

NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 217

Summary of the Pan American Petroleum Corporation - R. A. Owings Unit #1  
 Burke County, North Dakota  
 Well No. 1766 - Permit No. 1778

by William P. Eastwood  
 November, 1959

Pan American #1 Owings located in C SE 1/4 SW 1/4, Sec. 13, T. 161N., R. 92W., Burke County, North Dakota. Ground level - 2162, K.B. - 2171, total depth 7250, plugged back to 6895. Drilling contractor Brinkerhoff Drilling Company, Denver Colorado.

The drilling permit was issued February 25, 1958. The well was drilled to a total depth of 7250 feet, tested, plugged back to 6895 feet and completed as producer in the Midale zone on May 20, 1958.

Drill Stem Tests:

#1 6840-6867: Initial Hydrostatic - 3745#, Final 3745,#. Open 4 hours, recovered 360 feet of fluid; 180 feet of heavy sulfur and gas cut mud, 180 feet of heavy oil gas cut mud. No water.

#2 6813-6840: Initial Hydrostatic - 3750#, Final - 3715#. Open 4 hours. Gas to surface in 2 hours and 20 minutes. Recovered 690 feet of fluid; 150 feet of heavily oil and gas cut mud, 190 feet of gas cut oil and 350 feet of oil and gas cut salt water.

#3 6879-6899: Tool open 3 hours, very weak intermittent blow throughout test. Recovered 180 feet of slightly gas cut drilling mud. Initial flowing pressure 54#, final flowing pressure 100#.

Cores:

1. 6817-6867: Full recovery
2. 6867-6910: Full recovery

Core Analysis (Chemical and Geological Lab., Glendive, Montana)

Averages

		Permeability		Effective Porosity	Saturation % of Pore Space		
		Radial	Vertical		Residual Oil	Water	
<u>Midale</u>							
3'	6822-6825	Oil	11.2	2.18	20.6	12.4	44.2
8'	6825-6833	Transitional	4.17	1.04	21.0	4.2	53.3
4'	6833-6637	Water	1.72	0.83	20.2	Trace	56.4
<u>Nesson</u>							
2'	6851-6853	Gas-Oil	2.11	0.30	6.4	7.1	29.5
4'	6853-6869	Oil	2.38	0.52	7.6	9.7	36.1
<u>Klitzke Pay</u>							
1'	6889-6890	Gas	0.36	0.38	19.1	1.2	24.6
1'	6903-6904	Water	0.23	0.27	11.4	Trace	76.0

Completion Data:

1. Perforated 6906-21 with 4 shots per foot, acidized with 500 gallons mud acid. Swabbed black sulfur water.

2. Set retainer at 6895.

3. Perforated 6858-78 with 4 shots per foot; acidized with 500 gallons of mud acid. Swabbed 23 barrels oil, 1% water in 7 hours. Swabbed 28 barrels oil, 73 barrels water in 8 hours.

4. Set packer at 6854.

5. Perforated 6828-52 with 4 shots per foot, acidized with 500 gallons; swabbed dry. Re-acidized with 2000 gallons; swabbed 89 barrels oil, 107 barrels water in 10 hours. Pumped 41 barrels oil in 12 hours, cut 18% basic sediment and water. Pumped 37 barrels oil, 18 barrels water per day. Pumped 52 barrels oil, 5 barrels water per day; 42 barrels oil 20 barrels water per day; 37 barrels oil, 10 barrels water in 18 hours; 42 barrels oil, 15 barrels water per day; 58 barrels oil; 54 barrels water in 20 hours; 41 barrels oil per day with trace of water. Pumped 48 barrels oil per day, 44% water, 36 A.P.I., shut-in pressure - 425#.

Casing and Tubing Record:

527 feet of 8 5/8 in. surface casing set at 535 with 400 sacks of cement.

7255 feet of 5 1/2 in. casing set at 7214 with 250 sacks of cement.

