

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO.90

Summary of the Socony-Vacuum Oil Company Clarence and M. Jacobs F14-24-P
Hettinger County, North Dakota
Well No. 511, Permit No. 526

by Morton Strassberg
September, 1954

Socony-Vacuum Oil Company-Jacobs F14-24-F, Hettinger, County, North Dakota, SW SW Section 24, T. 134N., R. 96W. (660 feet from N. line and 660 feet from W. line) Elevation G.L. 2604, R.B. 2614.

The Socony-Vacuum-Jacobs F14-24P was spudded December 24, 1953 and 13 3/8 inch casing was cemented at 626 feet with 475 sacks of cement. The well was completed as a dry hole April 13, 1954 and was abandoned. Total depth 10,433 feet.

TESTS

- DST #1 7610-60, Open 3 hours, shut in 35 minutes, weak blow immediately, decrease to very weak blow throughout remainder of test, recovered 699 feet salt water, IFP 100, FFP 500, SIP 3050, IHP 4300, FHP 4350.
- DST #2 7830-7900, Open 3 hours, shut in 30 minutes, weak blow for 20 minutes, intermittent for 1 hour 30 minutes, recovered 2160 feet fluid, then died. Top 20 feet watery mud, 2500 ppm, 1890 feet light gas and watery mud, 5000 ppm, 1/2 inch scum to a bucket, IFP 200, FFP 1050, SIP 3300, HP 4400.
- DST #3 7900-7958, packer failed, misrun.
- DST #4 7885-7958, Open 3 hours, shut in 30 minutes, recovered 960 feet fluid; very slight oil and gas cut muddy water, 3000 ppm at the top, 6000 ppm at bottom, IFP 100, FFP 400, SIP 3450, IHP 4300-4200.
- DST #5 8023-8110, Open 20 minutes, shut in 30 minutes, strong blow throughout, recovered 5640 feet sulphur water, 35,000 ppm. IFP 2050-3150, SIP 3700, HP 4700-4650. This was a test of the second Mission Canyon porosity zone.
- DST #6 10,199-10,300, Good blow immediately and strong blow in 20 minutes, open 40 minutes, shut in 15 minutes, recovered 180 feet and mud-top very slightly gas cut, 450 feet slightly muddy salt water-trifle sulfur, 1290 feet salt water, sulfur water and taste and odor IFP 310-1045, SIP 4320, HP 5400, Salinity Top 84,000 ppm. Middle 172,000 ppm.

CORES

1. 6709-24	18. 8493-8509	35. 10,195-212
2. 7005-7018	19. 8598-8606	36. 10,212-226
3. 7615-30	20. 8606-20	37. 10,226-241
4. 7630-45	21. 8620-37	38. 10,241-256
5. 7645-60	22. 8637-54	39. 10,256-270
6. 7844-54	23. 8932-49	40. 10,270-285
7. 7854-67	24. 8949-60	41. 10,285-300
8. 7867-78	25. 8960-76	42. 10,300-315
9. 7878-93	26. 8976-87	43. 10,315-327
10. 7893-7900	27. 8987-96	44. 10,327-344
11. 7900-7958	28. 8996-99	45. 10,344-355
12. 7958-8016	29. 8999-9002	46. 10,355-360
13. 8016-8071	30. 10,045-62	47. 10,360-365
14. 8071-8110	31. 10,092-10,145	48. 10,365-368
15. 8402-08	32. 10,145-162	49. 10,368-371
16. 8408-10	33. 10,162-179	50. 10,371-375
17. 8410-14	34. 10,179-195	51. 10,375-433

Cement plugs were set at the following depths:

top of surface pipe with 10 sacks	
585-650'	with 40 sacks
4980-5120'	with 75 sacks
7575-7700'	with 50 sacks
8875-9000'	with 50 sacks
10,150-10,275'	with 50 sacks

Formation tops were determined from samples and cores, electric, micro, and radioactivity logs and were corrected to electric log tops. Not all lithologic tops were called in the following list. Colors were determined from the rock color chart.

FORMATION TOPS

<u>Formation</u>	<u>Depth</u>
Cretaceous System	
Pierre Formation	1538
Niobrara Formation	3497
Greenhorn Formation	4102
Dakota	4980
Jurassic System	5190
Piper Limestone	5855
Triassic System	
Spearfish Formation	5960
Permian System	
Minnekahta Formation	6270
Opeche Formation	6309
Pennsylvanian System	
Minnelusa Formation	6455
Mississippian System	

Amsden Formation	6590
Big Snowy Group	6780
Kibbey Formation	7108
Kibbey Limestone	7200
Madison Group	
Charles Formation	7320
Mission Canyon Formation	7830
Lodgepole Formation	8198
Englewood Formation	8693
Devonian System	
Lyleton Formation	8789
Nisku Equivalent	8958
Duperow Formation	9020
Souris River Formation	9240
Dawson Bay Formation	9350
Prairie Evaporites	9390
Ashern Formation	9520
Silurian System	
Interlake group	9552
Ordovician System	
Upper Stony Mountain	10,030
Lower Stony Mountain	10,113
Red River	10,208

