## 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, ½ 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 Form		6590
	Big Snowy G		6780
	Kibbey Form		7108
	Kibbey Lime	stone	7200
Madis	on Group		
	Charles For		7320
		yon Formation	7830
	Lodgepole F		8198
	Englewood F	ormation	8693
Devon	ian System		
	Lyleton For		8789
	Nisku Equiv		8958
	Duperow For		9020
		r Formation	9240
	Dawson Bay		9350
	Prairie Eva	_	9390
	Ashern Form	ation	9520
Silur	ian System		
	Interlake g	_	9552
Ordov	ician System		
	Upper Stony		10,030
	Lower Stony	Mountain	10,113
	Red River		10,208
180	200	Lignite.	
200	300	Missing samples.	
300	320	Lignitevery fin	ne grained pyritic sandstone.
320	480	Lignite.	
480	540	-	ined calcareous sandstone.
540	580		Medium gray, fine grained limestone.
580	650		ray fine grained limestone.
650	670	Limestonevery 1	ight gray, fine grained. Dark yellowish
		-	e red arenaceous limestone.
670	690	_	grained calcareous.
690	750	Shalemedium gra	_
750	770		gray, fine grained, dense.
770	880		ght to medium gray.
880	900	Limestonemedium	gray, fine grained dense.
900	920	Shalemedium gra	=
920	980		medium dark gray, silty.
980	1000		bentonitic and medium dark gray silty.
1000	1020	Shalemedium dar	ck gray, silty.
1020	1060	_	rained, calcareous.
1060	1080	Shalemedium lig	ht to medium gray.
1080	1100	Shalemedium to	medium dark gray, silty.
1100	1140	Sandstonefine t	o medium grained.
1140	1240	Shalemedium to	medium dark gray.
1240	1300	Shalemedium to	medium dark gray. Fine to medium grained
		free quartz.	
1300	1320	Shalemedium lig	ght to medium gray, bentonitic.
1320	1380	Sandstonefine t	o medium grained, subrounded to
		subangular, frost	ed. Medium light to medium gray shale.
1380	1440	Sandstonefine t	o medium grained, subrounded to
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4120 4140 Shalemedium dark gray, white specks calcareous. Calcite prism, fragments.  4140 4180 Shalelight gray, micaceous, bentonitic and medium dark gray, calcareous.  4180 4220 Shalelight gray, micaceous, bentonitic.  4220 4360 Shalelight to medium light gray, bentonitic silty and medium dark gray, white specks, calcareous.  4360 4440 Shalemedium dark gray and light gray, bentonitic, arenaceous.  4440 4540 Shalemedium dark gray.  4540 4580 Shalemedium dark gray. Light olive gray siltstone.  4580 4760 Shalemedium dark gray.  4760 4780 Shalemedium light gray, bentonitic, silty and medium dark gray.  4780 5180 Missing samples.  5180 5240 Sandstonefine grained, frosted, subrounded. Light gray siltstone.  5240 5260 Sandstonewhite, very fine grained to fine grained,	4040	4100	Shalemedium light to medium gray.
prism, fragments.  4140 4180 Shalelight gray, micaceous, bentonitic and medium dark gray, calcareous.  4180 4220 Shalelight gray, micaceous, bentonitic.  4220 4360 Shalelight to medium light gray, bentonitic silty and medium dark gray, white specks, calcareous.  4360 4440 Shalemedium dark gray and light gray, bentonitic, arenaceous.  4440 4540 Shalemedium dark gray.  4540 4580 Shalemedium dark gray. Light olive gray siltstone.  4580 4760 Shalemedium dark gray.  4760 4780 Shalemedium light gray, bentonitic, silty and medium dark gray.  4780 5180 Missing samples.  5180 5240 Sandstonefine grained, frosted, subrounded. Light gray siltstone.  5240 5260 Sandstonewhite, very fine grained to fine grained,	4100	4120	Shalemedium dark gray.
gray, calcareous.  4180 4220 Shalelight gray, micaceous, bentonitic.  4220 4360 Shalelight to medium light gray, bentonitic silty and medium dark gray, white specks, calcareous.  4360 4440 Shalemedium dark gray and light gray, bentonitic, arenaceous.  4440 4540 Shalemedium dark gray.  4540 4580 Shalemedium dark gray. Light olive gray siltstone.  4580 4760 Shalemedium dark gray.  4760 4780 Shalemedium light gray, bentonitic, silty and medium dark gray.  4780 5180 Missing samples.  5180 5240 Sandstonefine grained, frosted, subrounded. Light gray siltstone.  5240 5260 Sandstonewhite, very fine grained to fine grained,	4120	4140	
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4220 4360 Shalelight to medium light gray, bentonitic silty and medium dark gray, white specks, calcareous.  4360 4440 Shalemedium dark gray and light gray, bentonitic, arenaceous.  4440 4540 Shalemedium dark gray.  4540 4580 Shalemedium dark gray. Light olive gray siltstone.  4580 4760 Shalemedium dark gray.  4760 4780 Shalemedium light gray, bentonitic, silty and medium dark gray.  4780 5180 Missing samples.  5180 5240 Sandstonefine grained, frosted, subrounded. Light gray siltstone.  5240 5260 Sandstonewhite, very fine grained to fine grained,	4180	4220	
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4540 4580 Shalemedium dark gray. Light olive gray siltstone. 4580 4760 Shalemedium dark gray. 4760 4780 Shalemedium light gray, bentonitic, silty and medium dark gray. 4780 5180 Missing samples. 5180 5240 Sandstonefine grained, frosted, subrounded. Light gray siltstone. 5240 5260 Sandstonewhite, very fine grained to fine grained,	1110	1510	
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5180 5240 Sandstonefine grained, frosted, subrounded. Light gray siltstone. 5240 5260 Sandstonewhite, very fine grained to fine grained,	4/00	4/00	
siltstone. 5240 5260 Sandstonewhite, very fine grained to fine grained,	4780	5180	Missing samples.
5240 5260 Sandstonewhite, very fine grained to fine grained,	5180	5240	
	5240	5260	Sandstonewhite, very fine grained to fine grained,

5260 5300	5300 5320	Sandstonelight greenish gray, very fine grained to silty. Shalemedium light to medium dark gray.
