NORTH DAKOTA GEOLOGICAL SURVEY CIRCULAR NO. 69

Summary of Sohio Petroleum Company and A. J. Artz #1

Bottineau County, North Dakota

Permit #354, Well #338

By LaVerne B. Nelson May, 1954

Sohio Oil Company - A. J. Artz #1, Bottineau County, North Dakota. NE NN SW Section 14, T. 163N., R. 82W., (330 feet from north line and 990 feet from west line). Elevation 1521 Grd, 1530 K.B.

The Sohio - Artz #1 was spudded July 7, 1953, 10 3/4" surface casing was set at 280 feet and cemented with 150 sacks of cement. The well was drilled to a total depth of 4123 feet, plugged and abandoned August 7, 1953.

Cement plugs were set at the following depths: @ 3780-3720 w/25 sacks, @ 2390-2340 w/20 sacks of cement, @ 320-260 w/35 sacks of cement, top of surface casing w/5 sacks of cement and steel plate welded on top.

Core #1 3539-3545 Received 5 1/2 feet of sand with spotted oil stain.

DST #1 3534-45

Tool open 1 hour, received 90 feet of water cut mud with slight show of oil, 230 feet of brackish water. Flow pressure 300#, shut in pressure 1420#.

DST #2 3747-72

Tool open 4 hours, received 3472 feet mud out brackish water with slight oily taste. Flow pressure 300-1800#, 20 minutes, shut in pressure 2200#.

Formation tops were determined from samples and electric logs with sample depth corrected to electric log depth, not all lithologic tops were called in following list. Colors were determined from rock color chart.

FORMATION TOPS

Cretaceous System		
Niobrara Fm.	1602	
Greenhorn Fm.	1874	
Dakota	2369	
Jurassic System		
Morrison Fm.	2770	
Sundance Fm.	2833	
Piper Fm.	3131	
Triassic System		
Spearfish Fm.	3420	

