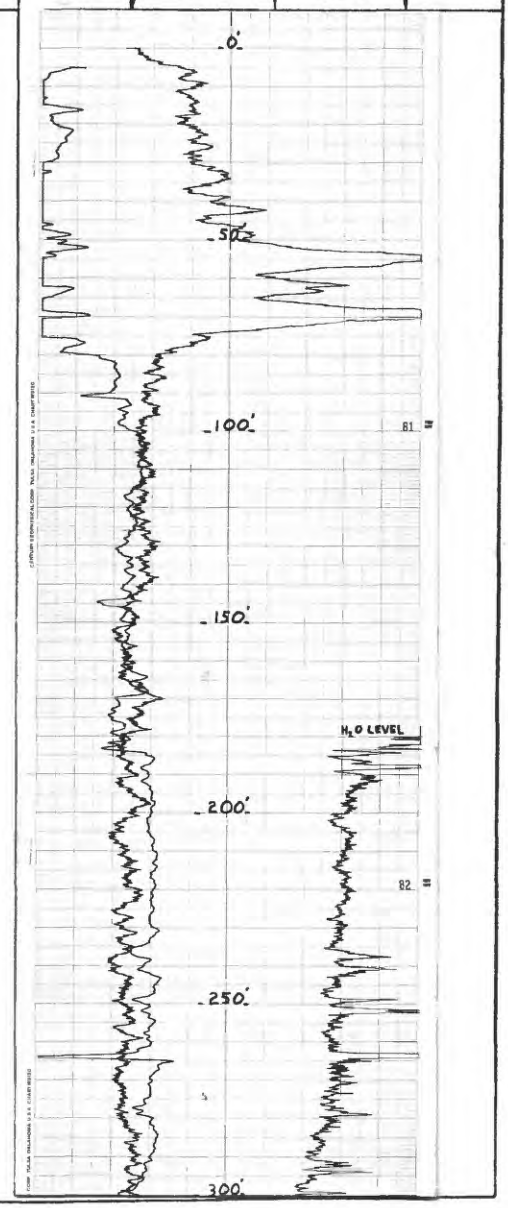
Gamma (G): T.C. 2 sec. Scale 250 = 25 cps/in.

Density (DEN): T.C. 1 sec. Scale 50K = 5K cps/in. from 1,330' to 0'

Scale _____ cps/in. from _____ to _____

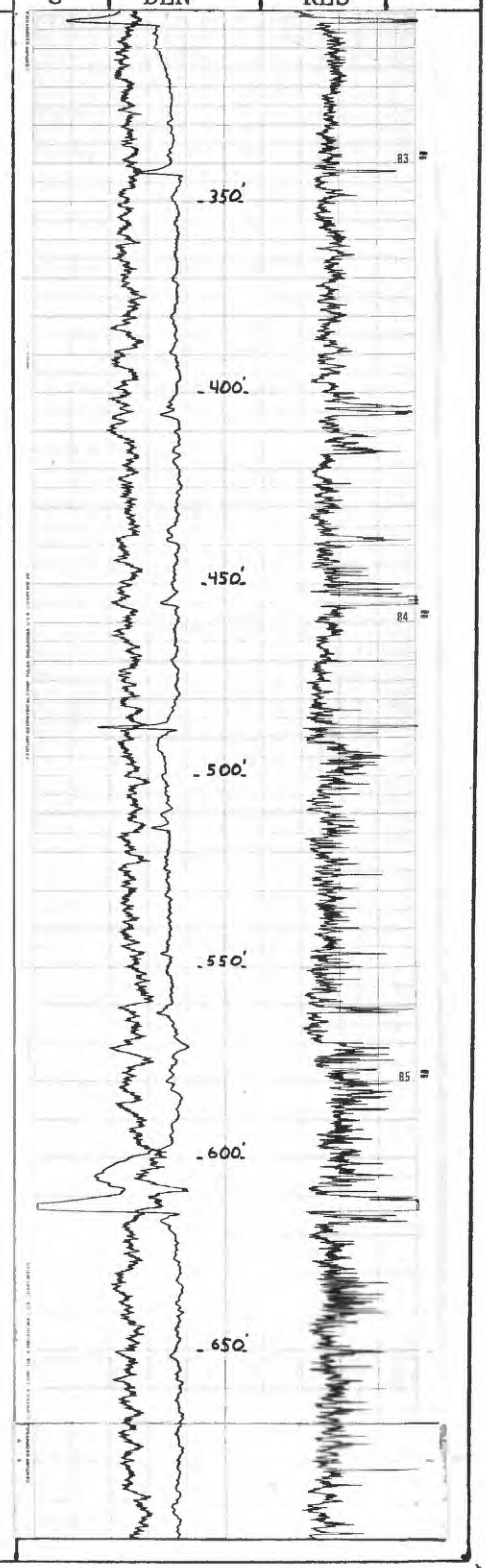
Caliper (CAL): Scale _____ from _____ to _____

Remarks: _____

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
No samples were collected or described. Upper shale member of Mancos Shale ("Blue Gate Shale")		

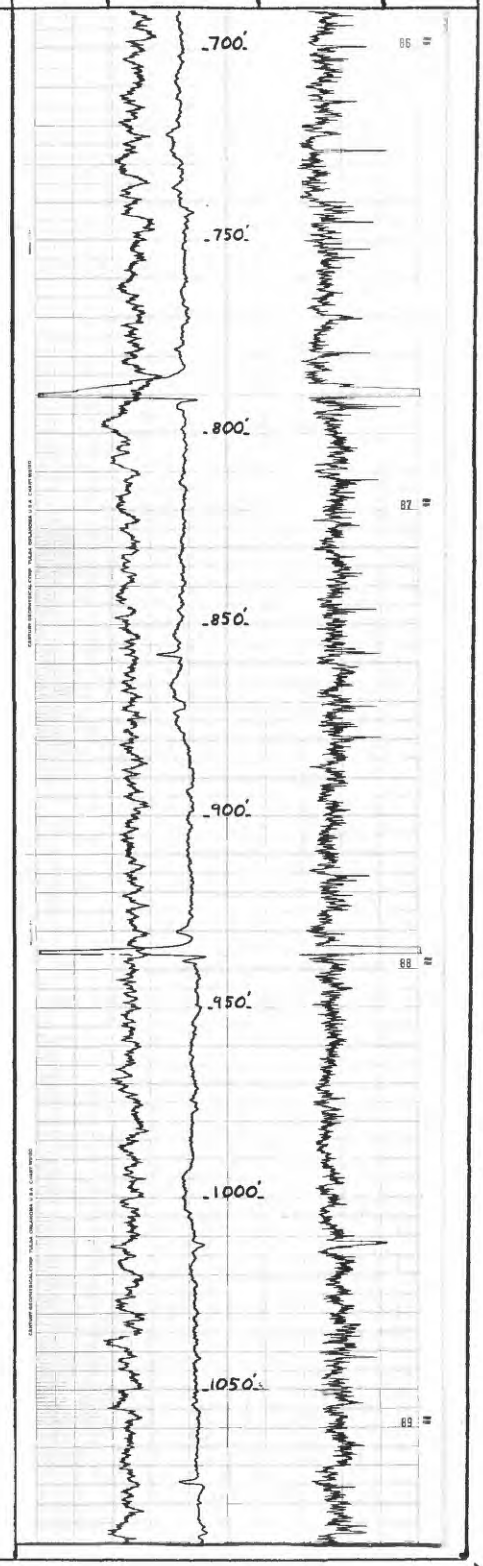
Hole No. W-LCC-9-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS



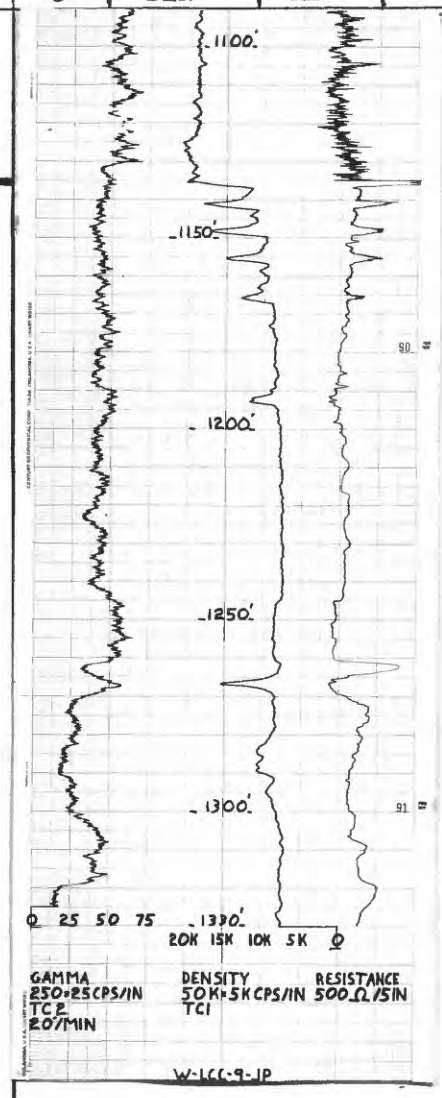
Hole No. W-LCC-9-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
		G DEN RES



Hole No. W-LCC-9-JP (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
1135	Top of Ferron Sandstone Member of Mancos Shale		
1135-1136	Coal		



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-10-JP Quadrangle Johns Peak Date logged 6/26/77 Elev. 7,770'

Location: T. 25 S., R. 5 E., sec. 4, 450' FWL 0' FNL

Drilled depth 1,116' Logged depth 1,116' Drilling medium air Fluid level None

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale

Gamma (G): T.C. 2 sec. Scale 100 = 10 cps/in.