5320	5360	Shalelight to light greenish gray waxy.
5360	5380	Shalelight gray. Light to light greenish gray very fine
5380	5480	grained sandstone. Medium gray fragmental limestone. Siltstonelight to light greenish gray, slightly calcareous. Light to medium gray shale.
5480	5600	Sandstonewhite to very light gray, fine grained, calcareous.
5600	5640 calcareo	Sandstone-very light to light gray, salt and pepper, bus, fine grained.
5640	5660	Siltstonevery light gray, slightly glauconitic, calcareous.
5660	5680	Shalelight to medium gray, micaceous. Very light gray calcareous siltstone.
5680	5700	Sandstonevery light gray, calcareous, fine grained to silty, slightly glauconitic.
5700	5720	Shalemedium light and light olive gray. Yellowish gray calcareous siltstone.
5720	5780	Shalemedium light to greenish gray, slightly calcareous.
5780	5810	Limestonelight to medium light gray fine grained. Light
		to medium gray shale.
5810	5820	Shalelight to medium gray. Light gray siltstone.
5820	5830	Limestonewhite to very light gray, fine grained to chalky. Yellowish gray calcareous siltstone.
5830	5850	Shalegrayish red, silty, calcareous.
5850	5860	Limestonepale yellowish brown, sublithographic.
5860	5900	Limestonepale red to pale brown, sublithographic, argillaceous.
5900	5920	Shalemedium light to medium gray, calcareous.
5920	5930	Limestonepale red, argillaceous, sublithographic.
5930	5940	Limestonevery light gray to pale yellowish brown, sub-lithographic.
5940	5950	Shalemedium light to medium gray, calcareous.
5950	5960	Dolomitewhite to very light gray, microsucrosic.
5960	5980	Shalemedium light to medium gray and pale reddish brown, calcareous.
5980	5990	Gypsumwhite, medium gray and gray red calcareous shale.
5990	6000	Shalemedium light to medium gray and pale red, calcareous.
6000	6010	Dolomitevery light to greenish gray, microsucrosic.  Medium light to medium gray and gray red, calcareous shale.
6010	6060	Shalemoderate reddish brown, silty.
6060	6110	Siltstonepale reddish brown, argillaceous, arenaceous.  Moderate reddish brown silty shale.
6110	6130	Siltstonepale reddish brown, argillaceous, arenaceous.
6130	6180	Shalemoderate reddish orange, calcareous and pale reddish brown silty.
6180	6240	Shalepale reddish brown, silty and medium gray.
6240	6260	Siltstonepale reddish brown, argillaceous, arenaceous.
6260	6270	Shalemedium light to medium gray and pale reddish brown silty shale. White gypsum.
6270	6290	Anhydritewhite to moderate reddish orange.
6290	6310	Anhydritepale red to pale reddish brown. White chalky limestone.

6310	6320	Limestonepale red, fine grained. Pale reddish brown
	60.00	anhydrite.
6320	6370	Siltstonepale reddish brown, argillaceous, calcareous.  Medium light to medium gray shale.
6370	6410	Siltstonepale reddish brown, argillaceous, slightly
0370	0410	calcareous.
6410	6430	Siltstonepale reddish brown, argillaceous, arenaceous.
0410	0430	Pale reddish brown fine grained sandstone.
6430	6440	Dolomitepinkish gray, microsucrosic, pinpoint porosity.
6440	6450	
0440	6430	Dolomitepinkish gray, microsucrosic, pinpoint porosity, pale reddish brown argillaceous siltstone.
6450	6480	Siltstonepale reddish brown, calcareous, argillaceous.
		Medium light to medium gray calcareous shale.
6480	6490	Sandstonegrayish pink fine grained. Pinkish gray.
		Calcareous anhydrite.
6490	6510	Siltstonepale reddish brown argillaceous. Fine grained
0100	0010	sandstone.
6510	6540	Shalepale reddish brown, silty and medium light to medium
0310	0010	gray calcareous.
6540	6550	Shalemedium light to medium gray, calcareous.
6550	6570	Shalemedium light to medium gray, calcareous.
6570	6590	Sandstonepale red fine to medium grained, subrounded
0370	0390	frosted. Medium light to medium gray shale.
6590	6620	Dolomitepale red, fine grained. White to pale red fine
0390	0020	to medium grained, rounded frosted sandstone.
6620	6640	Shalemedium to medium dark gray. Pale red fine grained
0020	0040	dolomite.
6640	6670	Dolomitewhite to pale red, fine grained, arenaceous.
6670	6680	Shalemedium dark gray, highly calcareous.
6680	6690	Anhydritewhite to pale red.
6690	6700	Dolomitemedium light to light gray, fine grained dense.
0000	0700	Medium to medium dark gray shale.
6700	6710	Shalemedium to medium dark gray calcareous.
6710	6720	Shalemedium to medium dark gray. Medium light to medium
0710	0720	gray, dense dolomite.
6720	6730	Shalemedium dark to dark gray calcareous. Light to
0720	0730	medium, light gray, fine grained dense to sucrosic
		dolomite.
6730	6740	
0/30	0740	Dolomitemedium light to medium gray fine grained. Very light gray fine grained sandstone.
6740	6750	Dolomitepale brown to medium gray, fine grained dense
0/40	0730	
6750	6770	anhydrite.
0730	0770	Shalemedium dark to dark gray, slightly calcareous.  Grayish orange pink, fine grained dolomite.
6770	6780	Dolomitepale brown fine grained, dense, anhydrite.
6780	6790	-
	6800	Dolomitelight to medium light gray, fine grained dense.
6790	0000	Dolomitemedium light to medium dark gray. Fine grained dense. Dark gray shale.
6800	6810	Dolomitelight gray, fine grained. White to very light
0000	0010	gray. Fine grained sandstone. Medium dark to greenish gray
		shale.
6810	6820	Shalemedium to medium dark gray.
6820	6850	Dolomiteyellowish gray, fine grained, some pinpoint
0020	0000	porosity, anhydrite inclusions.
		porosicy, annightnee increasions.