180	200	Lignite.
200	300	Missing samples.
300	320	Lignite--very fine grained pyritic sandstone.
320	480	Lignite.
480	540	Lignite--fine grained calcareous sandstone.
540	580	Shale--light gray. Medium gray, fine grained limestone.
580	650	Lignite--light gray fine grained limestone.
650	670	Limestone--very light gray, fine grained. Dark yellowish orange chert. Pale red arenaceous limestone.
670	690	Sandstone--fine grained calcareous.
690	750	Shale--medium gray, bentonitic.
750	770	Limestone--medium gray, fine grained, dense.
770	880	Shale--medium light to medium gray.
880	900	Limestone--medium gray, fine grained dense.
900	920	Shale--medium gray.
920	980	Shale--medium to medium dark gray, silty.
980	1000	Shale--light gray bentonitic and medium dark gray silty.
1000	1020	Shale--medium dark gray, silty.
1020	1060	Sandstone--fine grained, calcareous.
1060	1080	Shale--medium light to medium gray.
1080	1100	Shale--medium to medium dark gray, silty.
1100	1140	Sandstone--fine to medium grained.
1140	1240	Shale--medium to medium dark gray.
1240	1300	Shale--medium to medium dark gray. Fine to medium grained free quartz.
1300	1320	Shale--medium light to medium gray, bentonitic.
1320	1380	Sandstone--fine to medium grained, subrounded to subangular, frosted. Medium light to medium gray shale.
1380	1440	Sandstone--fine to medium grained, subrounded to subangular, frosted.

1440	1460	Shale--light to medium gray bentonitic.
1460	1480	Lignite--fine grained calcareous sandstone.
1480	1580	Limestone--white, fine grained, arenaceous. Light to medium light gray shale.
1580	1640	Shale--light to medium light gray, bentonitic.
1640	1660	Sandstone--white to very light gray, fine grained, calcareous.
1660	1720	Shale--medium light to medium gray, bentonitic.
1720	1760	Shale--medium light to medium gray, bentonitic and white bentonite.
1760	2380	Shale--medium light to medium gray bcntonitic.
2380	2460	Shale--medium light to medium gray, part bcntonitic.
2460	2900	Shale--medium light to medium gray, bentonitic.
2900	2940	Shale--medium light to medium gray and light olive gray.
2940	3080	Shale--medium light to medium gray, bentonitic.
3080	3100	Shale--medium light to medium gray and light olive gray.
3100	3200	Shale--medium light to medium gray bentonitic.
3200	3240	Shale--medium light to medium gray and light olive gray, bentonitic.
3240	3300	Shale--medium light to medium gray, bentonitic.
3300	3380	Shale--medium light to medium and light olive gray, bentonitic.
3380	3500	Shale--medium light to medium gray, bentonitic.
3500	3560	Shale--medium to medium dark gray, white specks, calcareous.
3560	3580	Shale--medium light to medium gray, bentonitic.
3580	3600	Shale--medium light to medium dark gray, bentonitic, pyritic.
3600	3720	Shale--medium dark gray calcareous and medium light gray bentonitic.
3720	3760	Shale--medium light to medium dark gray. Fine to medium grained free quartz.
3760	3800	Shale--medium light to medium gray, bentonitic.
3800	4040	Shale--medium light to medium dark gray, bentonitic.
4040	4100	Shale--medium light to medium gray.
4100	4120	Shale--medium dark gray.
4120	4140	Shale--medium dark gray, white specks calcareous. Calcite prism, fragments.
4140	4180	Shale--light gray, micaceous, bentonitic and medium dark gray, calcareous.
4180	4220	Shale--light gray, micaceous, bentonitic.
4220	4360	Shale--light to medium light gray, bentonitic silty and medium dark gray, white specks, calcareous.
4360	4440	Shale--medium dark gray and light gray, bentonitic, arenaceous.
4440	4540	Shale--medium dark gray.
4540	4580	Shale--medium dark gray. Light olive gray siltstone.
4580	4760	Shale--medium dark gray.
4760	4780	Shale--medium light gray, bentonitic, silty and medium dark gray.
4780	5180	Missing samples.
5180	5240	Sandstone--fine grained, frosted, subrounded. Light gray siltstone.
5240	5260	Sandstone--white, very fine grained to fine grained, frosted. Light gray siltstone.