Mississippian	System		
Charles	Fm.		3570
Mission	Canyon	Fm.	3750

rounded, frosted, pitted. 150-275 Shale; light gray, micro-micaceous, claystone. 275-370 Shale; greenish gray 5076/1, micro-micaceous, claystone, some medium grained, sub-angular sand. 370-400 Shale; greenish gray, compact, firm claystone, micro-micaceous, slightly pyritic. 400-450 Shale; medium gray, brittle, micro-micaceous. 450-500 Shale; medium light to greenish gray, firm to brittle. 510-510 Shale; medium light gray, firm, slightly pyritic, micro- micaceous. 510-500 Shale; medium light gray, firm, slightly pyritic, micro- micaceous. 510-500 Shale; medium light gray, lumpy, micro-micaceous, slightly pyritic. 510-500 Shale; medium light gray, lumpy, micro-micaceous. 510-610 Shale; medium light gray, lumpy, micro-micaceous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; laght gray, compact, firm to brittle, micro- micaceous. 1130-1290 Shale; light gray, compact, firm. 1130-1290 Shale; a sabove, bluish white micaceous, some bluish white bentonite, traces of tan siltstone. 1290-1310 Shale; medium light gray, some bluish white bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1300-1410 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, some brown siltstone. 1540-1630 Shale; medium gray, flaky, some bluish white micaceous bentonite. 1540-1630 Shale; medium gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystal sof pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite, some brown siltstone. 1540-1630 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystal sof pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1860 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, gray, flaky, s	0-150	Sandstone; fine to very coarse grained, subrounded to well
 275-370 Shale; greenish gray 5GY6/1, micro-micaceous, claystone, some medium grained, sub-angular sand. 370-400 Shale; greenish gray, compact, firm claystone, micro-micaceous, slightly pyritic. 400-450 Shale; medium light or greenish gray, firm to brittle. 510-570 Shale; medium light and medium dark gray, lumpy micaeous, slightly pyritic. 570-590 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. 590-610 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. 590-610 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous. 640-710 Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic. 640-710 Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic, trace, of brown siltstone. 660-102 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium dray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dray gray, flaky, calcareous, some bluish white bentonite, silty. 1410-1540 Shale; medium dray, gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dray, gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dray, gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dray, gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dray, gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions. 1730-1810 Shale; medium dark gray, flaky,	1 5 0 7 5	
 medium grained, sub-angular sand. Shale; greenish gray, compact, firm claystone, micro-micaceous, slightly pyritic. Shale; medium gray, brittle, micro-micaceous. Shale; medium light to greenish gray, firm to brittle. Sho-Sino Shale; medium light and medium dark gray, lumpy micaeous, slightly pyritic. Shale; medium light gray, firm, slightly pyritic, micro-micaceous. Shale; medium light gray, firm, slightly pyritic, micro-micaceous. Shale; medium light gray, lumpy, micro-micaceous. Shale; medium light gray, lumpy, micro-micaceous. Shale; medium light gray, firm to brittle, micro-micaceous. Shale; medium light gray, firm to brittle, micro-micaceous. Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic. Shale; medium light gray, compact, firm to brittle, micro-micaceous. Shale; medium light gray, compact, firm. Shale; light gray, compact, firm. Shale; ababve, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. Shale; medium gray, lumpy, slightly calcareous. Shale; medium gray, flaky, some bluish white bentonite, silty. Shale; medium gray, lumpy, slightly calcareous. Shale; medium gray, flaky, calcareous, some bluish white bentonite, traces of tar stiltstone. Shale; medium gray, flaky, calcareous, some white bentonite. Shale; medium gray, flaky, calcareous, some white bentonite. Shale; medium gray, flaky, calcareous, some white bentonite. Shale; medium gray, flaky, calcareous, some bluish white bentonite. Shale; medium gray, flaky, calcareous, some bluish white bentonite. Shale; medium dark gray, flaky, calcareous, some bluish white bentonite. Shale; medium gray, flaky, calcareous, some bluish white bento		
 Shale; greenish gray, compact, firm claystone, micro-micaceous, slightly pyritic. Shale; medium gray, brittle, micro-micaceous. Shale; medium gray, micro-micaceous; lumpy. Shale; medium light to greenish gray, lumpy micreous, slightly pyritic. Shale; medium light and medium dark gray, lumpy micreous, slightly pyritic. Shale; medium light to greenish gray, lumpy, micro-micaceous. Shale; medium light gray, firm, slightly pyritic, micro-micaceous. Shale; medium light gray, lumpy, micro-micaceous. Shale; medium light gray, firm to brittle, micro-micaceous. Shale; medium light gray, firm to brittle, micro-micaceous. Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic, trace, of brown siltstone. Shale; light gray, compact, firm. Shale; medium light gray, compact, firm. Shale; light gray, compact, firm. Shale; light gray, flaky to firm, micro-micaceous. Shale; medium light gray, compact, firm. Shale; light gray, flaky, some bluish white bentonite, silty. Shale; dark gray, flaky, some bluish white bentonite, silty. Shale; dark gray, flaky, some bluish white micaceous bentonite. Shale; dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. Shale; medium dark gray, flaky, calcareous	2/5-3/0	
 slightly pyritic. 400-450 Shale; medium gray, brittle, micro-micaceous. 450-500 Shale; medium light to greenish gray, firm to brittle. 510-570 Shale; medium light and medium dark gray, lumpy micaeous, slightly pyritic. 570-590 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. 590-610 Shale; medium light gray, lumpy, micro-micaceous. 610-640 Shale; medium light gray, lumpy, micro-micaceous. 610-640 Shale; medium light gray, lumpy, micro-micaceous, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 640-710 Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; medium gray, lumpy, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous. 1290-1370 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline dark gray, flaky, calcareous, some bluish white bentonite, sprite and siltstone. <	270 400	
 400-450 Shale; medium gray, brittle, micro-micaceous. 450-500 Shale; medium-gray, micro-micaceous; lumpy. 500-510 Shale; medium light to greenish gray, firm to brittle. 510-570 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. 570-590 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. 590-610 Shale; medium light gray, lumpy, micro-micaceous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 860-1020 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; madium gray, flaky, some bluish white bentonite, traces of the slightly calcareous. 1370-1410 Shale; madium gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; madium gray, flaky, some bluish white bentonite, some brown siltstone. 1540-1630 Shale; medium gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dray gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, sprite and siltstone. 1800-1900 Shale; medium da	3/0-400	
 450-500 Shale; medium-gray, micro-micaceous; lumpy. 500-510 Shale; medium light to greenish gray, firm to brittle. 510-570 Shale; medium light and medium dark gray, lumpy micaeous, slightly pyritic. 570-590 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. 590-610 Shale; medium light to greenish gray, lumpy, micro-micaceous. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 860-102 Shale; medium light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; medium gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, slightly calcareous bentonite. 1540-1630 Shale; medium gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions. 1730-1810 Shale; dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1880-1980 Shale; medium dark gray, flaky, calcareous, some		
 500-510 Shale; medium light to greenish gray, firm to brittle. 510-570 Shale; medium light and medium dark gray, lumpy micaeous, slightly pyritic. 570-590 Shale; medium light gray, firm, slightly pyritic, micromicaeous. 590-610 Shale; medium light gray, lumpy, micro-micaecous. 610-640 Shale; medium light gray, lumpy, micro-micaecous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaecous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaecous, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micromicaecous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaecous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, flaky, some bluish white bentonite, slity. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, slity. 1410-1540 Shale; medium gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystal sof pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystal sof pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and calcite crystal sof pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and salitstone. 180-1800 Shale; medium dark gray, flaky, crystalline, dense limestone, traces of incceramus fragments. 180-1800 Shale; medium dark gray, flaky, crystalline, dense limestone, traces of incceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous bentonite s		
 510-570 Shale; medium light and medium dark gray, lumpy micaeous, slightly pyritic. 570-590 Shale; medium light gray, firm, slightly pyritic, micromicaceous. 590-610 Shale; medium light to greenish gray, lumpy, micro-micaceous. 610-640 Shale; medium light gray, lumpy, micro-micaceous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micromicaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; asdove, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dark gray, flaky, some bluish white and bluish white bentonite, silty. 1540-1630 Shale; dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 180-1980 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 180-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedde		
