

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY^{1/}

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 drilled in 1977 in SW1/4, NE1/4 (2474 ft. FNL, 2215 ft. FEL) of sec. 10, T 13 S, R 22 E, S.L.B. & M., Uintah County, Utah

Surface elevation: 6,427 feet
 Cored interval: 159.2 to 580.7
 Mahogany marker: (?) 448.65 to 448.93

From	To	Description
159.2	161.2	Oil shale: Medium olive gray (5Y 4/2-3/2); dolomitic. Faint streaked bedding and fine laminae. Irregular thick to medium parting; irregular fracture. Black hydrocarbon partings along natural bedding at 160.33, 160.42, and 160.98.
161.2	162.2	Oil shale: Dark brownish gray (10YR 3/2-3/3), dolomitic. Faint streaked bedding. Irregular medium to thick parting; irregular fracture. Black hydrocarbon partings along natural bedding at 161.98 and 161.13.
162.2	166.0	Mudstone: Medium olive gray (5Y 3/2-4/2), dolomitic to slightly calcareous. Very faint streaked bedding. Thick to medium parting; irregular parting becoming nearly conchoidal in lower half. Rare finely disseminated pyrrhotite, becoming slightly more abundant in lower half. Sample of medium olive gray mudstone with pyrite from 164.57 X-ray - dolomite, calcite, quartz, feldspar, pyrite, anarcite, analcime, illite, smectite.
166.0	167.3	Oil shale: Dark brownish gray to medium grayish brown (10YR 3/2-4/2), dolomitic to slightly calcareous. Faint streaked bedding and laminae. Thick to medium parting; irregular to slightly conchoidal fracture. Black hydrocarbon parting along natural bedding at 166.98.
167.3	168.7	Oil shale: Dark olive gray to black (5Y 3/2-2/1), dolomitic. Earthy to very faint satiny luster. Distinct dark laminations. Medium to thick partings; irregular to slightly conchoidal fracture. Sample of dark brownish gray oil shale from 167.5: X-ray - dolomite, calcite, quartz, feldspar, illite.

^{1/} By G. M. Mason, completed October 26, 1979

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168.7	169.1	Oil shale: Dark olive gray to dark brownish gray (5Y 3/2-5YR 3/2), dolomitic. Faint streaked bedding. Medium parting, irregular fracture.
169.1	169.2	Missing
169.2	170.2	Oil shale: Medium olive gray (5Y 5/1-4/3), dolomitic to slightly calcareous. Streaked bedding and fine laminae. Medium to thick parting; irregular fracture. Rare pyrite inclusions. Sample of medium olive gray oil shale from 169.4: X-ray - dolomite calcite, quartz, feldspar smectite, pyrite, illite.
170.2	171.5	Oil shale: Medium olive gray (5Y 5/2-4/3), dolomitic to slightly calcareous. Streaked bedding and fine laminae. Thick parting; irregular fracture.
171.5	173.5	Oil shale: Dark olive gray (5Y 3/2-3/3) with common black to olive-black laminae (5Y 2/3-2/2), dolomitic. Streaked bedding and fine laminae. Thick parting; slightly irregular fracture. Rare pyrite in disseminated blebs and fine streaks.
173.5	175.5	Oil shale: Medium olive gray to dark olive gray (5Y 4/3-3/2), dolomitic. Faint streaked bedding and laminae. Irregular medium to thick parting; Irregular fracture. Rare disseminated pyrite.
175.5	176.5	Oil shale: Medium grayish brown (2.5Y 5/2-4/2), dolomitic. Very faint streaked bedding and laminae. Irregular medium to thick parting; irregular to conchoidal fracture. Some black hydrocarbon streaks. Sample of medium grayish-brown oil shale from 175.8: X-ray - dolomite, calcite, quartz, feldspar, smectite, illite.
176.5	180.0	Oil shale: Dark grayish brown (2.5Y 3/1-3/2) with some brownish black streaks (2.5Y 2/2), dolomitic. Faint streaked bedding and laminae. Irregular medium to thick parting; irregular to hackly fracture. Rare disseminated hydrocarbon blebs. Sample of medium grayish-brown oil shale from 175.8: X-ray - dolomite, calcite, quartz, feldspar, smectite, illite.

