

General Hole Conditions: Ho<sup>1</sup> Deviation                      Other                      WW1 CO3W 045098W

Casing Record: Depth 0-40' Size 5 1/2" Depth 315.5' Size 4 3/4" Depth                      Size                     

Contractor Himes Drilling Inc. Drillers La Gree, Thompson, Noble

Samples & Core Description by Hartley & McMullin Report by Hartley

Attachments: ( \* mailed separately by B.P.B. )

Sample Description	<u>  X  </u>	E-Log	<u>  *  </u>	Geograph	<u>  X  </u>
Core Description	<u>  X  </u>	Gamma Ray	<u>  *  </u>	Core Run Record	<u>  X  </u>
Rock Mechanic Record	<u>  X  </u>	Density Log	<u>  *  </u>	Photo Record	<u>  X  </u>
Daily Water Reports	<u>          </u>	Temp. Log	<u>  *  </u>	Sample Receipt	<u>          </u>
Gas Sample Record	<u>          </u>	Caliper Log	<u>  *  </u>	Radioactive	<u>          </u>
Hydrologic Record	<u>          </u>	Acoustic Log	<u>  *  </u>	Tracer Survey	<u>          </u>
Daily Drilling Reports	<u>  X  </u>	Other Log	<u>          </u>	Other:	<u>          </u>
Prognosis sheet	<u>          </u>	Log	<u>  *  </u>	Flowmeter ( spinner )	<u>          </u>
			<u>  *  </u>	Dipmeter	<u>          </u>

Remarks: CASING: 5 1/2" cemented and set 15' into bedrock from 25' to 40'; 5 1/2" csg= 5" ID;  
4 3/4" csg.= 3 1/16" ID; Hole diameter: 0-315.5' = 3 1/16" , 315.5-2010.0' = 3.032"

GAS: Encountered flammable, odorless gas along fracture @ 1313.5'; let hole stand 20 hrs.  
 Gas bled down from original SI pressure of 100 lbs. to 25 lbs. SI pressure. We mixed heavy mud and continued coring. No more gas was encountered.

SPUD DATE ( rotary ): 01/18/80  
 MOVE-IN DATE ( core rig ): 01/23/80-01/29/80  
 CORE DATE: 01/29/80  
 LOG DATE: 02/16/80  
 MOVE DATE: 02/16/80-02/18/80

<u>LOGGING TIME:</u>	<u>CLOCK</u>	<u>EXPLANATION</u>	<u>CHARGE EST.</u>
	0300-0330	Set up equipment	-
	0330-0530	GR, Density, Cal.	\$ 1255.00
	0530-0745	Sonic	no charge
	0745-0930	Neutron	no charge
	0930-1245	Laterolog	\$ 350.00
	1245-1400	Temp. log ( attempted )	--
	1400-1430	Rig down, leave site	

Note: B. P. B. will run the temperature, flowmeter, and dipmeter logs later, with no charge on the temperature log.

SAMPLE/CORE DESCRIPTION

Hole No. West Willow #1  
 Location NE SE SW Sec. 2, T4S, R98W  
 County and State Rio Blanco Co, Colorado  
 Elev. KB 7430' TD 2010.0  
 Spud 1/18/80 Compl. 2/16/80  
 Examined by John Hartley and Crea McMillin

From	To	
315.5	329.5	Oil shale; dark gray brown, even with looped bedding, poor competency; medium grade; numerous zones of white calcite sealed hair-line fractures, numerous dark green gray pyritic streaks and laminae throughout, several scattered blue gray analcitized tuff stringers, thin gray tuff stringers at 320.5, 0.5 core loss 320.0-320.5, grades to medium gray brown from 321.0-329.5, 1.1 core loss 324.5-325.5; 328-329 angular vugs on core surface - probably contorted leached nahcolite vugs; 0.20 core loss 329.3-329.5.
329.5	348.5	Oil shale; medium brown, even bedding, partly competent, low to medium grade, core highly broken, numerous partings, numerous small soft zones; 333.2-335.5 solution fracture rubble zones, numerous partings and fractures at various angles with calcite and pyrite and evidence leached nahcolite vugs; dark brown to black massive silty clay band 339.5-339.9, brittle, calcareous with trace of oil shale stringers, 341.0-344.0; numerous white to light tan marley stringers and laminae.
348.5	350.7	Oil shale, with interbedded siltstone; oil shale, medium olive brown, looped to contorted bedding; siltstone, light brownish gray, massive with oil shale stringers; overall, very low grade, poor competency, numerous partings, brittle siltstone, calcite sealed fractures common, few 45° inclined fractures, .20 core loss 348.8-349.0; calcite and kaolinite common on partings.
350.7	355.5	Siltstone; light to medium brownish gray, massive, very poor competency, very brittle, numerous irregular partings with kaoline, few interbedded oil shale bands, and stringers, carbonaceous material on some partings, asphaltic material common on some partings, 0.3 core loss 355.2-355.5.
355.5	365.0	Oil shale; medium olive brown and light gray brown, faintly banded, even and looped bandings, poor to fair competency, low to medium grade, numerous planar partings, several calcareous slick fractures, soft zone with numerous calcareous slick fractures, at 355.5-356.4, .05 gray massive siltstone bands at 360.3, several white calcareous stringers and streaks throughout scattered, gradational contact with following oil shale.

From	To	
365.0	376.4	Oil shale; light gray brown, even with trace looped bedding, poor to fair competency, low grade, open planar and irregular partings with calcite common, few scattered calcite slick fractures, 365.7 to 365.0 several medium gray siltstone bands; .10 siltstone band at 371.0; gilsonite stringers at 371.0; 0.5 core loss 365.0-365.5; fractures with calcite common.
376.4	377.8	Oil shale; dark brown-black, even to looped bedding, poor competency, high grade, fair to dense, numerous shaley partings, .10 zones of light tan granular tuff stringers at 377.0.
377.8	389.8	Oil shale; light gray brown, even bedding, poor competency, very low grade; marley, dark green gray pyritic streaks and stringers common throughout, numerous partings throughout, pyrite common on some fractures and partings, 0.4 core loss at 384.6-385.0.
389.8	391.3	Oil shale; dark brown and light gray brown banded, even and streaked bedding, fair competency, low to medium grade, several partings, trace calcite stringers.
391.3	397.9	Oil shale; light gray brown, even bedding, fair competency, low grade, .10 zone of solution collapsed breccia with abundant calcite at 392.2; 393.0-393.7 zone of irregular blue-gray granular analcitized tuff blebs; pyrite and calcite common fractures; blue-gray tuff stringers at 396.3; calcite stringers at 396.5 and 397.1
397.9	399.4	Oil shale; dark gray brown, even to streaked bedding, good competency, medium grade; 398.7-399.4 light gray brown, low grade oil shale.
399.4	404.9	Oil shale; light gray brown, even bedding, very poor competency, low grade, numerous solution fractures throughout, numerous partings, open and closed fractures with asphalt and calcite common; .20 solution fracture zone, collapsed leached nahcolite zone at 399.7.
404.9	412.9	Oil shale; light gray brown, even to looped bedding, poor competency, low grade, numerous interbedded dark brown medium grade oil shale beds from 404.9-405.3 and 405.8-410.9-411.3 and 412.2-412.9; few light tan tuff blebs and stringers from 410.2 to 410.4.
412.9	421.9	Oil shale; light brown, even bedding, fair competency, low grade, few hairline calcite sealed fractures at 414.0, solution breccia zone 414.3-414.6 with calcite and pyrite; 415.1-415.5 solution collapsed breccia zone with small angular rotated fragments, abundant calcite and pyrite; 416.0-417.2 several open and closed fractures with calcite, trace dark gray pyritic stringers 416.2 to 416.8; 417.2-419.0 solution fracture zone with open and closed fractures with calcite, trace collapsed breccia, small zones of rubble; long vertical fractures and numerous partings at 419.0-420.8; .10 light tan marley zones with calcite sealed fractures at 421.0; 421.4-421.9 solution breccia zone.

From	To	
421.9	437.0	Oil shale; light brown, and medium brown, interbedded, collapsed even with few zones of looped and irregular bedding, poor competency, solution fractures scattered throughout; few zones of solution fractures with calcite from 422.3-424.0, 426.6-427.2, 430.4-430.6, 430.9-434.0, 435.4-435.9; zone of scattered tuff stringers 424.0-424.6; .05 tan tuff bands at 425.8, 425.9; streaked bedding 428.8-429.1, zone of irregular brown-white tuff blebs and lenses from 429.7-430.5; trace collapsed breccia at 432.0, small band of collapsed vugs replaced with pyrite at 432.7; 433.0-435.0 streaked and contorted bedding common.
437.0	439.0	Oil shale; light gray brown, irregular bedding, poor competency, very low grade; very tuffaceous from 437.0-437.7; gilsonite stringer at 437.05; 1.3 core loss from 437.7-439.0.
439.0	449.5	Oil shale; light gray brown to medium gray brown, even bedding, very poor competency, very low to low grade; numerous planar and irregular partings throughout, calcite and kaolinite common on partings and fractures; abundant dark green gray pyrite streaks and laminae at 439.0-439.7; fractured zone 439.0-439.7; numerous partings and solution fractures at 440.6-442.2, very argillaceous with numerous tan soft granular tuff stringers, from 443.5-448.0, solution fracture rubble, very marley, offset bedding common, collapsed breccia structure common, abundant partings, abundant open and closed fractures, kaolinite and calcite common; 448.0-448.3 medium olive brown oil shale bands.
449.5	450.6	Tuff; light brown, massive with abundant oil shale stringers, wavy appearance, good to excellent competency, barren, few interbedded light olive brown oil shale bands.
450.6	455.7	Oil shale; light olive brown, even bedding, fair to good competence, low grade; few (2/ft.) partings, few calcareous sealed fractures, .15 tuff bands at 451.55; trace light blue-gray and white kaolinitic tuff stringers scattered throughout, gilsonite streak at 454.3.
455.7	469.0	Oil shale; light to medium brown, even bedding, fair competency, low to medium grade; 1-2 partings/ft. - approximately, few scattered open and closed fractures with calcite, few scattered white calcite stringers, tan analcitized tuff stringers at 460.5; .10 tan granular analcitized tuff band at 460.7; long 80° fracture from 465.9-467.0 with calcite, probably extends thru core loss and down to 468.1; solution fracture zone 466.5-467.0; 0.3 core loss; 0.5 core loss 467.0-467.5; .15 zone at 467.7 of irregular hackley closed fracture with offset bedding and dark black, soft, sectile mineral with shiny metallic luster when scrapped - possibly altered pyrite; gradational contact with following oil shale.
469.0	471.1	Oil shale; light brown, even bedding, fair competency, low grade; few light brown granular analcitized tuff bands from 469.2-469.7; few partings with calcite, vertical fractures at 469.0-471.0.

From	To	
471.1	476.0	Oil shale; light olive brown, even bedding, good competency, low to medium grade, few tuff stringers at 471.9 and 472.2; few tuff stringers at 472.8-473.2; few fractures with calcite; 474.2-475.0 bedding contorted and inclined 25°; white irregular soft calcite stringer at 474.8; gradational contact with following oil shale.
476.0	482.5	Oil shale; light brown, even bedding, good competency, low grade, tuff blebs at 478.5; few irregular partings; slightly marley in places; zone of irregular partings and fractures 479.1, 479.9, tuff stringers common 481.6-482.1.
482.5	485.5	Oil shale; light gray brown, even bedding, very poor competency, very low grade, abundant partings (poker chip), calcite common on partings; 484.6-485.3, solution fracture rubble with abundant irregular calcite stringers; 0.20 core loss 485.3-485.5.
485.5	498.8	Oil shale; medium gray brown, even and irregular bedding, poor to fair competency; low to medium grade; scattered calcite sealed fractures common, calcite common partings; approximately 2-3 partings/ft.; .10 zone of solution breccia at 490.0, irregular fractures with altered pyritic and calcite contorted bedding at 490.1-490.2; bedding inclines 15° from 490.2-490.6; 498.3-498.8 zone with irregular calcite and pyritic sealed partings and fractures.
498.8	500.8	Tuff; light brown, massive wavy bedding, good to excellent competency, barren; analcitized, granular, abundant oil shale stringers, few medium olive brown oil shale bands; upper and lower contact well defined.
500.8	505.5	Oil shale; dark gray brown, even bedding, fair competency, medium grade, partly collapsed leached nahcolite vugs at 503.5-505.1; abundant irregular calcite blebs, stringers, and sealed fractures 504.4-505.1; 505.1-505.5 rubble with abundant fractures and partings with calcite; bedding inclines 15° from 506-506.7; 506.7-507.6 solution fracture zone with calcite common, gradational contact with following oil shale.
505.5	516.1	Oil shale; light gray brown, even bedding, poor to fair competency, low grade, 2-3 partings/ft., few scattered calcite stringers at 510.5, 510.6, 510.8, 511.2, several thin zones (solution fracture) with calcite and altered pyrite, .30 at 512.2 and .15 at 513.0, thin blue-gray analcitized tuff stringers at 513.5, trace gilsonite streaks.
516.1	520.0	Oil shale; light to medium olive brown, even bedding, good to excellent competency, medium grade, fairly tough, fairly elastic, few freak hairline 45° fractures scattered throughout.
520.0	524.0	Oil shale; light gray brown, even bedding, fair competency, low grade, approximately 2-3 partings/ft.; calcite common on partings, few scattered 45°-60° calcite sealed hairline fractures, few scattered blue-gray tuff blebs, gradational contact with following oil shale.