5260	5300	Sandstone--light greenish gray, very fine grained to silty.
5300	5320	Shale--medium light to medium dark gray.
5320	5360	Shale--light to light greenish gray waxy.
5360	5380	Shale--light gray. Light to light greenish gray very fine grained sandstone. Medium gray fragmental limestone.
5380	5480	Siltstone--light to light greenish gray, slightly calcareous. Light to medium gray shale.
5480	5600	Sandstone--white to very light gray, fine grained, calcareous.
5600	5640	Sandstone--very light to light gray, salt and pepper, calcareous, fine grained.
5640	5660	Siltstone--very light gray, slightly glauconitic, calcareous.
5660	5680	Shale--light to medium gray, micaceous. Very light gray calcareous siltstone.
5680	5700	Sandstone--very light gray, calcareous, fine grained to silty, slightly glauconitic.
5700	5720	Shale--medium light and light olive gray. Yellowish gray calcareous siltstone.
5720	5780	Shale--medium light to greenish gray, slightly calcareous.
5780	5810	Limestone---light to medium light gray fine grained. Light to medium gray shale.
5810	5820	Shale--light to medium gray. Light gray siltstone.
5820	5830	Limestone--white to very light gray, fine grained to chalky. Yellowish gray calcareous siltstone.
5830	5850	Shale--grayish red, silty, calcareous.
5850	5860	Limestone--pale yellowish brown, sublithographic.
5860	5900	Limestone--pale red to pale brown, sublithographic, argillaceous.
5900	5920	Shale--medium light to medium gray, calcareous.
5920	5930	Limestone--pale red, argillaceous, sublithographic.
5930	5940	Limestone--very light gray to pale yellowish brown, sublithographic.
5940	5950	Shale--medium light to medium gray, calcareous.
5950	5960	Dolomite--white to very light gray, microsucrosic.
5960	5980	Shale--medium light to medium gray and pale reddish brown, calcareous.
5980	5990	Gypsum--white, medium gray and gray red calcareous shale.
5990	6000	Shale--medium light to medium gray and pale red, calcareous.
6000	6010	Dolomite--very light to greenish gray, microsucrosic. Medium light to medium gray and gray red, calcareous shale.
6010	6060	Shale--moderate reddish brown, silty.
6060	6110	Siltstone--pale reddish brown, argillaceous, arenaceous. Moderate reddish brown silty shale.
6110	6130	Siltstone--pale reddish brown, argillaceous, arenaceous.
6130	6180	Shale--moderate reddish orange, calcareous and pale reddish brown silty.
6180	6240	Shale--pale reddish brown, silty and medium gray.
6240	6260	Siltstone--pale reddish brown, argillaceous, arenaceous.
6260	6270	Shale--medium light to medium gray and pale reddish brown silty shale. White gypsum.
6270	6290	Anhydrite--white to moderate reddish orange.
6290	6310	Anhydrite--pale red to pale reddish brown. White chalky limestone.

6310	6320	Limestone--pale red, fine grained. Pale reddish brown anhydrite.
6320	6370	Siltstone--pale reddish brown, argillaceous, calcareous. Medium light to medium gray shale.
6370	6410	Siltstone--pale reddish brown, argillaceous, slightly calcareous.
6410	6430	Siltstone--pale reddish brown, argillaceous, arenaceous. Pale reddish brown fine grained sandstone.
6430	6440	Dolomite--pinkish gray, microsucrosic, pinpoint porosity.
6440	6450	Dolomite--pinkish gray, microsucrosic, pinpoint porosity, pale reddish brown argillaceous siltstone.
6450	6480	Siltstone--pale reddish brown, calcareous, argillaceous. Medium light to medium gray calcareous shale.
6480	6490	Sandstone--grayish pink fine grained. Pinkish gray. Calcareous anhydrite.
6490	6510	Siltstone--pale reddish brown argillaceous. Fine grained sandstone.
6510	6540	Shale--pale reddish brown, silty and medium light to medium gray calcareous.
6540	6550	Shale--medium light to medium gray, calcareous.
6550	6570	Shale--medium light to medium gray, calcareous.
6570	6590	Sandstone--pale red fine to medium grained, subrounded frosted. Medium light to medium gray shale.
6590	6620	Dolomite--pale red, fine grained. White to pale red fine to medium grained, rounded frosted sandstone.
6620	6640	Shale--medium to medium dark gray. Pale red fine grained dolomite.
6640	6670	Dolomite--white to pale red, fine grained, arenaceous.
6670	6680	Shale--medium dark gray, highly calcareous.
6680	6690	Anhydrite--white to pale red.
6690	6700	Dolomite--medium light to light gray, fine grained dense. Medium to medium dark gray shale.
6700	6710	Shale--medium to medium dark gray calcareous.
6710	6720	Shale--medium to medium dark gray. Medium light to medium gray, dense dolomite.
6720	6730	Shale--medium dark to dark gray calcareous. Light to medium, light gray, fine grained dense to sucrosic dolomite.
6730	6740	Dolomite--medium light to medium gray fine grained. Very light gray fine grained sandstone.
6740	6750	Dolomite--pale brown to medium gray, fine grained dense anhydrite.
6750	6770	Shale--medium dark to dark gray, slightly calcareous. Grayish orange pink, fine grained dolomite.
6770	6780	Dolomite--pale brown fine grained, dense, anhydrite.
6780	6790	Dolomite--light to medium light gray, fine grained dense.
6790	6800	Dolomite--medium light to medium dark gray. Fine grained dense. Dark gray shale.
6800	6810	Dolomite--light gray, fine grained. White to very light gray. Fine grained sandstone. Medium dark to greenish gray shale.
6810	6820	Shale--medium to medium dark gray.
6820	6850	Dolomite--yellowish gray, fine grained, some pinpoint porosity, anhydrite inclusions.

