

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 112

Summary of the Carter Oil Company - Ed Lockwood #1
Dunn County, North Dakota
Well #413 - Permit #429

By Clarence G. Carlson

Carter Oil Company - Ed Lockwood #1, Dunn County, North Dakotas SE SW
Section 5, T. 147N., R. 93 W. (560 feet from south line and 2130 feet from the west line). Elevation K.B. 2145', G.L. 2133'.

The Carter Oil- Lockwood #1 was spudded October 9, 1953 and 16 inch casing was set at 720 feet with 700 sacks of cement. 10 3/4 inch casing was set at 6216 feet with 260 sacks of cement, November 17, 1953. 7 inch casing was set at 11,016 feet with 480 sacks of cement March 15, 1954. The well was completed as a dry hole and plugged and abandoned February 16, 1955. Total depth 11,105 feet.

Plugging Record:

Lane Wells bridge plugs set at 10,908, 10,863, 10,460, 9,250, 9,160, 9,100, 8,590, 8,525.

Cemett Plugs as follows:

9093-9042 25 sacks
7800-7750 25 sacks
1808-1783 25 sacks
600-579 25 sacks
at surface 10 sacks

Casing left in hole: 703 feet of 16 inch casing, 4,424 feet of 10 3/4 inch and 3231 feet of 7 inch.

Cores:

8549-8578	9203-9315
8950-9086	10386-10444
9168-9202	

Drill Stem Tests and Perforations:

DST 1 8460-8549; open 6 hours, weak blow for 20 minutes, then died; recovered 470 feet of mud.

DST 2 8930-8950; open 5 hours, weak blow for 2 minutes, died; recovered 1 foot of clean oil 27° API, 4 feet of oil cut mud, 719 feet of salt water. IFP 50#, FFP 400#, 15 minutes SIP 2600#.

DST 3 9018-9066; open 5 hours; weak blow increasing to good blow after 5 minutes, gas to surface in 3 3/4 hours - burned with a 4 foot flame. Recovered 415 feet of 32° API oil, 2% BS & W; 280 feet of heavily gas and oil cut mud, IFP 0#, FFP 195#, 30 minute SIP 3752#.

DST 4 9056-9086; open 4 hours, very weak blow throughout, recovered 430 feet of gas cut salty sulphur water. IFP 0#, FFP 195#, 30 minute SIP 3752#.

DST 5 9176-9202; (run 1) Tool open 20 minutes shut in 5 minutes, recovered 1200 feet of mud.

DST 5 (run 2) open 4 hours, very weak blow; recovered 724 feet of mud. IFP 150#, FFP 325#, 20 minutes SIP 350#, HP 5375#.

DST 5 (run 3) Open 6 hours, very weak initial blow; recovered 180 feet water cushion, 90 feet of water cut drilling mud with sulphur odor and oil fluorescence. IFP 130#, FFP 130#, 30 minutes SIP 1465#.

DST 6 9200-9257 (run 1) open 4 hours, weak blow for 3 hours; recovered 2370 feet of drilling mud.

DST 6 (run 2) open 3 hours, fair blow 1st hour, died after second hour. Packer failed after 3 hours and 5 minutes and mud dropped in annulus. Recovered 300 feet of slightly gas cut mud with sulphur odor, 535 feet of drilling mud. IFP 0#, FFP 150#,

DST 7 9267-9315; open 2 hours, weak blow for 20 minutes, packer failed after 2 hours, recovered 120 feet of water cut mud, salt content 222,950 PPM with sulphur odor, 360 feet of drilling mud, salt content 216,000 PPM. IFP 200#, FFP 600#.

DST 8 10,370-10,444; open 5 hours, weak blow for 45 minutes increasing to good blow for remainder of test. Used 1080 feet water cushion, recovered 30 feet of 34 gravity oil, 60 feet of oil and gas cut water cushion, 710 feet of slightly oil and gas cut water cushion, 400 feet of heavily gas and oil cut mud with no sulphur odor, no indication of formation water. IFP 500#, FFP 500#, 30 minutes SIP 1500#, HP 6050-5900#.

DST 9 10,442-10,502; open 4 hours, weak blow for 8 minutes. Used 1080 feet water cushion, recovered 360 feet of gas, 2 feet of oil cut water cushion, 1018 feet slightly gas and oil cut water cushion, 90 feet of heavily gas cut mud. IFP 650#, FFP 650#, 30 minutes SIP 700#.

DST 10 10,451-10,560; open 3 hours, 5 minutes, then packer failed, good blow; recovered 2160 feet of sweet gas, 510 feet of heavily gas cut mud with very slight oil show. IFP 70#, FFP 100#.

DST 11 11,000-11,046; open 4 hours, recovered 3300 feet of very salty water with salt crystals, no shows, IFP 825#, FFP 2600#, 30 minute SIP 5175#.

DST 12 11,058-11,104; open 4 hours, 40 minutes, then packer failed. Weak blow for 32 minutes. Recovered 640 feet of muddy salt water and 1170 feet of water load. IFP 800#, FFP 975#.

Perforated 10,912-10,928, W/4 jets per foot; swabbed tubing dry; waited 2 hours, swabbed with no recovery of well fluid.