6850         Shalemedium dark to greenish gray. Yellowish gray to pale yellowish brown, fine grained dolomite.           6860         6880         Sandstonefine to medium grained, subrounded frosted. Pale red silty shale.           6890         6910         Dolomitelight gray, microsucrosic. Medium to medium dark gray shale.           6910         6920         Himestonepale yellowish to pale brown, fine grained to fragmental. Medium to medium dark gray shale.           6920         6930         Shalemedium to medium dark gray.           6950         6950         Limestonebrownish gray fine grained, dense. Medium dark to greenish gray shale.           6950         6960         Limestonebrownish gray, fine grained to sublithographic. Medium dark to greenish gray, fine grained to sublithographic. Medium dark to greenish gray, fine grained to sublithographic. Medium dark gray, Ostracods.           6980         7000         Shalemedium dark gray. Ostracods.           6980         Jimestonegrayish orange pink fine grained to sublithographic, fossiliferous. Medium to medium dark qray shale.           7000         7018         Shaleblack to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show.           7020         7030         Shalemedium dark to dark gray and gray red pyritic, ostracods.           7030         Shalemedium to medium dark gray and gray red pyritic, ostracods.           7			
6880 6910 Sandstone—fine to medium grained, subrounded frosted. Pale red silty shale. 6880 6910 bolomite—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 shale. 6950 6950 Limestone—brownish gray fine grained, dense. Medium dark to greenish gray shale. 6950 6960 Limestone—brownish gray, fine grained to sublithographic. 6970 6980 Limestone—brownish gray, fine grained to sublithographic. 6970 Medium dark to greenish gray, fine grained to sublithographic. 6980 Medium dark to greenish gray, fine grained to sublithographic. 6980 Medium dark gray. Obtracods. 6980 Shale—moderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. Obtracods. 6980 Shale—moderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. Obtracods. 6980 Shale—moderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. 6980 Shale—moderate yellowish brown, dark greenish gray. Grayish red say. Thin limestone streaks. Black shale with coal. Faint gas show. 6980 Shale—medium dark to dark gray, gray red and moderate yellowish brown. 6980 Shale—medium to medium dark gray and gray red pyritic, ostracods. 6980 7090 Shale—medium to medium dark gray and gray red pyritic, ostracods. 7090 710 Shale—medium to medium dark gray and gray red shale. 710 7130 Shale—gray red and medium dark to dark gray. Light gray fine grained limestone. 7110 Shale—pale red, fine grained. Medium dark gray and gray red shale. 7110 7120 Slitstone—pale red, fine grained to silty. Medium dark and gray red shale. 7120 720 Shale—pale red, highly calcareous. White chalky limestone. 720 720 Shale—pale red, highly calcareous. White anhydrite. Fine grained to sublithographic. 720 730 Shale—pale red, highly calcareous. White anhydrite. Fine grained free quartz. 7310 7320 Shale—pale red, highly calcareous. White anhydrite. Fine grained. 7320 7330 Shale—pale red, highly ar	6850	6860	
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-pale brown to pale yellowish brown, fine grained. 6950 6960 Limestone-brownish gray fine grained, dense. Medium dark to greenish grey shale. 6950 6960 Limestone-brownish gray, fine grained to sublithographic. 6970 6980 Idmestone-brownish gray, fine grained to sublithographic. 6970 6980 Montane dark to greenish gray, fine grained to sublithographic. 6980 Montane 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. 7070 710 Shale-gray red and medium dark to dark gray. Light gray fine grained limestone. 7080 Shale-black etc. Siltstone-white, fine grained to silty. Medium dark and gray red shale. 710 7210 Sandstone-pale red, fine grained to silty. Medium dark and gray red shale. 7110 Sandstone-pale red, calcareous. White chalky limestone. 7110 Sandstone-pale yellowish brown to brownish gray, fine grained to sublithographic. 7120 7240 Limestone-pale yellowish brown to brownish gray fine grained to sublithographic. 7210 7240 Shale-pale red, highly calcareous. White anhydrite. Fine grained to sublithographic. 7250 7260 Shale-pale red, highly calcareous and gray red arenaceous. 7310 7320 Shale-pale red, highly calcareous white only fine grained limestone- 7320 7330 Limestone-were light gray chalky to medium gra	6860	6880	Sandstonefine to medium grained, subrounded frosted. Pale
6910 6920 Limestonepale yellowish to pale brown, fine grained to fragmental. Medium to medium dark gray shale. 6920 6930 Shalemedium to medium dark gray shale. 6950 6950 Limestonebrownish gray fine grained, dense. Medium dark to greenish grey shale. 6950 6960 Limestonebrownish gray, fine grained to sublithographic. 6970 6980 Limestonebrownish gray, fine grained to sublithographic. 6980 Medium dark to greenish gray shale. Fine grained free quartz. Ostracods. 6980 7000 Shalemoderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. Ostracods. 7001 7005 Limestone-grayish orange pink fine grained to sublithographic, fossiliferous. Medium to medium dark gray shale. 7005 Shalemedium dark gray ostracods. 7006 Shalemedium dark to dark gray, gray red and moderate yellowish brown. 7010 7020 7030 Shalemedium dark to dark gray, gray red and moderate yellowish brown. 7030 7060 Shalemedium to medium dark gray and gray red pyritic, ostracods. 7050 7070 Shalequary red and medium dark gray and gray red shale. 7070 708 Shalegray red and medium dark to dark gray. Light gray fine grained limestone. 708 710 Sandstonewhite, fine grained to silty. Medium dark and gray red shale. 710 710 Sandstonepale red, fine grained to silty. Medium dark and gray red shale. 7110 720 Siltstonepale red, calcareous. White chalky limestone. 720 720 Siltstonepale red, dighly calcareous, arenaceous. Grayish red silty shale. 720 7210 Siltstonevery light gray, calcareous. White anhydrite. Fine grained free quartz. 7210 7220 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz. 7220 7330 Anhydritewhite. Medium light gray fine grained to oolitic. 7230 7340 Anhydritewhite. Medium light gray fine grained to oolitic. 7350 7360 Limestonewhite to very light gray, fine grained to sublimestonewhite to very light g	6880	6910	Dolomitelight gray, microsucrosic. Medium to medium dark
