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Table 1.--Core log and physical properties of USGS-AEC core hole No. Mancos RR-1), Piceance Creek Basin, Rio Blanco County, Colorado

[Core recovered between 964 and 3,302 feet in depth]

Location: SW1/4.SW1/4 sec. 14, T. 1 N., R. 98 W.

Elevation: Ground 6,356 feet; Kelly bushing 6,367 feet.

Physical Properties (Dry core)

[Analysts: P. Powers and A. Chleborad]

Hole depth interval and (thickness) (in feet)	Core data: Dip of joints (from horizontal) Range of dip (in degrees)	Number of joints	Number of bedding-plane fractures[1]	Joint fillings (type)	Percent of joints and fractures with fillings	Joint frequency (excludes bedding plane fractures)	Lost core (percent)	Broken core (percent)	Index Number (joint frequencies + lost core + broken core): includes bedding plane fractures	excludes bedding plane fractures	Sample depth (feet)	Dry bulk density (g/cc)	Saturated bulk density (g/cc)	Grain density (g/cc)	Total porosity (percent)	Compressive velocity (ft/sec)	Shear velocity (ft/sec)	Poisson's ratio	Dynamic Young's modulus (psi x10^6)	Dynamic Shear modulus (psi x10^6)	Dynamic Bulk modulus (psi x10^6)	Static Poisson's ratio	Static Young's modulus psi x10^6	Static Shear modulus (psi x10^6)	Static Bulk modulus (psi x10^6)	Shore Hardness (shore units)	Unconfined compressive strength (psi)	Lithologic description
964 - 1,001 (37)	0 - 30 30 - 60 60 - 90	0 2 0	2	gilsonite(?) carbonate	25 25	0.05	4.0	76.0	8.0	8.0																		964.0-969.3.--Siltstone; yellowish-brown (10YR 5/2); very thin bedded; contains pale-yellowish-brown (10YR 6/2) lens (0.5-3.0 cm) which are flattened parallel to bedding. 969.3-975.5.--Siltstone; alternating thin (1 to 3 cm) dark-yellowish-brown (10YR 4/2) and pale-yellowish-brown (10YR 6/2) beds with sparse vugs; bedding dips less than 2°. 975.5-976.5.--Sandstone, light-gray (N6), limy, contains 6 cm bed of flattened clay pellets. 976.5-984.0.--Siltstone, as above. 984.0-992.5.--Sandstone and siltstone, as above but without pellet zone; thin-bedded; contains 6 cm bed of carbonaceous material (gilsonite?); bedding generally horizontal, with local 2 foot zone of wavy beds dipping as much as 25°; all bedding distinct.
1,001 - 1,054 (53)	0 - 30 30 - 60 60 - 90	14 21 16	167	pyrite gilsonite(?) clay (gouge)	30 5 5	1.0	0	27.0	6.9	3.7																		1,001.8-1,035.5.--Bedded siltstone; pale-yellowish-brown (10YR 6/2); contains occasional vugs as much as 5 cm filled with nahcolite; bedding dips as much as 20°. Siltstone contains small horizontal lens of black carbonaceous material and thin beds of gilsonite(?). 1,035.5-1,037.2.--Sandstone; dark-yellowish-gray (5Y 7/1); very fine-grained; limy; contains scattered chert and clay lens 3 to 6 cm in diameter. 1,037.2-1,052.5.--Siltstone; alternating thin beds of very pale-yellowish-brown (10YR 7/2) and dark-yellowish-brown (10YR 4/2) with some very thin beds of dusky-yellowish-brown (10YR 2/2); contains some thin beds of carbonaceous material. Bedding distinct and dips <3°. 1,052.5-1,057.2.--Siltstone, as above; contains thin beds of fine-grained light-gray (N6) limy sandstone.