6825 feet of 2 7/8 inch tubing.

Formation tops were determined by the well samples and mechanical logs. Color names are those used by the Rock-Color Chart of the National Research Council. Limestone petrography terms are those proposed by Folk (1959) Bull. Amer. Assoc. Petroleum Geologists, v. 43, No. 1, pp. 1-38.

FORMATION TOPS

Cretaceous System	
Pierre Formation	1518
Niobrara Formation	3475
Greenhorn Formation	3843
Mowry Formation	4109
Fall River	4442
Jurassic System	
Rierdon Formation	5154
Piper Formation	5275
Piper "lime"	5457
Triassic System (?)	
Spearfish Formation	5738
Mississippian System	
Kibbey "sand"	6086
Kibbey "lime"	6199
Charles Formation	6334
"Midale zone"	6820
"Nesson zone"	6852
T.D.	7250
P.B.T.D.	6895

500-600 Lignite.  
600-700 Lignite.  
700-800 Abundant loose coarse rounded quartz grains, common lignite.  
800-900 As above with rare light gray silty shale.  
900-1000 Missing.  
1000-1100 Medium gray to light gray sandy shale.  
1100-1200 Rare silty and sandy shale as above with abundant lignite.  
1200-1300 Brownish gray silty shale with fine grained brownish gray silty and limy sandstone.  
1300-1400 Abundant, light gray silty shale.  
1400-1500 As above.  
1518 Pierre formation  
1500-1600 As above with gray shale and rare medium grains glauconitic sandstone. Very rare dark gray limy shale, rare moderate yellowish brown siltstone, rare lignite.  
1600-1700 As above with common white medium grained glauconitic slightly limy sandstone.  
1700-1800 As above.  
1800-1900 Light gray clay shale, rare yellowish brown siltstone, very rare dark greenish gray clayey siltstone.  
1900-2000 Shale as above with rare glauconitic white sandstone as above.  
2000-2100 Shale as above with common light gray soft shale.  
2100-2200 As above.  
2200-2300 Shale as above, rare pyrite, one foram and one carophyte.  
2400-2500 As above, forams and mollusk fragments.  
2500-2600 Shale as above, rare yellowish brown siltstone.  
2600-2700 As above.  
2700-2800 As above.  
2800-2900 As above, lignite cavings.  
2900-3000 Shale and siltstone as above, mollusk fragments.  
3000-3100 As above, rare calcite crystals and mollusk fragments.  
3100-3200 Shale, as above.  
3200-3300 Shale, medium gray as above.  
3300-3400 As above, mollusk fragments.  
3475 Top of Niobrara Formation  
3400-3500 As above, rare pyrite, rare dark gray shale with white specks. Rare lite gray fine grained sandstone.  
3500-3600 Medium gray shale, as above with speckled shale.  
3600-3700 As above.  
3700-3800 Medium gray shale as above, common black shale, no speckled shale.  
3843 Top of Greenhorn Formation  
3800-3900 Medium gray shale and black shale as above, rare very pale orange limy sandstone.  
3900-4000 As above, rare speckled shale; rare limy medium grained sandstone.  
4000-4100 Abundant black shale, rare medium gray shale and sandstone as above.  
4109 Top of Mowry Formation  
4100-4200 As above with rare dark greenish gray shales.  
4200-4300 As above, rare pyrite.  
4300-4400 As above.  
4442 Top of Fall River Formation  
4400-4500 As above, rare manganese-siderite pellets.

4500-4600 Shale as above, rare light gray fine grained sandstone, rare red-brown siltstone.

4600-4700 Shale as above, common light gray sandy shale.

4700-4800 Shale as above, very common loose coarse quartz grains.

4800-4900 As above.

4900-5000 Shale as above with common white limy, medium grained sandstone, rare quartz grains.

5000-5010 As above with rare greenish gray shale.

5010-5020 As above, sandstone slightly glauconitic.