6930 6950 Shalemedium to medium dark gray.  Limestonebrownish gray fine grained, dense. Medium dark to greenish grey shale.  Limestonebrownish gray, fine grained to sublithographic.  Medium dark to greenish gray, fine grained to sublithographic.  Medium dark to greenish gray shale. Fine grained free quartz. Ostracods.  Shalemoderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. Ostracods.  Limestonegrayish orange pink fine grained to sublithographic, fossiliferous. Medium to medium dark gray shale.  7005 7018 Shaleblack to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show.  7020 7030 Shalemedium dark to dark gray, gray red and moderate yellowish brown.  7030 7060 Shalemedium to medium dark gray and gray red pyritic, ostracods.  7040 7050 Shaledusky yellow, grayish red and medium dark gray calcareous.  7050 710 Shalegray red and medium dark to dark gray. Light gray fine grained limestone.  7071 710 Sandstonewhite, fine grained. Medium dark gray and gray red shale.  710 710 Sandstonepale red, fine grained to silty. Medium dark and gray red shale.  7110 Siltstonepale red, calcareous. White chalky limestone.  7110 720 Limestonepale red, calcareous. White chalky limestone.  720 7310 Shalepale red, highly calcareous, arenaceous. Grayish red silty shale.  720 7310 Shalepale red, highly calcareous.  7210 7320 Shalepale red, highly calcareous.  7220 7330 Shalepale red, highly calcareous.  7230 7340 Anhydritewhite. Medium light gray fine grained to colitic.  7240 7350 Limestonewery light gray chalky to medium gray fine grained to colitic.  7250 7360 Limestonewhite to very light gray, fine grained to sub-	6910	6920	Limestonepale yellowish to pale brown, fine grained to
6950 Limestonebrownish gray fine grained, dense. Medium dark to greenish grey shale. 6960 6960 Limestonepale brown to pale yellowish brown, fine grained. 6970 6980 Limestonebrownish gray, fine grained to sublithographic. 6970 6980 Medium dark to greenish gray shale. Fine grained free quartz. Ostracods. 6980 7000 Shalemoderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. Ostracods. 6980 1000 Filmestonegrayish orange pink fine grained to sublithographic, fossiliferous. Medium to medium dark gray shale. 6980 7018 Shaleblack to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show. 6980 7030 Shalemedium dark to dark gray, gray red and moderate yellowish brown. 6980 7090 Shalemedium to medium dark gray and gray red spritic, ostracods. 6980 7090 Shaledusky yellow, grayish red and medium dark gray calcareous. 6980 7090 Shalewhite, fine grained. Medium dark gray and gray red shale. 6980 7090 Siltstonepale red, fine grained to silty. Medium dark and gray red shale. 6980 7090 Siltstonepale red, calcareous. White chalky limestone. 6980 7110 Siltstonepale red, inghly calcareous, arenaceous. Grayish red silty shale. 6980 7260 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz. 6980 7380 7360 Shalemedium light to medium gray fine grained to colitic. 6980 7380 Shalemedium gray. White gypsum.	6920	6930	
6950 6960 Limestone—pale brown to pale yellowish brown, fine grained. 6960 6970 Limestone—brownish gray, fine grained to sublithographic. 6980 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 sub- lithographic, 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. 7090 7110 Shale—gray red and medium dark to dark gray. Light gray fine grained limestone. 7100 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. 7240 7250 Siltstone—pale yellowish brown to brownish gray, fine grained to sublithographic. 7250 7260 Shale—gray red, arenaceous, calcareous. Grayish red silty shale. 7260 7290 Shale—pale red, highly calcareous. 7270 7310 Shale—pale red, highly calcareous. 7310 7320 Shale—pale red, highly calcareous. 7320 7330 Shale—pale red, highly arenaceous and gray red arenaceous. 7320 7330 Shale—pale red, highly arenaceous and gray red arenaceous. 7330 7340 Anhydrite—white. Medium light gray fine grained limestone. 7350 7360 Limestone—werl light gray chalky to medium gray fine grained. 7360 7380 Shale—medium gray. White gypsum. 7370 Limestone—white to very light gray, fine grained to sub-			Limestonebrownish gray fine grained, dense. Medium dark
6970 6980 Limestonebrownish gray, fine grained to sublithographic. 6980 6980 Limestonebrownish gray, fine grained to sublithographic. 6980 7000 Shalemoderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. Ostracods. 7000 7005 Limestonegrayish orange pink fine grained to sublithographic, fossiliferous. Medium to medium dark gray shale. 7005 7018 Shaleblack to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show. 7020 7030 Shalemedium dark to dark gray, gray red and moderate yellowish brown. 7030 7060 Shalemedium to medium dark gray and gray red pyritic, ostracods. 7060 7090 Shaledusky yellow, grayish red and medium dark gray calcareous. 7090 7110 Shalegray red and medium dark to dark gray. Light gray fine grained limestone. 7110 7130 Sandstonewhite, fine grained. Medium dark gray and gray red shale. 7130 7160 Sandstonepale red, fine grained to silty. Medium dark and gray red shale. 7160 7210 Siltstonepale yellowish brown to brownish gray, fine grained to sublithographic. 7240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale. 7250 7260 Shalegray red, arenaceous, calcareous. White anhydrite. Fine grained free quartz. 7310 7320 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz. 7320 7340 Anhydritewhite. Medium light gray fine grained limestone. 7330 7360 Limestonewery light gray chalky to medium gray fine grained. 7360 7380 Shalemedium gray. White gypsum. 7380 7380 Shalemedium gray. White gypsum. 7380 7380 Limestonewhite to very light gray, fine grained to sub-	6950	6960	
6970 6980 Limestonebrownish gray, fine grained to sublithographic. Medium dark to greenish gray shale. Fine grained free quartz. Ostracods. 6980 7000 Shalemoderate yellowish brown, dark greenish gray. Grayish red and medium dark gray. Ostracods. 1000 7005 Limestonegrayish orange pink fine grained to sub- lithographic, fossiliferous. Medium to medium dark gray shale. 7005 7018 Shaleblack to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show. 7020 7030 Shalemedium dark to dark gray, gray red and moderate yellowish brown. 7030 7060 Shalemedium dark gray and gray red pyritic, ostracods. 7090 7110 Shalequar red and medium dark gray and gray fine grained limestone. 710 7130 Sandstonewhite, fine grained. Medium dark gray and gray red shale. 7130 7160 Sandstonepale red, fine grained to silty. Medium dark and gray red shale. 7160 7210 Siltstonepale yellowish brown to brownish gray, fine grained to sublithographic. 7240 Limestonepale yellowish brown to brownish gray, fine grained to sublithographic. 7250 7260 Shalegray red, arenaceous, calcareous. 7260 7290 Shalegray red, arenaceous. White anhydrite. Fine grained free quartz. 7310 7320 Shalepale red, highly calcareous. 7340 7350 Limestonewhite Medium light gray fine grained limestone. 7350 7360 Limestonewhite Medium light gray fine grained to oolitic. 7350 7360 Limestonewhite Medium light gray, fine grained to oolitic. 7360 7380 Shalemedium gray. White gypsum. 7380 7390 Limestonewhite to very light gray, fine grained to sub-	6960	6970	