1,054 - 1,103 (49)	0 - 30 30 - 60 60 - 90	12 21 18	0	pyrite clay FeO carbonate gilsonite(?)	15 15 15 5 2	1.1	4.0	20.0	3.5	3.5																		1,057.2-1,085.5.--Sandstone; medium-gray (N5); fine-grained; contains thin beds of oil shale; iron stained. 1,085.5-1,100.0.--Siltstone, silty marlstone and oil shale; pale-yellowish-brown (10YR 6/2) to dusky-yellowish-brown (10YR 2/2); varved; contains small (<3 cm) vugs filled with nahcolite; bedding dips <3°. 1,100.0-1,101.1.--Sandstone; pale-orange (10YR 7/2); fine-grained; thin bedded; siliceous; iron stained. 1,101.1-1,103.0.--Sandstone, light-olive-gray (5Y 6/1), poorly sorted; siliceous; iron stained.
1,103 - 1,153 (50)	0 - 30 30 - 60 60 - 90	4 23 8	153	pyrite	90	0.7	2.0	25.0	6.6	3.4																		1,103.0-1,132.0.--Sandstone, marlstone and oil shale; dusky-yellowish-brown (10YR 2/2) interbedded with pale-orangish-brown (10YR 6/3), bedding generally distinct and dips <3° locally to as much as 30°. 1,132.0-1,153.3.--Sandstone; pale-yellowish-brown (10YR 6/2), tuffaceous(?), bedded, limy, porous.
1,153 - 1,201 (48)	0 - 30 30 - 60 60 - 90	0 7 6	122	pyrite	50	0.3	3.0	6.0	3.8	1.2																		1,153.3-1,167.8.--Oil shale; dark-yellowish-brown (10YR 4/2) to dusky-yellowish-brown (10YR 2/2); varved. 1,167.8-1,168.6.--Sandstone. 1,168.6-1,201.0.--Oil shale; pale-yellowish-brown (10YR 6/2) to dusky-yellowish-brown (10YR 2/2); contains small (<1 cm) nahcolite vugs. Strong iron staining from 1,168.6 to 1,173.2; 1,188-1,200.0 shows dark-greenish-black (5G 2/1) mottling.
1,201 - 1,254 (53)	0 - 30 30 - 60 60 - 90	0 5 6	142	pyrite carbonate gilsonite(?) FeO	20 5 5 <5	0.2	3.0	16.0	4.9	2.1																		1,201.2-1,201.5.--Tuff, ash-fall; dark-yellowish-brown (10YR 6/2); contains small quartz and feldspar(?) phenocrysts. 1,201.5-1,208.2.--Oil shale; alternating dark-yellowish-brown (10YR 3/2) and grayish-orange (10YR 7/4); varved. 1,208.2-1,208.4.--Tuff; ash-fall; moderate-yellowish-brown (10YR 5/4), granular; contains 1 mm grayish-yellow (5Y 8/4) silky pumice and small quartz and feldspar phenocrysts. 1,208.4-1,233.8.--Oil shale; bedding as much as 3 feet thick; 1,233.8-1,234.2.--Tuff; ash-fall; grayish-brown (5YR 3/2). Mahogany Marker. 1,234.2-1,240.0.--Sandstone, dark-yellowish-brown (10YR 4/2), limy; contains tiny (2-3 mm) carbonaceous inclusions. 1,240.0-1,254.0.--Oil shale; contains small (<2 cm) scattered vugs usually filled with nahcolite; few (<5 percent) vugs are filled with carbonaceous material.
