J. M. HUBER CORPORATION

CUNNINGHAM #10-1

C/SE/SE Sec. 10-16S-48W

Cheyenne County, Colo.

DVR	✓
FJP	
HHM	✓
JAM	✓
JJD	✓
RLS	
CGM	

JOSEPH R. CLAIR
Geological Consultant
C.P.G. #713

file

WELL CHRONOLOGY

J. M. HUBER CORPORATION
CUNNINGHAM #10-1

C/SE/SE Sec. 10-16S-48W
Cheyenne County, Colo.

1978

July 4 — Spudded. Drilled 12 1/4" surface hole to 217'. Ran 8 joints of 24#, H-40, new 8 5/8" surface casing, set casing at 213' K.B. measurement, and cemented with 165 sacks of Class "G" cement plus 3% calcium chloride. Plug was pumped down at 12:30 A.M., July 5, 1978.

July 5 — Drilled out from under surface at 12:30 P.M.

July 6 — Drilled to 1067'. Tripping for Bit #2 (DTJ) at 7:00 A.M.

July 7 — Drilled to 1936'. Tripping for Bit #3 (OSC3AJ) at 7:00 A.M.

July 8 — Drilling @ 2360' at 7:00 A.M.

July 9 — Drilling @ 2788' at 7:00 A.M.

July 10 — Drilling @ 3240' at 7:00 A.M. Geologist out to well.

July 11 — Drilling @ 3635' at 6:22 A.M.

July 12 — Drilling @ 3903' at 7:00 A.M.

July 13 — Drilling @ 4130' at 7:10 A.M.

July 14 — Preparing to run DST #1 from 4274' to 4300' at 7:00 A.M. Got DST results at 11:30 P.M.

July 15 — Back to drilling from 4300' at 3:45 A.M. Drilling @ 4327' at 6:45 A.M.

July 16 — Drilling @ 4544' at 6:15 A.M.

July 17 — Drilling @ 4738' at 6:25 A.M.

July 18 — Drilling @ 4991' at 5:45 A.M.

July 19 — Drilling @ 5217' at 8:45 A.M. Drilled to 5274' TD at 3:00 P.M. Conditioned hole for logging. Started trip out to run logs at 9:00 P.M.

July 20 — Started logging at 12:30 A.M. Got electrical logs at 9:30 A.M. Decision made to run DST #2 across Osage porosity. Lost circulation while conditioning hole for DST.

July 21 — Still trying to regain circulation at 7:00 A.M. Regained circulation but promptly lost it again. Planned to spot fresh mud on bottom and try to run DST #2 when I left well and returned to Denver.

July 22 — Ran DST #2 from 5226' to 5278'. Decision made to plug.

July 23 — Well plugged and abandoned.

WELL SUMMARY

Operator:	J. M. Huber Corporation
Well:	Cunningham #10-1
Location:	C/SE/SE Section 19, Township 16 South, Range 48 West, Cheyenne County, Colorado.
Field:	Wildcat
Elevation:	4232' Ground, 4241' K.B.
Spudded:	July 4, 1978
Completed:	Drilled to 5274' TD at 3:00 P.M., July 19, 1978.
Casing:	8 5/8" surface casing set at 213'.
Total Depth:	5274' - Driller 5280' - Schlumberger
Cores:	None
Drill Stem Tests:	Two. (1) 4274' to 4300' (2) 5226' to 5278'
Testing Co.:	Halliburton. Dick Rudic, Tester.
Mud Control:	Service Mud Company. Lloyd Wells and Bill Foreman - Mud Engineers.
Logs:	Drilling Time Log - 3600' to 5274' Detailed Sample Log - 3600' to 5274' Schlumberger Electrical Logs: Dual Induction-Laterolog - 215' to 5280' Simultaneous Compensated Neutron-Formation Density Log - 3600' to 5280' Bore Hole Compensated Sonic Log - 215' to 5280'
Contractor:	Jim Snyder Drilling Co. - Rig #2 Gene Owens - Tool Pusher
Equipment:	Derrick: 96' Lee C. Moore Drawworks: Bethlehem S-55 Power: Two V-8 318 Detroit Diesels Pumps: (1) Emsco D300 - 14" x 6" Power: 671N - GMC Twin Diesel (2) Wilson-Snyder 16" x 6" Power: 6 cylinder Caterpillar Diesel Drill Collars: 16 - 6" x 2 1/4" Drill Pipe: 5" Full Hole
Status:	Plugged and abandoned, July 23, 1978.

GEOLOGICAL REPORT

J. M. HUBER CORPORATION
CUNNINGHAM #10-1

C/SE/SE Sec. 10-16S-48W
Cheyenne County, Colo.

The Cunningham #10-1 was spudded July 4, 1978. 12 1/4" surface hole was drilled to 217'. 8 joints of 20#, H-40, new 8 5/8" casing were run and set at 213' K. B. measurement. Casing was cemented with 165 sacks of Class "G" cement plus 3% calcium chloride. Plug was pumped down at 12:30 A.M., July 5, 1978.

The well drilled out from under surface casing at 12:30 P.M., July 5, 1978.

The following formation tops, corrected to Schlumberger Electrical Logs, were picked on the well.