Density (DEN): T.C. sec. Scale cps/in. from to

Scale cps/in. from to

Caliper (CAL): Scale from to

Remarks: Geophysical logs run separately on this hole only.

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
		G
No samples were collected or described. Middle shale member of Mancos Shale ("Blue Gate Shale")		

Hole No. W-LCC-10-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
		G
962 Top of Ferron Sandstone Member of Mancos Shale		

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

W-LCC-10-JP

Hole No. continued Quadrangle Johns Peak Date logged _____ Elev. _____

Location: T. 25 S., R. 5 E., sec. _____, _____ F L _____ F L

Drilled depth 1,116' Logged depth 1,092' Drilling medium _____ Fluid level _____

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale _____

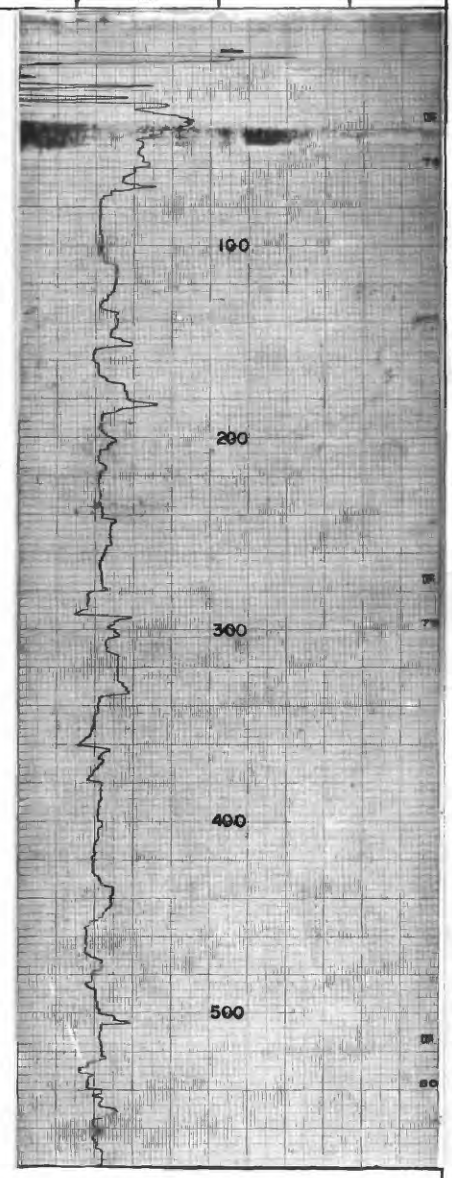
Gamma (G): T.C. _____ sec. Scale _____ cps/in.

Density (DEN): T.C. 2 sec. Scale 50K = 5K cps/in. from 1,092' to 0'

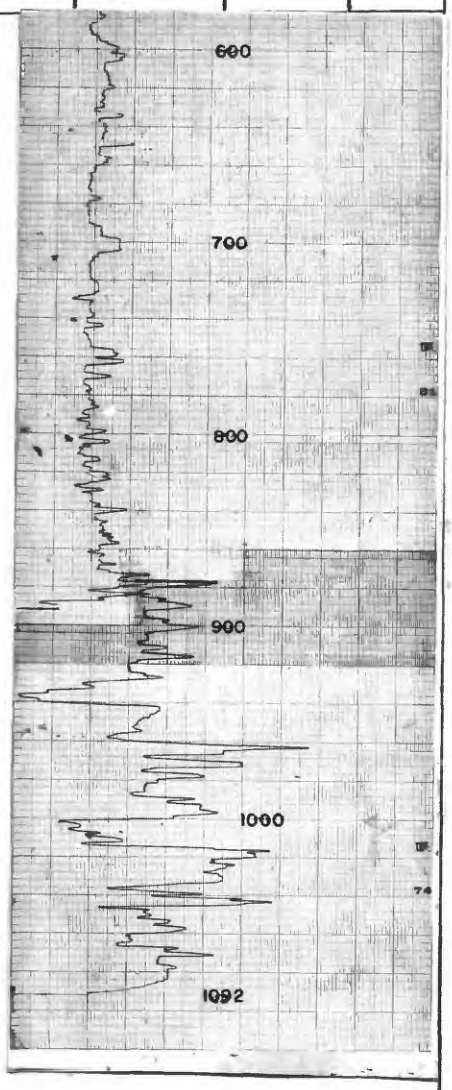
Scale _____ cps/in. from _____ to _____

Caliper (CAL): Scale _____ from _____ to _____

Remarks: Density log only. See gamma log for other information on this hole.

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
Middle shale member of Mancos Shale ("Blue Gate Shale")		

Hole No. W-LCC-10-JP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
962 Top of Ferron Sandstone Member of Mancos Shale		

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-12-OWP Quadrangle Old Woman Plateau Date logged 7/30/77 Elev. 8,310

Location: T. 22 S., R. 4 E., sec. 34, 1,700' FEL 1,700 FNL

Drilled depth 920' Logged depth 898' Drilling medium foam Fluid level 537'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 500 Ω/5 in

Gamma (G): T.C. 2 sec. Scale 250 = 25 cps/in.

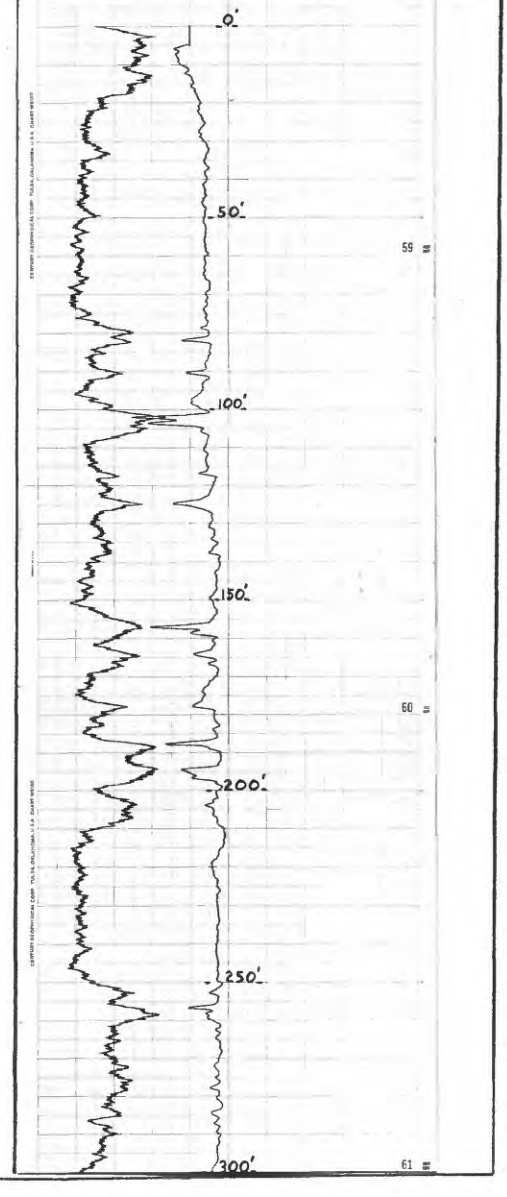
Density (DEN): T.C. 1 sec. Scale 50K = 5K cps/in. from 898' to 537'