From	To	
524.0	535.0	Oil shale; light to medium olive brown, even bedding, fair competency, low to medium grade; 525-526 poker chip partings - some with calcite, gradational contact with following oil shale.
535.0	544.9	Oil shale; light olive brown, even bedding, fair competency, faint banding, low to medium grade, fairly tough, fairly elastic, trace gilsonite stringers, 538.2-539.4 set of 45° fractures with calcite, several scattered fractures with calcite throughout; 544.0-544.7 irregular bedding with abundant irregular altered pyrite stringers and flakes and gilsonite streaks possible zone of turbidation with some irregular vertical clay stringers; few tan tuff blebs 544.8 and 544.9.
544.9	545.5	Oil shale; medium olive brown with medium mahogany bands, even with trace looped bedding, excellent competency, medium grade, fairly tough, fairly elastic, gradational contact with following oil shale.
545.5	548.8	Oil shale; light brown, even with looped and irregular bedding, excellent competency, low to medium grade.
548.8	549.6	Oil shale; medium to dark mahogany brown, even to irregular bedding, good competency, medium to high grade, fairly low density, fairly elastic; light tan tuff stringers and laminae throughout.
TOP "A" AT 549.6'		
549.6	551.0	Oil shale; light gray brown; even bedding; poor competency, very low grade; grades to marlstone; faintly banded; approximately 4 partings, trace dark green gray pyritic laminae; calcite stringers at 550.5; calcite common on partings.
551.0	555.0	Marlstone; light gray brown-tan, even bedding, very poor competency, numerous light olive brown interbedded oil shale bands; numerous partings with pyrite, kaolinite, and calcite; several poker chip parting zones.
555.0	555.8	Marlstone; light gray brown, brecciated and recemented; very poor competency; calcite and pyrite common; evidence collapsed leached nahcolite vugs; thin white granular analcitized tuff .05 at 555.7.
555.8	561.0	Marlstone; tan, even with offset bedding, very poor competency, barren, numerous fractures with calcite, kaolinite, and slicks, prominent vertical closed fracture system with pyrite and offset bedding, numerous partings, very brittle, 559.5-560.0 and 560.2-560.4 light brown, very low grade, oil shale bands with bedding inclining 5°; 0.5 core loss 557.0-557.5.
561.0	563.0	Core Loss
563.0	563.5	Marlstone; light gray brown; even bedding, very poor competency; bedding inclined 45°; numerous partings with calcite.
563.5	564.3	Oil shale; medium gray brown; streaked bedding, excellent competency, low to medium grade; abundant calcite streaks.

From	To	
564.3	565.3	Oil shale; dark olive brown, even bedding, excellent competency, gradational contact with following marlstone.
565.3	570.3	Marlstone; light olive brown overall, with abundant tan-white and medium mahogany brown stringers and banded; poor competency, trace looped bedding scattered throughout, 566.5-567.5 numerous tan tuff blebs, stringers and laminae; few dark green gray pyritic streaks at 566.8-567.1; calcite stringers at 567.3, white granular analcitized tuff blebs at 568.0; numerous undulatory partings and bands at 568.0 and 570.05, associated with numerous light blue gray granular analcitized tuff bands with undulatory contacts; 570.05-570.3 light gray brown, massive analcitized tuff with abundant oil shale stringers; 1.0 core loss 567.5-568.5.
570.3	571.5	Oil shale; dark olive brown, even to looped bedding, excellent competency, medium grade, tan tuff stringers and blebs common.
571.5	573.2	Oil shale; light brown tan, even and looped bedding, poor competency, low grade, several planar partings, several tuff stringers; 573.0 and 573.2 solution fracture zones with altered pyrite.
573.2	574.4	Oil shale; dark brown, even and irregular bedding, poor competency, low density, high grade, numerous planar partings, fairly elastic, .10 irregular bedded gray tuff with undulatory contacts.
574.4	576.1	Oil shale; medium brown, even bedding, low to medium grade, fair competency, 575.0-575.5 few dark brown oil shale bands.
576.1	577.3	Oil shale, light brown, brecciated and recemented, poor competency, medium grade, abundant rotated oil shale fragments, numerous sealed fractures at 45°; numerous dark black soft altered pyrite stringers.
577.3	584.1	Oil shale; light brown, even with some looped bedding, excellent competency, low to medium grade, brown granular tuff stringers at 577.8; dark gray tuff laminae 582-583.0; light tan band at 581 and 583.2, blue-gray massive, hard, analcitized tuff stringers at 583.8-583.9 and blue-gray analcitized tuff blebs at 584.1.
584.1	584.6	Tuff, light brown with blue-gray zones, massive, hard, granular, analcitized, sharp, well-defined planar contacts with oil shale, mahogany marker.
584.6	588.1	Oil shale; light brown, with medium olive brown bands, even bedding, excellent competency, low to medium grade; few planar partings, gilsonite on parting at 585.9; thin .02 blue-gray analcitized tuff band at 587.8.
588.1	588.9	Oil shale; dark olive brown, even bedding, excellent competency, high grade.
588.9	590.9	Oil shale; medium olive brown, even with trace looped bedding, excellent competency, medium grade, analcitized tuff stringer at 590.4; gradational contact with following oil shale.
590.9	592.0	Oil shale; light olive brown, even bedding, excellent competency, medium grade.

From	To	
592.0	593.9	Oil shale; dark olive brown-black, streaked and even bedding, excellent competency; high grade, fairly tough, low density, streaked banding 592.0-592.7; .10 medium olive brown, tuff band at 592.7; 592.8-593.9 even bedding; .05 light tan granular hard, analcitized tuff band at 593.2.
593.9	594.5	Oil shale; tan, even bedding, excellent competency, tough, fairly elastic, low to medium grade.
594.5	597.5	Oil shale; dark olive brown-black, even to looped bedding, excellent competency, tough, fairly tough, fairly elastic, high grade; 0.9 core loss at 594.6-595.5.
597.5	601.0	Oil shale; dark olive brown-black, with light tan stringers, looped and irregular bedding, excellent competency; medium to high grade, gradational contact with following oil shale.
601.0	601.9	Oil shale; medium olive brown, even bedding, excellent competency, medium grade, tough, elastic, gradational contact with next unit.
601.9	603.5	Oil shale; dark olive brown-black, even with trace looped bedding, excellent competency, high grade, very tough, very elastic; .05 gray, hard, analcitized tuff band at 603.0; gradational contact with following oil shale.
603.5	606.7	Oil shale; medium olive brown; even to looped bedding, excellent competency; medium grade, tough, fairly elastic.
606.7	609.7	Oil shale; medium olive brown and dark olive brown, faintly banded, even and irregular bedding, excellent competency, tough, medium to high grade, elastic; light tan tuffaceous at 607.9 and 608.3, dark gray pyritic clay bands at 607.8 and 608.1.
609.7	613.3	Oil shale; dark brown-black; streaked to irregular bedding, excellent competency, very low density, very high grade; .20 asphaltic tuff zone at 611.5; .05 disseminated pyrite clay band at 610.0.
613.3	614.0	Oil shale; light olive brown, even to looped bedding, excellent competency, medium grade.
614.0	614.4	Oil shale; dark olive brown-black, streaked bedding, excellent competency, high grade.
614.4	618.2	Oil shale; medium brown, even bedding, excellent competency, medium grade; dark green gray pyrite laminae common; black asphaltic laminae common; .10 diameter irregular pod with altered pyrite at 616.9.
618.2	619.0	Oil shale; medium olive brown, streaked bedding, excellent competency, medium grade, abundant white calcite streaks.

From	To	
619.0	626.6	Oil shale; light olive brown, even bedding, oil shale dark olive brown, even and streaked bedding, interbedded with excellent competency, medium grade, trace dark green gray pyrite stringers, trace fractures and partings with calcite; .10 light gray-white tuff bands, massive, granular at 623.7, massive granular light gray white tuff stringers at 623.8 and 624.3; light gray granular hard, analcitized, tuff stringers at 624.9 and 625.5.
626.6	628.4	Oil shale; medium olive brown, streaked bedding, good competency, medium grade; dark olive brown at 626.6-626.9; long vertical fracture at 627.2-628.1; irregular parting with trace leached nahcolite vugs at 628.4.
628.4	629.9	Oil shale; light brown, even bedding, very poor competency, low grade, brittle; abundant planar poker chip partings - some with calcite and slicks, few incipient sealed fractures.
629.9	633.0	Oil shale; medium brown, even with trace irregular bedding, good competency, medium grade, trace solution fractures at 629.9-630.5, evidence solution breccia, collapsed nahcolite 630.4-630.5 with pyrite; dark olive brown, high grade oil shale zones 631.1-631.8 and 632.8-633.0.
633.0	635.5	Oil shale; medium olive brown, streaked bedding, excellent competency, medium to high grade, very tough, very elastic.
635.5	640.0	Oil shale; light brown, even bedding with abundant offset solution fractures and brecciated, recemented zones, very poor competency, low to medium grade, numerous partings, abundant fractures, highly broken; scattered gilsonite streaks common; numerous scattered pyrite streaks and laminae, calcite common; 635.9-637.6 solution breccia, abundant angular recemented fragments, very clayey, pyrite and calcite common; evidence leached nahcolite vugs; 637.8-638.1 solution breccia; 638.1-640.0 solution fractured rubble.
640.0	642.1	Oil shale; light brown; even with trace looped bedding, fair competency, low to medium grade.
642.1	643.8	Oil shale; medium olive brown, even to looped bedding, fair competency, medium grade, fairly tough, elastic; gradational contact with following oil shale.
643.8	645.5	Oil shale; medium gray-brown, even bedding, fairly competent, low to medium grade, slightly brittle; several scattered dark gray pyritic laminae.
645.5	648.9	Oil shale; light gray brown, even bedding, very poor competency, brittle, marley; "poker chip" partings; .05 gray clay band at 646.3; 647.9-648.6 solution breccia, abundant angular recemented fragments, very argillaceous, crumbly, pyrite common; 648.6-648.9 very argillaceous with poker chip shaley partings.

From	To	
648.9	652.7	Oil shale; medium gray brown, even bedding, poor to fair competency, low to medium grade, abundant dark green gray pyrite streaks and laminae, streaked bedding 649.5-649.9; light gray, massive, granular, analcitized tuff 651.0-651.4; pyrite common on partings and fractures.
652.7	654.5	Oil shale; medium to dark olive brown, even bedding, fair competency, medium grade, fairly tough, elastic; dark brown tuff blebs at 654.3 and 654.9.
654.5	657.7	Oil shale; light olive brown, even bedding, good competency, low to medium grade, fairly tough, elastic, abundant dark gray pyrite laminae from 655.0-656.5; looped bedding and tan bedding common from 655.0 to 657.7, brown granular tuff stringers at 656.4.
657.7	658.7	Oil shale; dark olive brown, even bedding, good to excellent competency, medium to high grade, tough, elastic, low density.
658.7	662.8	Oil shale, medium gray-brown, even bedding, fair competency, low to medium grade, 45° fractures common with calcite and slicks solution fracture zone with minor solution breccia bands from 660.9-662.2; trace white calcite tuff blebs at 661.5, 662.2-662.6 interbedded light gray brown, hard, granular analcitized tuff bands with undulatory contacts.
662.8	665.5	Oil shale; tuff, interbedded; oil shale dark olive brown, even and looped bedding, excellent competency, tough, elastic, medium to high grade, tuff 663.3-663.5, 664.1-664.7 and 664.9-665.5; light gray brown; tan, massive, fairly hard, granular, slightly brittle, oil shale stringers common, gilsonite bands and stringers common.
665.5	667.5	Oil shale; medium olive brown, even bedding, good to excellent competency, medium grade, fairly tough, fairly elastic.
667.5	669.1	Oil shale; medium olive brown, streaked bedding, excellent competency, medium grade, large whitish tan irregular tuff patch 668.3-668.5, bedding inclines 5° - 45° from 668.5-669.1.
669.1	675.5	Oil shale; light olive brown, even with abundant offset bedding, very poor competency, abundant zones of breccia; abundant solution fractures throughout; abundant small hairline calcite sealed fractures, highly rubblized; pyrite streaks common; pyrite and calcite common in rubble, slickensides common fractures; very marley 672.5-675.5; pin point calcite 673.2-673.8; gilsonite stringers common throughout.
675.5	678.2	Oil shale; light gray-brown, even bedding, very poor competency, very low grade, brittle; abundant pin point calcite; numerous partings; numerous solution fractures and solution fracture rubble zones; solution breccia common, pyrite and calcite common; grades to following marlstone.
678.2	681.3	Marlstone; light gray brown, even bedding, very poor competency, barren, irregular streaks of calcite and pyrite 678.2-678.9; .20 blue gray granular, hard, massive analcitized tuff at 679.2; 679.4-681.3 solution fractures and solution breccia rubble.

From	To	
704.4	707.5	.25 core loss at 704.75-705.0, Brecciated; light gray brown, very poor competency, abundant small recemented marley fragments, very crumbly, possibly tectonic breccia.
707.5	709.0	Marlstone, light gray brown, even bedding, very poor competency, abundant partings, abundant short hackley sealed fractures, abundant rubble, kaolinite and calcite common, trace pyrite, 0.5 core loss at 708.5-709.0.
709.0	710.8	Oil shale; medium and light olive brown, even bedding, good to excellent competency, low to medium grade.
710.8	712.0	Core Loss (1.2').
712.0	714.3	Oil shale; medium olive brown, even bedding, faintly banded, fair competency, low to medium grade; dark gray, brown, irregular bedded, tuff stringer and bands at 713.5 and 713.7, gradational contact with following oil shale.
714.3	715.0	Oil shale; light olive brown to light gray brown, even bedding, very poor competency, very low grade, pyrite laminae common, poker chip partings common, gradational contact with following oil shale.
715.0	717.0	Oil shale; dark mahogany brown, even and looped bedding, fair competency, high grade; few planar partings.
717.0	719.5	Oil shale; light brown, even bedding, very poor competency, low grade, numerous fractures and partings with pyrite; rubblized; 1.0 core loss from 718.5-719.5.
719.5	725.5	Oil shale; medium to dark gray brown, even with some streaked bedding, poor competency, low to medium grade, several fractured rubblized zones; several closed fractures throughout; solution fracture zone with leached nahcolite structure 721.3-722.3, 724.65-724.95 dark gray black irregular bedded tuff.
725.5	728.3	Marlstone; light gray brown, even bedding, very poor competency, barren to very low grade, very argillaceous, highly rubblized; abundant planar partings, abundant fractures.
728.3	729.6	Oil shale; light to medium olive brown; streaked bedding, poor competency, low to medium grade; tuffaceous from 729.4-729.6.
729.6	730.8	Tuff, with interbedded oil shale; tuff, light brown, massive, hard, granular, analcitized with associated blue gray analcitized tuff blebs; oil shale; medium olive brown, irregular bedding, overall very low grade.
730.8	732.9	Oil shale; light olive brown, even bedding, good to excellent competency; .10 zone of streaked bedding at 732.2.