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From	To	Description
180.0	182.0	Oil shale: Dark grayish brown (2.5Y 3/2) with brownish black stringers (2.5Y 2/2), dolomitic. Distinct streaked bedding and laminae. Medium to thick parting; irregular to slightly conchoidal fracture. Very fine hydrocarbon partings at 180.51, 181.71 and 181.88. Rare disseminated hydrocarbon blebs.
182.0	183.6	Oil shale: Medium olive gray (5Y 4/2), dolomitic. Faint streaked bedding and laminae. Thick parting; irregular to slightly conchoidal fracture.
183.6	185.0	Oil shale: Dark olive gray (5Y 3/2-4/2), dolomitic. Very faint streaked bedding and laminae. Thick parting; irregular to slightly conchoidal fracture.
185.0	188.0	Oil shale: Medium to dark olive gray (5Y 4/2-3/2) with some streaks of black (5Y 2/1), dolomitic. Streaked bedding and laminae. Thin to thick parting; irregular to slightly hackly fracture. Medium olive gray marlstone. 185.27-185.35, slightly calcareous. Oil stained olive black very fine tuff 187.60-187.65. Rare finely disseminated pyrite. Very rare disseminated hydrocarbon blebs.
		Sample of oil stained very fine sandy olive black marlstone at 187.6.: X-ray - quartz, calcite, sodium feldspar, potassium feldspar, dolomite, analcime, smectite.
188.0	191.9	Oil shale: Medium to dark olive gray (5Y 4/2-3/2), dolomitic. Faint streaked bedding and laminae. Medium to thick parting; irregular to slightly hackly fracture. Calcareous light olive-grey marlstone (5Y 6/1) stringers at 188.79-188.80. Oil stained fine sandy marlstone at 189.55-189.58 and 189.92-189.93.
191.9	192.9	Oil shale: Medium olive gray to black (5Y 4/1-2/1), dolomitic. Distinct streaked bedding and fine laminae. Thin to thick parting; slightly irregular to slightly conchoidal fracture.
192.9	193.5	Oil shale: Dark olive gray to black (5Y 3/1-2/1), dolomitic slight satiny luster. Distinct streaked bedding and fine laminae. Thick parting; slightly irregular to slightly conchoidal fracture.
193.5	197.5	Oil shale: Medium brownish gray (2.5Y 4/2), dolomitic. Streaked bedding and fine laminae. Medium to thick parting; irregular fracture. Very fine sandstone and marlstone; light brownish gray (25Y 6/2), calcareous;

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		with some hydrocarbon blebs at 193.65, 194.24, 194.43 and 196.41 black hydrocarbon parting along natural bedding at 195.76.
197.5	198.5	Oil shale: Medium brownish gray (2.5Y 4/1-4/2), dolomitic. Faint streaked bedding and fine laminae. Thin to thick parting, irregular to slightly hackly fracture. Very rare black hydrocarbon blebs.
198.5	201.5	Oil shale: Medium to dark brownish gray (2.5Y 4/2-3/2), dolomitic. Streaked bedding and laminae. Thin to thick parting; irregular to hackly fracture. Very rare disseminated pyrite.
201.5	205.0	Oil shale: Medium olive gray (5Y 4/1-4/2), dolomitic. Faint streaked bedding and fine laminae. Medium to thick parting; irregular to hackly fracture. Very rare disseminated bleb of black hydrocarbon.
205.0	206.0	Oil shale: Medium to dark olive gray (5Y 4/2-3/2), dolomitic. Faint streaked bedding and fine laminae. Medium to thick parting; irregular to slightly hackly fracture.
206.0	209.6	Oil shale: Medium olive gray (5Y 4/1-4/2), dolomitic. Faint streaked bedding and laminae. Thin to thick parting, irregular fracture. Lt. olive gray fine sandy marlstone (5Y 6/1), calcareous, at 208.0. Oil shale dark brownish gray (2.5 3/2)
209.6	210.3	Oil shale: Olive black to black (5Y 3/2-2/1), dolomitic. Streaked bedding and laminae. Thin to thick parting; irregular fracture. Calcite crystals at 210.2. Sample of olive-black oil shale with calcite from 210.20: X-ray - calcite, dolomite, feldspar, quartz, illite, Mg-siderite.
210.3	230.7	Oil shale: Medium to dark olive gray (5Y 4/1-3/2), dolomitic. Faint streaked bedding and laminae. Thin to thick parting; irregular to slightly hackly fracture. Pyrite rare in dissiminated blebs, streaks, and small lenses. Very fine sandy marlstone; medium olive gray (5Y 5/1) at 218.22-218.27, 222.44-222.47. Core dropped during handling missing 212.38-212.72 and 216.04-216.20. Sample of metallic mineral pyrite? in medium olive gray oil shale at 223.1.: X-ray - dolomite, calcite, quartz, feldspar, pyrite, marcasite, illite, smectite.