5020-5030 Abundant greenish gray shale, common white sandstone as above, common brownish gray medium grained sandstone, rare black shale.

5030-5040 Shale and brownish gray sandstone as above, common white fine grained sandstone, rare medium grained white sandstone.

5040-5050 As above, rare brownish gray shale.

5050-5060 As above.

5060-5070 As above.

5070-5080 Abundant greenish gray shale, common white, fine to medium grained sandstone, rare black shale.

5080-5090 As above.

5090-5100 Abundant medium light gray shale, rare white sandstone and black shale.

5100-5110 As above with common greenish gray shale.

5110-5120 As above, rare pyrite and calcite crystals.

5120-5130 As above.

5130-5140 As above with rare yellowish brown crystalline limestone.

5140-5150 Shale and rare sandstone as above. No limestone.

5154 Top of Rierdon Formation.

5150-5160 Shale, medium gray, with rare greenish gray and black shale.

5160-5170 As above.

5170-5180 As above, rare white sandstone and mollusk fragments.

5180-5190 As above.

5190-5200 As above.

5200-5210 As above with common black shale.

5210-5220 As above rare coarse quartz grains.

5220-5230 Abundant medium dark gray shale, common medium light gray limy shale, common dark gray shale, rare mollusk fragments.

5230-5240 As above.

5240-5250 As above.

5250-5260 As above.

5260-5270 As above, rare greenish gray shale.

5275 Top of Piper Formation.

5270-5280 Medium dark gray, greenish gray, and dark gray shale as above. No medium lite gray shale. Common reddish brown shale.

5280-5290 As above.

5290-5300 As above very common reddish brown splintery shale.

5300-5310 As above.

5310-5320 Gray, reddish brown and black shales as above, rare greenish white limestone.

5320-5330 As above.

5330-5340 Shale as above, very common black shale.

5340-5350 As above.

5350-5360 As above, very rare greenish gray sandstone.

5360-5370 Shale, as above.

5370-5380 Shale as above, with very common medium to fine grained white limy sandstone. Rare very pale orange pseudo-oolitic limestone.

5380-5390 Sandstone shale and very rare limestone as above.

5390-5400 Abundant very pale orange fine crystalline limestone, common shale as above, rare sandstone as above.

5400-5410 Limestone as above slightly sandy, rare white limy sandstone, common shale as above.

5410-5420 As above.

5420-5430 As above, but less limestone and more black and greenish gray shale, rare reddish brown shale.

5430-5440 As above, rare pyrite crystals.

5440-5450 Shale as above, common reddish brown shale less common limestone.

5450-5460 As above.

5460-5470 Shale as above, rare limestone.

5470-5480 Missing.

5480-5490 As above with rare white very sandy limestone.

5490-5500 As above.

5500-5510 As above.

5510-5520 As above, rare limestone.

5520-5530 As above, rare white siltstone.

5530-5540 As above.

5540-5550 Shale as above, dark gray limestone and rare yellowish-brown oolitic and fine crystalline limestone.

5550-5560 Dark yellowish brown fine crystalline limestone with common shale as above.

5560-5570 Abundant dark to light yellowish brown limestone, rare shale as above.

5570-5580 As above.

5580-5590 Common limestone and shale as above.

5590-5600 Abundant black & gray shale as above, common limestone, common reddish brown shale.

5600-5610 Red brown shale as above, common limestone and dark shale as above.

5610-5620 As above with rare white anhydrite.

5620-5630 As above.

5630-5640 As above, rare greenish gray shale and sandstone.

5640-5650 Reddish brown medium gray and black shales as above, common white slightly limy gypsum.

5650-5660 As above.

5660-5670 As above.

5670-5680 Shale as above, no gypsum.

5680-5690 Shale as above, with common white gypsum, common medium gray sandy shale.

5690-5700 Shale as above, rare gypsum.

5700-5710 Abundant dark gray to black slightly silty shale, very rare gypsum.