1,254 - 1,300 (46)	0 - 30 30 - 60 60 - 90	1 9 10	121	pyrite carbonate	<1 <1	0.5	3.0	18.0	5.2	2.6																		1,254.0-1,259.2.--Sandstone; moderate-yellowish-brown (10YR 5/4), poorly sorted; limy; contains small (<1 cm) irregular lens of carbonaceous material. 1,259.2-1,260.8.--Oil shale. 1,260.8-1,265.0.--Sandstone. 1,265.0-1,272.4.--Oil shale. 1,272.4-1,272.5.--Tuff(?); pale-red (5R 5/2). 1,272.5-1,275.2.--Oil shale; brownish-black (5YR 2/1); indistinct, bedding. 1,275.2-1,277.9.--Oil shale; alternating brownish-black (5YR 2/1) and pale-yellowish-brown (10YR 6/2); distinct bedding, dips generally <3°; beds average <3 cm in thickness. 1,277.9-1,283.5.--Oil shale; brownish-black (5YR 2/1); contains sparse beds (<3 cm) of medium brown (5YR 5/4) ash-fall tuff(?).
1,300 - 1,352 (52)	0 - 30 30 - 60 60 - 90	18 16 19	0	carbonate gilsonite(?) clay	20 <1 <1	1.1	6.0	17.0	3.4	3.4																		1,283.5-1,389.0.--Oil shale; dusky-yellowish-brown (10YR 2/2); contains scattered beds moderate-yellowish-brown (10YR 5/4) medium-grained sandstone. Sandstone often occurs as irregular lens <2 cm in diameter; between 1,299 and 1,352 feet bedding dips as much as 34°, and is broken; well-developed carbonate-healed vertical fractures at 1,301 feet; several empty or partially filled nahcolite vugs up to 10 cm in diameter below 1,300 feet. 1,389.0-1,394.7.--Siltstone; grayish-orange (10YR 7/4); limy; contains vugs filled with nahcolite.
1,352 - 1,400 (48)	0 - 30 30 - 60 60 - 90	0 3 4	0			0.1	1.0	73.0	7.5	7.5	1,356	2.27	2.27	2.28	0.44	12,796	7,481	0.24	1.23	1.71	2.71	0.22	1.24	0.74	0.51	49	18,000	1,394.7-1,438.0.--Oil shale and sandstone as above; bedding dips 0° to 20°.
1,400 - 1,452 (52)	0 - 30 30 - 60 60 - 90	0 3 6	0	carbonate gilsonite(?)	2 1	0.2	29.0	44.0	7.5	7.5																		1,438.0-1,475.0.--Oil shale; greenish-gray (5GY 6/1) to dark-greenish-gray (5G 4/1); with interbedded porous sandstones between 1,438 and 1,452 feet; interval contains vugs, 50 percent empty and 50 percent filled with nahcolite.
1,452 - 1,498 (46)	0 - 30 30 - 60 60 - 90	0 8 13	65	carbonate	30	0.6	24.0	22.0	7.1	5.2	1,456	2.21	2.29	2.40	7.92	10,434	5,807	0.27	1.54	1.00	1.84	0.24	1.76	1.13	0.71	44	14,000	1,475.0-1,498.0.--Oil shale; greenish-black (5G 2/1) grading downward to dusky-yellowish-brown (10YR 2/2) much nahcolite, occurring both in vugs and as beds as much as 6 cm. thick; broken zones are strongly iron stained.
1,498 - 1,552 (54)	0 - 30 30 - 60 60 - 90	2 3 11	63	carbonate	90	0.3	10.0	11.0	3.7	2.4																		1,498.0-1,579.0.--Oil shale; dusky-yellowish-brown (10YR 2/2) bedding horizontal; empty vugs are common in top half of interval. Minor iron staining in broken zones; core tends to break along edges of vugs. 1,579.0-1,590.0.--Sandstone; olive-gray (5Y 4/1); fine-grained, indistinctly bedded; contains small lens of carbonaceous material.
1,552 - 1,602 (50)	0 - 30 30 - 60 60 - 90	1 12 16	94	carbonate	50	0.2	15.0	20.0	6.4	4.2																		1,590.0-1,602.0.--Oil shale; contains sparse thin (0.6 cm) halite(?) and nahcolite beds.