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From	To	Description
230.7	232.6	Oil shale: Medium brownish gray (2.5Y 5/2-4/2), dolomitic. Faint streaked bedding and laminae. Thick parting; irregular fracture.
232.6	233.1	Oil shale: Brownish black to black (2.5Y 2/2-2/1, dolomitic. Distinct bedding and laminae. Medium to thick parting; irregular fracture. Clastic layer of oil coated fine sand, dense with non-calcareous cement at 232.68-232.75.
233.1	238.0	Oil shale: Dark olive gray (5Y 3/1-3/2), dolomitic. Faint bedding and laminae. Thin to thick parting; irregular to hackly fracture.
238.0	240.0	Oil shale: Medium olive gray to medium brownish gray (5Y 4/1-5YR 4/1), dolomitic. Faint streaked bedding and laminae. Medium to thick parting; irregular to slightly hackly fracture.
240.0	240.5	Oil shale: Brown to dark grayish brown (10YR 5/2-4/2) and black (10YR 2/1) laminated, dolomitic. Distinct bedding and laminae. Thin to thick parting; irregular fracture. Oil stained clastic zone, of dark brown (10YR 4/3) tuffaceous material at 240.15-240.30; not reactive with acid. Rare small hydrocarbon blebs present in the zone. Sample of dark brown clastic material from 240.3. X-ray - dolomite, some quartz, feldspar.
240.5	242.0	Oil shale: Dark grey to dark grayish brown (10YR 3/1-4/2), dolomitic. Faint bedding and laminae. Thin to thick parting, irregular fracture.
242.0	245.0	Oil shale: Medium to dark olive gray. (5Y 4/1-3/2), dolomitic. Faint bedding and laminae. Medium to thick parting; irregular fracturing. Gray dolomite (5Y 6/1-5/1) laminae at 242.95 and 243.65.
245.0	246.0	Oil shale: Dark grayish brown to dark brownish gray (10YR 3/1-3/3), dolomitic. Realatively distinct bedding and laminae. Medium to thick parting; irregular fracture. Coal streak at 245.84. Dolomite impregnated with hydrocarbon material 245.9. Sample of dark grayish-brown oil shale from 245.7: X-ray - dolomite, calcite, quartz, feldspar, illite, smectite.
246.0	248.0	Oil shale: Medium to dark olive gray (5Y 4/1-3/2); dolomitic. Moderately distinct laminae. Thick parting; hackly fracture. Medium gray limestone lamina at 246.97.

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From	To	Description
248.0	249.6	Oil shale: Medium to dark olive gray (5Y 4/2-3/2); dolomitic. Faint laminae. Medium to thick parting; irregular to slightly hackly fracture. Dark grey limestone bed at 248.3 with irregular wavy contact. Rare pyrite in blebs and streaks. Tuff laminae with rare biotite at 249.4.
249.6	253.0	Oil shale: Medium olive gray (5Y 4/1-4/2); dolomitic. Very faint streaked bedding and laminae. Thick parting; irregular to slightly hackly fracture. Some pyrite blebs throughout section.
253.0	254.5	Oil shale: Dark olive gray to dark brownish gray (5Y 3/2-2.5Y 3/2); dolomitic. Faint streaked bedding and laminae becoming more distinct lower in the section. Thick parting; irregular to slightly hackly fracture. Limestone stringers medium to dark gray (2.5 5/0-4/0) at 253.16 and 253.18. Rare pyrite blebs in upper one-half. Oil stained dolomite lens at 254.45. Sample of dark brownish-gray oil shale from 254.3: X-ray - calcite, quartz, dolomite, feldspar, illite, smectite, analcime.
254.5	254.9	Oil shale: Brownish black (5YR 2/1-2/2) with dark grayish brown (5YR 3/3) alternating laminae; dolomitic. Distinct bedding and laminae. Thin to thick parting; irregular to slightly hackly fracture. Oil stained clastic unit (black) very slightly reactive to acid.
254.9	257.4	Oil shale: Medium olive gray (5Y 4/1-4/2) to medium brownish gray (5YR 4/1-4/2); dolomitic. Faint streaked bedding and laminae. Thick parting; irregular fracture. Very rare disseminated pyrite.
257.4	258.9	Oil shale: Medium olive gray (5Y 4/1-4/2); dolomitic. Streaked bedding and laminae. Thin to thick parting; irregular to hackly fracture. Limestone stringers at 258.07 and 258.25. Dolomite lens at 258.88.
258.9	261.4	Oil shale: Medium brownish gray (5YR 4/1-4/2); dolomitic. Streaked bedding and laminae. Thin to thick parting; hackly fracture.
261.4	262.3	Oil shale: Medium - dark grayish brown (10YR 5/2-3/2) with rare brownish black laminae (10YR 2/2). Tuffaceous clastic band with common very small flecks of biotite. Very slight reaction to acid. Natural fracture through tuff with reddish-brown waxy hydrocarbon blebs along the fracture.