6850	6860	Shale--medium dark to greenish gray. Yellowish gray to pale yellowish brown, fine grained dolomite.
6860	6880	Sandstone--fine to medium grained, subrounded frosted. Pale red silty shale.
6880	6910	Dolomite--light gray, microsucrosic. Medium to medium dark gray shale.
6910	6920	Limestone--pale yellowish to pale brown, fine grained to fragmental. Medium to medium dark gray shale.
6920	6930	Shale--medium to medium dark gray.
6930	6950	Limestone--brownish gray fine grained, dense. Medium dark to greenish gray shale.
6950	6960	Limestone--pale brown to pale yellowish brown, fine grained.
6960	6970	Limestone--brownish gray, fine grained to sublithographic.
6970	6980	Limestone--brownish gray, fine grained to sublithographic. Medium dark to greenish gray shale. Fine grained free quartz. Ostracods.
6980	7000	Shale--moderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. Ostracods.
7000	7005	Limestone--grayish orange pink fine grained to sublithographic, fossiliferous. Medium to medium dark gray shale.
7005	7018	Shale--black to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show.
7020	7030	Shale--medium dark to dark gray, gray red and moderate yellowish brown.
7030	7060	Shale--medium to medium dark gray and gray red pyritic, ostracods.
7060	7090	Shale--dusky yellow, grayish red and medium dark gray calcareous.
7090	7110	Shale--gray red and medium dark to dark gray. Light gray fine grained limestone.
7110	7130	Sandstone--white, fine grained. Medium dark gray and gray red shale.
7130	7160	Sandstone--pale red, fine grained to silty. Medium dark and gray red shale.
7160	7210	Siltstone--pale red, calcareous. White chalky limestone.
7210	7240	Limestone--pale yellowish brown to brownish gray, fine grained to sublithographic.
7240	7250	Siltstone--very light gray, calcareous, arenaceous. Grayish red silty shale.
7250	7260	Shale--gray red, arenaceous, calcareous.
7260	7290	Shale--pale red, highly calcareous.
7290	7310	Shale--pale red, highly calcareous. White anhydrite. Fine grained free quartz.
7310	7320	Shale--pale red, highly arenaceous and gray red arenaceous.
7320	7340	Anhydrite--white. Medium light gray fine grained limestone.
7340	7350	Limestone--medium light to medium gray fine grained to oolitic.
7350	7360	Limestone--very light gray chalky to medium gray fine grained.
7360	7380	Shale--medium gray. White gypsum.
7380	7390	Limestone--white to very light gray, fine grained to sublithographic.

7390	7400	Limestone--pale yellowish brown to very light gray, fine grained to oolitic.
7400	7410	Limestone--light to medium gray, fine grained to fragmental.
7410	7440	Anhydrite--white. Light to medium gray, fine grained to fragmental limestone.
7440	7450	Limestone--very light to medium gray, fine grained to fragmental.
7450	7460	Anhydrite--white, light to medium light gray, fine grained limestone.
7460	7500	Limestone--pale yellowish brown to yellowish gray, fine grained to fragmental.
7500	7530	Anhydrite--white to yellowish gray.
7530	7550	Anhydrite--white to yellowish gray. Pale yellowish to pale brown fragmental to sublithographic limestone.
7550	7560	Anhydrite--white to medium light gray. Pale yellowish to pale brown, fine grained to sublithographic limestone.
7560	7580	Limestone--pale brown to pale yellowish brown, fine grained to sublithographic. White to yellowish gray anhydrite.
7580	7600	Anhydrite--medium light to yellowish gray. Grayish red shale.
7600	7615	Limestone--pale yellowish brown to pale brown, fine grained to fragmental.
7615	7618	Anhydrite--white to brownish gray, mottled.
7618	7626½	Anhydrite--dusky yellowish brown.
7626½	7630	Anhydrite--white to medium gray. Pale yellowish brown dolomite inclusions with bleeding oil.
7630	7634	Anhydrite--light brownish gray with pale yellowish brown dolomite inclusions.
7634	7635	Dolomite--pale yellowish brown, fine grained, fossiliferous vertical fracture, good fluorescence, good oil cut.
7635	7640	Limestone--pale brown to brownish gray, fragmental, tight, show of oil along stylolitic pattern.
7640	7642	Limestone--pale yellowish brown to pale brown, fair porosity good show of oil and fluorescence.
7645	7660	Limestone--pale yellowish brown, fine grained to oolitic, slight show at top and pale yellowish brown fine grained porous.
7660	7670	Shale--light olive gray, calcareous.
7670	7700	Limestone--pale yellowish brown, fine grained to fragmental, some anhydrite inclusions.
7700	7710	Dolomite--pale yellowish brown, fine grained to sucrosic, pinpoint porosity, fluorescence, slight cut.
7710	7730	Limestone--pale yellowish brown to pale brown, fine grained to fragmental, fluorescence, slight cut.
7730	7750	Limestone--pale yellowish brown, fine grained to fragmental, good fluorescence and good oil cut.
7750	7760	Anhydrite--white and gypsum. Medium dark gray shale.
7760	7820	Anhydrite--white to medium gray.
7820	7840	Limestone--pale yellowish brown to pale brown, fine grained to fragmental, anhydrite, inclusions.
7844	7854	Dolomite--pale yellowish brown, sucrosic, fragmental, calcareous tight.
7854	7867	Limestone--pale yellowish brown, fine grained to fragmental, dolomitic.