5710-5720 As above with rare reddish brown shale.

5720-5730 As above, rare reddish brown shale and greenish gray shale.

5738 Top of Spearfish Formation

5730-5740 Abundant reddish brown shale, common medium gray and dark gray shale as above.

5740-5750 As above, rare white gypsum.

5750-5760 Abundant medium gray silty shale and black shale (cavings ?) common reddish brown shale.

5760-5770 As above.  
 5770-5780 Shale as above, rare white gypsum and pale yellowish brown limestone.  
 5780-5790 Abundant moderate red to moderate reddish brown shaly, medium grained sandstone, common shale as above.  
 5790-5800 As above with greenish gray shale and white gypsum.  
 5800-5810 As above.  
 5810-5820 As above.  
 5820-5830 As above.  
 5830-5840 Black and medium gray shale as above with reddish brown sandstone as above.  
 5840-5850 As above.  
 5850-5860 Very abundant black and medium gray shales, rare reddish brown shale and sandstone.  
 5860-5870 As above.  
 5870-5880 As above.  
 5880-5890 As above.  
 5890-5900 As above with rare medium lite gray limy shale.  
 5900-5910 As above.  
 5910-5920 As above, common reddish brown sandstone and shale.  
 5920-5930 As above, rare pink and white gypsum.  
 5930-5940 As above, rare moderate greenish yellow shale.  
 5940-5950 Medium gray and black shale, reddish brown shale and sandstone as above, rare gray fine grained sandstone.  
 5950-5960 Shale as above with dark reddish brown shale.  
 5960-5970 Gray and black shales, dark reddish brown shale, moderate reddish brown shale and sandstone.  
 5970-5980 As above, common sandstone.  
 5980-5990 As above.  
 5990-6000 Shale as above, abundant reddish brown sandstone.  
 6000-6010 As above  
 6010-6020 Abundant sandstone as above, common gray and black shale as above, rare white gypsum.  
 6020-6030 Very abundant sandstone, rare shales.  
 6030-6040 As above.  
 6040-6050 As above, rare coarse grained red brown sandstone.  
 6050-6060 As above.  
 6060-6070 As above, rare white gypsum.  
 6070-6080 As above, very rare greenish gray to lite gray fine grained sandstone.  
 6080-6090 As above, rare white, gypsum.  
 6090-6100 Missing.  
 6100-6110 As above with rare moderate red limy shale and sandstone.  
 6110-6120 Reddish brown sandstone as above with rare shale as above and rare coarse grained white quartz sandstone.  
 6120-6130 As above.  
 6130-6140 As above with rare loose quartz grains.  
 6140-6150 Sandstone as above with abundant black shale.  
 6150-6160 Abundant black shale as above with common coarse to medium grained reddish brown sandstone.  
 6160-6170 Abundant medium grained rarely coarse grained sandstone rare black and gray shale cavings.  
 6170-6180 As above, rare white gypsum.

6180-6190 Abundant grayish pink limy, gypsiferous sandstone, sandstone and shale as above.

6190-6200 As above.

6200-6210 Abundant very pale orange to white, fine to medium crystalline algal (?) limestone.

6210-6220 Limestone as above, commonly pelletoid with rare pseudo-oolites.

6220-6230 As above.

6230-6240 Limestone, as above.

6240-6250 Abundant reddish brown fine grained sandstone, rare limestone as above.

6250-6260 As above.

6260-6270 Sandstone as above, very rare limestone.

6270-6280 Sandstone as above with common black shale, no limestone.

6280-6290 Abundant dark reddish brown silty shale, common moderate reddish brown sandstone and black shale as above.

6290-6300 Sandstone and black shale as above, rare red brown shale as above.

6300-6310 Abundant black shale as above, very rare sandstone.

6310-6320 Common sandstone as above, common dark reddish brown shale, common black shale.

6320-6330 As above, rare white gypsum.