From	To	
681.3	683.7	Breccia; light greenish gray, brecciated and recemented, possible tectonic breccia, fair competency; rubble 681.3-681.7, 681.7-682.3 core loss (0.6); 682.3-683.7, very argillaceous; easily broken by hand, brown oil shale stringers common, pyrite blebs common, calcite blebs and stringers common.
683.7	685.1	Shale; light greenish gray, very irregular bedding, fair competency, trace undulatory and offset bedding, trace angular rotating fragments, calcite and pyrite blebs and stringers common, gilsonite flakes common; very argillaceous.
685.1	688.7	Marlstone; light brownish gray, even bedding, very poor competency, abundant pyritic streaks and stringers, poker chip partings with calcite, very brittle; few very smooth planar partings with soft opaque red coating; few fractures and brecciated zones; gradational contact with following.
688.7	691.1	Marlstone; tan, even bedding, very poor competency, abundant small hairline sealed fractures throughout; numerous partings throughout, very brittle; numerous calcite and pyrite blebs and stringers, dark black pin point pyrite common; few fractures and partings with unknown mineral; pin point calcite 690.1-690.4, brecciated and recemented 690.9-691.1.
691.1	691.7	Breccia; light greenish gray, brecciated and recemented, fair competency, possible tectonic breccia, very argillaceous, easily broken, very brittle, pyrite blebs common, calcite blebs and stringers common.
691.7	693.5	Oil shale; medium mahogany brown, even to irregular and streaked bedding, fair competency; medium to high grade, fairly low density, tough, elastic; several partings along tuff laminae 691.7-691.85, leached partly collapsed nahcolite vugs at 691.1, 692.1, 692.3, short, hackley, solution fractures and bedding inclines 15° around collapsed leached nahcolite vugs at 692.3; calcite stringers common 692.65-692.8.
693.5	696.3	Oil shale; light brown-tan, even bedding, low grade, few planar partings, few dark gray pyrite streaks and laminae; black pin point pyritic blebs common.
696.3	699.7	Oil shale; light olive brown, even with trace streaked bedding, very poor competency, low to medium grade, 697.0-697.9-zone of numerous irregular partings with trace evident leached nahcolite vugs and warped bedding; tuff blebs at 698.4, .10 tan tuff band with abundant pin point pyrite 699.4, gradational contact with following unit.
699.7	704.4	Oil shale; light gray brown, even bedding, very poor competency, very low grade; numerous partings (planar), .10 tan tuff with abundant pin point pyrite at 700.0; blue gray granular analcitized tuff bleb at 701.1; tan granular massive tuff with abundant pin point pyrite 701.6-702.1; irregular tuffaceous stringers at 702.4; few fractures with asphalt and calcite.

From	To	
758.2	763.0	Marlstone; light gray brown, even bedding, very poor competency, rubblized throughout, abundant poker chip partings with pyrite, numerous 45° - 90° open fractures with pyrite.
763.0	766.0	Oil shale; medium gray brown, even, irregular and contorted bedding, low to medium grade, poor competency, pyrite common on few fractures and partings, pyrite and gilsonite streaks common, calcite common on partings, dark gray tuff blebs at 764.1 and 764.9.
766.0	767.5	Oil shale; dark brown black, even bedding, fair competency, fairly low density, high grade, trace solution fractures, few planar partings with pyrite, .20 light brown tuff bed at 766.7, gradational contact with following oil shale.
767.5	769.0	Oil shale; medium brown, even to irregular bedding, fair competency, low grade to medium grade.
769.0	770.5	Marlstone; light gray brown, brecciated and recemented, very poor competency, abundant rubble and poker chip partings, very crumbly, argillaceous, abundant pyrite.
770.5	775.6	Oil shale; dark brown black, streaked bedding with light tan marley blebs and streaks throughout, fair competency, fairly low density, high grade, numerous planar and undulatory partings with pyrite, few thin solution fracture zones at 771.6 and 772.1 and 774.3, trace leached nahcolite vugs at 774.9.
775.6	777.0	Oil shale; dark olive brown to light olive brown, even bedding, excellent competency, medium grade, trace pin point calcite at 775.9.
770.0	779.4	Oil shale; light olive brown, even with looped bedding and irregular bedding, low to medium grade, fair competency, abundant pin point calcite 777.0-777.3 and 777.8-778.8, abundant dark blue pin point pyrite 777.5-777.7.
779.4	780.6	Oil shale; dark brown, even bedding, good to excellent competency, medium to high grade.
780.6	783.1	Oil shale; light gray brown, even bedding, very low grade, very poor competency, brittle, grades to marl; abundant partings and fractures with pyrite; few thin stringers of pin point calcite; gradational contact with following oil shale.
783.1	785.8	Oil shale; medium to dark gray brown, even bedding, poor competency, low to medium grade; planar partings with pyrite common, abundant dark mahogany brown oil shale stringers and laminae common.
785.8	789.0	Marlstone; light gray brown, even bedding to nearly massive, very poor competency, highly rubblized due to brittle incompetent nature of unit, abundant poker chip partings, pyrite common throughout; 1.0 core loss at 788.0-789.0

From	To	
732.9	733.4	Oil shale; dark brown with light tan bands, even with looped bedding, good to excellent competency, blue-gray analcitized tuff stringers and blebs at 733.2, blue-gray analcitized tuff band at 733.3 with well defined upper planar contact and well defined lower contact.
733.4	735.9	Oil shale; light gray brown-tan and medium brown, even with streaked bedding, poor competency, very low to low grade, very marley, poker chip partings common, pyrite common on partings, medium brown oil shale with streaked bedding 734.4-734.7 and 735.4-735.5; .10 dark brown-black oil shale band at 635.6.
735.9	737.2	Oil shale; dark brown, steraked bedding, good to excellent competency, medium to high grade.
737.2	741.9	Oil shale; medium brown, even bedding, fair competency, medium grade trace contorted bedding 737.4, irregular brown tuffaceous patch at 737.6, dark gray tuff band at 737.7, 738.0-738.8, dark brown, medium to high grade oil shale; .105 dark gray tuffaceous band at 739, dark gray pyritic stringers at 739.3, 739.5, and 739.9.
741.9	742.9	Oil shale; light gray brown, brecciated and recemented, very poor competency, low grade, marley, abundant pyrite.
742.9	745.7	Oil shale; light olive brown to light gray brown, even with trace streaked bedding, low to medium grade, poor competency, pyrite common on some partings and fractures, gradational contact with following oil shale.
745.7	748.0	Oil shale; medium to dark brown, even bedding, poor to fair competency, medium grade, several planar partings with kaolinite, gradational contact with following oil shale.
748.0	750.4	Oil shale; light gray brown, even bedding, very poor competency, very low grade, trace dark gray pyrite laminae at 748.3, abundant partings and fractures, 749.7-750.4, very marley and rubblized.
750.4	752.1	Oil shale; medium olive brown, irregular bedding, fair competency, low to medium grade, abundant small leached nahcolite vugs.
752.1	754.4	Oil shale; light to medium brown, even bedding, good to excellent competency, low to medium grade.
754.4	755.3	Oil shale; medium to dark brown, even with looped-bedding, fair competency, low to medium grade.
755.3	756.8	Oil shale; medium gray brown, even bedding, very poor competency, low to medium grade; .15 very marley breccia band at 755.3, 756.0-756.8 rubble due to poker chip partings and numerous 45° - 90° fractures with pyrite and calcite.
756.8	758.2	Marlstone; light gray brown, brecciated and recemented, very crumbly, abundant angular rotated fragments, pyrite throughout, very poor competency.

From	To	
789.0	790.0	Breccia; light gray brown, brecciated and recemented, abundant and angular rotated marley fragments, very argillaceous, very crumbly, very poor competency.
790.0	793.0	Oil shale; dark brown black, even bedding, with streaked bedding from 790.4-791.0; fair competency, medium grade; poor competency with several poker chip partings from 790-790.6; thin granular tuff band with pyrite at 791.8; gradational contact with following oil shale.
793.0	794.7	Oil shale; light brown, even bedding, fair competency, low to medium grade, few zones pin point calcite, few dark gray pyrite streaks and laminae; pyrite common on partings.
794.7	796.4	Oil shale; medium olive brown, even with looped bedding, poor competency, low to medium grade; several planar partings with pyrite, trace leached nahcolite vug at 795.2; vertical fractures with asphalt at 795.5-796.0.
796.4	797.9	Oil shale; medium brown, even with trace looped and irregular bedding, good competency, medium grade, gradational contact with following unit.
797.9	802.7	Oil shale; medium gray brown, very poor competency, low to medium grade, even bedding, abundant partings and fractures, abundant pin point calcite, pyrite streaks and bands common, pyrite common on partings and fractures.
802.7	804.8	Oil shale; medium olive brown, even with irregular and streaked bedding, very poor to poor competency, low to medium grade; 803.3-803.6 zone of small pin point leached vugs; 803.9-803.8 solution fracture rubble with even leached nahcolite vugs with marley filled material and warped bedding.
804.8	806.8	Oil shale; medium brown, streaked bedding, with some irregular bedding, poor competency, medium to high grade; 805.2-806.3 solution fracture zone with abundant irregular partings, with leached nahcolite vugs replacing with pyrite and associated warped bedding; trace gilsonite streaks.
806.8	811.0	Oil shale; medium brown - light olive brown, even bedding, poor to fair competency, low to medium grade, bedding inclines 10° at 806.8 to 808.0; irregular sealed fractures common from 806.8-808.5; pyrite common on fractures and partings, pin point calcite common 808.7-811.0; dark gray pyrite stringers and laminae common 808.4 to 810.1; gradational contact with following oil shale.
811.0	813.4	Oil shale; medium brown, irregular bedding, poor to fair competency, low to medium grade, planar shaley partings common; dark gray pyrite streaks common 811.4-811.9; irregular white calcite stringers common 812.2-812.8; 812.9-813.4, small abundant leached vugs replaced with white soft calcite and pyrite.

From	To	
813.4	815.7	Clay shale; light gray and light brownish gray, brecciated and recemented, very poor competency, pyrite common throughout, pin point calcite blebs and stringers common, very soft, crumbly core; gradational contact with following marlstone.
815.7	817.0	Marlstone; light olive brown, irregular bedding, poor competency, trace pyrite stringers, abundant pin point calcite, abundant irregular patches of partly leached white opaque calcareous mineral - possibly calcite, gradational contact with following oil shale.
817.0	818.5	Oil shale; medium olive brown, even bedding, fair competency, low grade, argillaceous laminae common, dark gray pyrite laminae; .10 tan tuff with pyrite stringers at 817.5; gradational contact with following marlstone.
818.5	819.4	Marlstone; light olive brown-tan, irregular bedding, very poor competency, abundant undulatory shaley partings, pyrite streaks and stringers common, abundant irregular white calcite stringers, streaks and vugs, pyrite associated with calcite stringers, gradational contact with following clay shale.
819.4	821.4	Clay shale; calcareous, light brownish gray, irregular to wavy bedding, very poor competency, tuffaceous, very soft, abundant intermixed calcite blebs; gradational contact with following.
821.4	826.1	Oil shale; very argillaceous, light brown-tan, even bedding, fair competency, very low grade, abundant pin point calcite; 822.8-823.2 abundant small partly collapsed leached nahcolite vugs, pyrite and calcite patches, slightly brecciated and recemented; 823.3-824.5 pyrite streaks and laminae common, closed 45° and vertical fractures with associated angular rotated fragments and small scale graben structure, .15 zone with very argillaceous material and abundant offset bedding at 825.3.
826.1	828.7	Oil shale; medium olive brown, streaked bedding, poor to fair competency, low grade, very argillaceous; numerous closed fractures, dark brown black irregular tuff stringers at 826.7; numerous pin point leached vugs on core surface; .10 light orange-tan tuff band with pyrite at 828.5; very marley 828.4-828.7; even bedding from 827.3-828.7; pyrite streaks and laminae common.
828.7	852.2	Marlstone, clay shale interbedded; marlstone, light brownish gray to light gray, even to nearly massive, brittle, very poor competency; clay shale, calcareous, light gray, soft, very poor competency; abundant partings and fractures throughout; numerous rubblized zones; pyrite common throughout as streaks, blebs, and stringers; pyrite common on partings and in rubble, calcite common throughout as pin point vugs, irregular patches and stringers; thin zone of very low kerogen content 831.0-832.5; gray shale 835-836.1; gray shale with interbedded tuff laminae 836.1-837.9; low grade argillaceous oil shale 837.9-841.9; tan marlstone 841.9-846.0; 846-852.2 gray calcareous shale, gradational contact with following clay shale.

From	To	
852.2	855.6	Clay shale; calcareous, light gray, brecciated and recemented, very poor competency, crumbly, soft, pyrite common throughout, possible set of 45° fractures.
855.6	860.6	Marlstone; light brownish gray, even bedding, very poor competency, abundant poker chip partings with pyrite, dark gray pyrite streaks and laminae common; .10 zone of small partly leached vugs with white opaque soft calcareous mineral filling at 855.6; parts into very thin waffers 858.2-859.0; pin point calcite common 860-860.6; leached vug at 860.6.
860.6	863.5	Shale; very argillaceous, very calcareous, light brownish gray, brecciated and recemented, very poor competency, pyrite common, high rubblized.
863.5	863.9	Shale; very argillaceous, calcareous, silty, light brownish gray, pyrite common throughout, very poor competency, even bedding, abundant partings throughout, abundant evidence small angular vugs.
863.9	865.2	Oil shale; medium gray brown, even bedding, very poor competency, very low grade, very marley, grades to marlstone, abundant poker chip partings, highly rubblized.
865.2	872.0	Shale and claystone interbedded; light gray, even bedding and massive, very poor competency, shaley, poker chip parting zones interbedded with rubble zones with blocky claystone fragments, very silty throughout, very brittle, soft; abundant pin point pyrite blebs 868.7-869.0, few scattered leached vugs:
872.0	872.5	Oil shale; medium gray brown, streaked bedding, very poor competency, low grade, abundant partings.
872.5	876.0	Marlstone; light gray brown-tan, even bedding, very poor competency, trace kerogen content, abundant planar partings with kaolinite, abundant dark gray pyrite streaks and laminae; warped bedding inclines 45° at 875.2-875.6.
876.0	877.0	Marlstone; buff-tan, even bedding, very poor competency, very silty - possible calcareous siltstone.
877.0	882.6	Oil shale; medium gray brown and dark gray brown, even bedding, very poor competency, low grade; highly rubblized with numerous partings and fractures 877.1-878.4; abundant dark gray pyrite streaks and laminae; streaked bedding 881.4-881.8; abundant gilsonite on parting at 881.9; dark brown tuff band at .05 at 882.1.
882.6	883.4	Shale; light brownish gray, even bedding, poor competency, silty, calcareous, soft to brittle.
883.4	888.9	Siltstone; light to medium gray, massive with some even and irregular bedding, very poor competency, very argillaceous, very calcareous, .09 core loss 883.6-884.5; core loss .05 887.0-887.5.