7870	7890	Limestone--pale yellowish brown, fine grained to fragmental dolomitic.
7890	7900	Missing samples.
7900	7901	Limestone--medium dark gray, fragmental, vertical fractures, slight oil cut.
7901	7916	Limestone--pale yellowish brown, fine grained to fragmental, slightly dolomitic.
7916	7919	Limestone--brownish gray, fragmental, stylolitic, oil cut.
7919	7925	Limestone--pale yellowish brown, fragmental, fossiliferous, slight oil cut.
7925	7928	Limestone--pale yellowish brown to brownish gray, fragmental, stylolitic, good oil cut from carbonaceous material in the stylolite.
7928	7937	Limestone--light brownish gray, fragmental, slight oil cut.
7937	7940	Limestone--medium dark gray, fragmental, stylolitic, good oil cut.
7940	7946	Limestone--pale yellowish brown, fragmental, dolomitic.
7946	7949	Limestone--pale yellowish brown, fragmental, dolomitic.
7949	7952	Limestone--brownish gray, fragmental, dolomitic.
7952	7958	Dolomite--pale yellowish brown, sucrosic, calcite fragment inclusions, slight oil cut.
7958	7961	Limestone--light brownish gray, fragmental, dolomitic.
7961	7970	Limestone--light brownish to brownish gray, fragmental, stylolitic, good oil cut.
7970	7972	Limestone--brownish gray, fragmental, tight.
7972	7974	Dolomite--pale yellowish brown, sucrosic, calcite fragments.
7974	7977	Limestone--pale yellowish brown, fine grained to fragmental anhydrite.
7977	7980	Limestone--light brownish gray, fragmental, good oil cut from stylolites.
7980	7983	Limestone--pale yellowish brown, fragmental.
7983	7986	Limestone--medium light gray, fragmental, anhydrite inclusions.
7986	7989	Limestone--medium gray, fine grained to fragmental, anhydrite inclusions carbonaceous residue, slight oil cut.
7989	7992	Dolomite--very pale orange, fine grained to fragmental, dense, good fluorescence, slight oil cut.
7992	7995	Dolomite--very pale orange, fine grained, dense, calcite inclusions, good fluorescence and oil cut.
7995	8001	Dolomite--very pale orange, microsucrosic, dense, anhydrite inclusions spotted fluorescence, slight oil cut.
8001	8004	Limestone--pale yellowish brown, oolitic to sublithographic, anhydrite inclusions.
8004	8010	Dolomite--pale yellowish brown, microsucrosic, dense, calcareous.
8010	8015	Dolomite--pale yellowish brown, microsucrosic, dense, anhydrite inclusions.
8015	8016	Dolomite--light brownish gray, microsucrosic, dense, anhydrite inclusions.
8016	8018	Dolomite--light brownish gray, microsucrosic, anhydrite inclusions.
8019	8021	Dolomite--pale yellowish brown, microsucrosic, tight.
8021	8023	Dolomite--pale yellowish brown, microsucrosic, tight, anhydrite streaks.