 slightly pyritic. S70-590 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. S90-610 Shale; medium light to greenish gray, lumpy, micro-micaceous. 610-640 Shale; medium light gray, lumpy, micro-micaceous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 640-710 Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some tystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, calcareous, some bluish white bentonite, traces of pyrite and saltstone. 180-1880 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of incceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous bentonite slightly calcareous		
 570-590 Shale; medium light gray, firm, slightly pyritic, micro-micaceous. 590-610 Shale; medium light to greenish gray, lumpy, micro-micaceous. 610-640 Shale; medium light gray, lumpy, micro-micaceous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceous, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; medium gray, lumpy, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous. 1290-1370 Shale; medium gray, bentonitic, lumpy, much white bentonite, silty. 1410-1540 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, flaky, some bluish white bentonite. 1540-1630 Shale; medium gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. 1730-1800 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium dark gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	510-570	
 micaceous. 590-610 Shale; medium light to greenish gray, lumpy, micro-micaceous. 610-640 Shale; medium light gray, lumpy, micro-micaceous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; medium gray, lumpy, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1540-1630 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, some brown siltstone. 1540-1630 Shale; medium gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, calcareous, some bluish white bentonite, pyrite and siltstone. 1800-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of incceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous bentonite slightly calcareous. 2000-2030 Shale; medium dark gray, flaky, slightly calcareous bentonite slightly calcareous. 	570-590	
 610-640 Shale; medium light gray, lumpy, micro-micaceous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceaus, slightly pyritic, trace, of brown slitstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; medium gray, lumpy, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dark gray, flaky, some bluish white bentonite, silty. 1540-1630 Shale; dark gray, flaky, some bluish white bentonite. 1630-1710 Shale; medium gray, lumpy, flaky, calcareous, some duish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; dark gray, flaky, some white bentonite. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous bentonite slightly calcareous. 2000-2030 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite 		
 610-640 Shale; medium light gray, lumpy, micro-micaceous, some bluish white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceaus, slightly pyritic, trace, of brown slitstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; medium gray, lumpy, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dark gray, flaky, some bluish white bentonite, silty. 1540-1630 Shale; dark gray, flaky, some bluish white bentonite. 1630-1710 Shale; medium gray, lumpy, flaky, calcareous, some duish white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; dark gray, flaky, some white bentonite. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous bentonite slightly calcareous. 2000-2030 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite 	590-610	Shale; medium light to greenish gray, lumpy, micro-micaceous.
 white bentonite, slightly pyritic. 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceaus, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some brown siltstone. 1540-1630 Shale; dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, some white bentonite. 180-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of incceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous bentonite slightly calcareous. 2000-2030 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	610-640	
 640-710 Shale; medium light gray, firm to brittle, micro-micaceous, slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceaus, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micro-micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 slightly pyritic. 710-850 Shale; medium light gray, flaky to firm, micro-micaceaus, slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micromicaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium dark gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	640-710	
 Shale; medium light gray, flaky to firm, micro-micaceaus, slightly pyritic, trace, of brown siltstone. Shale; medium light gray, compact, firm to brittle, micromicaceous. Shale; light gray, compact, firm. Shale; light gray, compact, firm. Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. Shale; medium gray, lumpy, slightly calcareous. Shale; dark gray, flaky, some bluish white bentonite, silty. Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and calcite crystal inclusions. Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. Shale; medium dark gray, flaky, slightly calcareous bentonite slightly calcareous. Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 slightly pyritic, trace, of brown siltstone. 860-1020 Shale; medium light gray, compact, firm to brittle, micromicaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dark gray, flaky, some bluish white bentonite. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; dark gray, flaky, some white bentonite. 1980-2000 Shale; medium dark gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	710-850	
 860-1020 Shale; medium light gray, compact, firm to brittle, micromicaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; dark gray, flaky, some bluish white bentonite. 1540-1630 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, traces of pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 micaceous. 1020-1130 Shale; light gray, compact, firm. 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; medium dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite, pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, some white bentonite. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	860-1020	
 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, some white bentonite. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite 		
 1130-1290 Shale; as above, bluish white micaceous bentonite, traces of crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, some white bentonite. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite 	1020-1130	Shale; light grav, compact, firm.
 crystalline calcite inclusions, slightly calcareous. 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 1290-1370 Shale; medium gray, lumpy, slightly calcareous, some bluish white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; dark gray, flaky, some white bentonite. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 white bentonite, traces of tan siltstone. 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1290-1370	
 1370-1410 Shale; dark gray, flaky, some bluish white bentonite, silty. 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 1410-1540 Shale; medium gray, bentonitic, lumpy, much white and bluish white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1370-1410	
 white bentonite, some brown siltstone. 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 1540-1630 Shale; dark gray, flaky, some bluish white micaceous bentonite. 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 1630-1710 Shale; medium dark gray, flaky, calcareous, some white bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1540-1630	
 bentonite, crystalline calcite inclusions, some crystals of pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 pyrite. 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 1710-1730 Shale; medium gray, flaky, calcareous, some bluish white bentonite traces of pyrite and calcite crystal inclusions. 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 bentonite traces of pyrite and calcite crystal inclusions. Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. Shale; dark gray, flaky, some white bentonite. Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1710-1730	
 1730-1810 Shale; medium dark gray, flaky, calcareous, some bluish white bentonite, pyrite and siltstone. 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1,10 1,00	
 bentonite, pyrite and siltstone. 1810-1880 1880-1980 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1730-1810	
 1810-1880 Shale; dark gray, flaky, some white bentonite. 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1,00 1010	
 1880-1980 Shale; medium dark gray, calcareous, flaky, white specks, interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1810-1880	
 interbedded, thin beds of shaly, crystalline, dense limestone, traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
 traces of inoceramus fragments. 1980-2000 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 	1000 1000	
 Shale; medium, gray, much bluish white, micaceous bentonite slightly calcareous. Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite. 		
slightly calcareous. 2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite.	1980-2000	
2000-2030 Shale, medium dark gray, flaky, slightly calcareous traces of crystalline dolomite, some white bentonite and pyrite.	T)00 7000	
crystalline dolomite, some white bentonite and pyrite.	2000-2030	
	2000 2000	
2000 2100 Dhate, meatam gray, Pracy, IIIm.	2030-2150	
	2000 2100	Share, mearam gray, pracy, rink.