Permian System:		
Stone Corral	- 2602	(+1639)
Pennsylvanian System:		
Waubunsee Series	- 3597	(+ 644)
Virgil Series:		
Shawnee Group (Topeka)	- 3706	(+ 535)
Missouri Series:		
Lansing-Kansas City Group	- 3912	(+ 323)
Base Kansas City	- 4305	(- 64)
Des Moines Series:		
Marmaton Group	- 4344	(- 103)
Cherokee Group	- 4490	(- 249)
Atoka Series	- 4698	(- 457)
Morrow Series	- 4850	(- 609)
Lower Morrow	- 5070	(- 829)
Mississippian System:		
Meramec Series:		
St. Louis	- 5119	(- 878)
"X" Shale Marker	- 5140	(- 899)
Spergen	- 5142	(- 901)
Warsaw *	- 5204	(- 963)
Osage Series	- 5254	(-1013)
Total depth	- 5274	Driller
	- 5280	Schlumberger

* See Detailed Sample Log.

The Cunningham #10-1 was a wildcat test based on subsurface and seismic data. The well ran structurally lower on the upper markers, through the top of the Pennsylvanian, than the nearest control well, the N.C.R.A. #1 Union Pacific, SW/NW of Sec. 11-16S-48W. However, from the top of the Shawnee Group (Topeka) through the top of the Lansing-Kansas City the Cunningham #10-1 was higher than the #1 Union Pacific, reflecting the additional structural movement along the Eads Axis of the Las Animas Arch during Missouri and Virgil time.

The Cunningham #10-1 was 5' high to the #1 Union Pacific on the Topeka. No shows and little or no visible prosity were observed in the samples throughout the Shawnee Group.

At the top of the Lansing-Kansas City Group the Cunningham #10-1 was 7' high to the #1 Union Pacific. There were no shows and little porosity in the upper part of the sequence. The first shows were found in the samples at 4170' and related to ragged drilling breaks between 4146' and that point (see Detailed Sample Log). The best drilling break was from 4180-95', corrected to 4186-97' by electrical logs. There was only very spotted, brown oil stain in very poor, microvug porosity (see Detailed Sample Log) and, after circulating samples at 4195', I did not consider the zone warranted testing and so reported to Huber in Denver.

There were no further shows and only minor drilling breaks down to just above the base of the Kansas City. At 4279' the penetration rate increased abruptly and the well drilled at 1/2 minute to 2 minutes per foot to 4296' (porosity on electrical logs 4284' to 4302'). Samples were circulated at 4300' (see Detailed Sample Log). In wet samples there was good, spotted fluorescence, streaming cut, free oil and fair to good odor. However, dry samples showed only 30% of the oolicastic porosity was stained. The character of the samples, staining, etc. was discussed at length with Huber's Denver office and it was decided that the zone should be tested.

DST #1 was run from 5274' to 5300' (not corrected). The tool was opened for Initial Open Flow of 20 minutes with a weak blow increasing to strong blow (blew from bottom of 15" bucket through 1/4" blow hose in 5 minutes) which continued steady, but there was no gas to surface. Tool was closed for Initial Closed In period of 60 minutes, then reopened for Final Flow of 90 minutes. Again, there was a weak blow increasing to strong blow in 5 minutes, which remained steady, but no gas to surface. Tool was closed for Final Closed In period of 90 minutes and test pulled.

Fluid recovered was as follows:

5'	of slightly oil cut brachish water
1116'	of brachish water (formation water)
905'	of brachish water (formation water)
2026'	total recovery.

Sampler contained 2100 cc of water at 30# pressure. Water analysis indicated definite formation water.

Pressures were as follows:

Initial Hydrostatic	-	2111#
Final Hydrostatic	-	2111#
Initial Open Flow (20")	-	27#-397#
Initial Closed In (60")	-	1188#
2nd Open Flow (90")	-	397#-1004#
Final Closed In (90")	-	1188#
Bottom Hole Temperature	-	100°F

Results of this DST were disappointing, but not unexpected.

The well was then drilled ahead and base of the Kansas City was placed at 4300' by samples and drilling time, corrected to 4305' by electrical logs. At this point the Cunningham #10-1 was 20' low to the #1 Union Pacific, indicating thickening in the Lansing-Kansas City Group.

There was some thickening in the interval from the base of the Kansas City to the Marmaton, and at the top of the Marmaton the Cunningham #10-1 was 35' low to the #1 Union Pacific. There were no shows in the samples and no observable porosity; also, no porosity was indicated on the logs.

The Marmaton thinned and at the top of the Cherokee the Cunningham #10-1 was 19' low to the #1 Union Pacific. There were no shows in the samples, no drilling breaks, and no porosity was observable or indicated on the logs. Further, the entire Cherokee to Morrow interval was much more argillaceous and silty than normal.

At the top of the Morrow the Cunningham #10-1 was still 19' low to the #1 Union Pacific. There was no sand development in the Morrow except for a very thin, very, very fine, tight, glauconitic sand at the base (see Detailed Sample Log).

The top of the Mississippian was picked on drilling time and samples at 5122', corrected to 5119' by electrical logs. Lithology indicated the well was in low St. Louis No porosity and no shows were observed (see Detailed Sample Log).

The first Spergen lithology was found in the 5150-60' sample and top placed at 5150' drilling time, corrected to 5142' by electrical logs. The lithology was very finely crystalline, very silty and slightly argillaceous, very tight dolomite (see Detailed Sample Log). There were no drilling time breaks, absolutely no shows, and no porosity was indicated on the electrical logs.

The first questionable Warsaw lithology was found in the 5200-10' sample. The lithology was not typical Warsaw and top was not called on the well. The electrical logs put this top at 5204' (see Detailed Sample Log).