8025	8028	Limestone--brownish gray, fragmental, tight.
8028	8034	Limestone--brownish gray, oolitic, good intergranular porosity, well cemented in places, slight oil cut.
8046	8055	Limestone--pale yellowish brown, oolitic, some pinpoint porosity, anhydrite cementing, stylolitic in sections.
8055	8071	Limestone--pale yellowish brown, oolitic, very good intergranular porosity, anhydrite inclusions, slight oil cut.
8071	8074	Limestone--pale yellowish brown, oolitic to fragmental, anhydrite inclusions, good porosity, permeability negligible.
8074	8077	Limestone--pale yellowish brown, oolitic, excellent intergranular porosity.
8077	8086	Limestone--pale yellowish brown, oolitic, good intergranular porosity, anhydrite inclusions.
8086	8088	Limestone--pale yellowish brown, finely oolitic, intergranular porosity.
8089	8092	Limestone--pale yellowish brown, coarsely oolitic to fragmental, good intergranular porosity, anhydrite inclusions.
8092	8096	Limestone--pale yellowish brown, finely oolitic, intergranular porosity.
8096	8105	Limestone--pale yellowish brown, fine to coarsely oolitic, intergranular porosity, anhydrite inclusions.
8105	8108	Limestone--pale yellowish brown, fine grained to finely oolitic.
8108	8110	(End core) Limestone--pale yellowish brown, coarsely oolitic to fragmental, anhydrite inclusions.
8110	8120	Limestone--pale yellowish brown, fragmental to oolitic, some intergranular porosity.
8120	8140	Dolomite--pale yellowish brown, microsucrosic. Pale yellowish brown oolitic to fragmental limestone.
8140	8160	Limestone--very light to pale yellowish brown, fine grained to fragmental.
8160	8190	Limestone--very light to medium light gray, fine grained to fragmental, dolomitic.
8190	8200	Limestone--very light to pale yellowish brown, fragmental to oolitic.
8200	8210	Limestone--very light to medium gray, fine grained to fragmental.
8210	8310	Limestone--very light to medium gray, oolitic to fragmental.
8310	8400	Limestone--very light to medium gray fine grain to fragmental, argillaceous.
8402	8409	(Core) Limestone--medium gray, fine grained, dolomitic, tight.
8410	8420	Limestone--medium gray, fine grained, dolomitic, tight.
8420	8430	Limestone--medium gray, fine grained, dolomitic, tight. Medium dark gray shale.
8430	8450	Limestone--very light to medium gray, fine grained to fragmental and medium gray, fine grained dense, dolomitic.
8450	8493	Dolomite--very light to medium gray, fine grained, calcareous.
8493	8507	(Core) Limestone--medium gray, fine grained, dense, highly fossiliferous-brachiopods, carbonaceous.
8507	8530	Shale--medium to medium dark gray. Very light to medium gray fine grained calcareous dolomite.

8530	8540	Dolomite--light gray to medium gray, fine grained calcareous.
8540	8590	Limestone--light to medium gray, fine grained to fragmental, dolomitic.
8598	8637	(Core) Limestone--medium gray, fine grained to sub-lithographic, dense, carbonaceous.
8637	8654	(End Core) Limestone--medium dark gray, sublithographic, carbonaceous.
8654	8660	Poor sample.
8660	8710	Limestone--medium to medium dark gray, fine grained to sublithographic, dense, carbonaceous.
8710	8720	Shale--greyish red, calcareous, arenaceous.
8720	8740	Shale--medium light to medium dark gray.
8745		(Circ. 1/4 hr.) Limestone--very light to light olive gray, chalky to sublithographic.
8740	8750	Limestone--medium to medium dark gray, fine grained, carbonaceous and white to light olive gray, fine grained.
8750	8765	Limestone--yellowish to brownish gray sublithographic to fine grained. Pale reddish brown calcareous and medium dark gray shale.
8765	8770	Limestone--medium to medium dark gray, fine grained to sublithographic, carbonaceous.
8770	8790	Limestone--very light to medium gray, fine grained to sublithographic, dense.
8790	8800	Shale--greenish gray, hard fissile.
8800	8810	Dolomite--yellowish to greenish gray, microsucrosic. Greenish gray shale.
8810	8820	Dolomite--yellowish to greenish gray, microsucrosic. Grayish red and greenish gray shale.
8820	8840	Shale--medium gray, greenish gray and grayish red.
8840	8850	Missing samples.
8850	8880	Shale--medium light to medium dark gray and grayish red.
8880	8920	Shale--gray to pale red, slightly calcareous.
8920	8930	Shale--grayish to pale red, calcareous and light to greenish gray.
8932	8934	(Core) Shale--grayish red, calcareous and grayish green calcareous.
8934	8935	Shale--grayish red and greenish gray, calcareous. Pink anhydrite.
8935	8940	Shale--grayish red, calcareous and greenish gray shale inclusions.
8940	8941	Shale--grayish red, calcareous and greenish gray calcareous, interbedded.
8941	8942	Shale--grayish red, calcareous.
8942	8945	Anhydrite--moderate pink to pale red. Grayish red, calcareous shale.
8943	8944	Anhydrite--white to medium gray. Greenish gray calcareous shale streaks.
8944	8946	Limestone--medium to brownish gray, anhydrite in part, sulfur odor, little staining, poor cut.
8946	8947	Anhydrite--brownish to medium gray.
8947	8949	Anhydrite--white to medium gray with interbedded, greenish gray, slightly calcareous.
8950	8952	Dolomite--greenish gray, fine grained, dense, pyritic, white anhydrite inclusions.