Scale 100K = 10K cps/in. from 537' to 0'

Caliper (CAL): Scale _____ from _____ to _____

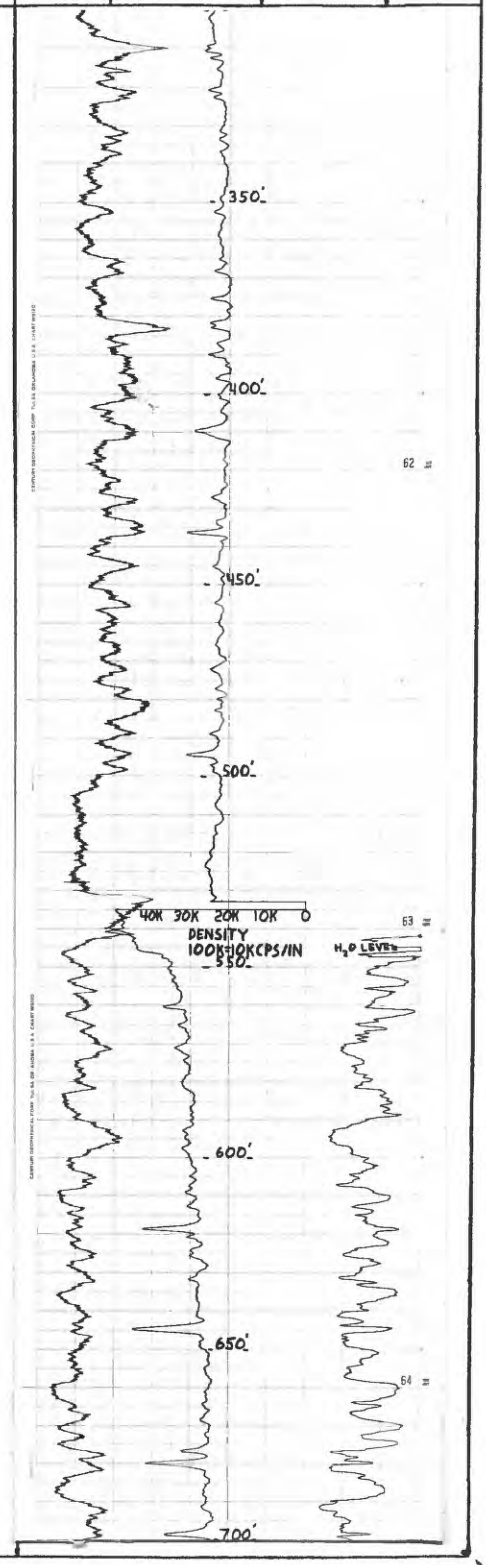
Remarks: _____

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
No samples were collected or described.		G DEN RES



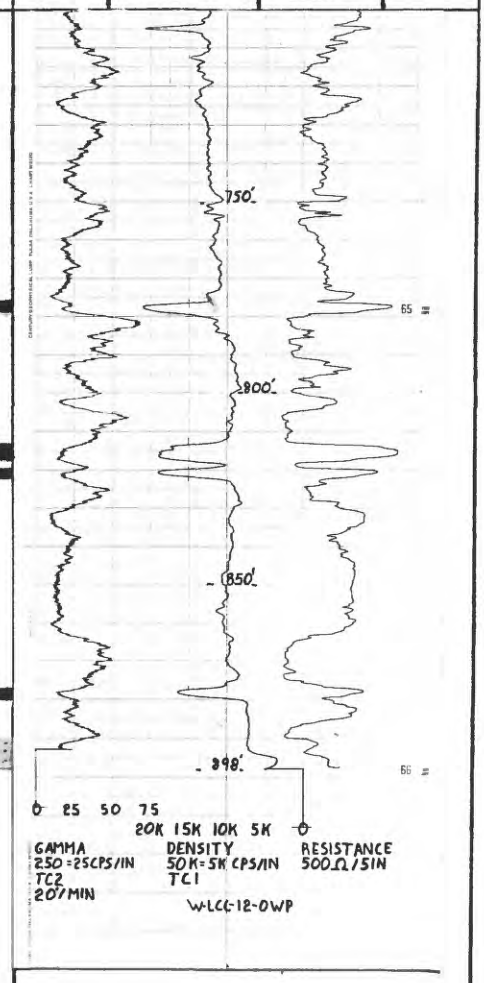
Hole No. W-LCC-12-OWP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
		G DEN RES



Hole No. W-LCC-12-OWP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
776.5-779.5 Coal (Upper Ivie bed)		G DEN RES
813 -818 Coal (Ivie bed)		
820 -822 Coal (Ivie bed)		
877 -879.5 Coal (Hiawatha bed)		
892 Top of Star Point Sandstone		



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-13-OWP Quadrangle Old Woman Plateau Date logged 7/24/77 Elev. 8,270'

Location: T. 23 S., R. 4 E., sec. 22, 1,150' FWL 925' FNL

Drilled depth 885' Logged depth 885' Drilling medium foam Fluid level 866'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 500 Ω 5/in

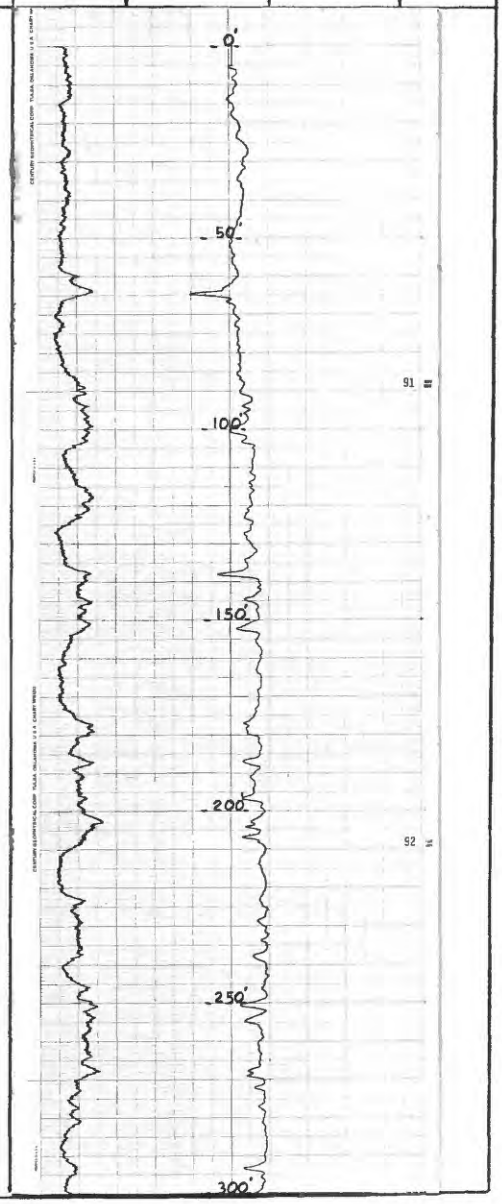
Gamma (G): T.C. 2 sec. Scale 500 = 50 cps/in.

Density (DEN): T.C. 1 sec. Scale 25K = 2.5K cps/in. from 866' to 885'

Scale 100K = 10K cps/in. from 866' to 0'

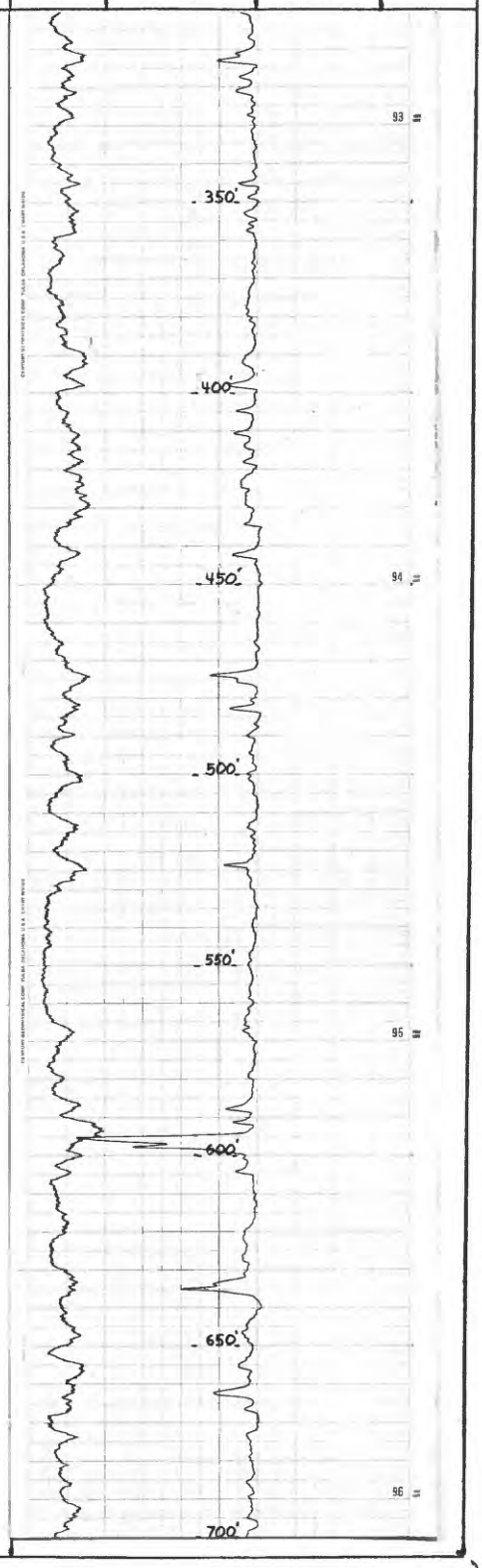
Caliper (CAL): Scale _____ from _____ to _____