There was a drilling break from 5259-64' and the first Osage cherts and dolomite were found in the 5260-70' drilling sample. Samples were circulated at 5270' and had very finely crystalline to finely crystalline, finely granular, tight dolomite with spotted, gold fluorescence, no odor, but very slow cut. There was fair, spotted, brown oil stain in roughly 10% of the dolomite and the samples contained 10% to 20% chert.

Decision was made not to drill below 5274' TD in order not to penetrate the Osage Shale Marker which generally produces water. Drilling time placed the top of this marker at 5252', and on interval 5274' was just at the top.

At that point Schlumberger Dual Induction-Laterolog, Simultaneous Compensated Neutron-Formation Density and Bore Hole Compensated Sonic Log were run. Logs were calculated by Don Lanman with Huber and decision was made to run a drill stem test of the Osage. While conditioning hole for DST #2 total returns were lost. Mud was replaced and circulation regained but lost again immediately. It was determined that circulation was being lost on bottom, and decision was made to mix fresh mud, spot it on bottom, and attempt to run DST without circulating.

At this point I was released from the well and returned to Denver. Subsequently, DST #2 was run from 5225' to 5278'. Tool was opened for Initial Flow period of 20 minutes with a weak blow which did not increase. Tool was then closed for Initial Closed In of 60 minutes and reopened, again with a weak blow. It was left open 90 minutes on 2nd Open Flow, then closed for Final Closed In of 180 minutes.

Recovery was 480' of fluid as follows:

30'	mud
270'	water cut mud
180'	water (formation water)
480'	total recovery.

Pressures were as follows:

Initial Hydrostatic		2548#
Final Hydrostatic		2535#
Initial Open Flow	(20")	106#-212#
Initial Closed In	(60")	1241#
2nd Open Flow	(90")	159#-265#
Final Closed In	(180")	1109#
Bottom Hole Temperature		140°F

Sampler had no pressure and contained 2200cc of water cut mud.

Decision was made to plug and abandon the well, and hole was plugged in accordance with instructions of the State Plugging Engineer.

Joseph R. Clair

JOSEPH R. CLAIR
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C.P.G. #713

July 27, 1978

DETAILED SAMPLE LOG

J. M. HUBER CORPORATION
CUNNINGHAM #10-1
C/SE/SE Sec. 10-16S-48W
Cheyenne County, Colo.

	Sample study starts in lower Permian at 3570'.
3570-3597	Shale, red and dark red.
3597	Top - PENNSYLVANIAN (+644)
3597-3604	Limestone, buff to gray, trace brown, very finely crystalline, dense.
3604-3618	Shale, red, dark red, chocolate. (Note: Only Shale in samples but log indicates probably Siltstone.)
3618-3624	Limestone, gray, gray-buff, little brown, very finely crystalline, dense.
3624-3626	Shale, red, dark red.
3626-3640	Siltstone, gray, light grat, micromicaceous, limey.
3640-3644	Shale, red, dark red.
3644-3653	Limestone, gray, gray, buff, traces of brown, very finely crystalline to finely crystalline, dense; trace to a few microfossils; little silty.
3653-3658	Siltstone ? Only shale in samples.
3658-3661	Shale, red, dark red.
3661-3667	Siltstone ? Only shale in samples.
3667-3676	Limestone, gray, buff, brown, very finely crystalline to finely crystalline, dense; few microfossils.
3676-3702	Siltstone ? Only shale and little Limestone in samples.
3702-3706	Shale, red, dark red, trace chocolate.
3706	Top - TOPEKA (+535)
3706-3724	Limestone, gray to buff, little brown, very finely crystalline to finely crystalline, dense; considerable microfossils, slightly less toward bottom.
3724-3726	Shale, red, dark red.
3726-3740	Limestone, gray, buff, little brown, very finely crystalline to finely crystalline, dense; trace microfossils.
3740-3746	Shale, black, gray-black, little dark red.

3746-3761	Limestone, gray, gray-buff, buff, little brown, very finely crystalline, dense; trace microfossils; trace Chert, gray, opaque.
3761-3763	Shale, dark gray, black.
3763-3777	Limestone, buff, gray-buff, gray, brown, very finely crystalline to finely crystalline, dense; considerable Chert, gray and brown, opaque and semiopaque; few microfossils; little interbedded, black Shale.
3777-3779	Shale, black, gray-black, some hard.
3779-3790	Limestone, as above; most gray and gray-buff; only trace Chert.
3790-3805	Limestone, gray, little gray-buff, brown, very finely crystalline to finely crystalline, dense; trace fossil fragments and microfossils; trace Chert, gray, opaque.
3805-3807	Shale, black, fairly hard.
3807-3810	Siltstone, gray, micromicaceous, slightly limey.
3810-3817	Limestone, gray, gray-buff, little buff, very finely crystalline to finely crystalline, dense; some microfossils.
3817-3820	Siltstone, gray, micromicaceous, slightly limey, dirty.
3820-3822	Shale, gray-black, black, hard.
3822-3834	Siltstone, gray, micromicaceous, slightly limey.
3834-3846	Limestone, buff, gray, gray-buff, very finely crystalline to finely crystalline, dense; some microfossils.
3846-3849	Shale, black, slightly carbonaceous to hard.
3849-3855	Siltstone, gray, micromicaceous, slightly limey.
3855-3861	Limestone, gray to buff and brown, very finely crystalline to finely crystalline, dense; some to considerable microfossils; trace crinoid stem.
3861-3863	Shale, black, gray-black, very slightly carbonaceous to hard.
3863-3892	Limestone, buff to gray, finely crystalline, dense; few microfossils; some very finely granular; trace Dolomite, dark brown, very very finely succrosic, tight toward bottom.
3892-3896	Shale, black to dark gray, hard.
3896-3912	Siltstone, gray, dark gray, micromicaceous, limey; with some interbedded Shale, as above.
3912	Top - LANSING-KANSAS CITY (+329)
3912-3924	Limestone, buff to gray, little white and brown, very finely crystalline to finely crystalline, dense; some microfossils; little white chalky.