Reperforated 10,912-10,928, W/4 bullets per foot; swabbed load water. Spotted 1000 gallons of 15% HCl with packer set at 10,873' tubing perforations 10,911-14. Swabbed load water and acid, recovered salt water, 304,000 PPM at rate of barrels 1 hour, for 6 hours. Set wire line plug at 10,908'.

Perforated 10,883-98 with 4 shots/foot. Set packer at 10,844' and swabbed off load water. Swabbed 4 barrels of salt water/hour for 5 hours, no shows. Set wire line plug at 10,863'.

Perforated 10,470-510 with Lane Wells jets. Swabbed load water and swabbed dry. Spotted 1,000 gallons of etching acid with 4500#, but formation would not break down.

Reperforated 104,70-510 with 4 A-2 bullets/foot. Spotted 1,000 gallons of etching acid; formation would not take at 4,000# pressure. Bridge plug set at 10,460'.

Perforated 10,410-10,450 with 4 jet shots/foot and with 2.5 A-2 bullets/foot. Attempted to acidize with 1,000 gallons of etching acid. No breakdown in 2 hours at 4,000# pressure.

Perforated 10,360-10,390 with 4 Lane Wells cone shots and 3 A-2 bullets per foot. Spotted 1,000 gallons of acid; formation would not take at 4000#, gradually took at 4100#, displaced acid at 4300#, displaced with water; swabbed load water. Perforated casing at 10,364 with 3 Lane Wells open hole jets and at 10,384 with 3 open hole jets;

displaced 500 gallons acid, 2000 gallons stratafrac and 500 gallons of 15% acid at 4200# through perforations 10,360-390; no breakdown in pressure. Swabbed off load water, then swabbed 50' of oil cut acid water (20% oil) and 400' of acid water. 22 hour swab test recovered 1 barrel of oil, 3 barrels of acid water. Set Lane Wells bridge at 9250'.

Perforated 9170-9230 with 4 jet shots/foot. Swabbed dry with no shows; acidized with 1000 gallons of 15% HCl, max. pressure 2500#, broke at 1700#, swabbed load water and acid water. Ran 6 hour swab test, recovered 2 1/2 barrels of water with a very slight trace of oil. Set Lane Wells bridge plug at 9160'.

Perforated 9121-9148 with 4 jet shots/foot. Set packer at 9090'. 4 hour swab test recovered 1 barrel of black sulphur water per hour with show of oil and sulphur gas. Acidized 9121-48 with 1000 gallons, maximum pressure 1950#, broke to 1750#, pumped in at rate of 3 barrels/minute. Swabbed off load and acid water. 4 hour swab test recovered 6 barrels of salt water with a trace of oil. Set Lane Wells bridge plug at 9100'.

Perforated 9012-9040 with 4 jet shots/foot; swabbed tubing dry, recovered 5 gallons oil on natural test. Acidized with 1000 gallons of 15% M38 acid, max. pressure 2500#, broke to 1800#, acid in at 2 barrels per minute, swabbed 2 hours, recovered 13 1/2 barrels of 26° API oil with 1% BS and W, 26 1/2 barrels of water 256,000 PPM; swabbed 32° API oil and 290,000 PPM water at following rates - 8 hours, 1.1 BOPH and 7.6 BWPH; 15 hours, - 1.5 BOPH and 4.2 BWPH; 24 hours - 1.6 BOPH and 5.9 BWPH; 17 hours - .2 BOPH and 8 BWPH.

Perforated 9046-9054 with 4 cone shots/foot; set packer at 9045' on 6 hour swab test produced 9 BWPH, 330,000 PPM with very slight trace of oil and gas. Set bridge plug at 9041'. Filled with cement to 9014', drilled out to 9025'. Swabbed perforations 9012'-9025' recovered 7 barrels of oil and 127 barrels of salt water in 24 hours. Set bridge plug at 8974'.

Perforated 8914-8960 with 4 jets/foot; 4 hours swab test recovered no shows of oil, gas and water. Acidized with 1000 gallons of regular acid, IP 1900#, built up to 2100# while taking acid, no break down pressure. 6 hour swab test recovered 59 1/2 barrels of black sulphur water with very slight show of gas and asphaltic oil. Swabbed down 7000' shut in 3 hours - fluid rose to 4500' and held. Drilled out bridge plug at 8974' and cement 9025'-9040'. Set retainer at 8988' sand squeezed perforations 9012'-9040' with 100 sacks of cement. Drilled retainer and cement 8988'- 9040', swab test recovered 1 barrel of salt water per hour for 9 hours, with trace of load oil. Set retainer at 8990' and resqueezed perforations 9012'-9040' with 50 sacks, washed out to 9040'; swabbed tubing dry, swabbed for 4 hours for no recovery. Drilled out to 9093', squeezed perforations 9046'-9054' with 100 sacks with retainer at 8984'; drilled out; resqueezed perforations with 100 sacks; drilled out to 9042'. Set packer at 8984'; swabbed dry.

Perforated 9012-9025 with 4 jets/foot. Swabbed load water; 10 hour swab test recovered 2 barrels of salt water/hour, no shows. Set bridge plug at 8590'.