Remarks: _____

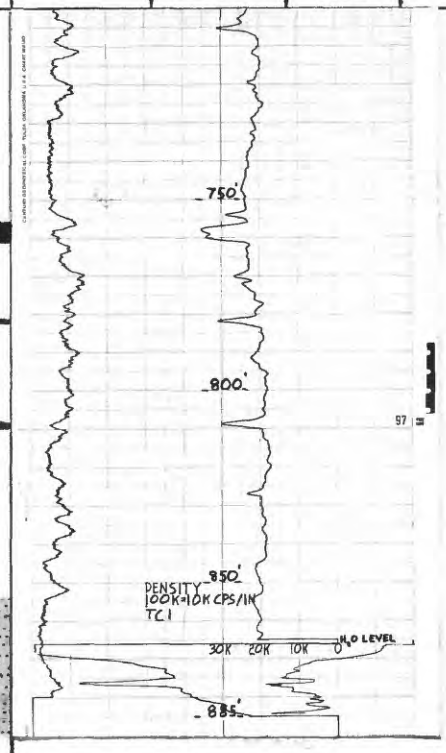
LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS			
		G	DEN	RES	
No samples were collected or described.					

Hole No. W-LCC-13-OWP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS



Hole No. W-LCC-13-OWP (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
756.5-761	Coal (Ivie bed)		
781 -782.5	Coal		
808 -809.5	Coal		
853	Top of Star Point Sandstone		

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-14-OWP Quadrangle Old Woman Plateau Date logged 7/28/78 Elev. 8,385'

Location: T. 22 S., R. 4 E., sec. 25, 1,425' FWL 4,225' FSL

Drilled depth 900' Logged depth 900' Drilling medium Foam Fluid level None

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale

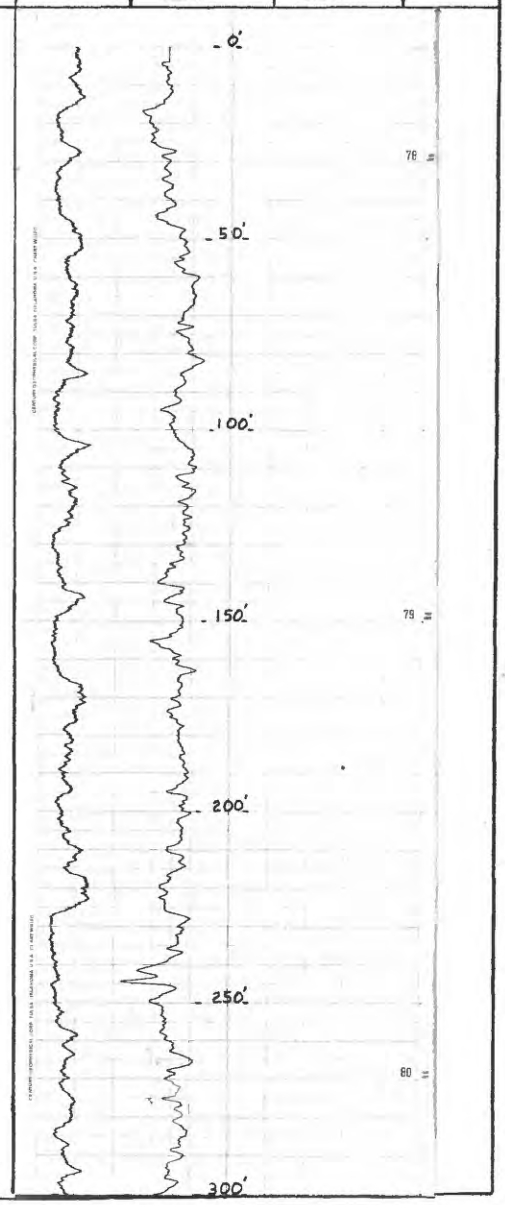
Gamma (G): T.C. 2 sec. Scale 500 = 50 cps/in.

Density (DEN): T.C. 1 sec. Scale 50K = 5K cps/in. from 900' to 0'

Scale cps/in. from to

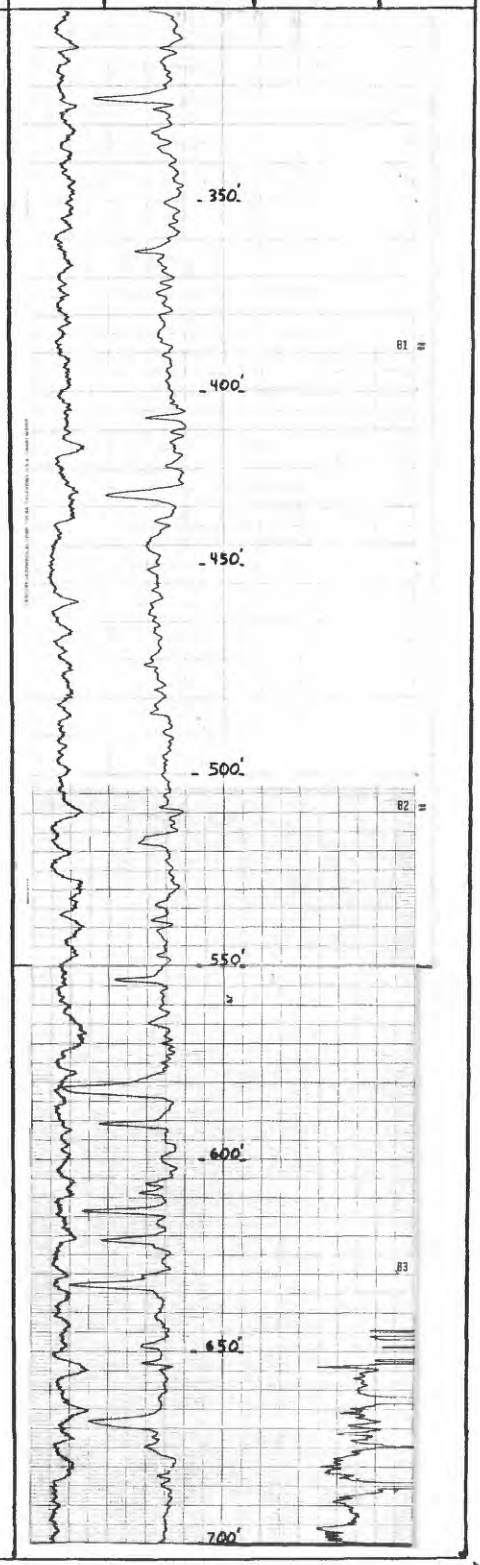
Caliper (CAL): Scale from to

Remarks:

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
No samples were collected or described		

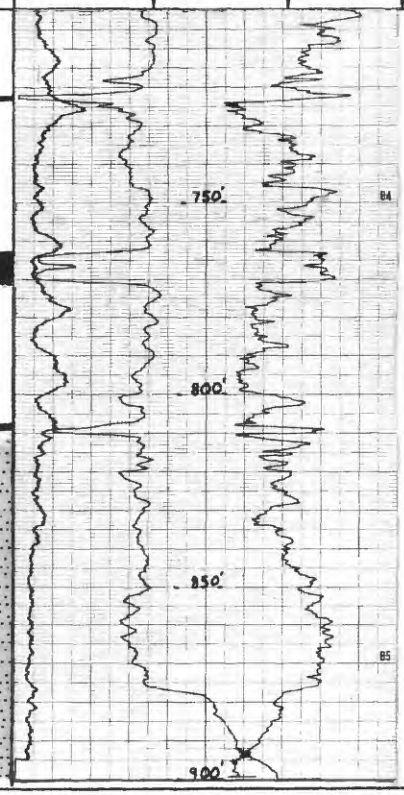
Hole No. W-LCC-14-OWP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
		G DEN RES



Hole No. W-LCC-14-OWP (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
722-723.5	Coal		G DEN RES
763-771	Coal (Upper Hiawatha bed)		
808-810	Coal		
812	Top of Star Point Sandstone		



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-23-OWP Quadrangle Old Woman Plateau Date logged 10/17/77 Elev. 8,140'

Location: T. 23 S., R. 4 E., sec. 16, 1,250' FWL 1,750' FSL

Drilled depth 1,000' Logged depth 975' Drilling medium foam Fluid level 595'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 20 Ω/in

Gamma (G): T.C. 2 sec. Scale 200 = 20 cps/in.