6334 Top of Charles Formation

6330-6340 As above, rare pink gypsum.

6340-6350 Fine grained silty reddish brown sandstone, common black shale (cavings ?).

6350-6360 As above.

6360-6370 As above, rare pink anhydrite.

6370-6380 White anhydrite with black shale cavings.

6380-6390 As above.

6390-6400 White to lite pink limy anhydrite, black shale cavings.

6400-6410 Abundant medium lite gray, fine crystalline limestone; common pale reddish brown silty limestone, common white to pink gypsum.

6410-6420 Abundant pale red to moderate orange pink fine crystalline limestone with white anhydrite.

6420-6430 White limy anhydrite, rare limestone as above, black shale (cavings ?).

6430-6440 Pink and white anhydrite, rare finely granular limestone as above.

6440-6450 As above, pink finely granular dolomitic limestone. MLL and caliper log show salt 6442-6474.

6450-6460 As above.

6460-6470 As above, common black shale cavings.

6470-6480 Abundant lite gray to white slightly limy anhydrite with halite coatings.

6480-6490 Abundant pale yellowish brown pelletoid (pelmicrite), rarely fine crystalline (micrite) limestone. Pelmicrite has many pinpoint vugs; common white anhydrite as above.

6490-6500 Limestone, pale yellowish brown, fine crystalline (micrite), rare pelmicrite as above.

6500-6510 Limestone, as above.

6510-6520 Common limestone as above with abundant white anhydrite.

6520-6530 As above.

6530-6540 Abundant white anhydrite with black shale cavings.

6540-6550 As above with common dark yellowish brown friable pelmicrite. Pellets appear to be glauconite.

6550-6560 Anhydrite as above, rare medium gray fine grained limy sandstone, very rare limestone as above.

6560-6570 White anhydrite and gray and black shale cavings.

6570-6580 As above.

6580-6590 As above.

6590-6600 Abundant dark yellowish brown fine crystalline limestone (micrite) with numerous small secondary pores; rare anhydrite and shale as above.

6600-6610 As above.

6610-6620 As above with rare yellowish brown porous oomicrit or pelmicrite with good intergranular porosity.

6620-6630 As above, with common dark yellowish brown to dark gray micrite.

6630-6640 Abundant limy white anhydrite; black shale cavings.

6640-6650 As above.

6650-6660 Limestone, yellowish brown, micrite with well developed secondary granularity rare yellowish brown pelmicrite; rare anhydrite.

6660-6670 Abundant white anhydrite and black shale, common pale yellowish brown finely granular limestone.

6670-6680 As above.

6680-6690 As above.

6690-6700 Very abundant white anhydrite.

6700-6710 As above.

6710-6720 As above.

6720-6730 Limy anhydrite as above.

6730-6740 As above.

6740-6750 Limestone, dark yellowish brown micrite; with common pale yellowish brown finely granular limestone, rare white anhydrite.

6750-6760 As above.

6760-6770 Abundant white anhydrite, rare limestone as above.

6770-6780 As above.

6780-6790 Anhydrite as above with rare yellowish brown finely granular limestone.

6790-6800 Anhydrite white.

6800-6810 As above, very rare dark yellowish brown porous pelmicrite.

6810-6817 Circulation - Limestone, pale yellowish brown, finely granular, fair porosity, good fluorescence and cut. Rare white anhydrite.

Core #1

6817-6818 Limestone, finely granular dark yellowish brown, shaly, dead oil stain, weak fluorescence.

6818-6819 Limestone, medium gray, pelmicrite, fair intergranular porosity, low permeability, very faint fluorescence.

6819-6820 As above, slightly silty.

6820 Top of "Midale zone"

6820-6821 As above, silty and anhydritic, scattered patches of finely granular limestone.

6821-6822 Limestone, pale yellowish brown, intraclasts in finely granular matrix, scattered large dark yellowish brown anhydrite crystals, no stain, very weak fluorescence and cut.