2150-2310 Shale; medium gray, flaky. 2310-2352 Shale; medium gray lumpy, slightly calcareous, bentonitic. 1 3/4 hour 2352 Shale; same as above. 2352-2380 Shale; medium gray, lumpy, bentonitic, slightly calcareous. Note: poor samples, electric log shows sandstone 2380-2650. 2380 - 2420Shale; as above, some fine, well rounded, frosted quartz grains. 2420-2430 Shale; as above, medium grained, subangular to well rounded quartz cemented with pyrite. 2430-2450 Shale; medium gray, laminated, calcareous. 2450-2540 Shale; medium gray, flaky, some medium, well rounded, frosted quartz, siderite pellets. 2540-2670 Shale; medium light gray, massive, bentonitic, some very fine grained, silica cemented sandstone. 3/4 hour 2670 Sandstone; medium to very coarse, subangular guartz, some quartz pebbles, shale as above. 2670-2700 Shale; light gray, platy. 2700-2760 Shale; as above, some very fine grained, sandstone cemented with calcite. Shale; greenish gray, friable, trace of fine crystalline, dense 2760-2770 limestone, shale as above, some medium grained sandstone. Shale; medium light, medium gray, and greenish gray, platy, 2770-2800 trace of brown siltstone. 2800-2810 Shale; medium light and greenish gray, platy, trace of moderate orange pink, crystalline anhydrite. 2810-2900 Shale; greenish gray and light olive gray, some brownish gray siltstone. 2900-2980 Shale; light gray, platy. 2980-3030 Shale; light gray, greenish gray and moderate reddish brown. 3030-3040 Shale; as above, trace of lavender, splintery shale. 3040-3090 Shale; light gray, greenish gray, and moderate reddish brown, splintery and flaky. 3090-3100 Shale; as above, white to light gray, dense, sublithographic limestone. 3100-3130 Shale; greenish gray, moderate reddish brown and light gray. 3130-3170 Dolomite; grayish orange pink to very pale orange, dense, sublithographic, calcitic, anhydrite, filled veins, some fragmental and chalky limestone. 3170-3270 Shale; greenish gray and moderate reddish brown, lavender calcareous shale, traces of white oolitic limestone. 3270-3280 Limestone; white, chalky, some shale as above. 3280-3390 Shale; greenish gray, moderate reddish brown, olive gray and medium dark gray, flaky and brittle, much fine grained, sucrosic, anhydrite. 3390-3430 Shale; as above, traces of white chalky limestone, much anhydrite as above. Shale; moderate reddish orange to light brown, silty some very 3430-3455 fine grained orange sandstone. Some greenish gray shale. 3455 1 1/4 hours. Shale; light brown, silty, lumpy. 3455-3484 Shale; light brown, silty and greenish gray, splintery.