From	To	
888.9	889.5	Claystone and shale intermixed; light gray brown, brecciated and recemented, very poor competency, calcareous.
889.5	890.9	Oil shale; medium olive brown, streaked bedding, very poor competency, medium to high grade, solution fractures and collapsed leached nahcolite throughout, bedding warped around vugs.
890.9	893.1	Oil shale; dark olive brown, even bedding, poor competency, medium grade, few partings with kaolinite, 1.5 core loss 891.0-892.5.
893.1	899.3	Marlstone; light brownish gray, even bedding, very poor competency, brittle, abundant poker chip partings, highly rubblized, few 45° to 60° fractures.
899.3	901.0	Oil shale; medium olive brown, streaked bedding, very poor competency, low to medium grade, numerous irregular partings with soft white, opaque kaolinite coating; .10 granular blue-gray massive, analcitized tuff at 899.6; brecciated and recemented oil shale due to collapsed leached nahcolite from 900.0-900.8.
901.0	903.9	Core Loss at 2.9.
903.9	905.4	Oil shale; light olive brown, irregular bedding, very silty, very poor competency, very low grade; siltstone with oil shale stringers 904.4-905.1; numerous open and closed irregular partings and fractures with heavy kaolinite coating.
905.4	907.9	Oil shale; dark brown, streaked bedding, fair competency, trace gilsonite streaks; trace closed parting with leached nahcolite structure at 905.7; few partings with kaolinite.
907.9	909.7	Oil shale; dark brown, brecciated and recemented, very poor competency, low to medium grade, highly broken with abundant small fractures and partings with heavy kaolinite coating; 0.6 core loss 909.1-909.7:
909.7	911.9	Oil shale; medium brown, even, irregular, and streaked bedding, excellent competency, medium grade; closed irregular partings at 909.8; trace gilsonite streaks; .20 silty zone with irregular bedding at 911.4.
911.9	919.5	Oil shale; light brown, faint even and streaked bedding to nearly massive, excellent competency, very low grade, very silty, very porous zone of abundant small angular vugs and kaolinite and irregular patches and stringers of kaolinite and sealed fractures with kaolinite 911.9-916.6; abundant dark gray pyrite streaks throughout.
919.5	921.9	Siltstone; light brownish gray, very calcareous, excellent competency, slightly argillaceous, few dark gray pyritic stringers, few oil shale stringers, fracture with kaolinite and asphalt at 921.2; .15 massive tuff at 921.7.

From	To	
921.9	923.0	Oil shale; light brown-tan, even bedding with trace streaked bedding, excellent competency, very low grade, very silty, abundant irregular dark gray pyrite stringers, black gilsonite stringer at 923.0.
923.0	927.1	Oil shale; medium olive brown, streaked bedding with abundant light tan marley blebs, excellent competency, medium grade, trace gilsonite flakes, trace leached nahcolite vugs with pyrite at 926.9.
927.1	929.0	Oil shale; dark olive brown, even bedding, excellent competency, low to medium grade, trace gilsonite streaks.
929.0	929.8	Oil shale; light tan, even, streaked, and irregular bedding, excellent competency, low grade.
929.8	931.6	Siltstone; light brownish gray-tan, massive, excellent competency, trace dark gray pyrite streaks, moderate to very calcareous.
931.6	932.9	Oil shale; light brown, even bedding, excellent competency, very low grade, very silty, dark gray pyrite stringers at 931.8; slightly calcareous.
932.9	935.8	Marlstone; tan, even bedding, excellent competency, very silty, moderate to very calcareous, 60° fracture with kaolinite at 933.7, 0.75 core loss 934.75-935.5.
935.8	939.2	Oil shale; tan, streaked bedding, excellent competency, low to medium grade, abundant bleby structure; 939.8-937.2 zone of small to medium size leached nahcolite vugs replaced with opaque white soft calcareous mineral; irregular hackley fracture and parting with abundant white kaolinite mineral at 938.7; soft black altered pyrite stringer at 938.9; gradational contact with following oil shale.
939.2	942.3	Oil shale; light olive brown, even bedding, excellent competency, low grade.
942.3	948.2	Oil shale; medium olive brown, streaked bedding, excellent competency, medium grade; 942.6-942.8 zone of solution fracture and collapsed leached nahcolite vug with warped bedding; small leached vug at 943.0; irregular dark black altered pyrite stringers common 945.4 to 948.2; numerous tan marley blebs scattered throughout; few irregular patches with altered pyrite and white calcareous mineral at 947.3.
948.2	953.5	Oil shale; light and dark brown interbedded, even with trace streaked bedding, excellent competency, medium grade; streaked bedding, 948.8-949.7 and 950.2-950.3, and 952.3-953.5; .15 granular light gray, hard, analcitized, tuff with pin point pyrite at 950.5; trace offset bedding at 950.8; gradational contact with following oil shale.

From	To	
953.5	955.6	Oil shale; medium olive brown, streaked bedding, excellent competency, medium to high grade, gilsonite streaks common.
955.6	957.5	Oil shale; medium brown, even bedding, excellent competency, low to medium grade; numerous tan tuff stringers, dark gray analcitized tuff stringers 956.5 and 957.1; gradational contact with following oil shale.
957.5	958.5	Oil shale; light brown-tan, even bedding, excellent competency, low to medium grade, tan marley and gray tuff stringers common.
958.5	966.2	Marlstone; light brown-tan, massive, even and irregular bedding, good competency, barren, grades to calcareous siltstone and calcareous silty shale, several partings and fractures with kaolinite scattered throughout; oil shale stringers and laminae common throughout; dark gray pyrite stringers common 962.0-966.2; 964.0 to 965.5, few thin light brown, oil shale bands and stringers; gradational contact with following oil shale.
966.2	970.0	Oil-shale; light brown to light olive brown, even bedding, excellent competency, slightly silty, low grade, slightly calcareous; .15 zone of medium gray brown irregular bedded asphaltic tuff at 968.8; trace dark gray tuff laminae; gray pyrite stringer at 961.1; white, soft, opaque, mineralized stringer at 969.5.
970.0	970.9	Siltstone; light gray brown, massive with trace even bedding, excellent competency, hard, very calcareous, grades to silty marlstone, .10 light olive brown oil shale band at 970.8.
970.9	972.1	Siltstone; light gray brown, massive with irregular and streaked bedding, excellent competency, hard, very calcareous, grades to silty marlstone; oil shale streaks and stringers common.
972.1	972.9	Marlstone; light brownish gray, even to irregular bedding, excellent competency, very silty.
972.9	975.9	Oil shale; medium olive brown, streaked to irregular bedding, excellent competency, medium grade, numerous irregular black, soft, altered pyrite stringers common 974.0-975.1; few scattered gilsonite streaks; irregular patches with black altered pyrite and white calcareous mineral at 974.5, 974.9, and 975.9, gradational contact with following oil shale.
975.9	977.6	Oil shale; light olive brown, even bedding, good competency, very low grade, very silty, very calcareous, grades to silty marlstone, gradational contact with following marlstone.
977.6	979.0	Marlstone; light gray brown, massive and irregular bedding, excellent competency, very silty, very calcareous, few light brown oil shale bands and stringers, gradational contact with following siltstone.

From	To	
979.0	981.8	Siltstone; light brownish gray, massive with trace even bedding, fair competency, very calcareous, hard, very argillaceous, grades to silty calcareous marlstone, trace brown oil shale stringers; thin band of pin point vugs at 980.6.
981.8	986.4	Oil shale; medium olive brown, streaked and even bedding, fair competency, low to medium grade; 981.8-982.5, poker chip partings common; trace small leached nahcolite vugs 982.5-983.5, dark gray tuff band at 984.7, gradational contact with following.
986.4	989.5	Siltstone; light brown-tan, massive with even and looped and streaked bedding, good to excellent competency, hard, very calcareous, grades to silty marlstone, blue gray analcitized, tuff, stringers at 986.4; oil shale streaks and stringers and laminae throughout.
989.5	991.5	Siltstone; light gray brown to buff, massive, excellent competency, hard, very calcareous.
991.5	995.0	Marlstone; light tan to buff, even, irregular and massive bedding, fair to good competency, hard, very silty.
995.0	995.9	Oil shale; light olive brown, streaked to irregular bedding, excellent competency, low grade; .10 tan granular analcitized tuff at 995.4 with unknown brown, clear, slightly hard, crystals and asphalt.
995.9	998.8	Oil shale; light brown, streaked and irregular bedding, excellent competency, low to medium grade; light brown marley zones 996-996.9 and 997.4-997.7; tan marley streaks and blebs common; pyrite streaks and stringers common.
998.8	1003.3	Oil shale; light olive brown, streaked with even and irregular bedding, fair competency, low to medium grade, long vertical fractures with asphalt and calcite 999.5-1001.2.
1003.3	1006.6	Oil shale; light olive brown, even with trace streaked bedding, excellent competency, low to medium grade, trace pyrite streaks, tan marley bleb at 1005.8 and 1006.4.
1006.6	1008.1	Oil shale; medium brown, faint streaked bedding, excellent competency, low to medium grade; asphaltic tuff blebs and irregular patches at 1007.2-1008.1.
1008.1	1009.0	Oil shale; medium brown, even bedding, excellent competency, low to medium grade; gilsonite stringer at 1008.3, gradational contact with following oil shale.
1009.0	1011.9	Oil shale; light brown, even bedding, excellent competency, low to medium grade, irregular pyrite stringer 1009.1; gray irregular tuff stringer 1009.2; grades to light olive brown 1011-1011.9.
1011.9	1016.0	Oil shale, medium olive brown, streaked bedding, excellent competency, medium grade, trace gilsonite streaks.

From	To	
1016.0	1017.2	Oil shale; medium olive brown, even bedding, excellent competency, medium grade.
1017.2	1019.7	Oil shale; light to medium olive brown, even, irregular, looped, and streaked bedding, excellent competency, low grade, abundant small granular white calcite streaks and blebs throughout.
1019.7	1022.1	Oil shale; medium olive brown, streaked bedding, excellent competency, medium grade, abundant small granular white calcite streaks and blebs throughout, gilsonite streaks common.
1022.1	1023.8	Oil shale; dark brown black, even with trace looped bedding, excellent competency, medium to high grade, trace gilsonite stringers 1022.1-1022.3; 1023.1-1023.8 abundant interbedded tan, granular tuff bands and stringers.
1023.8	1025.3	Oil shale; light gray brown and medium olive brown, even to slightly wavy bedding, excellent competency, low grade; light gray brown 1023.8-1024.5; medium olive brown 1024.5-1025.3.
1025.3	1026.1	Marlstone; light gray brown to tan, even to nearly massive bedding, excellent competency, moderate calcareous, abundant light gray, very fine grained sandy stringers or dolomitic laminated throughout, pyrite stringer at 1025.6.
1026.1	1027.0	Oil shale; light brown, streaked to irregular bedding, excellent competency, very low grade.
1027.0	1030.1	Marlstone; light gray brown to tan, even bedding, with few massive zones, fair competency, moderate to very calcareous, slightly sandy, long vertical fracture 1028.1-1030.1 and continues to next lithologic unit.
1030.1	1034.1	Marlstone; light gray brown to buff, massive, fair competency, moderate to very calcareous; long vertical fracture continuing from above lithologic unit throughout to following next unit; grades to calcareous silty claystone; few light brown oil shale bands.
1034.1	1037.05	Oil shale; medium olive brown, streaked with even and irregular bedding, excellent competency, medium to high grade; fairly tough, fairly elastic; light tan-white marley blebs common.
1037.05	1038.6	Oil shale; medium to dark olive brown; even with trace streaked and irregular bedding, excellent competency, high grade, few light olive brown bands.
1038.6	1040.1	Oil shale; light olive brown, streaked bedding, excellent competency, low grade.
1040.1	1045.4	Marlstone; light gray brown to tan, even bedding, excellent competency, fairly silty, dark olive brown, oil shale bands 1040.1-1040.3, oil shale stringers and laminae common; few dark gray tuff stringers; gradational contact with following oil shale.

From	To	
1045.4	1047.7	Oil shale; light brown, streaked and irregular bedding, excellent competency, low grade; irregular dark gray pyritic tuff stringer at 1047.5.
1047.7	1049.4	Oil shale, medium olive brown, even with trace irregular streaked and looped bedding, excellent competency, medium grade; .05 dark brown asphaltic tuff band at 1047.9; asphaltic tuff stringer at 1048.4; trace gilsonite streaks; dark brown oil shale band 1049.1 to 1049.3.
1049.4	1051.0	Marlstone; light brownish gray and tan and light gray brown banded, even with trace looped bedding, excellent competency, light and medium olive brown oil shale stringers and laminae common, abundant light gray dolomitic stringers and laminae throughout.
1051.0	1057.8	Marlstone; tan, irregular and massive bedding, excellent competency, overall wavy bedding, very silty, abundant light gray dolomitic streaks and stringers throughout, abundant dark black pyritic or gilsonite stringers common 1057.0-1057.6, grades to low grade oil shale 1057.6 to 1057.8; large irregular tan marley bleb at 1057.7.
1057.8	1060.8	Oil shale; medium brown, streaked bedding, excellent competency, low to medium grade, abundant irregular black soft, altered pyrite streaks and stringers; irregular tan marley blebs and stringers throughout.
1060.8	1064.5	Oil shale; light olive brown to tan, irregular bedding, excellent competency, low to medium grade, trace dark gray pyrite streaks and stringers; irregular white marley stringers 1062.8-1063.0, few thin irregular medium brown oil shale stringers and bands throughout; grades to marlstone 1063-1064.5.
1064.5	1069.0	Oil shale; medium olive brown, even to streaked bedding, excellent competency, low grade; irregular tan marley patches from 1068.5 to 1068.7, slightly argillaceous from 1068.0-1069.0.
1069.0	1072.3	Oil shale; light olive brown to light gray brown, even with trace looped bedding, good competency, very low grade, argillaceous; few scattered shaley partings, numerous dark gray pyrite laminae at 1069-1069.5, gradational contact with following.
1072.3	1074.4	Oil shale; medium brown, faint streaked bedding, excellent competency, low to medium grade, trace gilsonite streaks, slightly argillaceous.
1074.4	1075.7	Oil shale; medium gray brown, even bedding, excellent competency, medium grade, irregular light brownish gray tuff patch at 1074.8; gradational contact with following marlstone.
1075.7	1080.5	Marlstone; tan, even bedding, excellent competency, trace kerogen content; slightly silty in places; dark gray pyrite stringers at 1076.3, 1076.9-1077.1, 1078-1078.2, 1079.6-1079.7; light olive brown oil shale with streaked bedding 1079-1079.2, gradational contact with following oil shale.