8952	8956	Dolomite--light olive gray, microsucrosic, slight oil cut.
8956	8960	Limestone--brownish gray, fine grained to sublithographic, slight oil cut.
8960	8976	Limestone--brownish gray, sublithographic, tight, slight fluorescence.
8976	8987	Limestone--medium gray, fine grained to sublithographic, slightly fossiliferous.
8987	8996	Limestone--medium dark gray, sublithographic, black stain, slight cut.
8996	8999	Limestone--brownish gray, sublithographic, carbonaceous residue, anhydrite filling in fractures.
8999	9002	(End Core) Limestone--brownish gray, sublithographic and oolitic to fragmental.
9002	9020	Limestone--pale yellowish brown to brownish gray, fine grained to fragmental. Very light to greenish gray, microsucrosic dolomite.
9020	9030	Dolomite--very light to light greenish gray, microsucrosic. Pale yellowish brown to brownish gray, fine grained to fragmental limestone.
9030	9060	Limestone--pale brown, sublithographic and yellowish gray fine grained to chalky. Medium gray shale.
9060	9070	Shale--medium light to medium gray.
9070	9090	Limestone--very light gray fine grained and brownish gray sublithographic limestone to fragmental.
9090	9100	Dolomite--pale yellowish brown, sucrosic.
9100	9120	Limestone--pale yellowish to pale brown, fragmental to sublithographic. Pale yellowish brown sucrosic dolomite.
9120	9140	Dolomite--yellowish gray to pale yellowish brown, sucrosic. Very light gray chalky limestone.
9140	9160	Dolomite--very light to yellowish gray, sucrosic. Medium gray shale.
9160	9180	Shale--medium to medium dark and greenish gray. Fine grained calcareous sandstone.
9180	9220	Limestone--brownish gray sublithographic.
9220	9270	Limestone--yellowish gray, fine grained to chalky and brownish gray sublithographic.
9270	9280	Dolomite--very light gray, microsucrosic.
9280	9290	Shale--medium to medium dark gray.
9290	9300	Limestone--yellowish gray to pale yellowish brown, fine grained to fragmental. Medium to medium dark gray shale.
9300	9310	Limestone--white to very light gray, fine grained to chalky.
9310	9335	Sandstone--fine to medium grained, frosted to clear, subangular. Medium to dark greenish gray shale.
9335	9350	Limestone--very light to light gray, chalky to sublithographic.
9350	9380	Limestone--white to pale yellowish brown and light greenish gray, chalky to lithographic.
9380	9390	Shale--medium light to medium dark gray.
9390	9420	Limestone--yellowish gray sublithographic and medium gray fine grained, carbonaceous.
9420	9440	Limestone--very light gray, chalky and medium gray.
9440	9500	Shale--medium to medium dark gray. Light gray chalky limestone.
9500	9520	Limestone--very light to light gray, fine grained to chalky.

9520	9540	Shale--pale red and light gray. Light gray chalky limestone.
9540	9550	Shale--medium light to medium dark gray.
9550	9560	Limestone--white to very light gray, chalky.
9560	9570	Dolomite--yellowish gray to light olive gray, sucrosic.
9570	9610	Dolomite--white to yellowish gray, sublithographic to fine grained.
9610	9630	Dolomite--yellowish to pinkish gray, fine grained to sublithographic.
9630	9680	Dolomite--yellowish to pinkish gray and pale yellowish brown, microsucrosic to sublithographic.
9680	9710	Dolomite--yellowish gray to pale yellowish brown, microsucrosic to fine grained.
9710	9810	Dolomite--white to yellowish gray, microsucrosic to sublithographic.
9810	9920	Dolomite--white to yellowish gray, microsucrosic to sublithographic.
9920	9980	Dolomite--yellowish gray, microsucrosic. Medium gray shale. Few free quartz grains.
9980	9990	Dolomite--yellowish gray, chalky to microsucrosic.
9990	10010	Dolomite--yellowish to light brownish gray, microsucrosic to sublithographic.
10010	10040	Dolomite--white to yellowish gray, chalky to microsucrosic. Medium to medium dark gray shale.
10045	10056	(Core) Dolomite--medium light gray, microsucrosic, dense.
10056	10057	Dolomite--light to medium light gray, fine grained, dense, slight stain, good fluorescence and cut.
10057	10062	Dolomite--medium to medium dark gray, fine grained dense.
10062	10070	(End core) Shale--medium to medium dark gray and gray red.
10070	10092	Missing samples.
10092	10101	Core, Dolomite--light to medium gray and pale yellowish brown, microsucrosic, black staining, good cut.
10101	10110	Dolomite--medium gray, microsucrosic, calcareous, dense.
10110	10116	Limestone--medium light to medium gray, dense fossiliferous.
10116	10121	Limestone--brownish gray, dense, fossiliferous.
10121	10126	Limestone--medium gray, sublithographic, argillaceous.
10126	10145	Limestone--grayish brown, sublithographic, fossiliferous.
10145	10151	Limestone--medium gray, sublithographic, fossiliferous, anhydrite inclusions.
10151	10162	Limestone--medium gray, sublithographic, fossiliferous, dolomitic, anhydrite inclusions.
10162	10170	Limestone--medium dark gray, sublithographic.
10170	10175	Limestone--medium dark gray, fine grained to sublithographic, fossiliferous, argillaceous.
10175	10179	Shale--medium dark gray, platy, calcareous.
10179	10195	Limestone--medium dark gray, sublithographic, argillaceous.
10195	10205	Shale--medium dark gray, calcareous.
10205	10212	Limestone--medium dark to dark gray, fine grained, dense fossiliferous.
10212	10214	Limestone--medium light gray, microsucrosic, dense, dolomitic.
10214½	10215	Dolomite--brownish, finely sucrosic, good fluorescence and cut, good staining.
10215	10218	Limestone--brownish gray, dense, slightly argillaceous.
10218	10220	Dolomite--brown, finely sucrosic, good spotty fluorescence and black stain.