1,602 - 1,646 (44)	0 - 30 30 - 60 60 - 90	1 3 8	69	carbonate clay	75 20	0.3	20.0	30.0	7.3	5.3																		1,602.0-1,703.0.--Oil shale; contains sparse thin (<6 cm) beds of sandstone and siltstone and few empty vugs; part of interval is broken, probably caused by collapsed vugs; bedding horizontal, locally dips to 30°.
1,646 - 1,704 (58)	0 - 30 30 - 60 60 - 90	2 0 8	90	carbonate	15	0.3	34.0	35.0	9.6	7.2	1,652	2.14	2.32	2.60	17.69											35		1,703.0-1,748.0.--Oil shale; dusky-yellowish-brown (10YR 2/2) alternating with pale-yellowish-brown (10YR 6/2); contains partially leached vugs ranging between 5 mm and 2.5 cm; pale-yellowish-brown beds are highly contorted in leached zones.
1,704 - 1,748 (44)	0 - 30 30 - 60 60 - 90	3 5 6	127	carbonate clay	50 10	0.5	38.0	32.0	12.2	7.5																		1,748.1-1,847.0.--Oil shale; similar to above; slightly more sandy in texture and speckled with white carbonate salt(?); vugs are numerous (~80 percent are 2.5 cm in diameter); larger vugs generally leached, small ones filled with nahcolite; core contains many very thin (0.5 mm to 2 mm) beds of carbonates.
1,748 - 1,802 (54)	0 - 30 30 - 60 60 - 90	0 0 4	179			0.1	34.0	56.0	14.1	9.1																		
1,802 - 1,847 (45)	0 - 30 30 - 60 60 - 90	0 0 2	46	carbonate	80	0.1	21.0	62.0	9.7	8.4																		1,847.0-1,997.0.--Oil shale; dusky-yellowish-brown (10YR 2/2) and pale-yellowish-brown (10YR 6/2); vuggy; above 1,900 feet average vug diameter 1 to 2 mm; vugs are filled with nahcolite; abundant pyrite, and iron staining in broken zones; abundant halite occurs both as irregular lens and 3 cm beds; below 1,900 feet sparse pyrite, halite, and vugs become much larger (to 10 cm); vugs leached from 1,900 feet to 1,947 feet, and filled with fresh nahcolite below 1,947 feet.
1,847 - 1,899 (52)	0 - 30 30 - 60 60 - 90	0 1 3	92	carbonate	80	0.1	23.0	30.0	7.7	5.4																		
1,899 - 1,947 (48)	0 - 30 30 - 60 60 - 90	0 14 6	63	carbonate FeO gilsonite(?)	75 15 10	0.4	8.0	8.0	3.4	2.0	1,918	2.34	2.40	2.68	5.65	14,075	7,907	0.27	1.90	1.97	3.62					51		1,997.0-2,135.4--Oil shale; as above; nahcolite and halite(?); vugs range from 1 mm to 15 cm; ~10 percent are leached; top part of interval contains microcrystalline nahcolite as opposed to massive nahcolite typical throughout core; halite(?) present on 90 percent of fractures, distinct bedding; dips 0° to 10°.
1,947 - 1,997 (50)	0 - 30 30 - 60 60 - 90	0 1 0	79	carbonate	10	0	9.0	4.0	3.0	1.3	1,992	2.13	2.14	2.16	1.39	9,581	5,873	0.20	2.37	0.99	1.32	0.25 0.10	1.14 0.62	0.76 0.26	0.46 0.28	38	13,000 13,000	2,135.4-2,145.3--Halite zone, beds as much as 2 feet alternating with thin beds of oil shale. 2,145.3-2,172.0.--Oil shale. 2,172.0-2,174.0.--Halite.
1,997 - 2,052 (55)	0 - 30 30 - 60 60 - 90	2 0 2	64	halite	3	0.1	12.0	22	4.8	3.5																		
2,052 - 2,100 (48)	0 - 30 30 - 60 60 - 90	5 0 1	53	halite	3	0.1	2.0	3.0	1.7	0.6																		2,174.0-2,197.0.--Oil shale; contains some halite beds as much as 6 cm thick, bedding fairly distinct, wavy, locally dips as much as 30°; halite crystals present in center of nahcolite vugs (<5 percent), little or no leaching.