3484 1 hour. Shale; light brown, very silty, some very fine grained sandstone. 3484-3510 As above. 3510 1 1/2 hours. Shale; as above, 3510-3539 Sandstone; very fine grained, silica cemented, well sorted, orange colored. 3539 1 1/2 hours. Sandstone; medium grained, well rounded, frosted, pitted, well sorted. 3540-3545. Core 3540-3542 Sandstone; light brown, very fine grained, with medium grained, well rounded quartz grains suspended throughout, some anhydrite inclusions. 3542-3544 Sandstone; white medium grained, well rounded, frosted, pitted in very fine grained matrix. 3544-3545 Sandstone; as in 3540-42. 3545-3570 Sandstone; poor samples, mostly cavings from above, traces of light brown sandstone. 3570-3580 Anhydrite; pale red purple, lithographic, some fine grained, sucrosic anhydrite. Limestone; yellowish gray, arenaceous, dense, some anhydrite. 3580-3590 3590 1 1/2 hours. Limestone; as above. 3590-3600 Limestone; as above. 3600-3610 Anhydrite; white and pale red purple variegated, dense massive. 3610-3710 Anhydrite; light bluish gray and white, dense, massive, some pale red purple massive anhydrite. 3710 1 1/2 hours. Dolomite; yellowish gray, medium grained, grainy, calcareous, a little fair to poor pinpoint porosity. 3710-3750 Dolomite; as above. 3750 1 1/2 hours. Dolomite; as above, some dense, sublithographic limestone. 3750-3760 Shale; dark reddish brown and greenish gray, splintery. 3760-3780 Dolomite; yellowish gray, sublithographic, dense a little fair tubular porosity. 3780-3790 Limestone; yellowish gray, medium grained, grainy to crystalline, some fragmental with fair tubular porosity. 3790-3810 Limestone; white to yellowish gray, medium grained sucrosic, traces of chalky, oolitic limestone, some good tubular to vuggy porosity. 3810-3820 Dolomite; yellowish gray, fine to medium grained, sucrosic, some good vuggy porosity. 3820-3840 Limestone; yellowish gray, fragmental crystalline to sublithographic. 3840-3860 Limestone; yellowish gray, sublithographic, dense. Limestone; white to yellowish gray, argillaceous, chalky in 3860-3880 part, some dense, fragmental. 3880-3910 Limestone; yellowish gray, fragmental to medium grained, sucrosic, some chalky, oolitic limestone with good porosity. Some dolomitic rhombs. 3911 2 1/2 hours. Limestone; yellowish gray, medium grained, suorosic fair to good pinpoint porosity. 3911-3920 Limestone; yellowish gray, fine grained, much good vuggy porosity. Limestone; yellowish gray, oolitic, dense, chalky in part. 3920-3930 3930 2 1/2 hours. Limestone; as above.

3930-3940	Limestone; very light gray, fine to medium grained, sucrosic.
3940-4010	Limestone; white, medium grained, grainy, chalky in part very
	little apparent porosity, possibly a little good to fair
	interstitial porosity.
4010-4040	Limestone; yellowish gray, oolitic, fragmental some chalky
	limestone.
4040-4110	Limestone; very light gray, medium grained, oolitic.
4110-4123	Limostone; yellowish gray, sublithographic, dense.
Total Depth	4123