From	To	
1080.5	1087.3	Oil shale; light to medium gray brown, even bedding, good to excellent competency, low grade; trace dark gray pyrite stringers; .05 dark gray granular analcitized tuff band at 1082.2; long vertical fractures with gilsonite 1083.9-1085.7 with short zone of parallel fractures and numerous partings.
1087.3	1093.5	Marlstone; medium yellowish-brown, even to irregular bedding, excellent competency, very calcareous, very silty, banded; zone of few vertical fractures 1087.6-1088.8; abundant light gray dolomitic stringers and interbedded laminae throughout; gilsonite stringer at 1091.7; gradational contact with following oil shale.
1093.5	1096.3	Oil shale; light olive brown-tan, even bedding, excellent competency, very low grade, very calcareous, very marley, numerous medium gray pyrite stringers 1093.5-1094 and 1094.6-1094.7; gradational contact with following oil shale.
1096.3	1099.0	Oil shale; light to medium brown, streaked bedding, excellent competency, low to medium grade, few scattered pyrite stringers.
1099.0	1100.6	Oil shale; medium olive brown, even with faint streaked bedding, excellent competency, low to medium grade.
1100.6	1103.5	Oil shale; light olive brown and light brown, even and streaked bedding, excellent competency, low to medium grade, bleby, marley structure from 1101.2-1101.3 and 1102.5-1103.5.
1103.5	1105.0	Oil shale; medium olive brown, streaked with irregular bedding, excellent competency, medium grade; tan marley blebs common.
1105.0	1107.5	Oil shale; medium olive brown and tan, banded, even with looped bedding, excellent competency, medium grade; trace medium gray granular analcitized tuff blebs and streaks; trace scattered throughout; gradational contact with following oil shale.
1107.5	1110.3	Oil shale; medium olive brown to medium gray brown, even bedding, excellent competency, low to medium grade, few scattered shaley partings, few scattered blue-gray analcitized tuff streaks and stringers.
1110.3	1114.8	Oil shale; medium brown, streaked bedding, excellent competency, medium to high grade, abundant gilsonite streaks, few tan marley blebs and streaks.
1114.8	1124.1	Oil shale; light olive brown to light gray brown, even with trace looped bedding, good to excellent competency, low grade, very slightly argillaceous, several planar shaley partings, abundant dark gray pyritic stringers and granular dolomitic stringers and laminae 1117.0-1118.3 and 1118.8-1119.0 and 1119.4-1120.0; several scattered light gray granular dolomitic stringers throughout, trace offset bedding at 1116.8, trace blue gray granular analcitized tuff stringers at 1123.7.
1124.1	1124.9	Oil shale; medium olive brown, streaked bedding, excellent competency, medium to high grade; gradational contact with following oil shale.

From	To	
1124.9	1127.4	Oil shale; medium to dark gray brown, even bedding, excellent competency, medium to high grade, dark gray tuff stringers and laminae 1125.1-1125.3.
1127.4	1130.5	Oil shale; dark brown, streaked with even bedding, excellent competency, high grade, trace gilsonite streaks; trace tan marley streaks, fairly low density, gradational contact with following oil shale.
1130.5	1132.3	Oil shale; medium gray brown, streaked bedding, excellent competency, low to medium grade, tan marley blebs and streaks common; tan, massive marley blebs with oil shale stringers and tuff streaks 1131.5-1131.7 and 1131.9-1132.1.
1132.3	1134.4	Oil shale; medium to dark olive brown, even bedding, excellent competency, high grade, fairly low density, tough, elastic; light tan banding common 1132.5-1133.3.
1134.4	1135.4	Oil shale; light olive brown, irregular to wavy bedding, excellent competency, high grade, slightly argillaceous, fairly tough and elastic.
1135.4	1136.0	Oil shale; dark brown black, even with trace irregular bedding, excellent competency, high grade, fairly low density, fairly tough and elastic.
1136.0	1138.0	Oil shale; medium to dark brown, streaked bedding, excellent competency, high grade, fairly tough, fairly elastic; .10 light gray brown tuff band with pyritic streaks at 1137.8.
1138.0	1139.65	Oil shale; medium brown, even with trace looped bedding, excellent competency, medium to high grade, trace offset bedding at 1138.6.
1139.65	1140.5	Oil shale; dark olive brown black, even to streaked bedding, excellent competency, very high grade, fairly tough and elastic.
1140.5	1142.7	Oil shale; medium olive brown with dark brown black and tan banding common, excellent competency, medium grade, even, streaked and irregular bedding; few scattered tan marley blebs; trace light gray analcitized tuff blebs.
1142.7	1146.5	Oil shale; dark brown black, even with faint streaked bedding, excellent competency, very high grade, tough, elastic, gradational contact with following oil shale.
1146.5	1149.2	Oil shale; dark olive brown with light gray interbedded stringers, even bedding, very poor competency, low grade, abundant shaley poker chip partings, slightly argillaceous, abundant interbedded white, calcite stringers.
1149.2	1153.4	Oil shale; dark olive brown black, even bedding, excellent competency, high grade, tough, elastic; trace gilsonite stringers at 1150.7; 1153.0-1153.4 tan marlstone beds with few granular tuff blebs.

From	To	
1153.4	1158.4	Oil shale; medium olive brown, streaked bedding, excellent competency, medium grade; zone of irregular bedding 1154.1-1155.0; .15 tan marlstone band with gilsonite blebs at 1156.8; tan marley blebs common throughout; gradational contact with following oil shale.
1158.4	1159.4	Oil shale; dark brownish-black, even bedding, excellent competency, fairly low density, tough, elastic, very high grade.
1159.4	1163.8	Oil shale; medium olive brown, even bedding, good competency; light tan marley bands common; offset bedding at 1160.5, 1161.7; tuff band .10 at 1167.7, and .10 at 1163.7.
1163.8	1169.6	Oil shale; medium mahogany brown, even with some streaked and looped bedding, excellent competency, high grade, tough, fairly low density, elastic; few dark brown oil shale bands.
1169.6	1172.5	Oil shale; light olive brown, even to slightly wavy bedding, excellent competency, low grade; .10 tan tuff marley band at 1171.3.
1172.5	1177.0	Oil shale; dark mahogany brown, even with streaked and irregular bedding, excellent competency, low density, very tough, very elastic, high grade.
1177.0	1182.0	Oil shale; light to medium olive brown, even with trace streaked and irregular bedding, medium grade, fairly tough and elastic, few large tan marley blebs and streaks; gilsonite streaks common.
1182.0	1189.8	Oil shale; dark mahogany brown to dark olive brown, with few light olive brown bands, even with trace irregular bedding, excellent competency, high grade, tough, elastic; gilsonite pod with warped bedding at 1183.2; light olive brown and tan banding common 1183.6 to 1185.1; trace irregular asphaltic tuff blebs 1186-1187.
1189.8	1193.9	Oil shale; light olive brown to light mahogany brown, even and streaked bedding, excellent competency, low to medium grade; numerous gray granular tuff blebs 1190.0-1193.9 with associated pyrite and white opaque mineral - possibly analcitized, light tan marley zone 1190.7-1191.4; gradational contact with following oil shale.
1193.9	1196.5	Oil shale; dark mahogany brown-black, even bedding, excellent competency, high grade, fairly low density, tough, elastic; gradational contact with following oil shale.
1196.5	1197.7	Oil shale; medium olive brown to dark olive brown and light olive brown, banded, even and irregular bedding, excellent competency, medium to high grade, fairly tough and elastic.
1197.7	1199.3	Oil shale, medium olive brown, streaked to irregular bedding, excellent competency, low grade; .10 light tan to buff marley bands at 1197.7, 1198.2, 1198.6; few dark gray tuff blebs at 1199.2; gradational contact with following oil shale.

From	To	
1199.3	1203.0	Oil shale; light olive brown, even with trace looped and streaked bedding, excellent competency, low grade; dark gray granular tuff blebs 1200.3-1201.5 with associated pyrite; 1200.1-1202.0 light olive brown to tan oil shale, 1202-1203 light olive brown and medium olive brown banded oil shale gradational contact with following oil shale.
1203.0	1205.7	Oil shale; dark brownish-black, even bedding, excellent competency, high grade; trace dark gray tuff stringers at 1203.5, 1204.5, 1204.6; gradational contact with following oil shale.
1205.7	1208.5	Oil shale; medium brown, even bedding, fair to good competency, low to medium grade, few scattered planar shaley partings; gilsonite stringer at 1205.9; light tan marley band common 1205.7-1206.5; gradational contact with following oil shale.
1208.5	1209.5	Oil shale; dark olive brown, even bedding, excellent competency, medium grade, fairly tough, white hard, granular analcitized tuff stringer at 1209.0 and 1209.5.
1209.5	1210.9	Oil shale; light olive brown to tan, even bedding, good to excellent competency, slightly marley, low grade; light gray pyrite stringers common; gradational contact with following marlstone.
1210.9	1213.1	Marlstone; light gray brown, even bedding, excellent competency, light gray pyrite streaks common, slightly brittle; moderately calcareous; abundant light gray granular dolomitic streaks and stringers 1212.5-1213.1.
1213.1	1215.1	Marlstone; buff, irregular to nearly massive bedding, fair to good competency, very silty, brittle, argillaceous, brown oil shale stringers common, abundant light gray dolomitic stringers and streaks common; numerous light gray dolomitic irregular vertical stringers throughout; very calcareous - possibly argillaceous calcareous siltstone; 60° vertical fracture at 1214.2.
1215.1	1216.6	Marlstone; light brownish-gray, massive with some even bedding, excellent competency, hard, very calcareous, slightly porous, grades to argillaceous limestone, very fine crystalline surface on fresh break, gradational contact with following.
1216.6	1221.8	Marlstone; light gray brown, even bedding, excellent competency, hard, very calcareous; medium brown oil shale laminae common throughout, dark gray pyrite streaks and laminae common; light gray dolomitic stringers common; depositional 45° fractures with offset bedding (no effect on competency) at 1216.8, 1217.9, 1219.6, 1219.9, 1220.4, 1220.7, and 1220.9; few planar shaley partings.
1221.8	1225.0	Marlstone, very silty, buff, even to very irregular bedding (wavy); excellent competency, fairly hard - slightly brittle, possibly very calcareous siltstone; 1223.0-1225.0 numerous interbedded zones of irregular horizontal to vertical dolomitic stringers possibly burrows (gives a wavy bedded appearance), gradational contact with following.

From	To	
1225.0	1225.9	Oil shale; light brown to tan, streaked to irregular bedding, excellent competency, low grade, abundant irregular horizontal to vertical light gray dolomitic stringers.
1225.9	1228.9	Dolomite with interbedded oil shale; dolomite, light tan to buff, massive; oil shale, light olive brown to tan, even to looped and irregular bedding; overall excellent competency, hard, slightly effervescent, tight, fine, crystalline structure on fresh break.
1128.9	1230.1	Oil shale; light brown, even to looped bedding, excellent competency, low to medium grade, gradational contact with following.
1230.1	1233.4	Oil shale; light olive brown and light tan-banded, even to looped bedding, excellent competency, very low grade, very calcareous.
1233.4	1245.7	Marlstone; light gray brown, even to irregular bedding, excellent competency, very calcareous; numerous dolomitic bands and stringers; gradational contact with following.
1245.7	1249.9	Oil shale; light olive brown, even bedding, excellent competency, slightly to moderately calcareous; very low grade.
1249.9	1250.8	Oil shale; dark olive brown, even bedding, excellent competency, high grade, tough, elastic.
1250.8	1262.8	Oil shale; tan to light olive brown, even bedding, excellent competency, marley, very low grade, trace looped bedding, few tan dolomitic bands scattered throughout, trace dark gray pyrite streaks at 1259.2; gray irregular analcitized tuff band at 1261.1.
1262.8	1268.9	Marlstone; light tan, even to slightly wavy bedding, with several massive zones, excellent competency, slightly brittle, oil shale laminae common; silty dolomitic stringers common, very calcareous.
1268.9	1271.4	Oil shale; light olive brown, even to looped bedding, excellent competency, low to medium grade; fairly tough, elastic.
1271.4	1271.8	Oil shale; medium brown, streaked bedding, excellent competency, medium grade.
1271.8	1276.05	Oil shale; medium to dark brown, even bedding, excellent competency, high grade, very tough, very elastic.
1276.05	1289.5	Marlstone; light olive brown to light gray brown, even with abundant offset bedding, fair to good competency, argillaceous, very calcareous, numerous faint hairline sealed depositional fractures with offset bedding scattered throughout; medium gray dolomitic streaks and stringers common 1276.8-1278.1; trace kerogen content; planar shaley partings common; core surface is soft and greasy, possibly bentonitic; gradational contact with following.