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From	To	Description
		Sample of tuff with biotite: X-ray - sodium feldspar, quartz, biotite, hornblende, dolomite.
262.3	265.8	Oil shale: Gray (5Y 5/1) with medium olive gray (5Y 4/2) lamina; dolomitic. Distinct laminae and bedding. Medium to thick parting; slightly irregular fracture. Common very fine disseminated and rare streaks of pyrite. Streaks are more common lower in the section.
265.8	266.6	Oil shale: Medium olive gray (5Y 4/2) with dark brownish gray (2.5Y 3/2), dolomitic. Distinct laminae. Medium to thick parting; irregular fracture. Rare very fine disseminated pyrite and micaceous minerals. Sample of medium olive gray oil shale from 266.2: X-ray - dolomite, quartz, calcite, feldspar, illite.
266.6	267.0	Oil shale and tuff: Brownish-black (2.5Y 2/2) and tan (10YR 6/3), the oil shale is dolomitic, the tuffaceous material does not react with acid. Very distinct laminae and bedding. Thick parting and irregular fracture.
267.0	267.4	Oil shale: Medium brownish gray (2.5Y 5/2); dolomitic. Faint laminae and bedding. Thick parting; irregular fracture. Rare disseminated pyrite.
267.4	272.0	Oil shale: Medium olive gray (5Y 5/1-4/2), dolomitic. Distinct laminae and bedding. Thick parting; irregular to slightly hackly fracture. Common disseminated pyrite. Limestone with common tar blebs at 271.75-271.81.
272.0	272.5	Oil shale: Medium brownish gray to medium olive gray (2.5Y 4/1-5Y 4/1), dolomitic. Faint to fairly distinct laminae (becoming more distinct toward bottom of section).
272.5	273.0	Oil shale: Grayish brown and very dark grayish brown to brownish black (10YR 5/2 and 10YR 3/2-2/2), slightly dolomitic to dolomitic in lower half of section. Very distinct bedding and laminae. Thick parting; irregular to slightly hackly fracture.
273.0	276.6	Oil shale: Medium olive gray with dark olive gray laminations (5Y 4/1-4/2 and 5Y 3/2), dolomitic. Fairly distinct laminae. Thick parting; irregular to hackly fracture. Pyrite in common disseminated blebs and rare streaks. Sample of medium olive-gray oil shale from 274.8: X-ray - dolomite, quartz, feldspar, calcite, illite, smectite.