6980         7000         Shalemoderate 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         Shaleblack to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show.           7020         7030         Shalemedium dark to dark gray, gray red and moderate yellowish brown.           7030         7060         Shalemedium to medium dark gray and gray red pyritic, ostracods.           7060         7090         Shaledusky yellow, grayish red and medium dark gray calcareous.           7090         7110         Shalegray red and medium dark to dark gray. Light gray fine grained limestone.           7110         7130         Sandstonewhite, fine grained. Medium dark gray and gray red shale.           7130         7160         Sandstonepale red, fine grained to silty. Medium dark and gray red shale.           7160         7210         Siltstonepale red, calcareous. White chalky limestone.           7210         7240         Limestonepale red, park gray, calcareous, arenaceous. Grayish red silty shale.           7250         7260         Shalegray red, arenaceous, calcareous.           7250         7260         Shalepale red, highly calcareous	6970	6980	Limestonebrownish gray, fine grained to sublithographic. Medium dark to greenish gray shale. Fine grained free
Total Total Limestone—grayish orange pink fine grained to sub- lithographic, fossiliferous. Medium to medium dark gray shale.  Total Shale—black to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show.  Total Total Shale—medium dark to dark gray, gray red and moderate yellowish brown.  Total Total Shale—medium to medium dark gray and gray red pyritic, ostracods.  Total Shale—dusky yellow, grayish red and medium dark gray calcareous.  Total Shale—gray red and medium dark to dark gray. Light gray fine grained limestone.  Total Sandstone—white, fine grained. Medium dark gray and gray red shale.  Total Sandstone—pale red, fine grained to silty. Medium dark and gray red shale.  Total Siltstone—pale red, calcareous. White chalky limestone.  Limestone—pale yellowish brown to brownish gray, fine grained to sublithographic.  Total Shale—gray red, arenaceous, calcareous. Grayish red silty shale.  Total Shale—pale red, highly calcareous.  Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Shale—pale red, highly arenaceous and gray red arenaceous.  Total Total Shale—pale red, highly arenaceous and gray	6980	7000	Shalemoderate yellowish brown, dark greenish gray. Grayish
Shaleblack to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone streaks. Black shale with coal. Faint gas show.   Shalemedium dark to dark gray, gray red and moderate yellowish brown.   Shalemedium to medium dark gray and gray red pyritic, ostracods.   Shaledusky yellow, grayish red and medium dark gray calcareous.   Shaledusky yellow, grayish red and medium dark gray fine grained limestone.   Sandstonewhite, fine grained. Medium dark gray and gray red shale.   Sandstonepale red, fine grained to silty. Medium dark and gray red shale.   Siltstonepale red, calcareous. White chalky limestone.	7000	7005	Limestonegrayish orange pink fine grained to sub- lithographic, fossiliferous. Medium to medium dark gray
7020 7030 Shalemedium dark to dark gray, gray red and moderate yellowish brown.  7030 7060 Shalemedium to medium dark gray and gray red pyritic, ostracods.  7060 7090 Shaledusky yellow, grayish red and medium dark gray calcareous.  7090 7110 Shalegray red and medium dark to dark gray. Light gray fine grained limestone.  7110 7130 Sandstonewhite, fine grained. Medium dark gray and gray red shale.  7130 7160 Sandstonepale red, fine grained to silty. Medium dark and gray red shale.  7160 7210 Siltstonepale yellowish brown to brownish gray, fine grained to sublithographic.  7240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale.  7250 7260 Shalegray red, arenaceous, calcareous.  7290 7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz.  7310 7320 Shalepale red, highly arenaceous and gray red arenaceous.  7330 7340 Anhydritewhite. Medium light gray fine grained limestone.  7350 7360 Limestonewery light gray chalky to medium gray fine grained.  7360 7380 Shalemedium gray. White gypsum.  Limestonewhite to very light gray, fine grained to sub-	7005	7018	Shaleblack to brownish black, thin bedded, carbonaceous, highly fossiliferous and grayish red waxy. Thin limestone
7030 7060 Shalemedium to medium dark gray and gray red pyritic, ostracods.  7060 7090 Shaledusky yellow, grayish red and medium dark gray calcareous.  7090 7110 Shalegray red and medium dark to dark gray. Light gray fine grained limestone.  7110 7130 Sandstonewhite, fine grained. Medium dark gray and gray red shale.  7130 7160 Sandstonepale red, fine grained to silty. Medium dark and gray red shale.  7160 7210 Siltstonepale red, calcareous. White chalky limestone.  7210 7240 Limestonepale yellowish brown to brownish gray, fine grained to sublithographic.  7240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale.  7250 7260 Shalegray red, arenaceous, calcareous.  7260 7290 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz.  7310 7320 Shalepale red, highly arenaceous and gray red arenaceous.  7340 7350 Limestonemedium light to medium gray fine grained to oolitic.  7350 7360 Limestonewery light gray chalky to medium gray fine grained.  7380 7380 Shalemedium gray. White gypsum.  Limestonewhite to very light gray, fine grained to sub-	7020	7030	Shalemedium dark to dark gray, gray red and moderate