From	To	
1289.5	1291.9	Oil shale; tan, even bedding, poor competency, very low grade; dark gray pyrite streaks and laminae common, moderately calcareous, slightly argillaceous, planar shaley partings common.
1291.9	1293.0	Oil shale; light brown with medium brown bands, excellent competency, medium grade; abundant dark gray pyrite streaks and laminae, gradational contact with following oil shale.
1293.0	1295.5	Oil shale; medium to dark mahogany brown, even bedding, excellent competency, very tough, very elastic, very low density, very high grade, gradational contact with following.
1295.5	1303.0	Oil shale; light olive brown to medium gray brown, even bedding, very poor competency, very low grade, very argillaceous, abundant planar shaley partings; soft and greasy on core surface, bentonitic; few very faint hairline closed depositional fractures; few fractures with plastic-like (waxy luster on shaley surface), slicked surface; few brown oil shale bands; grades to light brown, low grade oil shale 1301.0-1303.0; gradational contact with following.
1303.0	1308.05	Oil shale; light olive brown, even bedding with trace looped, good to excellent competency, medium grade, grades to medium olive brown 1304.5-1308.05; zone of dark gray irregular pyrite sealed fractures 1307.5-1307.9.
1308.05	1319.8	Marlstone; light tan, even with some looped bedding, fair competency, very calcareous throughout, dolomitic light gray stringers and laminae common throughout; 1308.05-1309.0 even to nearly massive; 1309.0-1311.4 massive with numerous zones of irregular dolomitic stringers with wavy bedding; few oil shale stringers and laminae scattered throughout; 1310.9-1311.35 massive dolomitic zone with abundant angular claystone streaks and fragments; 1312.2-1214.3 zone of 85° fractures with asphalt and calcite (made 125 pounds of shut-in gas pressure on mud pump, flammable gas probably methane).
1319.8	1323.2	Oil shale; light gray brown, even to looped bedding, good to excellent competency, very low grade, argillaceous, slightly to moderately calcareous, light gray dolomitic stringers common 1319.8 to 1321.5; pyrite streaks common 1321.3-1321.8, gray analcitized tuff streaks and blebs common 1321.9-1322.8.
1323.2	1325.25	Oil shale; dark brown-black, streaked bedding, excellent competency, high grade, fairly tough, fairly elastic; trace gilsonite streaks; .05 dark brown asphaltic tuff bands at 1323.2 and 1323.35.
1325.25	1326.9	Oil shale; light olive brown and tan banded, even with looped, streaked, and irregular bedding, excellent competency, low grade, slightly argillaceous, moderate calcite; few medium gray pyrite streaks.
1326.9	1328.4	Oil shale; light olive brown and light brown, streaked bedding, excellent competency, low grade, moderately to very calcareous, light olive brown 1326.9-1327.8; light brown 1327.8-1328.4; numerous medium gray hard analcitized tuff blebs.

From	To	
1328.4	1342.6	Marlstone and oil shale interbedded; marlstone, light brown to light tan, even and irregular bedding; oil shale, light brown, even with looped and streaked bedding; overall excellent competency, very calcareous, gilsonite stringer at 1337.3-1337.6 and 1339.6 to 1340.9 and 1341.4-1341.6 and 1342.4-1342.6.
1342.6	1344.2	Oil shale; dark mahogany brown black, even to streaked bedding, excellent competency, high grade, fairly low density, fairly tough, fairly elastic.
1344.2	1345.1	Oil shale; tan, even to streaked bedding, excellent competency, low grade, few dark to light brown tuff blebs, even and looped bedding 1344.8-1345.1.
1345.1	1360.6	Marlstone; buff to light tan, even, massive, and looped bedding, excellent competency, very calcareous, silty; abundant interbedded dolomitic stringers, bands, and laminae; abundant medium brown oil shale stringers, 85° fractures with calcite at 1348.1; gray tuff blebs and streaks common; numerous zones of wavy bedding; numerous gray granular analcitized tuff streaks and blebs at 1358.2-1360.6; gradational contact with following oil shale.
1360.6	1362.8	Oil shale; medium mahogany brown, streaked bedding, excellent competency, medium grade, fairly tough, numerous dark gray analcitized tuff blebs.
1362.8	1366.6	Oil shale; dark brown black, even bedding, very poor competency, very high grade, very low density, several shaley planar partings; gradational contact with following oil shale.
1366.6	1368.7	Oil shale; light olive brown to medium mahogany brown, even with trace looped and streaked bedding, good to excellent competency, medium grade, few scattered gray and tan analcitized tuff blebs and stringers; gradational contact with following.
1368.7	1372.0	Oil shale; dark brown, even bedding, excellent competency, high grade, abundant gray analcitized tuff blebs and streaks, gradational contact with following.
1372.0	1377.1	Oil shale; dark brownish-black, even bedding, very high grade, very low density, very poor competency; abundant planar shaley poker chip partings; few 45° fractures with slicks; 1.0 core loss 1376-1377.
1377.1	1381.8	Marlstone; light olive brown, even bedding, fair to good competency, very argillaceous, very calcareous, grades to calcareous argillaceous shale; greasy core surface possibly bentonitic; gradational contact with following.
1381.8	1389.0	Oil shale; light olive brown to tan, with some gray banding; even bedding, fair to good competency, very argillaceous, very low grade; gradational contact with following.

From	To	
1389.0	1395.2	Oil shale; medium olive brown; even bedding, very poor competency, very argillaceous, low to medium grade, abundant poker chip planar shaley partings; 1390.0-1392.0 dark brown black and light tan banding; core surface slightly greasy and bentonitic.
1395.2	1397.2	Oil shale; light olive brown and tan, streaked with looped and offset bedding, excellent competency, low to medium grade, very calcareous, numerous tuff blebs; zone of looped and offset bedding 1397.0-1397.2.
1397.2	1403.1	Marlstone; light brown to tan, even, looped, massive and wavy bedding, excellent competency, banded, very calcareous, light gray dolomitic streaks and stringers common; gray tuff streaks and stringers common.
1403.1	1404.3	Oil shale; light brown, looped and streaked bedding, excellent competency, low grade.
1404.3	1405.5	Oil shale; medium brown, streaked bedding, excellent competency, medium grade; abundant small gray tuff blebs.
1405.5	1409.3	Oil shale; light brown and light olive brown, streaked and irregular bedding, low grade, abundant gray tuff blebs; numerous light tan marlstone bands.
1409.3	1412.6	Oil shale; dark brownish-black, even bedding, excellent competency, high grade; few gray tuff streaks and blebs.
1412.6	1415.4	Oil shale; dark brown-black with light olive brown bands, even bedding, poor competency, very low density, very high grade; 1415.0-1415.4 planar shaley poker chip partings.
1415.4	1421.3	Oil shale; dark brown black, even bedding, poor competency, very high grade, very low density, 1415.4-1419.4 abundant planar shaley poker chip partings; trace gilsonite streaks, trace gray tuff blebs.
1421.3	1423.05	Oil shale; light olive brown and tan banded, even with looped bedding, good to excellent competency, low grade, gray tuff blebs and stringers common, argillaceous, bentonitic.
1423.05	1427.6	Oil shale; dark brownish-black and light olive brown banded, medium grade, good competency, numerous planar shaley poker chip partings, slight desiccation.
1427.6	1433.9	Oil shale; tan to light olive brown, fair competency, even to irregular with looped bedding, low grade; moderately to very calcareous; 3.0 core loss 1430.5-1433.5.
1433.9	1442.1	Marlstone; light olive brown to tan, looped bedding, very calcareous, fair to good competency, abundant dolomitic stringers; abundant oil shale stringers and laminae, gradational contact with following oil shale.

From	To	
1442.1	1449.6	Oil shale; light brown and tan banded, even to looped bedding with some streaked bedding, good to excellent competency, low grade, very calcareous, few light gray tuff blebs scattered throughout, few light brown clayey bands; some medium brown oil shale bands.
1449.6	1452.8	Oil shale; medium brown, even to looped bedding, excellent competency, medium grade; trace offset bedding.
1452.8	1457.1	Oil shale; dark brownish-black, even bedding, poor competency, high grade, fairly low density, abundant poker chip partings, slight desiccation, light brown banding 1452.8-1453.4; several light olive brown bentonitic argillaceous bands 1453.8-1457.1.
1457.1	1464.0	Clay shale; medium dark green-gray, even bedding, very poor competency, abundant poker chip partings; very argillaceous, bentonitic, trace gilsonite on partings, gradational contact with following.
1464.0	1474.0	Oil shale; very argillaceous, light gray brown, even bedding, fair competency, very low grade, greasy, bentonitic, numerous shaley partings; moderate to very calcareous, trace gilsonite stringers; gradational contact with following.
1474.0	1475.6	Oil shale; medium brown, even with trace offset bedding, excellent competency, low grade, slightly argillaceous, moderately calcareous.
1475.6	1486.0	Oil shale; very argillaceous, light gray-brown to light brown-gray, even with offset bedding, poor to fair competency, very low grade, bentonitic, numerous planar shaley partings, asphalt on 60° fractures at 1482.2 and 1482.4, trace irregular marley blebs at 1484.7, numerous tan to light brown, marley streaks and laminae with offset bedding 1485.2-1486.0; numerous light gray dolomitic streaks and stringers 1484.4-1485.6.
1486.0	1500.6	Clay shale; medium brownish-gray, even with trace streaked and irregular and wavy bedding, poor competency, trace kerogen content, very calcareous, bentonitic (greasy); fractures with asphalt at 1486.4; tan, hard, analcitized tuff band .10 at 1486.8; few scattered light brown very high grade oil shale bands; gradational contact with following oil shale.
1500.6	1507.9	Clay shale; light gray, massive with some irregular bedding, poor competency, very calcareous, slightly greasy; from 1500.6-1501.5 numerous, light gray irregular dolomitic stringer; several planar shaley partings throughout.
1507.9	1511.5	Oil shale; dark brownish-gray, even bedding, poor competency, very low grade, very argillaceous, several planar shaley partings, soft, greasy, possibly bentonitic; numerous interbedded clay shaley bands; gradational contact with following.

From	To	
1511.5	1517.5	Clay shale; light gray, even to nearly massive, very calcareous, numerous light gray dolomitic streaks 1512.3-1513.0; silty; abundant poker chip partings, very poor competency, several plastic-like shaley slicked fractures, bentonitic; gradational contact with following, desiccation common, core broken easily by hand.
1517.5	1520.3	Oil shale; light gray brown to medium olive brown, even bedding, very poor competency, very low to barren grade, moderate to very calcareous, abundant poker chip planar shaley partings, few low angle shaley fractures with slicks; buff marley band .15 at 1518.05; irregular parting with calcite at 1519.1; light gray marley band 1520-1520.3; gradational contact with following dessication common, core easily broken by hand.
1520.3	1527.7	Clay shale; medium brownish-gray, even bedding, very poor competency, abundant planar shaley poker chip partings; several planar shaley fractures with slicks, dessication common; core easily broken by hand, very calcareous, few light gray-tan massive marley bands; gradational contact with following oil shale.
1527.7	1550.4	Oil shale; dark gray brown to light brownish-gray, even bedding, very poor competency, very low to barren grade, abundant planar shaley poker chip partings, few scattered plastic-like shaley fractures with slicks, dessication common, core easily broken, bentonitic, moderate to very calcareous, light gray dolomitic stringers common; trace offset bedding 1539.05-1539.02; few light gray clay bands.
1550.4	1550.9	Oil shale; medium olive brown, even with trace looped and irregular bedding, fair competency, low to medium grade.
1550.9	1559.8	Marlstone; light olive brown, even bedding, very poor competency, very argillaceous, bentonitic, abundant poker chip partings, very calcareous, trace offset and streaked bedding; light olive brown oil shale bands common 1558.0-1559.8.
1559.8	1563.5	Oil shale; light olive brown and medium brown banded, even bedding, low grade, very slightly calcareous, very poor competency, argillaceous, abundant planar shaley poker chip partings, several plastic-like fractures with slicks, calcite on few fractures 1562.5 and 1562.7, light tan marley band common; tan, very calcareous, very argillaceous marlstone 1560.7-1561.8; dessication common, offset bedding common, core easily broken; gradational contact with following.
1563.5	1571.8	Oil shale; dark brown black, even bedding, very poor competency, argillaceous, medium to high grade, abundant planar shaley poker chip partings; several fractures, shaley, slicks, plastic-like; dessication common, core easily broken.
1571.8	1574.0	Oil shale; light brown, even bedding, poor to fair competency, low to medium grade, slightly argillaceous, slightly calcareous, few planar shaley partings, trace plastic-like shaley slicks on fractures; gradational contact with following.

From	To	
1574.0	1575.6	Oil shale; medium brown, very poor competency, even bedding, low to medium grade, greasy, bentonitic, abundant planar shaley partings.
1575.6	1577.5	Oil shale; light brown, even bedding, poor to fair competency, argillaceous, low grade; several planar and dessicated shaley partings; slightly bentonitic, fairly easily broken.
1577.5	1583.1	Oil shale; medium gray brown to dark brownish black, even bedding, poor to fair competency, medium grade; argillaceous, bentonitic; numerous shaley partings, fairly easily broken, medium gray brown, moderately argillaceous 1577.5-1579.0 and 1581.1-1582.0; trace gilsonite stringers, irregular pyritic patches common on shaley core partings, pyrite stringers common, white hard, analicitized tuff stringers 1580.1-1580.4.
1583.1	1584.3	Marlstone; light olive brown to tan, even bedding, fair competency, very argillaceous, very calcareous, trace offset bedding.
1584.3	1589.6	Oil shale; medium brown with light olive brown and light tan banding, even bedding, low to medium grade, poor to fair competency, bentonitic, slightly calcareous; several shaley partings with pyrite; pyrite streaks common.
1589.6	1596.3	Oil shale; dark brownish black, even bedding, poor to fair competency, high grade, fairly low density, slightly argillaceous with moderate number of shaley partings, trace pyrite on partings, trace tuff and pyrite stringers and blebs.
1596.3	1600.3	Oil shale, medium brown, even bedding, very poor competency, low to medium grade, very argillaceous, abundant shaley poker chip partings, core easily broken, bentonitic, gradational contact with following.
1600.3	1606.9	Oil shale; light gray brown to light brownish-gray, medium brown on fresh fractures, even bedding, very poor competency, very low to low grade, very argillaceous, bentonitic, abundant shaley poker chip partings, dessication common, easily broken, tan massive marley zone 1603.2-1603.7 with pyrite sealed fractures, pyrite blebs and streaks.
1606.9	1616.9	Oil shale; dark brown-black, dark olive brown-black on fresh breaks even bedding, very poor to poor competency, low to medium grade, numerous planar shaley partings, numerous white pin point blebs and tuff blebs 1606.9-1608.5, easily broken.
1616.9	1620.0	Oil shale; tan, medium brown and dark brown banded, even bedding, poor competency, medium grade, slightly argillaceous, very slightly calcareous, several planar shaley partings, .10 zone of offset bedding at 1617.6 and 1618.4; gradational contact with following.
1620.0	1622.0	Oil shale; dark brown black, even bedding, poor to fair competency, medium to high grade, fairly low density, several planar shaley partings; gradational contact with following oil shale.