Density (DEN): T.C. 1 sec. Scale 20 cps/in. from 975' to 0'

Scale cps/in. from to

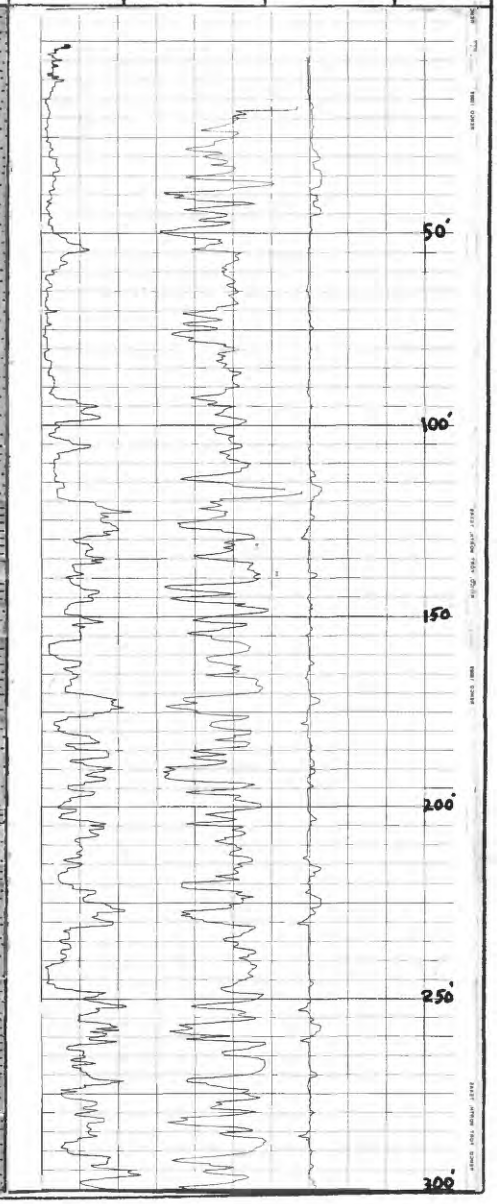
Caliper (CAL): Scale 1" = 5" from to

Remarks:

LITHOLOGY	
0- 5	Soil; alluvium
CASTLEGATE SANDSTONE MEMBER	
5-120	Sandstone, tan, medium- to coarse grained
120	Top of Blackhawk Formation
120-135	Shale, gray, silty, carbonaceous
135-140	Sandstone, light-gray, very fine grained
140-145	Shale, gray, silty
145-155	Sandstone, tan to yellow, fine-grained
155-175	Siltstone, gray
175-200	Sandstone, tan, very fine grained
200-205	Shale, dark-gray, carbonaceous
205-215	Sandstone, tan, fine-grained
215-220	Shale, gray, silty
220-245	Sandstone, gray, very fine grained
245-250	Siltstone, gray
250-255	Sandstone, gray, fine-grained
255-270	Siltstone, gray
270-280	Sandstone, gray, fine-grained
280-300	Siltstone, gray

STRIP LOG

GEOPHYSICAL LOGS

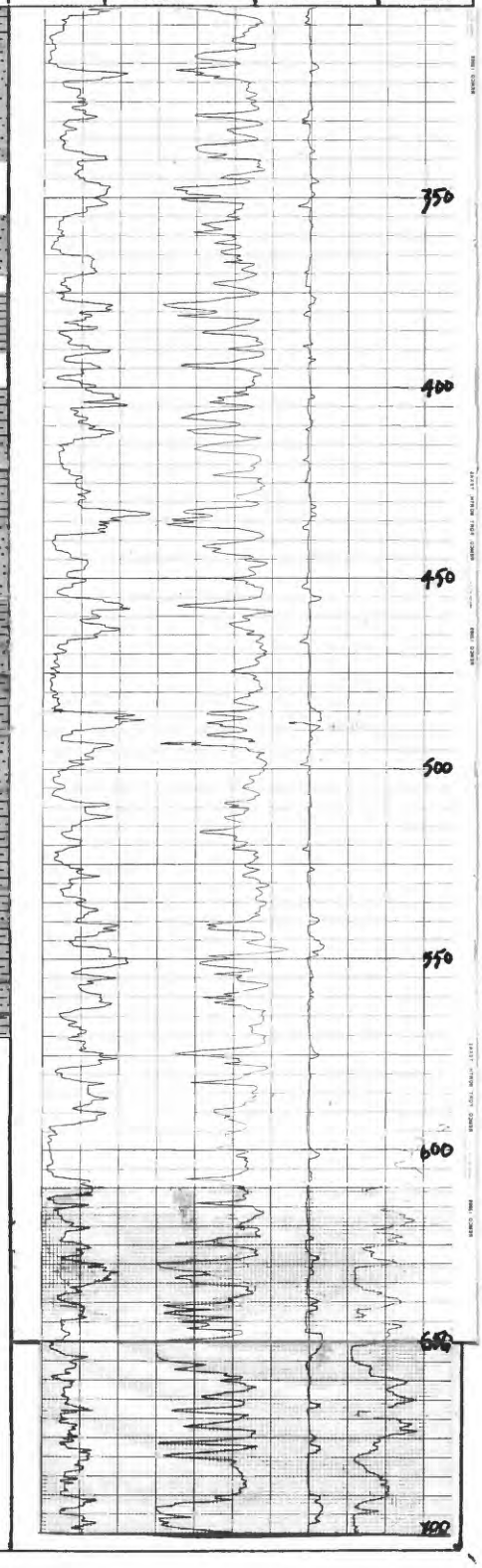


Hole No. W-LCC-23-OWP (continued)

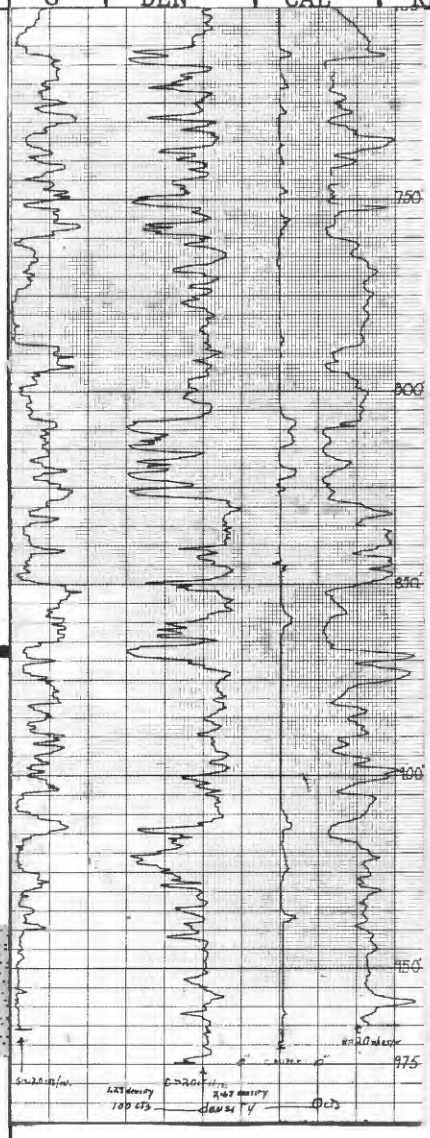
LITHOLOGY	
300-310	Shale, gray, silty
310-340	Sandstone, tan, fine-grained
340-355	No samples
355-370	Sandstone, tan, very fine grained
370-375	No sample
375-390	Shale, dark-gray
390-400	No sample
400-415	Shale, dark-gray
415-420	Sandstone, tan, fine-grained
420-435	Siltstone, dark-gray
435-455	Sandstone, tan, fine-grained
455-465	Shale, gray
465-475	Sandstone, gray, fine-grained
475-490	Shale, gray
490-505	Sandstone, gray, very fine grained
505-530	Shale, gray
530-540	Siltstone, gray
540-555	Shale, gray
555-565	Siltstone, gray
565-570	Shale, gray, silty
570-1000	Poor sample recovery - not described