2,100 - 2,148 (48)	0 - 30 30 - 60 60 - 90	1 1 1	78	halite	90	0	2.0	0	1.7	0.2	2,108	2.01	2.02	2.04	1.47	8,235	4,692	0.26	1.50	0.60	1.04	0.08	0.31	0.12	0.14	45	13,800	2,197.0-2,275.0.--Oil shale; as above, but without salt beds; halite occurs as fracture coating (<70 percent); and decreases towards bottom of interval.
2,148 - 2,197 (49)	0 - 30 30 - 60 60 - 90	0 2 1	79	halite	90	0.1	7.0	4.0	2.9	1.2																		2,275.0-2,309.7.--Oil shale; dark-yellowish-orange (10YR 6/6); distinct bedding; generally horizontal.
2,197 - 2,251 (54)	0 - 30 30 - 60 60 - 90	2 1 3	67	halite	65	0.1	7.0	0	2.2	0.8																		2,309.7-2,333.3.--Oil shale; dark-yellowish-orange (10YR 6/6); grading downward to dusky-yellowish-brown (10YR 2/2); nahcolite beds as thick as 2 feet; no evidence of leaching. 2,333.3-2,354.7.--Oil shale; dark-yellowish-brown (10YR 4/2); contains interbeds of moderate yellowish-brown (10YR 5/4) oil shale and thin nahcolite.
2,251 - 2,303 (52)	0 - 30 30 - 60 60 - 90	0 3 2	52	halite	55	0.1	9.0	0	2.1	1.0	2,296	1.94	2.12	2.37	17.72	10,434	5,020	0.35	1.78	0.66	1.98	0.14	0.79	0.36	0.35	24	3,200	2,354.7-2,368.0.--Oil shale; dusky-yellowish-brown (10YR 2/2).
2,303 - 2,347 (44)	0 - 30 30 - 60 60 - 90	3 2 0	33			0.1	10.0	0	1.9	1.1																		2,368.0-2,393.5.--Oil shale; alternating beds of dark-yellowish-brown (10YR 4/2), moderate yellowish-brown (10YR 5/4), and dusky-yellowish-brown (10YR 2/2) distinct horizontal bedding. 2,393.5-2,415.0.--Oil shale; dusky-yellowish brown (10YR 2/2); decreasing vugs (<5 cm).
2,347 - 2,402 (55)	0 - 30 30 - 60 60 - 90	0 0 1	52			0	7.0	0	1.7	0.7																		2,415-2,423.5.--Oil shale; dusky-yellowish-brown (10YR 2/2); several large vugs (up to 1 foot) of what seems to be altered nahcolite (very finely crystalline) in a matrix of nahcolite and white carbonate salts. 2,423.5-2,450.0.--Oil shale; dark-yellowish-brown (10YR 4/2); contains nahcolite vugs; color grades to moderate yellowish-brown (10YR 5/5) downward.
2,402 - 2,450 (48)	0 - 30 30 - 60 60 - 90	2 8 2	58			0.3	1.0	0	1.6	0.4																		2,450.0-2,503.0.--Oil shale, dusky-yellowish-brown (10YR 2/2); contains vugs as much as 75 cm in diameter; 90 percent of vugs are between 2,459 feet and 2,475 feet. 2,503.0-2,552.0.--Oil shale, grades downward from dusky-yellowish-brown (10YR 2/2) to dark-yellowish-brown (10YR 3/2); vugs generally 1 cm to 18 cm in diameter and show no evidence of leaching, becoming more numerous and larger toward the bottom of interval.