Perforated 8530-8570 with 4 jet shots/foot, after recovering load water, 3 hour swab test recovered 3 barrels of salt water/hour, no show of oil or gas.

Temporarily abandoned May 6, 1954. Plugged and abandoned February 16, 1955.

Formation tops picked from samples and electric logs, adjusted to electric log tops. Colors determined from the rock color chart. Not all formation tops picked in the following list.

FORMATION TOPS

Cretaceous System

Pierre Formation	1748
Niobrara Formation	3709
Greenhorn Formation	4230
Dakota Silt	4995
Dakota sand	5050

Jurassic System

Morrison Formation	5436
Sundance Formation	5553
Piper Lime	6157

Triassic System

Spearfish Formation	6288
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Permian System

Minnekahta Formation	6725
Opeche Formation	6775

Pennsylvanian System

Minnelusa Formation	7150
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Mississippian System

Amsden Formation	7483
Big Snowy Group	7650
Kibbey Lime	8090
Charles Formation	8245
Base of Last Salt	
“Mission Canyon Top”	8775
Lodgepole Formation	9530
Englewood Formation	10,391

Devonian System

Lyleton Formation	10,468
Nisku Formation	10,700
Duperow Formation	10,785

840-900	Lignite, shale, light brownish gray, silty, micaceous, lumpy,	spongy.
900-930	Shale, light brownish gray, resinous, lumpy, spongy.	
930-1020	Shale as above, lignite.	
1020-1080	Sandstone, light gray, calcareous, argillaceous, fine grained,	subangular loosely
cemented.		
1080-1110	Shale, light brownish gray, resinous, lumpy, spongy, some	lignite.
1110-1140	Shale as above, some sandstone as in 1020-80.	
1140-1200	Shale, medium light gray, massive, compact.	
1243-1270	Shale, medium gray, lumpy, compact, sandstone, light gray, fine	grained,
subangular, loosely cemented, argillaceous and	calcareous, some biotite flakes.	
1270-1300	Lignite, some medium gray shale.	
1300-1358	Shale, light brownish gray, micaceous, silty, lumpy, spongy to	compact, some
sandstone, light gray, fine grained as above.		

1358-1446	Shale, medium light gray, light brownish gray, lumpy, compact,	some lignite.
1456-1513	Shale, medium gray, lumpy, compact, some sandstone light gray, loosely cemented, argillaceous.	fine grained,
1513-1643	Sandstone, light gray, fine grained, loosely cemented, calcareous, with some biotite flakes, some medium gray shale.	argillaceous and
1643-1673	Sandstone, light gray, fine to medium grained, loosely cemented, calcareous, some medium light gray shale.	argillaceous and
1704-1725	Shale, medium gray, massive, compact, some sandstone as above.	
1725-1800	Sandstone, light gray, fine grained, argillaceous, calcareous, medium gray shale, lignite.	with mica flakes, some
1800-1920	Shale, medium light gray, bentonitic, lumpy, compact, some above.	sandstone as
1920-2040	Shale, medium gray, bentonitic, lumpy, compact.	
2040-2070	Shale, medium gray as above, some white, micaceous bentonite.	
2070-2160	Shale, medium gray, bentonitic, lumpy, compact.	
2160-2220	Shale, medium gray as above, some white bentonite.	
2270-2310	Shale, medium gray, bentonitic, lumpy, compact.	
2310-2430	Shale, medium light gray, bentonitic, lumpy, spongy to compact.	
2486-2538	Shale, medium gray, lumpy, compact, some white bentonite.	
2548-2880	Shale, medium gray, lumpy, compact.	
2880-2910	Shale, medium gray as above, some white bentonite.	
2910-2970	Shale, medium gray, lumpy, compact.	
3030-3080	Shale, medium gray, lumpy, spongy to compact.	
3080-3127	Shale, medium gray, foliated, spongy to compact.	
3140-3200	Shale, as above.	
3230-3320	Shale, medium gray, foliated, spongy to compact.	
3320-3350	Shale as above, some very light gray, micaceous bentonite.	
3389-3420	Shale, medium gray, foliated, spongy.	
3420-3601	Shale, medium gray, foliated, compact, some very light gray micaceous bentonite.	
3601-3662	Shale, medium gray, lumpy, compact.	
3662-3720	Shale, medium gray, foliated, spongy, some very light gray bentonite.	
3720-3780	Shale, medium gray to medium dark gray, calcareous, white specks, foliated, compact.	
3780-3840	Shale, medium gray to medium dark gray, foliated, spongy to compact, a few white specks.	
3840-4026	Shale, medium to medium light gray, lumpy, spongy.	
4026-4147	Shale, medium dark gray, foliated, spongy to compact.	
4147-4238	Shale, medium dark to dark gray, platy, compact.	
4238-4390	Shale, dark gray, calcareous, white specks, foliated, spongy to compact.	
4390-4420	Shale, dark gray, calcareous, foliated, spongy to compact.	
4420-4480	Shale, dark gray, foliated, compact.	
4513-4574	Shale, dark gray, massive, compact to spongy.	
4574-4730	Shale, dark gray, foliated, spongy to compact.	
4730-4820	Shale, dark gray, massive, compact, some platy, brittle.	
4848-5040	Shale, dark gray, foliated to platy, compact.	
5040-5050	Sandstone, fine to medium, subangular quartz grains, much shale	as above.
5050-5060	Sandstone, very light gray, fine to medium subangular quartz grains, fairly well cemented.	
5060-5070	Sandstone, very light gray, fine grained, well cemented.	
5080-5100	Sandstone as above, some shale, dark gray, foliated, compact.	
5100-5110	Sandstone, very light gray, fine grained, well cemented, some	very light gray,