6822-6823 Limestone, pale yellowish brown, finely granular, good porosity, weak fluorescence and cut.

6823-6824 Limestone, dolomitic as above, scattered anhydrite crystals, good fluorescence and cut.

6824-6825 Limestone dolomitic as above, very weak fluorescence.

6825-6826 Dolomite, pale yellowish brown, finely granular, no fluorescence.  
 6826-6827 As above, weak fluorescence.  
 6827-6828 Limestone, dolomitic, finely granular, weak fluorescence and cut.  
 6828-6829 Dolomitic limestone as above, no fluorescence.  
 6829-6830 Limestone, pale yellowish brown finely granular, scattered anhydrite crystals, weak fluorescence and cut.  
 6830-6831 Limestone, as above, dead oil stains, no fluorescence.  
 6831-6832 As above, no stains, no fluorescence.  
 6832-6833 Limestone as above, slightly dolomitic, good fluorescence and cut.  
 6833-6834 Limestone, as above, scattered anhydrite crystals, very weak fluorescence.  
 6834-6835 As above, no fluorescence.  
 6835-6836 As above.  
 6836-6837 Limestone, moderate to pale yellowish brown, finely granular, good porosity, no stain, no fluorescence.  
 6837-6838 Limestone, as above, dead oil stain, weak fluorescence and cut.  
 6838-6839 Limestone, yellowish brown, intramicrite and finely granular, very weak fluorescence.  
 6839-6840 Limestone moderate yellowish brown, intrabiomicrite, no fluorescence.  
 6840-6841 As above, slight dead oil stain, no fluorescence.  
 6841-6842 Limestone, dark yellowish brown, intrabiomicrite, low porosity, no fluorescence.  
 6842-6843 Limestone, dark yellowish brown, intrapelsparite with cast of spiriferid (?) brachiopod.  
 6843-6844 Limestone, dark gray, biomicrite, veins of white calcite.  
 6844-6845 Limestone, dark gray, pelmicrite with echinoderm (?) fragments, no cut.  
 6845-6846 Limestone moderate yellowish brown, biomicrite and finely granular, low porosity.  
 6846-6847 Limestone, as above.  
 6847-6848 Limestone, moderate yellowish brown, pelsparite (?), oil stained, weak fluorescence and cut.  
 6848-6849 As above, echinoderm and brachiopod fragments.  
 6849-6850 Limestone as above, fair intergranular porosity, weak fluorescence and cut.  
 6850-6851 Limestone, pale yellowish brown, intrabiomicrite, tight, no fluorescence or cut.  
 6851-6852 As above, scattered pinpoint porosity, weak fluorescence and cut.  
 6852 Top of "Nesson zone".  
 6852-6853 Limestone, pale to moderate yellowish brown, oosparite (?), good intergranular porosity, very weak cut and fluorescence.  
 6853-6854 Limestone, pale to moderate yellowish brown, intrapelmicrite (?), dark yellowish brown limestone fragments scattered in a pale yellowish brown pelmicrite matrix, good secondary porosity, good cut and fluorescence.  
 6854-6855 Limestone, pale yellowish brown, pelmicrite with echinoderm fragments and rare limestone fragments as above; fair intergranular porosity, good fluorescence and cut.  
 6855-6856 Limestone, pale yellowish brown, pelmicrite, good porosity, good cut.  
 6856-6857 As above.  
 6857-6858 Limestone, pelmicrite with limestone fragments as above, pinpoint porosity, good fluorescence and cut on fracture surfaces.

6858-6859 Limestone, as above.

6859-6860 As above, dark yellowish brown.

6860-6861 As above, good fluorescence and cut.

6861-6862 Limestone, pale yellowish brown, micrite with "floating" pseudo-oolites and intraclasts. Common clear anhydrite inclusions, tight, no fluorescence or cut. Carbonaceous material along stylolite.