calcareous.  7090 7110 Shalegray red and medium dark to dark gray. Light gray fine grained limestone.  7110 7130 Sandstonewhite, fine grained. Medium dark gray and gray red shale.  7130 7160 Sandstonepale red, fine grained to silty. Medium dark and gray red shale.  7160 7210 Siltstonepale red, calcareous. White chalky limestone.  7210 7240 Limestonepale yellowish brown to brownish gray, fine grained to sublithographic.  7240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale.  7250 7260 Shalegray red, arenaceous, calcareous.  7260 7290 Shalepale red, highly calcareous.  7290 7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz.  7310 7320 Shalepale red, highly arenaceous and gray red arenaceous.  7320 7340 Anhydritewhite. Medium light gray fine grained limestone.  7340 7350 Limestonemedium light to medium gray fine grained to oolitic.  7350 7360 Limestonevery light gray chalky to medium gray fine grained.  7360 7380 Shalemedium gray. White gypsum.  7380 7390 Limestonewhite to very light gray, fine grained to sub-	7030	7060	Shalemedium to medium dark gray and gray red pyritic,
fine grained limestone.  7110 7130 Sandstonewhite, fine grained. Medium dark gray and gray red shale.  7130 7160 Sandstonepale red, fine grained to silty. Medium dark and gray red shale.  7160 7210 Siltstonepale red, calcareous. White chalky limestone.  7210 7240 Limestonepale yellowish brown to brownish gray, fine grained to sublithographic.  7240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale.  7250 7260 Shalegray red, arenaceous, calcareous.  7260 7290 Shalepale red, highly calcareous.  7290 7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz.  7310 7320 Shalepale red, highly arenaceous and gray red arenaceous.  7320 7340 Anhydritewhite. Medium light gray fine grained limestone.  7350 7360 Limestonemedium light to medium gray fine grained to oolitic.  7350 7360 Limestonevery light gray chalky to medium gray fine grained.  7360 7380 Shalemedium gray. White gypsum.  7380 7390 Limestonewhite to very light gray, fine grained to sub-	7060	7090	
7110 7130 Sandstonewhite, fine grained. Medium dark gray and gray red shale. 7130 7160 Sandstonepale red, fine grained to silty. Medium dark and gray red shale. 7160 7210 Siltstonepale red, calcareous. White chalky limestone. 7210 7240 Limestonepale yellowish brown to brownish gray, fine grained to sublithographic. 7240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale. 7250 7260 Shalegray red, arenaceous, calcareous. 7260 7290 Shalepale red, highly calcareous. 7290 7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz. 7310 7320 Shalepale red, highly arenaceous and gray red arenaceous. 7320 7340 Anhydritewhite. Medium light gray fine grained limestone. 7340 7350 Limestonemedium light to medium gray fine grained to oolitic. 7350 7360 Limestonevery light gray chalky to medium gray fine grained. 7360 7380 Shalemedium gray. White gypsum. 7380 7390 Limestonewhite to very light gray, fine grained to sub-	7090	7110	
gray red shale.  7160 7210 Siltstonepale red, calcareous. White chalky limestone.  7210 7240 Limestonepale yellowish brown to brownish gray, fine grained to sublithographic.  7240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale.  7250 7260 Shalegray red, arenaceous, calcareous.  7260 7290 Shalepale red, highly calcareous.  7290 7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz.  7310 7320 Shalepale red, highly arenaceous and gray red arenaceous.  7320 7340 Anhydritewhite. Medium light gray fine grained limestone.  7340 7350 Limestonemedium light to medium gray fine grained to oolitic.  7350 7360 Limestonevery light gray chalky to medium gray fine grained.  7360 7380 Shalemedium gray. White gypsum.  7380 7390 Limestonewhite to very light gray, fine grained to sub-	7110	7130	Sandstonewhite, fine grained. Medium dark gray and gray
7160 7210 Siltstonepale red, calcareous. White chalky limestone. 7210 7240 Limestonepale yellowish brown to brownish gray, fine grained to sublithographic. 7240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale. 7250 7260 Shalegray red, arenaceous, calcareous. 7260 7290 Shalepale red, highly calcareous. 7290 7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz. 7310 7320 Shalepale red, highly arenaceous and gray red arenaceous. 7320 7340 Anhydritewhite. Medium light gray fine grained limestone. 7340 7350 Limestonemedium light to medium gray fine grained to oolitic. 7350 7360 Limestonevery light gray chalky to medium gray fine grained. 7360 7380 Shalemedium gray. White gypsum. 7380 7390 Limestonewhite to very light gray, fine grained to sub-	7130	7160	
T210 7240 Limestonepale yellowish brown to brownish gray, fine grained to sublithographic.  T240 7250 Siltstonevery light gray, calcareous, arenaceous. Grayish red silty shale.  T250 7260 Shalegray red, arenaceous, calcareous.  T260 7290 Shalepale red, highly calcareous.  T290 T310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz.  T310 T320 Shalepale red, highly arenaceous and gray red arenaceous.  T320 T340 Anhydritewhite. Medium light gray fine grained limestone.  T340 T350 Limestonemedium light to medium gray fine grained to oolitic.  T350 T360 Shalemedium gray. White gypsum.  T380 T390 Limestonewhite to very light gray, fine grained to sub-	7160	7210	
red silty shale.  7250 7260 Shalegray red, arenaceous, calcareous.  7260 7290 Shalepale red, highly calcareous.  7290 7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz.  7310 7320 Shalepale red, highly arenaceous and gray red arenaceous.  7320 7340 Anhydritewhite. Medium light gray fine grained limestone.  7340 7350 Limestonemedium light to medium gray fine grained to oolitic.  7350 7360 Limestonevery light gray chalky to medium gray fine grained.  7360 7380 Shalemedium gray. White gypsum.  7380 7390 Limestonewhite to very light gray, fine grained to sub-	7210	7240	Limestonepale yellowish brown to brownish gray, fine
7260 7290 Shalepale red, highly calcareous. 7290 7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz. 7310 7320 Shalepale red, highly arenaceous and gray red arenaceous. 7320 7340 Anhydritewhite. Medium light gray fine grained limestone. 7340 7350 Limestonemedium light to medium gray fine grained to oolitic. 7350 7360 Limestonevery light gray chalky to medium gray fine grained. 7360 7380 Shalemedium gray. White gypsum. 7380 7390 Limestonewhite to very light gray, fine grained to sub-	7240	7250	
7310 Shalepale red, highly calcareous. White anhydrite. Fine grained free quartz.  7310 7320 Shalepale red, highly arenaceous and gray red arenaceous.  7320 7340 Anhydritewhite. Medium light gray fine grained limestone.  7340 7350 Limestonemedium light to medium gray fine grained to oolitic.  7350 7360 Limestonevery light gray chalky to medium gray fine grained.  7360 7380 Shalemedium gray. White gypsum.  7380 7390 Limestonewhite to very light gray, fine grained to sub-	7250	7260	Shalegray red, arenaceous, calcareous.