3924-3934	Limestone, buff, cream-buff, gray, very finely crystalline to finely crystalline, dense; some microfossils; trace Fusulina.
3934-3940	Siltstone, gray, micromicaceous, limey; and Shale, black, dark gray, gray, hard.
3940-3955	Limestone, buff to light brown, gray, very finely crystalline to finely crystalline, dense; some fine to medium, dense oolitic; with very poor interoolitic porosity (log porosity 3944-51); few microfossils; trace pyrite.
3955-3964	Siltstone, gray, micromicaceous, limey; with some interbedded Shale.
3964-3966	Shale, black, gray-black, hard.
3966-3976	Siltstone, gray, micromicaceous, limey.
3976-3984	Limestone, buff, gray, very finely crystalline to finely crystalline, dense; trace microfossils.
3984-3987	Shale, dark gray, gray-black.
3987-4009	Limestone, buff to gray, little gray-buff, light brown, dark gray, very finely crystalline to finely crystalline, dense; few microfossils.
4009-4012	Shale, black, gray-black, dark gray, some hard.
4012-4018	Siltstone, gray, micromicaceous, limey; with some interbedded Shale, as above.
4018-4023	Limestone, buff and gray-buff to gray and brown, very finely crystalline, very dense; few microfossils; trace pyrite.
4023-4030	Siltstone and Shale, as above.
4030-4041	Limestone, gray and gray-buff to buff, very finely crystalline to finely crystalline, dense; few microfossils; Fusulina sections.
4041-4046	Siltstone, gray, micromicaceous, limey; and Shale, black and gray-black.
4046-4066	Limestone, buff to brown, gray, very finely crystalline to finely crystalline, very dense; some scattered microfossils.
4066-4068	Shale, black to dark gray, slightly carbonaceous to hard.
4068-4078	Limestone, buff, brown, dark gray, very finely crystalline to finely crystalline, dense; considerable microfossils; traces of Chert, gray, brown-gray, opaque.
4078-4080	Shale, black, gray-black, slightly carbonaceous to hard.
4080-4098	Limestone, gray to buff, brown, very finely crystalline to little finely crystalline, dense; few microfossils; trace Chert, brown, gray, semi-opaque; trace pyrite.
4098-4100	Shale, black, gray-black, hard.

4100-4118 Limestone, brown to gray, buff, very finely crystalline to finely crystalline, dense; some fine to medium, dense oolitic; few microfossils; trace Chert, gray, opaque.

4118-4123 Siltstone, gray, micromicaceous, limey; and Shale, black, gray-black, dark gray.

4123-4133 Limestone, as above; more brown, little very dark gray; trace pyrite.

4133-4146 Siltstone, gray, micromicaceous, limey; and Shale, black, gray-black, dark gray.

4146-4196 Limestone, buff and light gray, very finely crystalline to finely crystalline, dense; some white chalky; scattered, very poor, microvug porosity; traces of very spotted, brown oil stain; circulating samples at 4195' had slight to good odor, spotted dull to bright gold fluorescence, no free oil but instant cut. Dry samples were very finely crystalline to finely crystalline with some secondary calcite crystals and sparry calcite apparently lining vugs; staining was very spotted and entire section looked very tight; electrical logs show very scattered but poor porosity.

4196-4228 Limestone, gray, buff, little white chalky, very finely crystalline to finely crystalline, dense to slight microvug porosity; vugs are quite scattered; only trace very spotted, brown oil stain; some very, very finely granular, slightly dolomitic; traces of secondary calcite crystals; few microfossils; trace pyrite; best log porosity 4202-08.

4228-4232 Shale, black, slightly carbonaceous.

4232-4250 Limestone, gray, buff, light brown, very finely crystalline to slightly crystalline, dense; some microfossils; some light brown, very very finely granular, slightly dolomitic Limestone, possibly as lentils.

4250-4259 Siltstone, gray, micromicaceous, shaly; and Shale, black to dark gray, hard.

4259-4283 Limestone, buff to gray, little brown and light brown, very very finely crystalline to very slightly crystalline, dense; some scattered microfossils with slight microfossil vug porosity; little light brown and buff, very very finely granular, very tight, dolomitic Limestone.

4283-4305 Limestone, buff to gray, little brown, finely crystalline, fine to medium, dense oolitic and oolicastic; with poor to fair oolicastic porosity (only 10% to 30% showed any porosity); good but very spotted, brown oil stain (only 10% of porosity was stained). Wet samples had good odor, spotted dull to bright gold fluorescence, good cut. Ran DST #1 from 4274-4300'.

4305 Base KANSAS CITY (-64)

4305-4308 Shale, black, gray-black.

4308-4319 Siltstone to very, very fine Sandstone, dark gray, micromicaceous, limey; with some interbedded Shale, as above.

4319-4333 Shale, black, slightly carbonaceous to hard; and Siltstone to very, very fine Sandstone, gray, dark gray, micromicaceous, limey.