6862-6863 Limestone, pale yellowish brown, pelmicrite, anhydritic, good secondary porosity, where matrix has been removed; very weak fluorescence and cut.

6863-6864 Limestone, pale yellowish brown, micrite, numerous secondary vugs, some filled with colorless anhydrite, tight.

6864-6865 As above with rare intraclasts.

6865-6866 Limestone, pale yellowish brown to very pale orange, intramicrite, anhydrite with numerous pores as above, tight, weak fluorescence.

6866-6867 As above, secondary pores not as numerous as above.

Core #2

6867-6868 Limestone, dark yellowish brown, intramicrite with some sparry matrix, anhydritic, tight, carbonaceous material on fracture faces and in stylolite seams.

6868-6869 Limestone, pale yellowish brown, intrabiomicrite, common hollow ostracodes, fair matrix porosity, common pinpoint pores, no fluorescence or cut.

6869-6870 Limestone, pale yellowish brown intramicrite, tight, slight stain, weak fluorescence and cut.

6870-6871 Limestone, pale yellowish brown micrite, stained in fractures, tight, weak fluorescence and cut.

6871-6872 Limestone, dark yellowish brown, micrite, faintly laminated with algal (?) material, no stain, tight.

6872-6873 Limestone, pale yellowish brown, pelmicrite, small moderate yellowish brown pellets and intraclasts in pale yellowish brown matrix, tight, pinpoint porosity, no fluorescence or cut.

6873-6874 Limestone, pale yellowish brown, micrite, anhydritic, tight, poor porosity, slight stain, weak fluorescence.

6874-6875 As above, very weak fluorescence.

6875-6876 As above, sublithographic, very tight.

6876-6877 As above, scattered moderate yellowish brown intraclasts (?), tight.

6877-6878 As above.

6878-6879 As above with scattered dark yellowish brown pellets and small intraclasts, pinpoint porosity, anhydritic, slight staining, faint fluorescence and cut.

6879-6880 Limestone, pale yellowish brown micrite with scattered very small pellets and intraclasts, tight, sublithographic.

6880-6881 Limestone, moderate yellowish brown, pelmicrite, tight, no cut.

6881-6882 As above.

6882-6883 Pale yellowish brown pelmicrite with scattered intraclasts (?) and fossil fragments, tight.

6883-6884 Limestone, pale to moderate yellowish brown, biopelmicrite, tight, scattered intraclasts. Weak fluorescence and cut.

6884-6805 Limestone, moderate yellowish brown pelomicrite, tight with secondary porosity slightly developed, oil stained, good fluorescence and cut.

6885-6886 Limestone, intrapelmicrite; moderate yellowish brown pelmicrite and micrite intraclasts in pale yellowish brown pelmicrite, anhydritic, secondary porosity, slightly developed, fair fluorescence and cut.

6886-6887 Limestone, light gray to very pale yellowish brown, pelmicrite dead oil stains in thin laminae, very weak fluorescence, no cut, low porosity.

6887-6888 Limestone, very light gray, pelmicrite secondarily granulated, fair porosity, no fluorescence or cut.

6888-6889 Limestone, pale yellowish brown, pelmicrite with scattered large intraclasts, carbonaceous stain in thin laminae. Tight with secondary porosity poorly developed and with bituminous material in some of the small pores. Good fluorescence and cut.

6889-6890 Limestone, pale yellowish brown to very pale orange, oomicrite, anhydrite, parts of the rock appear to have a sparry matrix, but this may be secondary anhydrite, numerous seams and stylolites which have carbonaceous material. Poor porosity, faint fluorescence and weak cut.

6890-6891 Limestone, pale to moderate yellowish brown, intrapelmicrite, abundant anhydrite, tight, very faint fluorescence.

6891-6892 Limestone pale yellowish brown pelmicrite, abundant colorless anhydrite, no stain, tight.