grained free quartz.  7310 7320 Shalepale red, highly arenaceous and gray red arenaceous.  7320 7340 Anhydritewhite. Medium light gray fine grained limestone.  7340 7350 Limestonemedium light to medium gray fine grained to oolitic.  7350 7360 Limestonevery light gray chalky to medium gray fine grained.  7360 7380 Shalemedium gray. White gypsum.  7380 7390 Limestonewhite to very light gray, fine grained to sub-	7260	7290	Shalepale red, highly calcareous.
7320 7340 Anhydritewhite. Medium light gray fine grained limestone. 7340 7350 Limestonemedium light to medium gray fine grained to oolitic. 7350 7360 Limestonevery light gray chalky to medium gray fine grained. 7360 7380 Shalemedium gray. White gypsum. 7380 7390 Limestonewhite to very light gray, fine grained to sub-	7290	7310	
7340 7350 Limestonemedium light to medium gray fine grained to oolitic. 7350 7360 Limestonevery light gray chalky to medium gray fine grained. 7360 7380 Shalemedium gray. White gypsum. 7380 7390 Limestonewhite to very light gray, fine grained to sub-			
oolitic.  7350 7360 Limestonevery light gray chalky to medium gray fine grained.  7360 7380 Shalemedium gray. White gypsum.  7380 7390 Limestonewhite to very light gray, fine grained to sub-			
grained.  7360 7380 Shalemedium gray. White gypsum.  7380 7390 Limestonewhite to very light gray, fine grained to sub-	7340	7350	
7380 7390 Limestonewhite to very light gray, fine grained to sub-	7350	7360	
	7360	7380	Shalemedium gray. White gypsum.
	7380	7390	

7390	7400	Limestonepale yellowish brown to very light gray, fine grained to oolitic.
7400	7410	Limestonelight to medium gray, fine grained to fragmental.
7410	7440	Anhydritewhite. Light to medium gray, fine grained to
7410	7440	fragmental limestone.
7440	7450	Limestonevery light to medium gray, fine grained to
7440	7430	
7450	7460	fragmental.
7450	7460	Anhydritewhite, light to medium light gray, fine grained
7460	7500	limestone.
7460	7500	Limestonepale yellowish brown to yellowish gray, fine
7.5.0.0	7500	grained to fragmental.
7500	7530	Anhydritewhite to yellowish gray.
7530	7550	Anhydritewhite to yellowish gray. Pale yellowish to pale
	75.00	brown fragmental to sublithographic limestone.
7550	7560	Anhydritewhite to medium light gray. Pale yellowish to
		pale brown, fine grained to sublithographic limestone.
7560	7580	Limestonepale brown to pale yellowish brown, fine grained
		to sublithographic. White to yellowish gray anhydrite.
7580	7600	Anhydritemedium light to yellowish gray. Grayish red
		shale.
7600	7615	Limestonepale yellowish brown to pale brown, fine grained
		to fragmental.
7615	7618	Anhydritewhite to brownish gray, mottled.
7618	$7626\frac{1}{2}$	Anhydritedusky yellowish brown.
7626⅓	7630	Anhydritewhite to medium gray. Pale yellowish brown
		dolomite inclusions with bleeding oil.
7630	7634	Anhydritelight brownish gray with pale yellowish brown
		dolomite inclusions.
7634	7635	Dolomitepale yellowish brown, fine grained, fossiliferous
		vertical fracture, good fluorescence, good oil cut.
7635	7640	Limestonepale brown to brownish gray, fragmental, tight,
		show of oil along stylolitic pattern.
7640	7642	Limestonepale yellowish brown to pale brown, fair porosity
		good show of oil and fluorescence.
7645	7660	Limestonepale yellowish brown, fine grained to oolitic,
		slight show at top and pale yellowish brown fine grained
		porous.
7660	7670	Shalelight olive gray, calcareous.
7670	7700	Limestonepale yellowish brown, fine grained to fragmental,
		some anhydrite inclusions.
7700	7710	Dolomitepale yellowish brown, fine grained to sucrosic,
		pinpoint porosity, fluorescence, slight cut.
7710	7730	Limestonepale yellowish brown to pale brown, fine grained
		to fragmental, fluorescence, slight cut.
7730	7750	Limestonepale yellowish brown, fine grained to fragmental,
		good fluorescence and good oil cut.
7750	7760	Anhydritewhite and gypsum. Medium dark gray shale.
7760	7820	Anhydritewhite to medium gray.
7820	7840	Limestonepale yellowish brown to pale brown, fine grained
		to fragmental, anhydrite, inclusions.
7844	7854	Dolomitepale yellowish brown, sucrosic, fragmental,
		calcareous tight.
7854	7867	Limestonepale yellowish brown, fine grained to fragmental,
		dolomitic.

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

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

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

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

0.5.0.0	0540	
9520	9540	Shalepale red and light gray. Light gray chalky limestone.
9540	9550	Shalemedium light to medium dark gray.
9550	9560	Limestonewhite to very light gray, chalky.