	waxy, lumpy, compact shale.	
5110-5230	Sandstone, very light gray, fine to medium grained, well	cemented.
5230-5250	5230-5250 Shale, light gray, light bluish gray, earthy, lumpy, compact, some sandstone as above, much dark gray shale.	
5250-5260	Shale, light gray, light brownish gray, light bluish gray, resinous, lumpy, compact, much medium to dark gray shale.	earthy to
5260-5270	Sandstone, white to very light gray, fine, subangular grains, cement, shale as above.	well cemented, some pyrite
5270-5320	Shale, light brownish gray, light gray, earthy to resinous, lumpy, compact, much medium to dark gray shale.	
5320-5350	Shale as above, little sandstone, very light gray, fine grained,	some pyrite.
5350-5380	Sandstone, very light gray to light brownish gray, fine grained, shale, light gray, lumpy, compact.	subangular, some
5380-5440	Sandstone, white to very light gray, fine grained, shale, light	gray, lumpy, compact.
5440-5450	Shale, light to medium gray, massive, compact.	
5450-5460	Shale as above, sandstone, light gray, very fine grained, slightly calcareous.	
5460-5480	Sandstone as above, some shale, light to medium gray and light lumpy, compact.	brownish gray,
5480-5500	Shale, light to medium gray, some foliated, spongy, some lumpy	compact,
5500-5510	Shale as above, some sandstone light gray, fine grained, calcareous.	
5510-5520	Sandstone, light gray, very fine grained, argillaceous, calcareous. Shale as above.	
5520-5540	Shale, light to medium gray, spongy to compact.	
5540-5550	Siltstone, light gray to light greenish gray, calcareous, shale, compact, some shale, light greenish gray, foliated, compact, micaceous.	light gray, waxy, lumpy,
5550-5560	Sandstone, light gray, very fine grained, calcareous, some siltstone and shale as above.	
5560-5580	Sandstone, light gray, fine grained, calcareous, silty.	
5580-5600	Sandstone, light gray, fine grained, calcareous, glauconitic,	some light gray shale.
5600-5620	Sandstone, light gray, fine grained, calcareous, micaceous, some	glauconitic.
5620-5640	Sandstone, light gray, fine grained, calcareous, micaceous, some micaceous shale, spongy.	light gray, silty,
5640-5670	Siltstone, light gray, calcareous, some shale, light to medium	gray, spongy.
5670-5690	Sandstone, very light gray, very fine grained, calcareous, well	cemented.
5690-5720	Shale, greenish gray, 5GY6/1, foliated, spongy, some sandstone	as above.
5720-5740	Sandstone, very light gray, fine grained, calcareous, well cemented.	
5740-5760	Sandstone as above, some shale, greenish gray, slightly splintery, compact.	calcareous,
5760-5770	Sandstone, very light gray, very fine grained, calcareous, well	cemented.
5770-5800	Sandstone as above, some greenish gray shale as in 5740-60.	
5800-5840	Shale, greenish gray, slightly calcareous, some fissile, spongy, splintery.	some brittle,
5840-5890	Shale, greenish gray, 5GY6/1, calcareous, foliated, compact.	
5890-5900	Shale, greenish gray, as above, some greenish gray sandstone, calcareous.	fine grained,
5900-5930	Shale, greenish gray, calcareous, foliated, spongy to compact.	
5930-5940	Shale as above, little white oolitic limestone.	
5940-5970	Shale as above, some greenish gray siltstone.	
5970-5980	Shale as above, some greenish gray, fine grained calcareous sandstone.	