2,450 - 2,503 (53)	0 - 30 30 - 60 60 - 90	1 3 0	91			0.1	2.0	0	1.9	0.3																		2,552.0-2,638.0.--Oil shale as above; nahcolite comprises approximately 50 percent of core, occurring in vugs or in beds up to 15 cm thick.
2,503 - 2,552 (49)	0 - 30 30 - 60 60 - 90	1 2 1	79	halite(?)	70	0.1	3.0	1.0	2.2	0.5																		2,638.0-2,681.0.--Oil shale; dusky-yellowish-brown (10YR 2/2) grading to dark-yellowish-brown below 2,674 feet; small vugs <2 cm in diameter; this interval contains a 1 foot (2,644.0-2,645.0) zone of thin nahcolite beds.
2,552 - 2,598 (46)	0 - 30 30 - 60 60 - 90	0 2 1	87			0	0	3.9	2.3	0.4																		2,681.0-2,694.0.--Oil shale; grades from moderate-yellowish-brown (10YR 5/4) to dusky-yellowish-brown (10YR 2/2). 2,694.0-2,701.0.--Oil shale; moderate-yellowish-brown (10YR 5/4); sparse nahcolite vugs 1 cm to 5 cm in diameter. 2,701.0-2,708.7.--Sandstone; moderate-yellowish-brown (10YR 3/4); very fine grained and limy.
2,598 - 2,653 (55)	0 - 30 30 - 60 60 - 90	0 1 1	77			0	5.0	0	1.9	0.5	2,650	2.10	2.10	2.12	1.42	10,276	5,805	0.26	2.40	0.95	1.67	0.08 0.23	0.19 0.50	0.09 0.31	0.07 0.20	50	11,000 11,000	2,708.7-2,710.0.--Sandstone; as above with 3 cm, irregular lens of olive black (5Y 2/1) crystalline material. 2,710.0-2,714.0.--Sandstone; as above without crystalline material.
2,653 - 2,700 (47)	0.- 30 30 - 60 60 - 90	2 2 1	99			0.1	0	2.0	2.4	0.3																		2,714.0-2,749.0.--Oil shale, dark-yellowish-brown (10YR 3/2) to dusky-yellowish-brown (10YR 2/2); smooth texture; some small vugs (<2 cm) filled with nahcolite.
2,700 - 2,749 (49)	0 - 30 30 - 60 60 - 90	0 1 2	63	carbonate gilsonite(?)	70	0	1.0	0	1.4	0.1																		2,749.0-2,797.4.--Oil shale; color alternates between pale-yellowish-brown (10YR 3/6) and dark-yellowish-brown (10YR 3/2).
2,749 - 2,798 (49)	0 - 30 30 - 60 60 - 90	0 1 0	39			0	30.0	9.0	5.0	3.9																		2,797.4-3,050.0.--Claystone and oil shale; generally dusky-yellowish-brown (10YR 2/2) with interbeds of dark-yellowish-brown (10YR 4/2); vuggy; vugs as much as 15 cm; sparse 3 cm beds of nahcolite; sparse salt stringers; top of interval contains 6 cm bed of fine-grained, moderate-yellowish-brown (10YR 5/4) slightly limy sandstone; minor amounts of pyrite and iron staining in broken zones; bedding generally distinct and horizontal between 2,797 and 3,000 feet; below 3,000 feet bedding is generally indistinct.
2,798 - 2,847 (49)	0 - 30 30 - 60 60 - 90	3 0 1	115			0.1	0	2.0	2.6	0.3																		
2,847 - 2, 903 (56)	0 - 30 30 - 60 60 - 90	0 2 1	69	carbonate	2	0	1.0	4.0	1.7	0.5																		
2,903 - 2,950 (47)	0 - 30 30 - 60 60 - 90	1 1 2	59			0.1	0	21.0	3.4	2.2																		
2,950 - 3,000 (50)	0 - 30 30 - 60 60 - 90	0 0 0	82			0	4.0	10.0	3.1	1.4																		3,050.0-3,101.0.--Claystone and oil shale; dusky-yellowish-brown (10YR 2/2); and sandstone, medium-light-gray (N6) to grayish-brown (5YR 3/2); fine-grained; limy; vuggy. Vugs as much as 20 cm in diameter; core contains scattered lens of black carbonaceous material.