10220	10221	Limestone--brown finely sucrosic, spotty fluorescence and tan stain.
10221	10226	Limestone--medium dark gray, very fine grained dense.
10226	10241	Limestone--medium to medium dark gray, very fine grained dense to sublithographic, slightly fossiliferous, slight fluorescence along vertical fractures, some anhydrite inclusions.
10241	10244	Limestone--medium dark to brownish gray, sublithographic.
10244	10251	Dolomite--medium light to medium gray, dense, anhydrite.
10251	10256	Dolomite--brownish gray, sucrosic, calcareous, anhydrite inclusions.
10256	10260	Dolomite--pale yellowish brown, microsucrosic, slight, some intergranular porosity, slight fluorescence.
10260	10265	Limestone--brownish gray, sublithographic, fractured, fractures filled with anhydrite, carbonaceous residue, slight oil cut.
10265	10270	Limestone--brownish gray, very fine grained to sublithographic, anhydrite inclusions.
10270	10275	Limestone--brownish gray, sublithographic, fractured, carbonaceous residue.
10275	10280	Limestone--brownish gray sublithographic and pale yellowish brown fine grained, some pinpoint porosity, some staining and fluorescence.
10280	10285	Limestone--medium light gray to brownish gray, pinpoint porosity, good staining, good cut.
10285	10290	Limestone--dusky yellowish brown, sublithographic, slight spotty fluorescence, anhydrite inclusions.
10290	10295	Limestone--brownish gray, sublithographic, good fluorescence along fractures, little staining, little bleeding oil 1-290-91.
10295	10300	Limestone--brownish gray, sublithographic, little brown staining and fluorescence along fractures, anhydrite inclusions.
10300	10310	Anhydrite--medium dark to brownish gray.
10310	10316½	Anhydrite--medium dark gray, dense.
10316½	10320½	Dolomite--pale yellowish brown, sublithographic to pseudo oolitic good fluorescence, spotted fluorescence along irregular fractures, tight, strong sulfur and stain along edge of core.
10320½	10322	Anhydrite--pale yellowish brown to brownish gray.
10322	10323	Dolomite--pale yellowish brown, fine grained dense, slight staining and fluorescence along fractures.
10323	10327	Limestone--brownish gray, sublithographic, black carbonaceous residue.
10328	10330	Anhydrite--brownish gray.
10330	10333	Dolomite--pale yellowish brown, microsucrosic, banded staining, dull fluorescence throughout, slight cut and black carbonaceous residue.
10333	10334½	Dolomite--dark brown, dense, slight fluorescence along vertical fractures.
10334½	10342	Dolomite--pale yellowish brown, finely sucrosic to sublithographic, some good fluorescence.
10342	10344	Dolomite--pale yellowish brown, microsucrosic, slight fluorescence.

10344	10350	Limestone--pale brownish gray, sublithographic with patches of sucrosic which shows staining and carbonaceous residue. Spotty fluorescence and staining along fractures.
10350	10355	Dolomite--pale yellowish brown, microsucrosic to sublithographic, slight staining and fluorescence along vertical fractures.
10355	10360	Missing samples.
10360	10365	Limestone--pale brown, sublithographic, good fluorescence and cut along vertical fractures. Good gas reading.
10365	10375	Missing samples.
10375	10433	Limestone--pale yellowish brown sublithographic to finely sucrosic, spotty fluorescence in sucrosic. Irregular fractures with spotty fluorescence. Black carbonaceous residue.
Total Depth	10433	