5980-6000	Shale, greenish gray, light olive gray, foliated, splintery and	compact.
6000-6020	Shale, greenish gray, foliated, spongy to compact.	
6020-6050	Shale as above, some sandstone greenish gray, very fine grained,	calcareous.
6050-6070	Shale, greenish gray, pale brown, calcareous, foliated and splintery, compact.	
6070-6160	Shale as above, sandstone, greenish gray, fine grained, calcareous.	
6160-6170	Limestone, yellowish gray, very fine grained, dense,	crystal-
	line, some shale and sandstone as above.	
6170-6200	Limestone, very light gray to light brownish gray, very fine grained, dense.	
6200-6210	Limestone as above, shale, greenish gray 5G6/1, calcareous, splintery, brittle.	
6220-6230	Limestone, very light gray, sublithographic, some greenish gray	shale.
6240-6250	Limestone, very light gray, light brownish gray, very finely crystalline, dense.	
6250-6270	Limestone, very light gray, pale red 5R6/2, very finely crystalline, dense.	
6270-6290	Limestone, very light gray, finely crystalline, dense.	
6290-6330	Shale, pale reddish brown, grayish red 5R4/2, calcareous, pale siltstone, calcareous.	reddish brown,
6330-6350	Shale, grayish red 5R4/2, calcareous, lumpy, compact.	
6350-6360	Shale, moderate reddish brown, calcareous, massive, compact, little colorless gypsum.	
6370-6390	Shale as above, little colorless gypsum.	
6390-6420	Shale as above, some sandstone, pale reddish brown, fine calcareous, little gypsum.	grained,
6420-6460	Siltstone, pale reddish brown, shale, grayish red, calcareous.	
6460-6500	Shale, moderate reddish brown, calcareous, platy, compact, some above, little colorless gypsum.	siltstone as
6500-6560	Shale as above, sandstone, pale reddish brown, fine grained, silty, calcareous, little gypsum.	
6560-6580	Shale as above, little gypsum.	
6580-6650	Shale, moderate reddish brown, massive, compact, some gypsum.	
6650-6680	Shale as above, some gypsum, siltstone, moderate reddish brown, sandy.	calcareous,
6690-6720	Shale as above, some siltstone as above.	
6720-6730	Shale as above, some gypsum, siltstone as above.	
6730-6750	Limestone, moderate orange pink, very finely crystalline.	
6750-6760	Shale, moderate reddish brown, massive, compact, siltstone, pale calcareous.	reddish brown,
6760-6790	Shale as above, some siltstone as above, gypsum.	
6790-6810	Shale, pale reddish brown, calcareous, platy, compact.	
6810-6840	Shale, pale reddish brown, slightly calcareous, platy compact, reddish brown, calcareous, some gypsum.	siltstone, pale
6840-6860	Shale, pale reddish brown, slightly calcareous, platy, compact,	some gypsum.
6860-7040	Shale as above, some siltstone, pale reddish brown, gypsum.	
7040-7120	Shale, pale reddish brown, slightly calcareous, platy, compact.	
7120-7140	Shale as above, some siltstone, pale reddish brown.	
7140-7180	Siltstone, pale reddish brown, calcareous, some shale as above.	
7180-7190	Shale, pale reddish brown, calcareous, some siltstone as above,	gypsum.
7190-7200	Sandstone, very light gray, very fine to fine grained,	calcareous.
7200-7260	Dolomite, grayish pink, fine grained, dense, some sandstone as	above.

7260-7290	Sandstone, very light gray to pinkish gray, fine grained, calcareous, some dolomite, grayish pink to pale red, fine grained, dense, sandy.	
7290-7340 cemented.	Sandstone, very light gray to pinkish gray, very fine to fine	grained calcareous, well
7340-7365	Sandstone as above, some dolomite, pinkish gray, fine grained,	dense.
7365-7375	Sandstone as above.	
7375-7395	Dolomite, pinkish gray, finely crystalline dense, some sandstone	as above.
7395-7405 cemented, some limestone, very light	Sandstone, very light gray to pinkish gray, very fine to fine gray sublithographic.	grained, calcareous, well
7405-7415	Sandstone as above.	
7415-7450	Sandstone as above, some dolomite, grayish pink, finely crystalline.	
7450-7470	Dolomite, grayish pink, light gray, finely crystalline.	
7470-7475	Sandstone, very light gray, very fine grained, tightly cemented.	
7475-7480	Sandstone as above, some light gray, dolomitic limestone.	
7480-7485	Shale, grayish red purple, waxy, platy, brittle, some sandstone	as above.
7485-7505	Dolomite, very light gray, finely crystalline, limey.	
7505-7525	Dolomite as above, some shale, pale red 10R6/2, platy, compact.	
7525-7545	Shale, grayish red 10R4/2, platy, compact, some dolomite as above.	
7545-7580	Dolomite, limey, light gray, very fine grained, some shale, as	above.
7580-7610	Shale, grayish red, platy, compact.	
7610-7645	Limestone, very light gray, very fine grained, some shale as above.	
7645-7685	Shale, grayish red, light greenish gray, calcareous, splintery	brittle.
7685-7720	Shale as above and dusky yellow, splintery, compact.	
7720-7765 platy, compact.	Shale, grayish red, light greenish gray, dusky yellow, grayish	orange pink,
7775-7780	Shale, variegated, splintery, brittle.	
7780-7790	Shale as above, little sandstone, colorless, fine grained, subangular, well cemented.	
7790-7800	Sandstone, colorless to light gray, fine to medium grained, subrounded to subangular, quartz grains, some shale as above.	
7800-7810	Shale, variegated as above, some light gray, calcareous siltstone.	
7810-7820 some siltstone, light gray, calcareous.	Shale, variegated as above, some sandstone, light gray, fine to	medium grained,
7820-7830	Shale, variegated, splintery, brittle.	
7830-7865	Shale, variegated as above, some limestone, very light gray, sublithographic.	
7865-7925 yellow, light brownish gray, light greenish	Shale, variegated, mostly moderate red 5R4/2 to dusky red, some gray, splintery brittle, compact.	dark gray, dusky
7925-7950 calcareous.	Shale, variegated, as above, some sandstone, light gray, fine	grained, slightly
7950-7955	Shale, variegated as above, some limestone, light gray, very finely crystalline.	
7955-7960	Shale as above, some sandstone, pinkish gray, fine grained, slightly calcareous.	
7960-7975	Sandstone as above, some variegated shale.	
7975-8000	Shale, variegated as above, some sandstone as above.	
8000-8040	Sandstone, light gray, light pinkish gray, fine grained, calcareous, some variegated shale.	
8040-8100	Sandstone, pale red to pinkish gray, very fine grained,	calcareous.