3,000 - 3,050 (50)	0 - 30 30 - 60 60 - 90	3 3 2	165	clay (gouge?)	<1	0.2	410	11.0	5.1	1.7	3,005	2.52	2.53	2.54	0.79	15,257	8,498	0.28	6.27	2.45	4.75	0.13	3.93	1.77	1.74	47	16,000	3,101.0-3,142.0.--Claystone and oil shale; dusky-yellowish-brown (10YR 2/2) and moderate-yellowish-brown (10YR 5/3); distinct, bedding dips between 0° and 15°.
3,050 - 3,101 (51)	0 - 30 30 - 60 60 - 90	8 6 1	15	carbonate gilsonite(?) (slickensides)	20 40 50	0.3	4.0	0	1.0	0.7	3,065	2.25	2.29	2.35	4.26	11,549	6,070	0.31	2.92	1.12	2.56					37		3,142.0-3,147.7.--Sandstone; light-gray (N7); medium-grained; porous, limy; contains medium-olive-gray (5Y 5/1) inclusions.
3,101 - 3,150 (49)	0 - 30 30 - 60 60 - 90	6 5 0	114	clay (slickensides)	10 50	0.2	120	7.0	3.4	1.0	3,118 3,145	2.27 2.26	2.31 2.42	2.37 2.70	4.22 16.30	13,879 11,812	8,203 7,054	0.23 0.22	5.06 3.69	2.06 1.51	3.12 2.20	0.16	1.35	0.66	0.58	24 36	6,900	3,147.7-3,176.2.--Interbedded claystone and sandstone, as above; beds as much as 2 feet thick. 3,176.2-3,180.0.--Dolomite; light-olive-yellow (5Y 5/4); contains thin beds of slightly granular olive-black (5Y 2/1) oil shale.
3,150 - 3,200 (50)	0 - 30 30 - 60 60 - 90	5 3 6	94	gilsonite(?) FeO (slickensides)	25 5 25	0.3	4.0	8.0	3.5	1.5	3,178	2.44	2.54	2.72	10.29	13,386	8,203	0.20	5.31	2.21	2.95					31		3,180.0-3,217.0.--Claystone; olive-black (5Y 2/1), thin-bedded, smooth to slightly granular in texture; vuggy. 3,217.0-3,219.0.--Sandstone; greenish-gray (5GY 7/1); fine-grained, limy.
3,200 - 3,248 (48)	0 - 30 30 - 60 60 - 90	0 0 1	90			0	0	8.0	2.7	0.8																		3,219.0-3,223.8.--Dolomite, as above. 3,223.8-3,248.0.--Claystone; medium-gray (N4).
3,248 - 3,302 (54)	0 - 30 30 - 60 60 - 90	8 0 1	51			0	7.0	21.0	3.8	2.8	3,254	2.48	2.54	2.65	6.42											37		3,248.0-3,276.4.--Siltstone; dark-olive-gray (5Y 3/1); thick-bedded; alternating with dusky-yellowish-brown (10YR 2/2) claystone; color grades downward to medium light-gray (N6). 3,276.4-3,278.8.--Sandstone; light-gray (N7); fine grained; contains interbedded claystone (<3 cm). 3,278.8-3,284.0.--Siltstone, as above, vuggy, contains thin interbeds (<2 cm) of sandstone. 3,284.0-3,291.5.--Sandstone, as above. 3,291.5-3,302.0.--Sandstone and claystone, as above, thin-bedded.

[1] May indicate relative ease of parting along bedding planes.

This report is preliminary and has not been edited or reviewed for conformity with U. S. Geological Survey standards and nomenclature.