From	To	
1622.0	1629.6	Oil shale; dark brownish black, even bedding, very poor competency, medium grade, abundant poker chip partings, fairly argillaceous, trace gilsonite blebs at 1622.3, several interbedded gray .10-.30 clay bands, light olive brown marlstone bed 1624.0-1624.65 and 1629.0 to 1629.6; gradational contact with following.
1629.6	1630.7	Oil shale; dark brown black, even bedding, fair competency, medium to high grade, slightly argillaceous.
1630.7	1636.9	Oil shale; dark olive brown and dark brownish-black, faintly banded, even bedding, very poor competency, dark olive brown on fresh break, argillaceous-slightly bentonitic, low grade, abundant planar shaley poker chip partings, easily broken.
1636.9	1640.1	Oil shale; light olive brown and dark brownish black, even with streaked and irregular bedding, medium grade, fair to good competency; gradational contact with following.
1640.1	1649.4	Oil shale; dark brown, even bedding, good to excellent competency, medium to high grade, trace tuff blebs, few scattered pin point white blebs 1647.0-1649.4; gradational contact with following.
1649.4	1655.0	Oil shale, dark brown black, even bedding, argillaceous, poor competency, medium grade, numerous planar shaley partings; .10 gray pyrite clay band at 1649.4; light white analcitized tuff stringer 1650.1 and 1652.1 and 1653.0 and 1653.4, light orange clay band; white analcitized tuff stringer at 1653.4; gradational contact with following.
1655.0	1655.8	Oil shale; dark brown black, even bedding, excellent competency, tough, elastic, very high grade; gradational contact with following oil shale.
1655.8	1661.6	Oil shale; dark brown to dark brownish-black, even bedding, poor to fair competency, medium grade, fairly tough, fairly elastic, numerous asphaltic tuff stringers and gilsonite streaks at 1656.5 to 1657.5; asphaltic tuff blebs common 1657.7-1658.5.
1661.6	1671.9	Oil shale; dark gray brown and tan banded (1661.6-1663 and 1671.0 to 1671.6), even bedding, good competency, low to medium grade, few planar shaley partings, few gilsonite streaks, stringers, and blebs; 1.3 long 85° - 90° fracture with asphalt 1663.3; sole casts common on partings; calcite stringer at 1669.3; 1.0 long vertical fracture with heavy asphalt coating at 1670.9; gradational contact with following oil shale.
1671.9	1680.1	Oil shale; dark brownish-black, even with trace streaked bedding, very poor to poor competency, medium to high grade; easily broken, slightly argillaceous, abundant planar shaley partings, dark brownish black on fresh fracture, several 30° - 40° open undulatory slick shaley fractures (plastic-like), trace dessication; black patches of soft sectile, greenish brassy, metallic luster, dull black surface with shiney brassy metallic luster when scrapped, probably altered pyrite with associated gilsonite; sole casts common; gradational contact with following.

From	To	
1680.1	1684.9	Oil shale; light olive brown; even with streaked, looped and irregular bedding, fair to good competency, low grade; few shaley partings, few irregular black altered pyrite blebs and stringers.
1684.9	1693.7	Oil shale; dark brownish black, even with trace looped bedding, very poor to fair competency, medium grade, easily broken, slightly argillaceous, numerous planar shaley partings - some with altered pyrite blebs on surface - some with trace gilsonite fish fossils on partings, numerous irregular pyrite patches and stringers; trace gilsonite streaks; trace sole casts on partings; gradational contact with following.
1693.7	1698.5	Oil shale; medium to dark brownish-black, faintly banded, even and looped bedding, very high grade; trace gilsonite blebs and streaks, few altered pyrite stringers and blebs, few planar shaley partings; slightly argillaceous, easily broken; few analcitized tuff blebs common 1698.0-1698.4, 85° fracture with heavy asphaltic coating 1693.8-1694.3; gradational contact with following.
1698.5	1700.9	Oil shale; dark brownish black; even bedding, good to excellent competency, very high grade, very low density, altered pyrite stringers common; .10 light greenish brown, soft, massive, clay band, (pearly, greasy, luster, soapstone appearance) at 1700.05; gradational contact with following.
1700.9	1704.5	Oil shale; dark brownish black, even bedding, very poor competency, low to medium grade, argillaceous, core easily broken, open planar and dessicated shaley partings, core cast broken, dessication common; 1703.0-1704.5 few partings with triangular shaped possible fossils with replaced altered pyrite; gradational contact with following.
1704.5	1705.6	Oil shale; dark brown-black, even bedding, good to excellent competency, very high grade, gilsonite streaks and stringers common, gradational contact with following.
1705.6	1710.0	Oil shale; dark brown, even bedding, very poor competency, low grade, very argillaceous, abundant planar and dessicated shaley partings, altered pyrite replaced fractures common on partings, altered pyrite blebs and streaks common; core easily broken; dessication common; gradational contact with following.
1710.0	1714.0	Oil shale; light brown to medium brown, even bedding, poor competency, low grade, light brown and slightly marley 1710-1711.3; argillaceous, numerous planar shaley partings, core easily broken, dessication common; pyrite blebs and altered pyrite replaced fractures common; numerous triangular shaped altered pyrite fossil on partings, gilsonite streaks and stringers common; gradational contact with following.
1714.0	1720.0	Oil shale; dark brownish-black, even bedding, very poor competency, low to medium grade, planar and dessicated shaley poker chip partings common, easily broken, dessication common, gradational contact with following.

From	To	
1720.0	1725.0	Oil shale; dark brownish black, medium gray, light olive brown, tan, banded, even with looped bedding, very poor competency, medium to high grade; numerous planar shaley poker chip partings; trace dessication, core easily broken, argillaceous; tan massive marlstone band with short sealed hackley fractures .20 at 1722.8 and .15 at 1723.1; gradational contact with following.
1725.0	1734.5	Oil shale; dark brownish black, 1725.0-1727.7 very poor competency, 1727.1-1733.0 good competency, 1733.0-1734.5 poor competency; even with trace looped bedding, high grade, planar shaley partings common, fairly low density, tan irregular tuff stringer at 1730.95; dark brown asphaltic tuff stringer 1730.95, light tan marley stringer common 1731.9-1732.3, white calcareous tuff stringer 1732.7.
1734.5	1741.4	Oil shale; dark brown and dark brownish-black band, even bedding, fair competency, high grade, few planar shaley partings, fairly easily broken, moderately dessicated.
1741.4	1743.95	Oil shale; light brown, even bedding, good competency, low to medium grade, slightly argillaceous, moderately calcareous, numerous gray clay stringers.
1743.95	1750.2	Oil shale; dark gray brown, even bedding, poor to fair competency, medium grade, 1744.8-1745.5 abundant white opaque calcareous streaks and stringers; 1745.0-1745.5 rubble due to poker chip partings and soft clay material, core easily broken; gradational contact with following shale.
1750.2	1764.3	Shale; argillaceous, medium greenish-gray, even bedding, very poor competency, very greasy, bentonitic, numerous shaley partings, dessication common; core easily broken, moderate calcite in places, abundant thin brown oil shale band and stringers; gradational contact with following oil shale.
1764.3	1766.8	Oil shale; dark brown-black, even bedding, fair competency, very high grade, fairly low density, planar shaley partings common 1764.3-1765.0; gradational contact with following oil shale.
1766.8	1771.6	Shale; argillaceous, medium gray and dark brown banded, very poor competency, trace kerogen content with medium brown oil shale stringers and bands common, abundant planar and dessicated shaley partings; numerous short open and closed slick fractures, bentonitic, core easily broken, dessication common; gradational contact with following oil shale.
1771.6	1773.3	Oil shale; dark brownish black, even bedding, fair competency, medium to high grade, slightly argillaceous, few planar shaley partings; numerous gilsonite stringers, thin orange greasy bentonitic clay stringer at 1773.05; gradational contact with following.

From	To	
1773.3	1776.8	Oil shale; dark brown and light brown with abundant interbedded greenish gray clay bands, even with looped and irregular bedding, very poor competency, very low grade, abundant dessicated and planar shaley partings with gilsonite and fresh fossile, dessication common, easily broken, gradational contact with following oil shale.
1776.8	1786.45	Shale; argillaceous, medium greenish-gray, with numerous medium olive brown oil shale stringers and bands, very poor competency, trace kerogen content, numerous planar and dessicated partings, core easily broken, dessication common, few scattered 30° - 45° fractures with slicks and asphalt; light gray tough marlstone bands at 1777.9, 1779.1, and 1784.4; rubblized 1783.5-1784.4 due to abundant poker chip partings and short fractures; 1785.0-1786.1 grades to dark grayish-brown, low grade oil shale, tan, hard, marlstone band .05 at 1785.9 and .20 at 1786.1; gilsonite bleb at 1785.3.
1786.45	1790.6	Oil shale; dark brown grading to dark brownish-black, even with trace streaked bedding, poor to fair competency, high grade, fairly low density; from 1788.6-1790.6 abundant long gilsonite blebs; dark brown, granular, asphaltic tuff band .10 at 1789.8; gradational contact with following oil shale.
1790.6	1796.3	Oil shale; dark grayish-brown, even bedding, poor competency, very low grade, numerous planar shaley partings; easily broken; trace dark brown to black oil shale stringer throughout; gradational contact with following shale.
1796.3	1797.4	Shale; argillaceous, medium brownish-gray, even bedding and streaked bedding, very poor competency, numerous planar and dessicated shaley partings; trace kerogen, easily broken, dessication common; gradational contact with following oil shale.
1797.4	1801.5	Oil shale; dark brown to black, even bedding, fair competency, high grade, few planar, shaley partings; dark brown asphalt blebs at 1801.4; gradational contact with following oil shale.
1801.5	1806.1	Oil shale; medium grayish-brown; even and streaked bedding with trace offset bedding, very poor to poor competency, very low grade, very argillaceous numerous planar shaley poker chip partings; abundant rubble 1801.5-1802.9 due to planar shaley poker chip partings and incomplete nature of shale; .10 irregular dark gray pyrite band 1801.5; .10 tan to medium brown marlstone band at 1802.9, numerous marley streaks, stringers, and bands throughout.
1806.1	1811.5	Oil shale; dark grayish-brown, even with trace streaked bedding, fair competency, low to medium grade, abundant planar shaley partings, trace medium gray shale streaks scattered throughout; tan; marley bands .05 at 1808.0, .10 at 1809.0, .05 at 1809.5, .02 at 1809.9; dark brown to black gilsonite blebs and stringers from 1809.8-1810.9; gradational contact with following oil shale.

From	To	
1811.5	1814.0	Shale; argillaceous, medium brownish-gray, greenish-gray on fresh break, even and streaked bedding, very poor competency, trace kerogen, numerous tan marley stringers, streaks, and bands 1812.4 to 1813.3; very easily broken; abundant planar & dessicated shaley poker chip partings; dessication common, bentonitic, slightly greasy; gradational contact with following oil shale.
1814.0	1815.0	Oil shale; medium grayish brown, even bedding, poor competency, very low to low grade, numerous planar shaley partings, slightly argillaceous; gradational contact with following oil shale.
1815.0	1817.9	Oil shale; dark brown, even and streaked bedding, good competency, high grade, few tan and dark brown, hard, granular, tuffs .10 at 1816.4, asphaltic tuff .20 at 1816.6; gradational contact with following oil shale.
1817.9	1821.3	Oil shale; very marley, light brown and tan, banded, even, looped and streaked bedding, poor competency, very low grade, very calcareous, numerous planar shaley poker chip partings, very argillaceous, greasy, bentonitic.
1821.3	1825.0	Oil shale; dark brown to black, streaked bedding, good competency, high grade, few planar shaley partings; gradational contact with following oil shale.
1825.0	1826.1	Oil shale; light to medium grayish-brown, even bedding, poor competency, very low to low grade, argillaceous, bentonitic, numerous planar shaley partings; moderately calcareous; gradational contact with following oil shale.
1826.1	1831.4	Oil shale; dark brown to black, even and streaked bedding, fair to good competency, high grade; few light grayish-brown shale streaks from 1826.1-1827.0; few planar shaley partings; pyrite streak .05 at 1830.4; gradational contact with following oil shale.
1831.4	1833.6	Oil shale; medium gray-brown, even and streaked bedding, poor competency, low to medium grade; numerous planar shaley partings, slightly argillaceous, slightly bentonitic; few dark brown to black oil shale stringers; gradational contact with following oil shale.
1833.6	1842.0	Oil shale, medium brown grading to dark brownish-black, even bedding fair to good competency, high grade, few planar shaley partings; trace gray tuff stringers and blebs; trace gilsonite stringer; gradational contact with following oil shale.
1842.0	1844.15	Oil shale; dark brown to black, streaked bedding with trace irregular bedding, good competency, very high grade, very low density; gradational contact with following oil shale.
1844.15	1844.8	Oil shale; medium brown, even bedding, good competency, medium grade, gradational contact with following oil shale.