8100-8120	Limestone, light gray, very finely crystalline, dense.	
8120-8135	Limestone, light brownish gray to light gray, very finely crystalline, dense.	
8140-8150 as above.	Sandstone, pinkish gray to light gray, fine grained, calcareous,	some limestone
8150-8160	Limestone, light gray, fine grained, granular, arenaceous, some gray, fine grained, calcareous.	sandstone light
8160-8185	Sandstone, light gray, fine grained, calcareous, some variegated moderate red to dusky red.	shale, mostly
8185-8190 above.	Sandstone, pinkish gray to light gray, fine grained, calcareous,	some shale as
8190-8250	Shale, light gray, various shades of red, green, waxy platy, compact, little sandstone as above.	
8255-8350	Salt, not a salt base mud, so samples are siltstone, moderate calcareous shale, pale red to moderate reddish orange.	reddish orange, highly
8350-8360	Shale, moderate reddish brown, lumpy, compact, with anhydrite,	gypsum.
8360-8370	Shale, anhydrite, as above, some salt.	
8370-8390	Salt.	
8390-8405	Anhydrite, light gray, dense, some shale, moderate reddish	brown.
8415-8430	Salt.	
8430-8470	Anhydrite, some siltstone, moderate reddish orange, calcareous.	
8470-8525	Salt, samples mostly white anhydrite.	
8525-8535	Dolomite, light gray, fine grained, earthy.	
8535-8540	Dolomite, as above, limestone, brownish gray, finely	crystal-
8540-8549	Limestone, brownish gray, finely crystalline, limestone, light	gray, fine grained.
8549-8552	Limestone, light gray, finely crystalline, earthy, a few brachiopod fragments.	
8552-8554	Limestone, light brownish gray, finely crystalline, traces of	anhydrite.
8554-8555	Limestone, light gray, finely crystalline, traces of anhydrite.	
8555-8556	Limestone, light gray, fragmental, fine grained.	
8556-8562	Anhydrite, white to light gray, massive.	
8562-8563	Limestone, light brownish gray, very finely crystalline to fine	grained.
8563-8564	Limestone, light gray, fine grained, microoolitic, slight pinpoint porosity.	
8564-8569	Limestone, light gray, fine grained, earthy.	
8569-8570 inclusions.	Anhydrite, light gray massive with light brownish gray limestone	stringers and
8570-8571 calcite, dense.	Limestone, brownish gray, very finely crystalline, vuggy with	vugs filled with
8571-8573	Limestone, light gray, fine grained, argillaceous, traces of	anhydrite.
8573-8576	Anhydrite, light gray, massive, with shaly limestone layers.	
8576-8578	Anhydrite, light gray, massive.	
Samples		
8580-8610	Anhydrite, light gray to white, massive.	
8610-8615	Salt.	
8615-8620	Anhydrite, white, massive.	
8620-8630	Limestone, light brownish gray, fine grained, some anhydrite.	
8630-8650	Anhydrite, white to light gray, massive.	
8650-8690	Limestone, brownish gray, very finely crystalline, dense, some	anhydrite.
8690-8715	Anhydrite.	
8715-8735	Limestone, brownish gray, finely crystalline, some anhydrite.	