4333-4342	Siltstone to very, very fine Sandstone, gray, micromicaceous, very tight, limey.
4342-4344	Shale, black, gray-black, gray, hard; trace pyrite.
4344	Top - MARMATON (-103)
4344-4356	Limestone, buff to gray, very very finely crystalline to finely crystalline, dense; trace microfossils and fossil fragments.
4356-4358	Shale, black, gray-black, gray.
4358-4368	Limestone, as above; more gray, little brown; few microfossils; trace Dolomite, tan, very finely granular, tight, slightly limey.
4368-4370	Shale, as above.
4370-4384	Siltstone to very, very fine Sandstone, gray and light gray, micromicaceous, very tight, limey.
4384-4414	Limestone, gray to buff, light brown, brown, very finely crystalline, very dense; trace microfossils.
4414-4432	Limestone, buff to brown, gray, very finely crystalline to finely crystalline and some very, very finely crystalline, very dense; trace microfossils; little dark brown, sublithographic at base.
4432-4434	Shale, black, hard, trace slightly carbonaceous.
4434-4444	Limestone, gray to brown, gray-buff, very finely crystalline to finely crystalline, dense; considerable microfossils.
4444-4447	Shale, black to gray, hard.
4447-4490	Limestone, buff to brown and dark brown, very finely crystalline to very, very finely crystalline and sublithographic, very dense; trace microfossils and little chalky at top. (Note: Sublithographic limestone increases toward bottom.)
4490	Top - CHEROKEE (-249)
4490-4496	Shale, black, very carbonaceous to hard.
4496-4509	Limestone, buff, gray-buff to brown and little dark brown, very finely crystalline to finely crystalline, dense, little chalky, little silty and argillaceous; few microfossils.
4509-4515	Shale, black, very carbonaceous to hard.
4515-4548	Limestone, gray, gray-buff to brown, dark brown, very finely crystalline to finely crystalline, dense, little chalky, little silty and slightly argillaceous; few microfossils; trace Chert, gray-brown, opaque, fossiliferous.
4548-4551	Shale, black, gray-black, carbonaceous to hard.

4551-4564	Limestone, gray to dark gray, gray-black, very finely crystalline to finely crystalline, dense, some slightly argillaceous and little siliceous to silty; some fossil fragments; little interbedded Shale, as above.
4564-4587	Limestone, gray to dark gray, gray-black, little black, trace brown, very finely crystalline, dense, considerable argillaceous and trace siliceous; few microfossils and trace brachiopod spines; little interbedded Siltstone, gray, micromicaceous, limy and shaly; and Shale, black, slightly carbonaceous to hard, particularly from 4564-79'.
4587-4589	Shale, black, slightly carbonaceous to hard.
4589-4597	Limestone, gray to dark gray, little brown, very finely crystalline to finely crystalline, dense, some argillaceous and silty; trace fossil fragments (crinoid stem).
4597-4599	Shale, as above.
4599-4606	Limestone, as above; trace Chert, gray-black, opaque.
4606-4608	Shale, black, slightly carbonaceous to hard.
4608-4621	Limestone, gray to black, very finely crystalline to finely crystalline, dense; few microfossils; some quite argillaceous and little silty.
4621-4624	Shale, black, slightly carbonaceous to hard.
4624-4638	Limestone, gray to brown, gray-brown, some dark gray, trace gray-black, very finely crystalline to finely crystalline, dense; few microfossils; some argillaceous and trace silty; trace Chert, gray-white, semiopaque; becomes more argillaceous toward bottom; trace fossil fragments.
4638-4654	Limestone, gray to dark gray, little gray-black and black, very finely crystalline to finely crystalline, dense; few microfossils and trace fossil fragments; some argillaceous and little siliceous.
4654-4668	Shale, black, gray-black, slightly carbonaceous to hard; with some interbedded Limestone, as above.
4668-4671	Shale, black, hard.
4671-4690	Limestone, gray to brown, gray-black, very finely crystalline to finely crystalline, dense, little to some argillaceous and siliceous; scattered microfossils; with some interbedded Shale, as above.
4690-4698	Shale, black, hard.
4698	Top - ATOKA (-457)
4698-4723	Limestone, gray to dark gray, gray-black, brown and black, very finely crystalline to finely crystalline, dense; considerable argillaceous and little siliceous; some interbedded Shale, as above.
4723-4725	Shale, black, some splintery.
4725-4737	Limestone, gray to dark gray, gray-black, black, very finely crystalline to finely crystalline, dense, quite argillaceous and little siliceous; few microfossils and fossil fragments.

4737-4739	Shale, black, most hard, some splintery.
4739-4752	Limestone, gray to black, very finely crystalline to finely crystalline, dense, considerable argillaceous and little siliceous; trace fossil fragments.
4752-4774	Shale, black, very slightly carbonaceous to hard; with interbedded Limestone, gray to gray-black and black, very finely crystalline to finely crystalline, dense, quite argillaceous and little siliceous.
4774-4786	Limestone, as above; little brown and dark brown; trace shell fragments; with interbedded Shale, black, hard, little splintery.
4786-4790	Shale, black, hard, little splintery.
4790-4794	Limestone, gray to gray-black, black, trace brown, very finely crystalline to finely crystalline, dense, quite argillaceous and considerable siliceous; few fossil fragments; trace pyrite.
4794-4796	Shale, as above.
4796-4801	Limestone, as above.
4801-4804	Shale, black, some splintery, most hard.
4804-4814	Limestone, gray to gray-black, black, very finely crystalline to finely crystalline, dense, quite argillaceous and little siliceous.
4814-4816	Shale, as above.
4816-4824	Limestone, as above; trace fossil fragments; little silty to siliceous.
4824-4826	Shale, black, soft to hard, trace splintery.
4826-4833	Limestone, gray to gray-black, little black, dark brown, very finely crystalline, dense, considerable argillaceous and some silty to siliceous; more brown and dark brown at bottom.
4833-4838	Shale, black, gray-black, trace dark brown, slightly carbonaceous to hard, little splintery.
4838-4850	Limestone, gray to black, trace light brown and brown, very finely crystalline to finely crystalline, dense, considerable argillaceous and some siliceous; trace pyrite.
4850	Top - MORROW (-609)
4850-4875	Shale, gray-green, green-gray, green, little black, satiny to talcy; trace pyrite; trace poor coal.
4875-4900	Shale, gray-green, green, gray, black, satiny to talcy, some splintery; traces of pyrite; trace Limestone, brown, slightly crystalline, dense; with fossil fragments.
4900-4940	Shale, green, gray-green, gray, black, satiny to talcy; pyrite; traces of fossil fragments; traces of black and brown, dense, limestone nodules;