STRIP LOG

GEOPHYSICAL LOGS



Hole No. W-LCC-23-OWP (continued)

LITHOLOGY	STRIP LOG	GEOPHYSICAL LOGS
570-1000 Poor sample recovery - not described		
866-869.5 Coal (Ivie bed)		
939.5 Top of Star Point Sandstone		

U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-24-OWP Quadrangle Old Woman Plateau Date logged 10/22/77 Elev. 8,115'

Location: T. 23 S., R. 4 E., sec. 8, 1,150' FEL 850' FSL

Drilled depth 1,035' Logged depth 1,012' Drilling medium foam Fluid level 840'

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale

Gamma (G): T.C. 2 sec. Scale 200 = 20 cps/in.

Density (DEN): T.C. 1 sec. Scale 3.9K cps/in.^{2} from 1,012' to 0'

Scale cps/in. from to

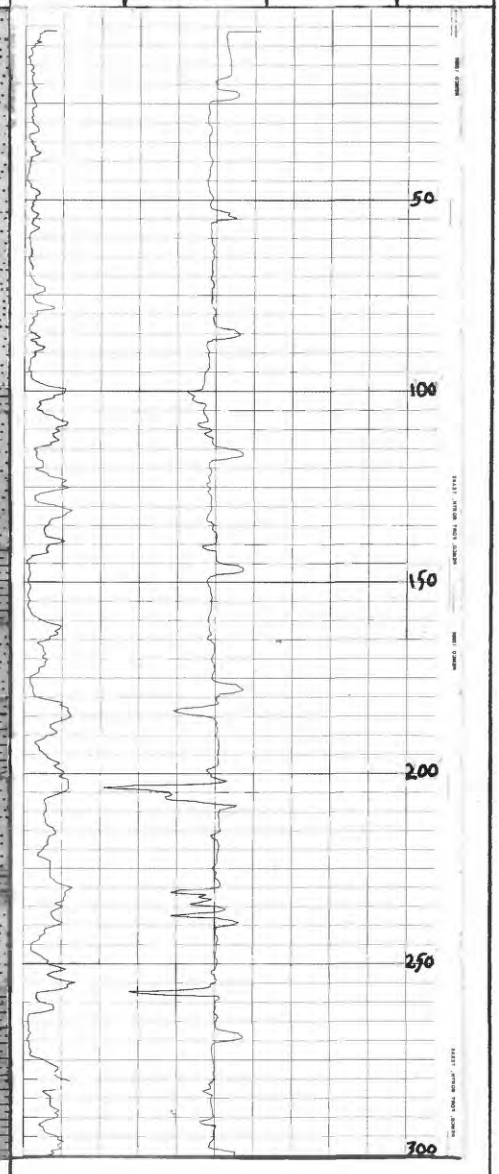
Caliper (CAL): Scale from to

Remarks: Geophysical logs run through pipe

LITHOLOGY	
CASTLEGATE SANDSTONE MEMBER	
0- 98	Sandstone, tan to dark-gray, medium- to coarse-grained
98	Top of Blackhawk Formation
98-105	Shale, carbonaceous
105-140	Sandstone, light-gray, medium-grained
140-160	Shale, dark-gray, and gray siltstone
160-180	Sandstone, gray, very fine grained
180-200	Shale, gray
200-225	Sandstone, gray, fine-grained
225-230	Siltstone, cray
230-255	Sandstone, gray, fine- to medium-grained
255-275	Shale, dark-gray
275-280	Siltstone, light-gray
280-300	Shale, dark-gray

STRIP LOG

GEOPHYSICAL LOGS

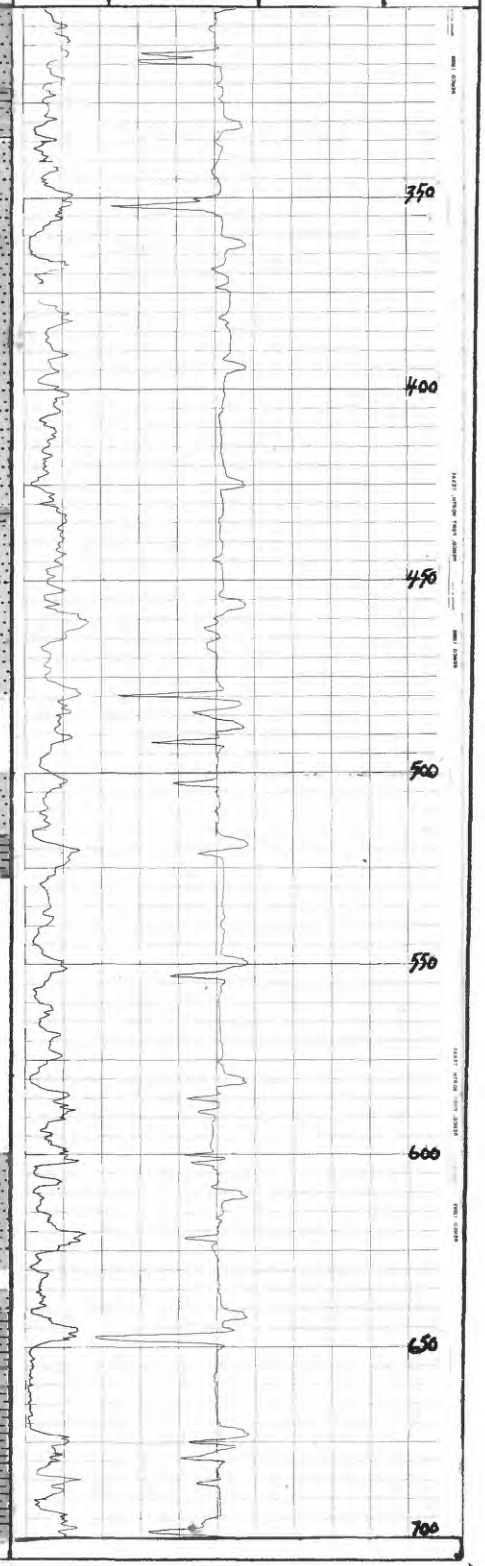


Hole No. W-LCC-24-OWP (continued)

LITHOLOGY	
300-320	Sandstone, gray, medium- to coarse-grained
320-325	Shale, dark-gray
325-330	Sandstone, gray, medium-grained
330-335	Shale, gray
335-430	Sandstone, gray, fine- to medium-grained; carbonaceous shale (poor sample recovery)
430-435	Mudstone, olive-gray
435-460	Sandstone, gray, very fine grained; gray shale and carbonaceous shale
460-480	Sandstone, gray, medium-grained
480-500	Poor sample recovery
500-515	Sandstone, gray, very fine grained
515-525	Shale, dark-gray, carbonaceous
525-600	Poor sample recovery
600-630	Sandstone, gray, very fine grained; gray and carbonaceous shale
630-635	No sample
635-640	Sandstone, gray, fine-grained
640-655	Shale, gray
655-660	Sandstone, light-gray, fine-grained
660-720	Shale, gray; carbonaceous shale; gray, fine-grained sandstone