8735-8775	Salt.	
8775-8795	Limestone, brownish gray, finely crystalline, some anhydrite.	
8795-8825	Anhydrite, light gray, dense.	
8825-8845	Anhydrite, light gray, some limestone brownish gray, finely crystalline.	
8845-8885	Limestone, brownish gray, very finely crystalline, some	anhydrite.
8885-8900	Limestone, brownish gray, finely crystalline, fragmental in	part.
8900-8940	Limestone, light brownish gray, fine grained, rounded, fragmental.	
8940-8950	Limestone, light brownish gray, microsucrosic, some brownish crystalline to fragmental.	gray, finely
Cores		
8950-8954	Limestone, brownish gray, very fine and coarsely crystalline.	
8954-8956	Limestone, light gray to light brownish gray, fine grained, some staining, good fluorescence, slight cut.	
8956-8958	Limestone as above and light gray, very fine grained, anhydrite.	
8958-8960	Limestone, light gray to light brownish gray, fine grained, little anhydrite, some staining and fluorescence.	
8960-8962	Limestone, light brownish gray, very finely crystalline, with	some coarse crystals.
8962-8966	Limestone as above, with some staining.	
8966-8972	Limestone, light brownish gray, finely crystalline, with some	coarse crystal prominent.
8972-8974	Anhydrite, white, massive.	
8974-8978	Anhydrite, medium gray, massive, dense.	
8978-8980	Anhydrite, colorless to white with thin limestone stringers, and brownish gray, fine to medium crystalline.	dolomite, light
8980-8984	Anhydrite, light gray to white, massive.	
8984-8986	Anhydrite, as above, dolomite, light brownish gray, finely crystalline, limey.	
8986-8988	Anhydrite, white with a few thin limestone stringers.	
8988-8990	Limestone, light gray, fine grained, fragmental with rounded to fragments, shaly.	subrounded
8990-8992	Limestone, light gray, fine grained, limestone, light brownish some coarse crystals, little staining.	gray finely crystalline with
8992-8994	Limestone, light brownish gray, fine and coarsely crystalline,	in about equal amounts.
8994-8996	Limestone, light brownish gray, finely crystalline, with some	coarse crystals.
8996-9000	Anhydrite and dolomite, light gray, limey, fine grained.	
9000-9008	Anhydrite, white to colorless, massive.	
9008-9013	Limestone, light brownish gray, fine grained, with some	anhydrite.
9013-9022	Limestone, light brownish gray, finely crystalline, dense, with crystals, some anhydrite, some carbonaceous residue, some oolitic tight limestone.	a few coarse
9022-9024	Limestone, light gray, fine grained.	
9024-9028	Limestone, light brownish gray, fine to medium crystalline, some staining and fluorescence,	
9028-9030	Limestone, light brownish gray, finely crystalline, spotty fluorescence.	
9030-9033	Limestone, light brownish gray, fine to medium crystalline, fragmental in part, some spotty fluorescence.	
9033-9040	Limestone, light brownish gray, finely crystalline, oolitic in a carbonaceous staining, scattered spotty fluorescence.	dense matrix, some
9040-9048	Limestone, light brownish gray, very finely to medium crystalline, some carbonaceous staining, oolitic in part.	
9048-9055	Limestone, light brownish gray, finely crystalline, with a few	medium crystals scattered

oolites.		
9055-9062	Limestone, brownish gray, finely crystalline with a few medium	crystals.
9062-9066	Limestone, brownish gray, finely crystalline, some medium crystals, some oolites.	
9066-9067	Limestone as above, some anhydrite.	
9067-9078	Limestone, light brownish gray, finely crystalline, fragmental seams, some medium crystals.	in part with some stylolitic
9078-9084	Limestone, light brownish gray, fine grained, rounded fragmental crystals.	with some coarse
9084-9088	Limestone, light brownish gray, fine grained, fragmental to oolitic with some medium crystals, dense.	
Samples		
9090-9125	Limestone, brownish gray, finely crystalline, fragmental in part.	
9125-9155	Limestone, light gray to brownish gray, fine grained and finely fragmental in part.	crystalline,
9155-9165	Limestone, light brownish gray, finely crystalline, fragmental.	
Cores		
9168-9169	Limestone, brownish gray, finely crystalline, petroliferous odor	on fresh break,
9169-9175	Limestone, light gray, finely crystalline dense, traces of anhydrite.	
9175-9177	Limestone, light brownish gray, finely crystalline, dense, anhydrite, petroliferous odor on fresh break.	traces of
9177-9184	Limestone, light brownish gray, finely crystalline, fragmental, petroliferous odor on fresh break.	dense,
9184-9189	Limestone, light brownish gray, fine to medium crystalline, fragmental, dense, petroliferous odor on fresh break.	
9189-9190	Limestone, light gray, finely crystalline, dense, petroliferous	odor on fresh break.
9192-9212	Limestone, light brownish gray, fine to medium crystalline, fragmental, dense, good odor on fresh breaks, carbonaceous material along stylolites, scattered stainings.	
9212-9235	Limestone, light brownish gray, fine to medium crystalline, fragmental, dense, petroliferous odor on fresh break, scattered	staining.
9235-9239	Limestone, medium gray, fine to medium crystalline, fragmental petroliferous odor on fresh break, few brachiopod fragments.	in part, dense,
9239-9242	Limestone, light gray, finely crystalline, some fragmental.	
9242-9252	Limestone, brownish gray, finely crystalline, dense, on fresh breaks.	petroliferous odor
9252-9265	Limestone, medium gray to brownish gray, fine to medium crystalline, dense, scattered staining of carbonaceous material	and petroliferous
odor.		
9265-9292	Limestone, light gray and brownish gray, fine to medium crystalline, fragmental, dense, some brachiopod fragments, scattered staining.	
9292-9315	Limestone, light gray, fine to medium crystalline, fragmental, gray limestone, carbonaceous material on stylolitic partings.	interbedded with brownish
Samples		
9315-9325	Limestone, light gray, fine grained, fragmental.	
9325-9345	Limestone, light yellowish gray, fine grained, fragmental in part, some dolomite, light yellowish gray, microsucrosic.	
9345-9425	Limestone, light yellowish gray to light brownish gray, fine to crystalline, fragmental in part.	medium