glauconite; trace Limestone, gray-black, gray, very finely crystalling, dense, glauconitic; and some fossil fragments.

4940-4992 Shale, gray, gray-green, green, black, satiny; pyrite; considerable glauconite; little brown and black, dense, limestone nodules; traces of Limestone, brown, gray-brown, gray-black, very finely crystalline to finely crystalline, dense, glauconitic, fossil fragmental and some shaly. (Note: Only an occasional fragment seen in samples.)

4992-4997 Siltstone, gray, micromicaceous, limy.

4997-5050 Shale, gray, dark gray, black, gray-green, green, satiny, some splintery; pyrite; traces of glauconite; trace brown, black, dense, limestone nodules; trace brown, finely crystalline, dense, fossil fragmental Limestone.

5050-5070 Shale, gray to black, gray-green, satiny, little splintery.

5070 Top - LOWER MORROW LIMESTONE (-829)

5070-5074 Limestone, gray, dark gray, buff, very finely crystalline to slightly crystalline, dense; with considerable fossil fragments and microfossils; slightly glauconitic; with traces of medium to slightly coarse, quartz wash grains imbedded.

5074-5076 Shale, gray to black, gray-green, satiny, trace splintery.

5076-5090 Limestone, gray, buff, brown, very finely crystalline to slightly crystalline, dense; considerable coarse fossil fragments; glauconitic; trace microfossils; few coarse to very coarse, quartz wash grains imbedded.

5090-5111 Limestone, buff, light brown, brown, gray, very finely crystalline to finely crystalline, dense, little glauconitic; few coarse fossil fragments; few loose, coarse, quartz wash grains.

5111-5119 Shale, gray to black, gray-green, satiny; trace pyrite; with little interbedded Sandstone, gray-white, very very fine, tight, limy, glauconitic.

5119 Top - MISSISSIPPIAN (ST. LOUIS) (-878)

5119-5140 Limestone, light brown, brown, dark brown, very very finely crystalline to finely crystalline and some sublithographic, very dense; considerable Chert, gray, gray-white, opaque and semiopaque; with traces of white quartzose (up to 2% Chert); little finely, dense oolitic toward bottom.

5140 Top - "X" SHALE MARKER (-899)

5140-5142 Shale (Note: No lithology characteristic of this interval found in samples.)

5142 Top - SPERGEN (-901)

5142-5170 Dolomite, brown, dark brown, gray, very very finely crystalline to very finely crystalline, very tight, quite silty and some argillaceous; traces of Chert, gray, light gray, opaque and semiopaque.

5170-5204 Dolomite, gray, brown, very very finely crystalline to finely crystalline, very tight, quite silty and some argillaceous.

5204 Top - WARSAW* (-963) ?

5204-5224 Limestone, gray, dark gray-brown, dark gray, finely crystalline to crystalline, dense; considerable coarse fossil fragments and microfossils; trace Chert, gray, opaque; slightly argillaceous.

* Note: Lithology was not typical Warsaw and there were no typical Warsaw cherts until the 5240-50' sample. Also, there was no electric log response as is usual; therefore, the Warsaw top is questioned.

5224-5254 Limestone, brown, buff-brown, gray, buff, finely crystalline to crystalline dense; traces of Chert, gray-brown, gray, white, opaque, fossiliferous, and semiopaque and quartzose; abundant fossil fragments.

5254 Top - OSAGE (-1013)

5254-5264 Dolomite, buff to light brown, very finely crystalline, very tight; Chert, light gray, white, gray-tan, opaque and semiopaque.

5264-5274 Dolomite, buff, very finely crystalline to finely crystalline, finely granular, tight; spotted brown oil stain (10% stained); abundant Chert, white, gray, opaque and semiopaque, rought and smooth, some to considerable weathered (20% Chert).

Note: Samples were circulated at 5270' and 5274'. Wet samples had spotted dull to bright gold fluorescence, possible spotted stain, no odor, slight very slow cut, with abundant Chert.

5274 Total depth - Driller.
5280 Total depth - Schlumberger.

Samples described:

Joseph R. Clair

JOSEPH R. CLAIR
(on well)

DRILLING TIME LOG

J. M. HUBER CORPORATION
CUNNINGHAM #10-1
C/SE/SE Sec. 10-16S-48W
Cheyenne County, Colo.

One foot drilling time from 3600'.