STRIP LOG

GEOPHYSICAL LOGS

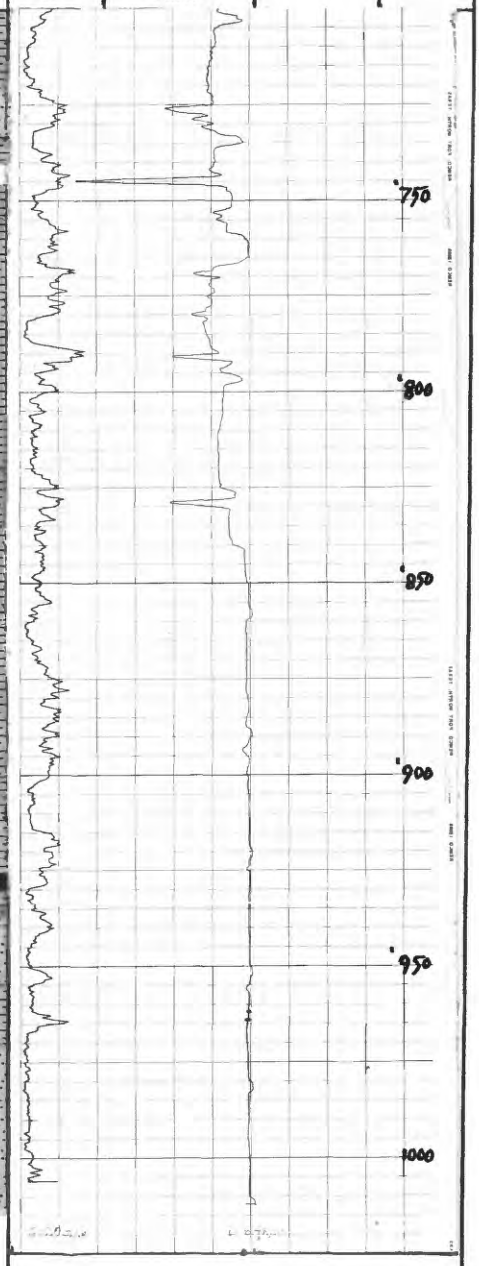


Hole No. W-LCC-24-OWP (continued)

LITHOLOGY	
660–720	Shale, gray; carbonaceous shale; gray, fine-grained sandstone
720–735	Sandstone, light-gray, fine-grained
735–740	Shale, carbonaceous
740–745	No sample
745–755	Shale, carbonaceous; gray siltstone
755–780	Siltstone, gray
780–820	Shale, carbonaceous
820–830	Siltstone, carbonaceous
830–835	Shale, dark-gray
835–900	Siltstone, gray (poor sample recovery)
900–925	Shale, carbonaceous
925–930	Coal (poor sample)
930–940	Shale, gray; carbonaceous shale
940–955	Sandstone, light-gray, fine-grained
955–970	Shale, carbonaceous
967	Top of Star Point Sandstone
970–1035	Sandstone, light-gray, very fine grained, silty (poor sample recovery)

STRIP LOG

GEOPHYSICAL LOGS



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-25-OWP Quadrangle Old Woman Plateau Date logged 11-2-77 Elev. 7,840'

Location: T. 23 S., R. 4 E., sec. 15, 900' FWL 2,625' FNL

Drilled depth 500' Logged depth 485' Drilling medium foam Fluid level none

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale

Gamma (G): T.C. 2 sec. Scale 20 cps/in.

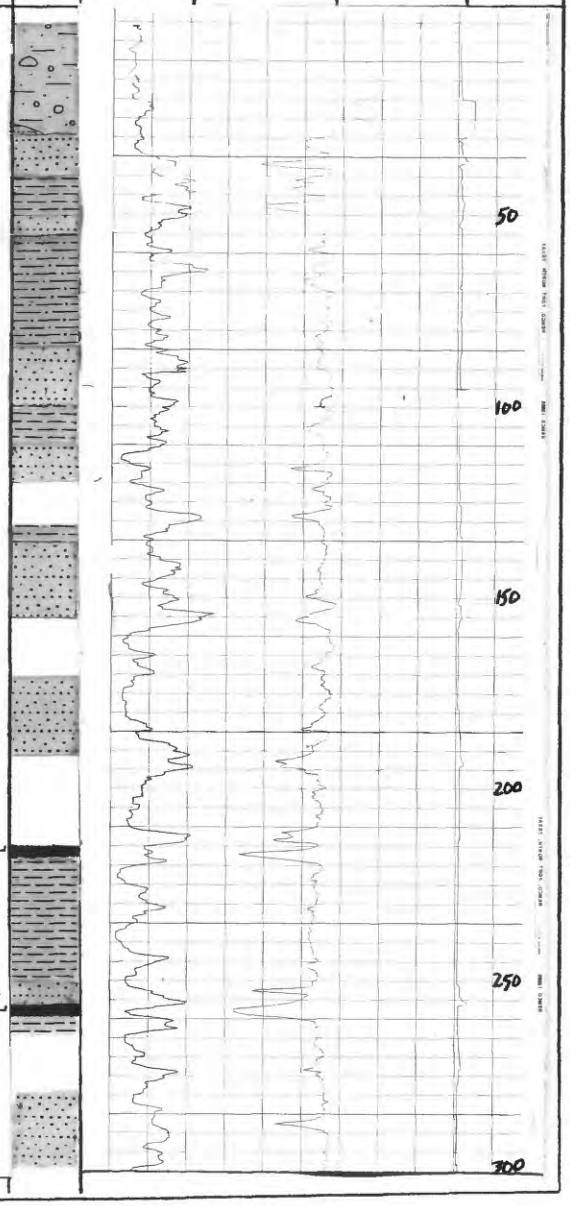
Density (DEN): T.C. 1 sec. Scale 20 cps/in. from 485' to 0'

Scale cps/in. from to

Caliper (CAL): Scale 2" = 10" from to

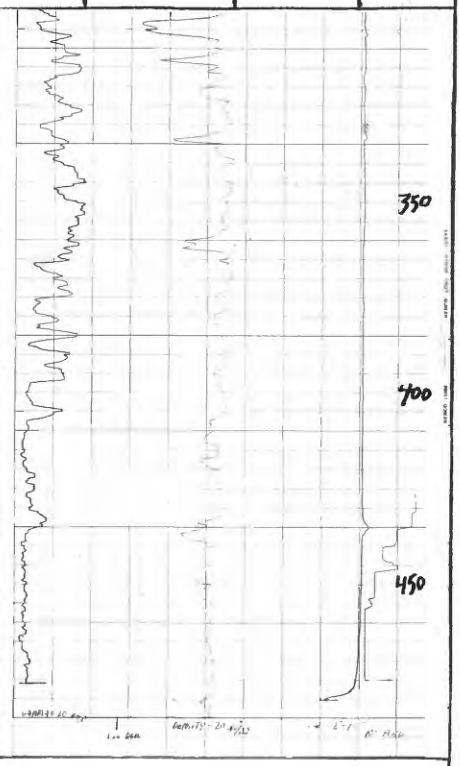
Remarks:

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
0- 30	Alluvium		G DEN CAL
30- 40	Sandstone, orange-brown and gray, fine-grained		
40- 50	Shale, carbonaceous, silty; gray, mudstone		
50- 55	Sandstone, gray, fine-grained		
55- 85	Siltstone, gray; gray, medium- to coarse-grained sandstone		
85-100	Sandstone, gray, medium- to coarse-grained		
100-110	Shale, carbonaceous, silty		
110-120	Sandstone, light-brown, medium-grained; gray shale and gray siltstone		
120-130	Sample missing		
130-135	Siltstone, gray		
135-155	Sandstone, brown, fine- to medium-grained		
155-170	Sample missing		
170-190	Sandstone, light-brown, medium-grained		
190-215	Sample missing		
	216.5-218 COAL		
215-250	Mudstone, brown		
250-260	Sandstone, brown to gray, gray, very fine grained to fine-grained	COAL	
260-265	Shale, dark-gray, silty		
265-285	Sample missing		
285-385	Sandstone, gray and brown, fine-grained; gray siltstone; carbonaceous shale; trace of coal		



Hole No. W-LCC-25-OWP (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
285-385	Sandstone, gray and brown; fine-grained; gray siltstone; carbonaceous shale; trace of coal (Ivie bed(?)) COAL COAL		G DEN CAL
385-395	Siltstone, dark-gray; dark-gray shale; trace of coal		
395-400	Sandstone, light-brown, medium-grained Top of Star Point Sandstone		
400-410	Shale, dark-gray; carbonaceous shale; trace of coal		
410-425	Shale, carbonaceous		
425-455	Sandstone, light-gray, fine-grained; gray siltstone; carbonaceous shale		
455-500	No sample		



U.S. GEOLOGICAL SURVEY
DRILL-HOLE LOG, SEVIER COUNTY, UTAH

Hole No. W-LCC-27-OWP Quadrangle Old Woman Plateau Date logged 10-28-77 Elev. 8,300'