6892-6893 Anhydritic pelmicrite as above fair secondary porosity, oil stained, faint fluorescence weak cut.

6893-6894 As above.

6894-6895 Limestone, moderate yellowish brown, intrapelmicrite, abundant brown and white anhydrite. Tight.

6895-6896 Limestone, moderate yellowish brown oosparite with rare pelmicrite intraclasts. Tight, faint fluorescence and cut.

6896-6897 Limestone, very pale yellowish brown, pelmicrite with scattered oolites, common colorless anhydrite crystals, rare very pale orange micrite intraclasts, tight, very weak fluorescence.

6897-6898 Limestone as above.

6898-6899 Limestone, pale yellowish brown, intrasparite with pellets, very abundant brown anhydrite.

6899-6900 Limestone as above.

6900-6901 Limestone, anhydritic, very lite gray, pelmicrite, good porosity, very weak fluorescence.

6901-6902 Limestone, moderate, moderate yellowish brown, pelmicrite, tight.

6902-6903 Limestone, as in 6900-01 above.

6903-6904 Limestone, dark yellowish brown, pelmicrite, tight, abundant dark brown anhydrite.

6904-6905 Dolomite, limy, lite gray, finely granular, good porosity, no fluorescence, clear anhydrite crystals.

6905-6906 Limestone, dolomitic, lite gray finely granular, shaly.

6906-6907 Dolomite, lite gray, medium crystalline with inclusions of pale yellowish brown, finely granular limestone.

6907-6908 Limestone, pale yellowish brown, finely granular, anhydritic, no fluorescence.

6908-6909 Dolomite, limy, lite gray, finely granular, good porosity.

6909-6910 As above, anhydritic.

6910-6920 Abundant pale yellowish brown and lite gray finely granular limestone; rare white anhydrite.

6920-6930 Common limestone as above with common dark yellowish brown pelmicrite to micrite (sublithographic) limestone, rare white anhydrite as above.

6930-6940 Abundant sublithographic limestone as above, rare pink and white anhydrite.

6940-6950 Abundant moderate yellowish brown sublithographic limestone, common pale yellowish brown sublithographic limestone, rare lite gray to white pelmicrite limestone.

6950-6960 As above.

6960-6970 Abundant pale yellowish brown to lite gray pelmicrite limestone, rare dark yellowish brown sublithographic limestone.

6970-6980 As above with common dark yellowish brown sublithographic limestone, and common lite gray finely granular limestone.

6980-6990 Very light gray pelmicrite and finely granular limestone.

6990-7000 As above with rare pale yellowish brown intrasparite limestone and rare moderate yellowish brown micrite limestone.

7000-7010 Pale yellowish brown to very light gray intrapelmicrite limestone, very rare pink anhydrite (cave?).

7010-7020 Limestone as above with rare oolites.

7020-7030 As above.

7030-7040 Very pale yellowish brown intramicrite limestone with rare crystalline calcite.

7040-7050 As above.

7050-7060 As above.

7060-7070 As above with common very pale yellowish brown pelmicrite and micrite limestone.

7070-7080 As above.

7080-7090 As above but rare intramicrite limestone.

7090-7100 Moderate yellowish brown intrapelmicrite limestone.

7100-7110 As above.

7110-7120 As above.

7120-7130 As above.

7130-7140 As above.

7140-7150 As above, with rare coarsely crystalline yellowish brown limestone.

7150-7160 Limestone, dolomitic, pelmicrite, moderate yellowish brown.

7160-7170 Limestone, moderate yellowish brown intrabiomicrite.

7170-7180 As above with common masses of crystalline calcite.

7180-7190 As above, dead oil stain, no fluorescence.

7190-7200 As above.

7200-7210 Moderate yellowish brown medium grained calcitic sandstone.

7210-7220 As above.

7220-7230 Missing.

7230-7240 Pale yellowish brown, intrapelmicrite limestone.

7240-7250 As above.

7250 Total depth.