3600-3620	5-6-3-3-3-5-3-2-3-4	
3620-3640	5-3-3-3-4-3-3-4-3-3	
3640-3660	5-5-4-5-4-5-5-5-4-5	
3660-3680	4-3-4-4-4-5-5-5-4-4	
3680-3700	4-3-5-5-5-5-4-5-4-5	
3700-3720	4-3-4-5-4-4-3-4-4-4	
3720-3740	3-4-4-4-3-2-3-4-4-4	
3740-3760	5-5-4-5-4-5-7-5-5-6	
3760-3780	6-6-5-6-6-4-5-5-5-5	
3780-3800	5-7-6-7-7-6-6-6-8-7	
3800-3820	6-5-7-9-8-7-8-6-8-5	
3820-3840	5-6-7-5-6-6-6-5-5-7	
3840-3860	4-4-4-4-5-6-6-5-8-5	
3860-3880	5-5-2-3-5-2-3-2-3-2	
3880-3900	2-3-1-2-2-2-3-1-5-4	
3900-3920	5-5-5-5-5-4-4-5-6-5	
3920-3940	5-4-3-3-3-5-6-6-6-6	
3940-3960	2-3-3-3-4-3-2-2-5-5	
3960-3980	4-4-5-6-5-5-5-6-5-6	
3980-4000	6-6-5-5-5-5-5-6-7-6	
4000-4020	10-9-6-8-6-5-4-6-7-5	
4020-4040	7-7-5-5-7-5-4-5-5-6	
4040-4060	4-6-7-7-6-6-5-4-5-5	
4060-4080	6-5-7-6-6-5-6-7-8-6	
4080-4100	7-6-5-7-6-7-6-6-7-5	
4100-4120	5-5-5-6-5-9-5-5-5-5	
4120-4140	4-5-7-3-2-5-7-8-6-8	
4140-4160	9-6-5-5-4-4-3-3-2-3	
4160-4180	3-3-3-4-5-4-4-3-2-3	
4180-4200	2-2-2-2-2-2-2-2-1-2	
4200-4220	2-2-4-4-4-5-5-4-4-5	
4220-4240	8-9-11-8-7-4-4-9-8-9	
4240-4260	9-10-8-10-6-4-4-3-3-5	
4260-4280	6-7-5-2-2-1-3-3-7-8	
4280-4300	1/2-1/2-1 1/2-1 1/2- 1 1/2-1-1-1/2-1/2-1/2	
4300-4320	11-12-9-7-8-10-7-10-12-10	
4320-4340	5-6-6-5-5-5-6-5-4-3	
4340-4360	5-5-5-6-5-6-6-6-5-5	
4360-4380	5-6-5-5-5-4-4-4-5-5	
4380-4400	6-6-5-6-5-5-5-6-6-7	
	3-5-5-5-5-6-9-5-5-5	Bit #5 (J-22) in at 2778'.
	4-3-3-2-5-4-4-4-4-5	
	5-5-4-4-4-4-4-5-4-4	
	5-4-4-4-4-4-4-4-4-4	
	4-4-4-4-3-4-3-3-4-4	
	3-4-3-2-2-2-3-4-4-4	
	4-4-3-4-3-4-3-2-3-4	
	5-5-5-5-6-5-5-5-5-5	
	5-6-5-6-5-4-3-5-5-5	
	7-7-6-6-7-6-6-5-6-8	
	6-6-8-6-6-6-4-5-9-7	
	5-6-5-6-8-5-6-6-9-7	
	5-4-4-5-5-6-4-5-6-8	
	3-3-2-4-3-2-2-3-2-3	
	2-8-5-5-5-5-7-8-5-6	
	5-5-4-4-4-3-3-3-3-4	
	4-5-5-6-4-5-6-6-4-4	
	5-5-5-5-5-4-5-5-4-3	
	5-5-7-6-6-4-4-6-8-6	
	6-5-4-4-4-5-8-9-7-9	
	6-5-6-5-5-6-6-6-6-8	
	3-6-6-6-8-7-7-6-5-5	
	5-3-3-6-7-6-4-4-1-4	
	8-8-6-6-5-5-4-6-5-5	
	6-6-6-7-6-6-8-7-8-5	
	5-7-8-6-5-5-9-5-3-3	
	10-10-12-10-10-9-7-9-10-9	
	4-3-3-3-2-4-3-4-3-3	
	3-4-4-4-3-4-3-4-4-4	
	1-2-2-3-3-5-9-4-4-3	Circ. samples at 4195'.
	4-3-6-4-3-5-4-6-8-5	
	8-9-9-10-9-9-10-13-10-7	
	7-7-6-6-6-4-6-3-6-6	
	10-9-8-9-10-4-6-8-5-1/2	
	1 1/2-1-1/2-1/2-1-1/2- 3 1/2-5-5-7	Circ. samples at 4300'. Ran DST #1 from 4274-4300'.
	6-9-5-6-4-5-5-6-6-5	
	3-3-4-3-4-5-5-5-5-5	
	6-6-5-4-6-5-5-6-6-5	
	5-5-5-5-5-5-5-5-5-6	
	8-7-6-5-3-3-3-3-4-4	

RECEIVED
OCT 23 1978
COLO. OIL & GAS CONS. COMM.