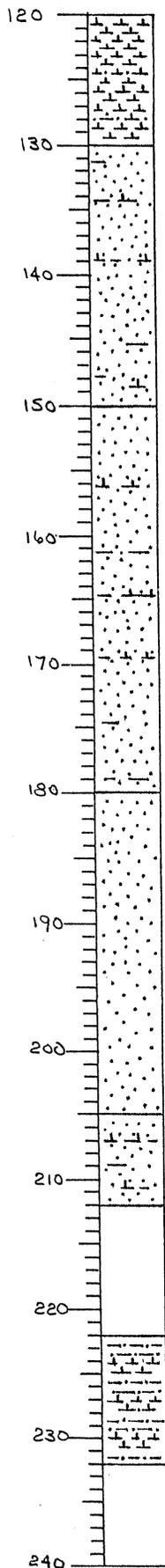
From	To	
1844.8	1846.0	Oil shale; dark brown to black, even bedding, fair competency, high grade; few planar shaley partings.
1846.0	1854.0	Shale; argillaceous, dark gray-brown, even bedding, dark greenish-gray on fresh surface; very poor to poor competency, trace kerogen, greasy, bentonitic; numerous planar shaley poker chip partings; light gray marley band .25 at 1850.1; core easily broken, dessication common; gradational contact with following oil shale.
1854.0	1855.1	Oil shale; dark brown, even bedding, good competency, low to medium grade, slightly argillaceous, slightly greasy, slightly bentonitic; gradational contact with following oil shale.
1855.1	1858.2	Oil shale; medium to dark brown and black, even and streaked bedding, very poor to poor competency, low grade, very argillaceous, numerous planar shaley partings; easily broken; slightly greasy, slightly bentonitic; very shaley banded .10 at 1856.2; gradational contact with following oil shale.
1858.2	1859.0	Oil shale; dark brown, even and streaked bedding, poor competency, low grade; slightly argillaceous, numerous planar poker chip partings; gradational contact with following oil shale.
1859.0	1862.6	Oil shale; light to medium gray-brown, even and streaked bedding, very poor to poor competency, very low to low grade; very argillaceous, slightly bentonitic, greasy; numerous planar shaley partings; light brown to tan marley bands and stringers 1859.0-1859.3; 1861.8-1861.95 light brownish-gray, granular, analcitized, massive, marley, tuff band; gradational contact with following oil shale.
1862.6	1866.0	Oil shale, dark gray-brown, even bedding, very poor to poor competency, low grade, easily broken, dessication common, numerous planar shaley partings; light brown, slightly to moderately tuff; marlstone bands and stringers common; gradational contact with following oil shale, slightly argillaceous, slightly greasy.
1866.0	1867.0	Oil shale and marlstone interbedded; oil shale, dark gray brown, even bedding; marlstone, light gray to buff, even to irregular bedding with trace streaked bedding, overall poor to fair competency, overall very low grade; few planar shaley partings along shaley laminae in oil shale bands.
1867.0	1870.1	Oil shale; medium gray brown grading to dark gray-brown, even bedding, poor to fair competency, low grade, slightly argillaceous, slightly greasy, bentonitic; few planar shaley partings; light brown marlstone streaks and bands 1867.0-1867.7 and 1868.1-1868.4; gradational contact with following; .30 medium gray greasy bentonitic clay band at 1869.6.
1870.1	1871.5	Marlstone; light brown to buff; massive with few dark gray brown oilshale stringers and bands, poor to fair competency, few planar shaley partings associated with oil shale stringer and bands.

From	To	
1871.5	1877.3	Oil shale; dark brown to black, even and streaked bedding, fair competency, low grade; few planar shaley partings; few interbedded light brown to tan marlstone bands; few scattered dark brown to black gilsonite blebs from 1874.8-1875.5; gradational contact with following oil shale.
1877.3	1882.2	Oil shale; dark brown to black grading to medium gray brown, even bedding, good competency, low grade few planar shaley partings; few light brown marley streaks and bands from 1877.3-1877.5; numerous gilsonite streaks and stringers from 1877.3-1879.3 and 1881.1-1881.7, numerous light brownish-green, vertical, hairline, irregular sealed fractures with disseminated pyrite and clay filling, no effect on competence.
1882.2	1883.4	Oil shale; light brown to dark brown, even bedding, fair to good competency, very low grade, slightly to moderately calcareous, few planar shaley partings.
1883.4	1886.0	Oil shale; medium brown to dark brown-black, even and streaked bedding, good competency, high grade, few planar shaley partings, light brown, irregular pyrite streak at 1883.45 and 1884.85; light gray, analcitized, tuff stringer with associated clay stringer at 1884.85 and 1885.4; gradational contact with following oil shale.
1886.0	1890.7	Oil shale; light olive brown grading and dark brownish-black, even and streaked bedding, good competency, low to medium grade; light brown irregular pyrite clay sealed fractures at 1889.7; grades to dark brown-black oil shale 1888.5-1890.7; few planar shaley partings; dark brown clay band at 1890.6.
1890.7	1892.9	Oil shale; medium to dark brown and black, even and irregular and streaked bedding, medium grade, good competency, few planar shaley partings, slightly marley in places.
1892.9	1895.4	Oil shale; medium olive brown, even and streaked bedding, good competency, low grade, few planar shaley partings, numerous light brownish-gray calcite streaks and blebs.
1895.4	1917.5	Oil shale; dark brown to brownish-black, even and streaked bedding, good competency, 1896.2-1899.0, very poor to poor competency 1899.0-1917.5, low to medium grade, argillaceous, numerous planar shaley partings; medium gray and brown, massive and irregular bedding, tuff band 1902.4-1902.7; zone of numerous irregular to hackley horizontal and vertical stringers of greenish-brown pyrite clay material from 1900.701903.5, grades to clayey shale, (probably zone of depositional fractures with no effect on competence); dessication common; desking common; few scattered undulatory shaley fractures with slicks; highly barren 1906.8-1908.5; few light to medium brown medium grade oil shale bands; .05 white to tan asphaltic tuff band at 1980.5; gilsonite fish fossile and casts common on partings; light tan marley bands common 1912.8-1913.1 and 1915.1-1915.4; .05 massive gray tuff band at 1915.8; 1915.8-1916.0 gray and light brown irregular horizontal and vertical tuff stringers (possibly burrows); light apple green, very soft, slightly dissolved bentonitic clay stringer at 1917.2.

From	To	
1917.5	1918.3	Oil shale; tan and dark gray brown-faintly banded; even bedding, low to medium grade, good competency, slightly argillaceous and grades to clayey shale.
1918.3	1927.2	Oil shale; argillaceous, dark gray brown to black with light brown and light gray brown band; even with abundant offset bedding, very poor competency, very low grade; grades to clayey shale, abundant planar and desking shaley partings; gilsonite fossile common on partings, few open and scattered plastic-like shaley fractures with slicks; offset bedding indicates numerous hairline depositional fractures (possibly plastic movement in incompetent oil shale); numerous clayey stringers; few scattered dark brown granular asphaltic tuff blebs and nodules 1926.3-1926.6; gradational contact with following.
1927.2	1930.5	Oil shale; argillaceous, dark gray brown, even bedding, very poor competency, very low grade, abundant poker chip and desking and shaley partings, gilsonite fossile and casts common on partings; gilsonite blebs common 1927.2-1921.1; gradational contact with following oil shale.
1930.5	1938.4	Oil shale; argillaceous, dark gray brown with few light brown and tan bands; very poor competency, very low grade; grades to clayey shale; abundant planar and desking shaley partings; gilsonite fossile and casts common; tuff zone 1932.5-1932.7, light to medium gray granular massive at top with irregular streaks at bottom (possibly burrowing); trace open planar slick fractures; offset bedding common 1933.0-1935.0; light whitish gray marley stringers at 1934.8.
1938.4	1940.3	Shale; dark brownish-gray to black, even bedding, very poor competency, trace kerogen content; numerous planar and desking shaley partings with gilsonite fossile and casts.
1940.3	1944.3	Shale with interbedded marlstone bands; shale, dark brownish-gray to black, even bedding, very poor competency, trace kerogen; marlstone, light brownish gray-buff, massive, fairly hard and tough, overall very poor competency with numerous planar and desking shaley partings, with gilsonite fossile and casts, easily broken and dessication common.
1944.3	1948.3	Oil shale; argillaceous, dark brownish-black, even bedding, very poor competency, low to medium grade, numerous planar and desking shaley partings with gilsonite fossile and casts; white tuff stringer at 1947.6; heavy gilsonite on parting at 1947.8; gradational contact with following shale; easily broken and dessication common.
1948.3	1953.7	Shale; dark brownish gray-black, even bedding, very poor competency, trace kerogen, numerous planar and desking shale with gilsonite fossile and casts; 1948.3-1949.0 interbedded light brownish-gray massive, hard, marlstone bands; gradational contact with following oil shale.

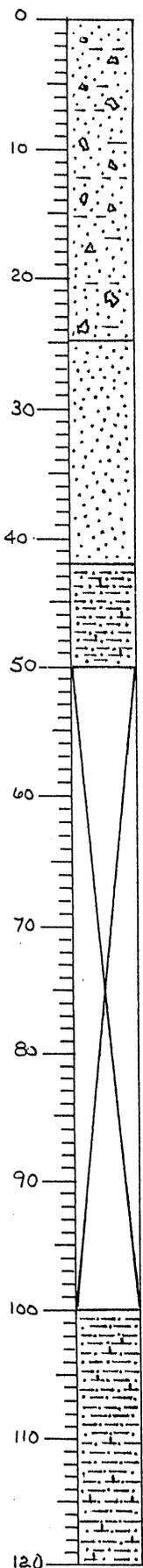
From	To	
1953.7	1956.0	Oil shale; dark brownish black and medium brown, even bedding, poor competency, very low to low grade, slightly argillaceous, few planar and desking shaley partings with gilsonite fossile and casts.
1956.0	1958.5	Oil shale; argillaceous, dark gray brown-black, even with irregular and trace offset bedding, very poor competency, easily broken and dessication common, very low to low grade, light tan marley band 1956.4, light brown oil shale bands 1956.8-1957.6, numerous planar and desking shaley partings common; gilsonite fossile common; trace slick shale fractures; gradational contact with following shale.
1958.5	1961.1	Shale; dark brownish-gray-black, even bedding, very poor competency, numerous planar and desking shaley partings, short .20 zone of irregular slicks shaley fractures at 1960.05; gradational contact with following oil shale.
1961.1	1963.7	Oil shale; argillaceous, dark brownish black with light brown band from 1962.7-1963.7, even with irregular bedding, easily broken, trace kerogen, dessication common, poor competency, very low to low grade; gradational contact with following shale.
1963.7	1967.7	Shale; dark brownish-gray-black, even bedding, very poor competency, trace kerogen, abundant planar and desking shaley partings; core easily broken dessication common; gilsonite plant and fish fossile common on partings; gradational contact with following.
1967.7	1971.0	Oil shale; argillaceous, dark gray brown to dark brownish black with tan band common, even bedding, poor competency, very low grade, several scattered argillaceous zone with abundant poker chip partings; core easily broken in places; dessication common in places; rounded fossile mud casts on few partings; gilsonite on few partings; light brown to tan massive oil shale band at 1968.3 and 1969.3; medium brown, medium grade, oil shale 1969.4-1969.9; gradational contact with following.
1971.0	1972.5	Shale; dark brownish gray, even and irregular bedding, very poor competency, trace kerogen, abundant planar and desking shaley partings, greasy, easily broken, dessication common; trace gilsonite streaks; gradational contact with following .
1972.5	1978.4	Oil shale; argillaceous, light olive brown and medium brown grading to greenish-gray, even bedding, very poor to poor competency, very low grade, very bentonitic; numerous planar and desking shaley partings, easily broken; dessication common; pyrite on partings 1975.2-1975.4, gilsonite stringer 1975.8; trace shaley slick fractures 1977.0; grades to dark brownish gray clay shale 1977.0-1978.4; gradational contact with following .

From	To	
1978.4	1983.6	Oil shale; argillaceous, dark gray brown, even bedding, very poor competency, very low grade, greasy; bentonitic; numerous planar and desking shaley partings; easily broken, slightly dessicated, trace pyrite on parting at 1980.3; trace gilsonite on partings; trace pyrite on parting at 1981.8; light white to tan granular tuff band with offset bedding and oil shale stringers .10 at 1982.9; gradational contact with following.
1983.6	1989.9	Oil shale; light brown and dark grayish brown band, even with trace irregular bedding, poor to fair competency, very low grade; very argillaceous, bentonitic, fairly hard, fairly tough with good competency 1984.8-1986.3; poor competency, fairly easily broken; trace dessication and numerous planar shaley partings from 1986.3 to 1989.9; gilsonite streak at 1985.8; trace gilsonite on partings .30 zone of open slicks fractures and closed hackley fractures with asphalt at 1989.1; gradational contact with following.
1989.9	1993.35	Shale; dark brownish-gray to black, even bedding, very poor competency, trace kerogen; bentonitic, easily broken, dessication common; numerous planar and desking shaley partings; trace gilsonite streaks; gilsonite on partings; trace slicks on few partings; few highly polished partings on surface; 45° shaley fracture with slicks and asphalt 1991.8; gradational contact with following.
1993.35	1994.2	Marlstone; light gray brown, massive with streak bedding, few shaley partings and bands; 90° fracture with asphalt at 1993.9.
1994.2	2010.0	Shale; medium to dark brownish-gray, even bedding, very poor competency, trace kerogen, bentonitic, greasy; abundant planar and desking shaley partings; core easily broken; dessication common; fossilized mud casts common; fossile replaced with light apple green slick calcareous flakey mineral filling; gilsonite fish fossile common on partings; light gray brown tuff bands at 1996.9 and 1997.05; few gilsonite streaks and blebs scattered throughout; orange oxidized (?) claystone blebs at 2002.9, 2003.6, 2006.5, 2009.0 and 2009.7.
		TOTAL DEPTH - 2010.0



From To Thick.

From	To	Thick.	Description
120	130	10	Mrlst, v lt brn, firm, tr buf slit lam, tr blk osh frags
130	180	50	SS, lt brn-buf, vfg-fg, firm-mod hd, tr intbd slit & mrlst lam, v calc, tr pyr, tr blk osh lam, few cly cmt (KAO?) fri fg ss frags, tr blk foss frags.
180	205	25	SS, lt brn vfg, v calc, firm-mod hd, sl arg, tr osh lam, tr blk asph ctg, tr cly cmt (KAO?) fri fg ss frags, tr pyr
205	212	07	SS, wht-buf, fg, v calc, cly cmt, firm, tr slit w/o sh lam, tr blk osh lam & frags, tr calc mnrl in few frags, tr mrlst lam, tr intbd slit.
212	222	10	Osh, m brn-blk, mod calc, hd, l-m grd, evn-irg bdg, tr calc mnrl, few mrlst frags
222	232	10	Slt & Mrlst, intbd, v lt-m brn, firm-hd, v calc, tr dk brn osh lam.
232	240	8	Osh, dk brn-blk, hd, h-v h grd, tr slit lam, sl calc.



From	To	Thick.	
0	25	25	Alluvium; M-dk brn, silty - vfg sand, sl Arg, uncens - firm, some org surf ox stn, some buf sl Arg vfg ss.
25	42	17	SS; M brn, sl silty, sl Arg, firm - mod hd, some org surf ox stn, mod - v calc, vfg
42	50		silt, lt gy, v calc, firm - mod hd, few v lt brn mlst lam, tr Aspht ctg on frag surf.
50	100	50	Lost Circulation, No sample return, missing samples
100	120	20	silt, lt gy, v calc, firm - mod hd, few v lt brn mlst lam, tr Aspht ctg on frag surf