9560	9570	Dolomiteyellowish gray to light olive gray, sucrosic.
9570	9610	Dolomitewhite to yellowish gray, sublithographic to fine
		grained.
9610	9630	Dolomiteyellowish to pinkish gray, fine grained to
		sublithographic.
9630	9680	Dolomiteyellowish to pinkish gray and pale yellowish
		brown, microsucrosic to sublithographic.
9680	9710	Dolomiteyellowish gray to pale yellowish brown, micro-
3000	3,10	sucrosic to fine grained.
9710	9810	Dolomitewhite to yellowish gray, microsucrosic to sub-
3110	2010	lithographic.
9810	9920	Dolomitewhite to yellowish gray, microsucrosic to sub-
9010	9920	
0.000	0.000	lithographic.
9920	9980	Dolomiteyellowish gray, microsucrosic. Medium gray shale.
		Few free quartz grains.
9980	9990	Dolomiteyellowish gray, chalky to microsucrosic.
9990	10010	Dolomiteyellowish to light brownish gray, microsucrosic
		to sublithographic.
10010	10040	Dolomitewhite to yellowish gray, chalky to microsucrosic.
		Medium to medium dark gray shale.
10045	10056	(Core) Dolomitemedium light gray, microsucrosic, dense.
10056	10057	Dolomitelight to medium light gray, fine grained, dense,
		slight stain, good fluorescence and cut.
10057	10062	Dolomitemedium to medium dark gray, fine grained dense.
10062	10070	(End core) Shalemedium to medium dark gray and gray red.
10070	10092	Missing samples.
10070	10101	Core, Dolomitelight to medium gray and pale yellowish
10052	10101	brown, microsucrosic, black staining, good cut.
10101	10110	Dolomitemedium gray, microsucrosic, calcareous, dense.
10110	10116	Limestonemedium light to medium gray, dense fossiliferous.
10116	10121	Limestonebrownish gray, dense, fossiliferous.
10121	10126	Limestonemedium gray, sublithographic, argillaceous.
10126	10145	Limestonegrayish brown, sublithographic, fossiliferous.
10145	10151	Limestonemedium gray, sublithographic, fossiliferous,
		anhydrite inclusions.
10151	10162	Limestonemedium gray, sublithographic, fossiliferous,
		dolomitic, anhydrite inclusions.
10162	10170	Limestonemedium dark gray, sublithographic.
10170	10175	Limestonemedium dark gray, fine grained to sub-
		lithographic, fossiliferous, argillaceous.
10175	10179	Shalemedium dark gray, platy, calcareous.
10179	10195	Limestonemedium dark gray, sublithographic, argillaceous.
10195	10205	Shalemedium dark gray, calcareous.
10205	10212	Limestonemedium dark to dark gray, fine grained, dense
10200	10212	fossiliferous.
10212	10214	Limestonemedium light gray, microsucrosic, dense,
10212	10214	dolomitic.
100141.	10015	
10214½	10215	Dolomitebrownish, finely sucrosic, good fluorescence
10015	10010	and cut, good staining.
10215	10218	Limestonebrownish gray, dense, slightly argillaceous.
10218	10220	Dolomitebrown, finely sucrosic, good spotty
		fluorescence and black stain.

10220	10221	Limestonebrown finely sucrosic, spotty fluorescence and tan stain.
10221	10226	Limestonemedium dark gray, very fine grained dense.
10226	10241	Limestonemedium to medium dark gray, very fine grained
		dense to sublithographic, slightly fossiliferous, slight
		fluorescence along vertical fractures, some anhydrite
		inclusions.
10241	10244	Limestonemedium dark to brownish gray, sublithographic.
10244	10251	Dolomitemedium light to medium gray, dense, anhydrite.
10251	10256	Dolomitebrownish gray, sucrosic, calcareous, anhydrite inclusions.
10256	10260	Dolomitepale yellowish brown, microsucrosic, slight, some
		intergranular porosity, slight fluorescence.
10260	10265	Limestonebrownish gray, sublithographic, fractured,
		fractures filled with anhydrite, carbonaceous residue,
		slight oil cut.
10265	10270	Limestonebrownish gray, very fine grained to sub-
10070	10075	lithographic, anhydrite inclusions.
10270	10275	Limestonebrownish gray, sublithographic, fractured, carbonaceous residue.
10275	10280	Limestonebrownish gray sublithographic and pale yellowish
		brown fine grained, some pinpoint porosity, some staining
		and fluorescence.
10280	10285	Limestonemedium light gray to brownish gray, pinpoint
10005	10000	porosity, good staining, good cut.
10285	10290	Limestonedusky yellowish brown, sublithographic, slight
10290	10295	spotty fluorescence, anhydrite inclusions. Limestonebrownish gray, sublithographic, good fluorescence
10290	10295	along fractures, little staining, little bleeding oil 1-290-
		91.
10295	10300	Limestonebrownish gray, sublithographic, little brown
10230	10000	staining and fluorescence along fractures, anhydrite
		inclusions.
10300	10310	Anhydritemedium dark to brownish gray.
10310	10316½	Anhydritemedium dark gray, dense.
10316½	10320½	Dolomitepale yellowish brown, sublithographic to pseudo
		oolitic good fluorescence, spotted fluorescence along
		irregular fractures, tight, strong sulfur and stain along
		edge of core.
10320½	10322	Anhydritepale yellowish brown to brownish gray.
10322	10323	Dolomitepale yellowish brown, fine grained dense, slight
10000	10000	staining and fluorescence along fractures.
10323	10327	Limestonebrownish gray, sublithographic, black
10328	10330	carbonaceous residue. Anhydritebrownish gray.
10326	10330	Dolomitepale yellowish brown, microsucrosic, banded
10330	10333	staining, dull fluorescence throughout, slight cut and
		black carbonaceous residue.
10333	10334½	Dolomitedark brown, dense, slight fluorescence along
1000	10001.7	vertical fractures.
10334½	10342	Dolomitepale yellowish brown, finely sucrosic to sub-
		lithographic, some good fluorescence.
10342	10344	Dolomitepale yellowish brown, microsucrosic, slight
		fluorescence.

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