4400-4420	4-4-5-6-6-6-5-6-7-6	5-6-5-2-3-5-4-5-5-6
4420-4440	5-5-5-5-5-6-5-5-4-4	5-5-6-7-8-6-7-8-5-6
4440-4460	7-6-6-6-8-6-5-5-5-5	7-6-7-6-4-10-6-8-5-6
4460-4480	13-8-7-6-6-8-8-7-8-7	8-7-8-6-9-8-6-8-9-9
4480-4500	10-8-8-12-10-4-3-5-3-3	2-3-8-9-5-5-7-4-7-6
4500-4520	7-5-7-4-4-5-3-3-2-4	5-4-4-8-8-7-7-7-4-5
4520-4540	6-7-5-7-7-7-5-5-6-6	6-9-6-9-6-6-5-8-10-7
4540-4560	6-5-7-5-1-3-4-5-7-6	4-5-5-7-5-4-4-5-6-7
4560-4580	8-7-7-6-6-6-7-5-6-6	7-6-6-6-6-5-6-6-5-8
4580-4600	8-5-5-5-7-6-5-6-6-5	5-6-4-3-4-7-8-5-5-5
4600-4620	8-5-5-6-6-7-6-7-7-6	5-5-5-5-5-6-6-5-5-5
4620-4640	6-7-5-4-6-8-7-7-10-8	5-6-6-6-8-8-6-5-7-8
4640-4660	7-10-8-10-9-12-9-7-11-10	6-5-5-4-5-9-6-5-5-6
4660-4680	7-7-5-5-5-3-7-10-8-10	14-18-8-8-14-11-2-7-3-6
4680-4700	6-10-6-10-5-5-4-4-3-4	4-4-2-8-6-10-5-6-8-7
4700-4720	8-8-10-6-8-7-7-9-6-9	5-8-9-6-9-4-6-7-7-4
4720-4740	4-8-9-8-8-7-8-6-5-6	6-8-8-4-5-6-6-7-7-5
4740-4760	7-6-7-6-8-5-4-5-8-5	2-2-6-6-4-2-3-6-4-3
4760-4780	2-2-6-9-6-2-4-8-4-3	4-4-5-5-5-4-4-3-5-9
4780-4800	7-7-7-5-4-5-4-5-9-7	8-3-7-5-7-6-9-7-5-5
4800-4820	5-5-9-6-5-5-5-5-5-7	5-4-9-6-8-6-4-6-8-7
4820-4840	6-5-6-5-5-7-8-5-6-2	5-6-5-5-7-3-6-7-4-9
4840-4860	10-8-4-4-8-10-3-2-3-5	6-4-3-7-7-3-3-3-6-3
4860-4880	2-3-8-7-9-4-2-7-4-3	2-3-2-3-4-2-4-3-3-4
4880-4900	3-4-3-3-4-3-4-3-4-4	5-4-4-3-3-3-5-4-5-4
4900-4920	3-4-8-5-4-3-4-5-5-4	4-4-7-4-4-5-6-8-4-3
4920-4940	4-4-5-3-3-4-3-4-4-4	4-4-4-2-4-4-3-3-4-3
4940-4960	4-3-4-6-3-4-3-3-4-4	4-3-3-4-5-5-5-5-5-5
4960-4980	5-4-4-4-5-3-3-4-4-3	5-4-4-5-5-4-4-5-4-4
4980-5000	4-5-5-6-5-5-5-5-5-6	7-4-4-4-3-4-3-4-4-4
5000-5020	3-4-4-4-4-4-4-4-4-4	4-4-4-4-4-4-4-4-4-4
5020-5040	4-4-4-4-3-2-3-4-6-6	6-6-5-6-6-5-6-6-5-6
5040-5060	6-5-4-4-6-6-6-6-6-5	6-4-4-4-4-4-3-4-4-4
5060-5080	4-4-3-3-4-4-8-10-8-4	4-4-8-7-7-6-5-6-7-6
5080-5100	6-7-7-7-7-6-6-6-5-5	5-5-6-5-7-5-7-5-5-6
5100-5120	7-7-7-7-7-7-6-8-8-8	7-7-7-9-6-7-6-7-8-7
5120-5140	7-6-7-9-9-7-5-8-7-9	6-8-8-8-8-8-7-8-9-8
5140-5160	13-12-10-8-10-12-13-8-7-11	6-5-9-7-8-8-7-8-8-7
5160-5180	10-9-5-6-6-5-8-7-8-7	5-7-8-6-9-8-7-7-8-7
5180-5200	7-6-7-7-7-8-6-9-8-8	8-7-6-7-8-9-10-6-9-6
5200-5220	8-7-7-9-9-9-10-9-8-9	8-5-5-6-5-5-6-8-7-6
5220-5240	7-5-8-6-7-5-7-5-6-6	7-6-5-6-6-6-7-8-6-7
5240-5260	7-8-6-5-6-6-8-7-7-8	10-11-7-6-7-6-6-5-7-4
5260-5274	4-2-2-2-4-3-4-6-4-4	4-5-5-5

Circ. samples at 5170'.

Circ. 1 hr. at 5274' TD.

5274	Total depth - Driller
5280	Total depth - Schlumberger

BIT RECORD

J. M. HUBER CORPORATION
CUNNINGHAM #10-1
C/SE/SE Sec. 10-16S-48W
Cheyenne County, Colo.

Run No.	Size	Make	Type	Jet Size 1	Jet Size 2	Jet Size 3	Depth out	Feet	Hours
1	12 1/4	Smith	DTJ	18/32	18/32	18/32	217	217	
1	7 7/8	Smith	DTJ	14/32	15/32	16/32	1067	850	11
2	7 7/8	Smith	DTJ	14/32	15/32	16/32	1930	863	18 3/4
3	7 7/8	HTC	OSC3AJ	16/32	16/32	14/32	2366	426	15 3/4
4	7 7/8	Reed	Y13TJ	12/32	16/32	16/32	2778	412	16 1/2
5	7 7/8	HTC	J22	16/32	16/32	18/32	5274	2496	196 1/2