Location: T. 23 S., R. 4 E., sec. 3, 3,000' FEL 2,350' FNL

Drilled depth 1,070' Logged depth 1,070' Drilling medium foam Fluid level N/A

Geophysical logs: Logging speed 20 ft/min

Resistivity (RES): Scale 200

Gamma (G): T.C. 2 sec. Scale 200 cps full scale

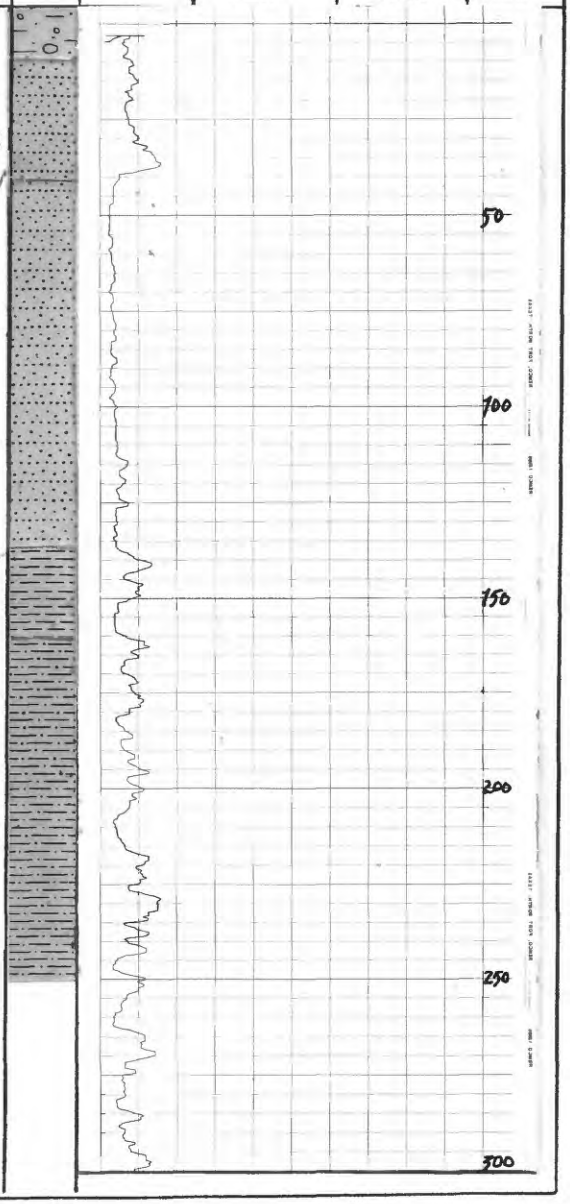
Density (DEN): T.C. 1 sec. Scale 200 cps full scale from 1,070' to 0'

Scale _____ from _____ to _____

Caliper (CAL): Scale 2" = 10" from _____ to _____

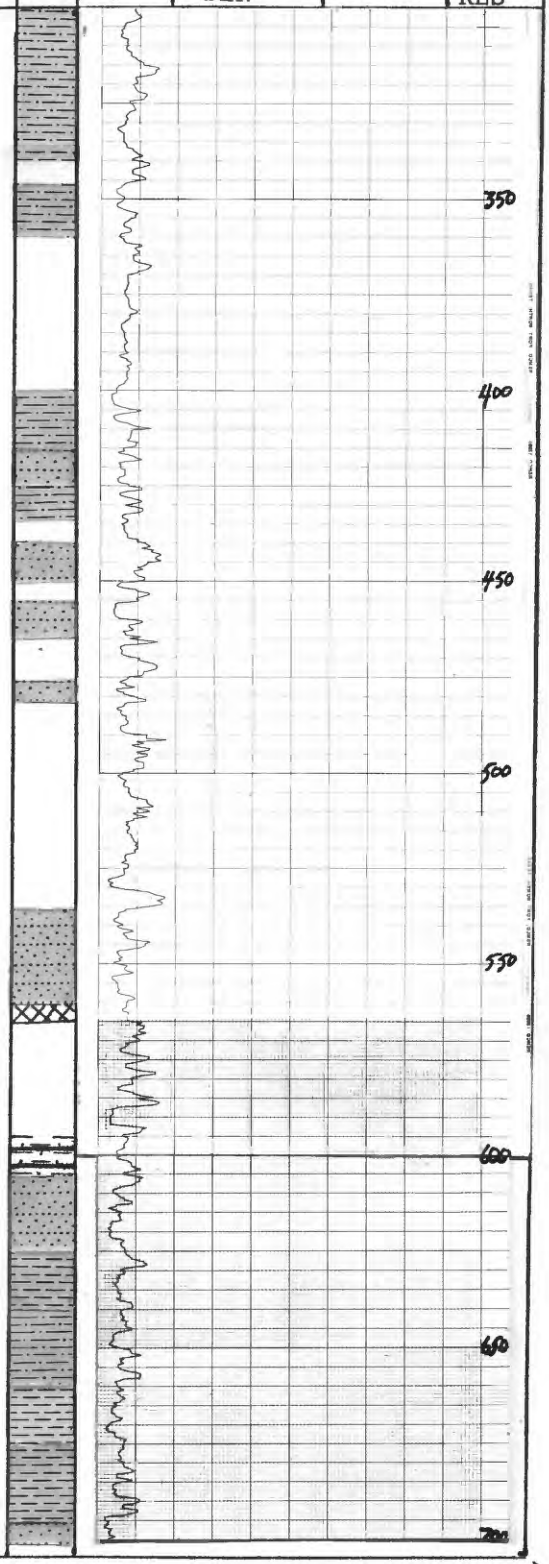
Remarks: Cased hole natural gamma

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
0-10	Soil		G DEN CAL RES
10-40	Sandstone, gray, light-brown, orange, fine- to coarse-grained; dark-gray shale		
39'	Top of Castlegate Sandstone Mbr.		
40-115	Sandstone, tan, orange, white, medium- to coarse-grained		
115-135	Sandstone, white to tan, medium-grained; dark-gray shale; light-brown mudstone		
135-160	Shale, dark-gray, slightly carbonaceous		
138'	Top of Blackhawk Formation		
160-250	(Poor samples) Siltstone, gray; carbonaceous siltstone and carbonaceous shale		
250-300	Sample missing		



Hole No. W-LCC-27-OWP (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
300-335	Siltstone, gray		
335-340	Shale, carbonaceous		
340-345	Sample missing		
345-360	Siltstone, gray		
360-400	Samples missing		
400-415	Siltstone, gray		
415-425	Sandstone, gray, very fine grained		
425-435	Siltstone, gray		
435-440	Sample missing		
440-450	Sandstone, light-gray, very fine grained		
450-455	Sample missing		
455-465	Sandstone, light-gray, very fine grained		
465-475	Samples missing		
475-480	Sandstone, light-gray, very fine grained		
480-535	Samples missing		
535-560	Sandstone, light-gray, fine-grained		
560-565	Coal, bone; carbonaceous shale		
565-595	Samples missing		
595-605	Coal; light-gray siltstone; carbonaceous shale		
605-625	Sandstone, gray, very fine grained		
625-640	Shale, gray		
640-660	Siltstone, gray		
660-675	Shale, carbonaceous; gray, very fine grained sandstone		
675-695	Shale, gray		



Hole No. W-LKC-27-OWP (continued)

LITHOLOGY		STRIP LOG	GEOPHYSICAL LOGS
			G DEN RES
695-700	Sandstone, gray, very fine grained		
700-715	Shale, carbonaceous		
715-740	Siltstone, gray; carbonaceous shale; olive mudstone		
740-750	Siltstone, light-gray		
750-760	Shale, gray, carbonaceous		
760-770	Siltstone, gray		
770-795	Sandstone, gray, fine-grained		
795-800	Sample missing		
822.5-827	Coal (Upper Ivie bed)		
800-806	Coal; olive siltstone		
805-810	Coal; gray, medium-grained sandstone		
810-815	Coal; gray, mediumgrained sandstone		
815-830	Siltstone, gray; trace coal		
882.5-888.5	Coal		
830-855	Siltstone, gray; olive mudstone		
855-890	Mudstone, olive		
890-900	Shale, carbonaceous		
925	Top of Star Point Sandstone		
900-905	Shale, gray		
905-920	Siltstone, gray; olive mudstone		
920-930	Mudstone, olive		
930-935	Siltstone, gray		
935-950	Shale, gray; gray, very fine grained sandstone		
950-965	Shale, carbonaceous; gray siltstone; trace coal		
965-975	Shale, carbonaceous; gray siltstone		
975-985	Siltstone, gray; gray, very fine grained sandstone		
985-1070	Samples missing		