9425-9450	Limestone, light gray to light yellowish gray, fine grained, fragmental.	
9450-9465	Limestone, light brownish gray, fine to medium crystalline, fragmental in part, partly granular.	
9470-9475	Limestone, light brownish gray, fine grained, granular.	
9475-9580	Limestone, light brownish gray, fine to medium crystalline, fragmental, dense.	
9590-9600	Limestone, light gray, light brownish gray, fine to medium crystalline, fragmental.	
9600-9690 fossiliferous.	Limestone, light to medium gray, fine grained, fragmental,	dense,
9690-9870	Limestone, light gray, fine grained, earthy, fragmental, fossiliferous, some finely crystalline, dense.	
9870-9895	Limestone, light brownish gray, fine to medium crystalline, dense, some light gray fine grained, earthy limestone.	
9895-9910	Limestone, light gray, fine grained, fossiliferous.	
9920-9985	Limestone as above, some light brownish gray, fine to medium crystalline, fossiliferous.	
9985-10105	Limestone, light to medium gray, finely crystalline, dense, fossiliferous.	
10105-10135	Limestone, light to medium gray, finely crystalline, dense, some gray, fine grained, earthy.	limestone, light
10135-10150	Limestone, light to medium gray, finely crystalline, dense, some light gray, fine grained, earthy	light gray chert, limestone.
10150-10180	Limestone, light to medium gray, finely crystalline, dense.	
10180-10385	Limestone as above, some light gray, fine grained, earthy.	
Cores		
10386-10391	Limestone, light gray, finely crystalline, dense, with a few shell fragments, some pyrite, spotty fluorescence.	
10391-10412	Shale, dark gray, massive, compact, some pyrite.	
10412-10413	Limestone, medium gray, fine grained, silty, dolomitic, fossiliferous.	
10413-10420 fluorescence.	Limestone, light gray, fine grained, silty, dolomitic, with some	spotted
10420-10426 fluorescence.	Limestone, light gray, fine grained, sandy dolomitic, with some	scattered spotty
10426-10455 pyrite.	Limestone, light gray, fine grained, silty, dolomitic, scattered	spotty fluorescence, some
10455-10470	Shale, dark gray, sooty, massive, compact, some pyrite.	
10470-10478	Dolomite, light gray, fine grained, silty, some light greenish	gray shale stringers.
10478-10503	Dolomite, light brownish gray, fine grained, silty, interbedded greenish gray, compact, containing pyrite	with shale, light
10503-10511 stringers.	Dolomite, light brownish gray, fine grained with a few greenish	gray shale
10511-10516	Dolomite and shale as above, interbedded.	
10516-10521	Shale, dark greenish gray, massive, compact.	
10521-10522	Dolomite, light brownish gray, fine grained, with greenish gray	shale stringers.
10522-10530	Shale, dark to light greenish gray, compact.	
10530-10531	Dolomite, light brownish gray, fine grained.	
10531-10534 dolomite.	Shale, light greenish gray, compact, with layers of light gray	to light brownish gray
10534-10538	Dolomite, light brownish gray, fine grained.	
10538-10543	Dolomite and shale, interbedded as in 10531-534.	

10543-10546	Shale, grayish red, calcareous, massive, compact.	
10546-10547	Dolomite, light gray, fine grained, shaly.	
10547-10550	Shale, grayish red, calcareous, massive, compact.	
10550-10559	Shale, greenish gray, interbedded with light brownish gray dolomite, some spotty fluorescence.	
Samples		
10560-10595	Shale, greenish gray, compact, interbedded with dolomite, light fine grained.	brownish gray,
10595-10625	Shale, greenish gray, calcareous, compact.	
10625-10675	Dolomite, light brownish gray, fine grained, some shale as	above.
10675-10690	Dolomite, light gray, light brownish gray, fine grained, shaly, gray.	some shale, light greenish
10690-10710	Dolomite, pale reddish brown, fine grained, shaly, some light	brownish gray as above.
10710-10735	Dolomite, light brownish gray, fine grained.	
10735-10765	Limestone, light brownish gray, finely crystalline, fragmental	in part.
10765-10780	Limestone as above, some dolomite, light brownish gray, fine grained.	
10780-10805	Limestone, light gray, fine grained, earthy, some light brownish limestone.	gray fine grained
10805-10815	Limestone, light gray to light brownish gray, fine grained, fragmental.	
10815-10840	Limestone, brownish gray, finely crystalline, dense.	
10845-10870	Dolomite, light brownish gray, microsucrosic, some finely crystalline, dense, brownish gray limestone.	
10870-10885	Dolomite, light gray, fine grained, limey with some limestone, crystalline, dense.	light brownish gray, finely
10885-10895	Limestone, light yellowish gray to light brownish gray, fine grained to finely crystalline.	
10895-10900	Limestone, brownish gray, finely crystalline, dense with a few	coarse crystals.
10905-10960	Limestone as above, and yellowish gray, fine grained, few fossil fragments.	fragmental, with a
10960-10975	Limestone, light gray to yellowish gray, fine grained.	
10975-10990	Limestone as above and light brownish gray, finely crystalline.	
10990-11030	Limestone, brownish gray, finely crystalline, dense.	
11030-11045	Limestone as above and brownish gray, fine grained.	
11045-11070	Limestone, light brownish gray, microsucrosic, some brownish gray, finely crystalline, little white anhydrite.	
11070-11080	Limestone, light brownish gray, finely crystalline, some light microsucrosic.	brownish gray,
11080-11100	Limestone, light brownish gray, microsucrosic.	
11102	Circulation. Limestone as above and brownish gray, finely crystalline.	
11105	Total Depth.	