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From	To	Description
276.6	277.2	Oil shale: Grayish brown to brownish black (10YR 5/2-2/2), slightly dolomitic. The rate of reaction with acid decreases with increasing darkness of sample. Distinct bedding and laminae. Thick parting; irregular to slightly hackly fracture.
277.2	280.0	Oil shale: Medium olive gray to medium brownish gray. (5Y 4/2-2.5 4/2) dolomitic. Fairly distinct fine laminae. Medium to thick parting; irregular to slightly hackly fracture. Pyrite in common disseminated blebs and rare streaks. Samples of medium olive-gray oil shale at 277.3: X-ray ₁₄ - dolomite, calcite, quartz, feldspar, smectite, illite, pyrite.
280.0	290.0	Oil shale: Medium grayish brown (10YR 4/2-5/2), dolomitic. Faint thin laminae and bedding. Thin to thick parting; irregular to very hackly fracture. Micritic dolomite; dark gray (10YR 3/1) at 280.91-280.96, 281.37-281.38, 281.59-281.64, 284.32-284.34, 285.60-285.61, 287.18-287.21. Pyrite becoming common in lower 1.5 feet.
290.0	291.0	Oil shale: Medium olive gray (5Y 4/1-3/2), dolomitic. Faint laminae and bedding. Thin to thick parting, irregular to slightly hackly. Some disseminated mica throughout section. Biotite tuff, gray buff to buff (10YR 7/1-7/2), slightly calcarious at 290.19-290.25. A second thinner tuff 290.55-290.56 with very small purple crystalline masses occurring primarily along the tuff/oil shale interface, assumed to be abelsonite. Gray limestone stringers 290.7, 290.73, and 290.76. Rare disseminated pyrite in upper oil shale becoming more common with some stringers occurring in lower .5 feet of section.
291.0	291.9	Oil shale: Medium brownish gray (2.5Y 4/1), dolomitic. Faint laminae and bedding. Medium to thick parting; irregular to slightly hackly fracture. Common disseminated pyrite and mica. Some pyrite occurring as streaks. Tuff occurring 291.28-291.32. Tight natural fracture extending through tuff with oil coating grains along fracture, small purple crystalline mass present near upper oil shale/tuff interface. Sample of medium brownish-gray oil shale from 291.3: X-ray ₁₅ - calcite, dolomite, quartz, feldspar, smectite, illite.

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291.9	296.0	Oil shale: Medium grayish brown to dark grayish brown (10YR 4/2-3/2), dolomitic to slightly calcareous. Fairly distinct laminae and bedding. Medium to thick parting; irregular to hackly fracture. Rare disseminated blebs of pyrite and flakes of mica. Rare small blebs of black hydrocarbons.
296.0	296.6	Oil shale: Dark brownish gray to brownish black (2.5Y 3/1-2/2), dolomitic. Distinct laminae and bedding. Thick parting; slightly irregular fracture generally along bedding plane. Biotitic tuff 296.02-296.08. White with black biotite flakes. Common disseminated pyrite. Sample of brownish-black oil shale from 296.5: X-ray ₁₆ - dolomite, calcite, quartz, feldspar, illite, smectite.
296.6	297.0	Oil shale: Dark brownish gray (2.5Y 3/1-3/2), dolomitic. Faint laminae and bedding. Medium to thick parting; irregular to slightly hackly fracture. Common pyrite in disseminated blebs and streaks.
297.0	297.9	Oil shale: Medium brownish gray (2.5Y 5/2-4/2), dolomitic. Fairly distinct laminae and bedding. Medium to thick parting; irregular to slightly hackly fracture. Tuff occurring 297.28-297.31; light gray with very slight bluish tint (N 6/1). Tuff 297.6-297.63, light brownish gray (2.5Y 6/2), contains small flakes of biotite. Some disseminated pyrite blebs in oil shale.
297.9	299.0	Oil shale: Dark grayish brown (2.5Y 4/2-3/3), dolomitic. Distinct laminae and bedding. Thick parting; irregular to slightly hackly fracture. Common pyrite in disseminated blebs and some streaks. Tuff 298.22-298.25, gray buff to buff (2.5Y 7/0-7/2) slightly reactive to acid. The tuff is porous and permeable. Common biotite flakes with a concentration at the base. Natural tight vertical oil stain fracture extending through tuff.
299.0	300.5	Oil shale: Dark grayish brown (2.5Y 4/2-4/3) with brownish black (2.5 2/2) laminae, dolomitic. Fairly distinct laminae and bedding. Thin to thick parting; irregular to hackly fracture. Disseminated pyrite common in upper half, grading to rare in lower portion. Gray limestone stringers at 299.26, 299.88-299.89, 300.03, and 300.39.
300.5	301.5	Oil shale: Dark grayish brown (2.5Y 3/3) to brownish black (2.5Y 2/2), dolomitic. Distinct laminae and bedding. Thick parting, irregular to slightly hackly fracture. Common disseminated flakes of mica. Tuff 300.52-300.58

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		with 2 tight vertical oil stained fractures extending thru tuff, also common boitite flakes in the tuff. Biotitic tuffs at 300.75-300.76, 300.87-300.90, and 301.3. All have two oil stains vertical tight natural fractures extending through them.
301.5	302.6	Oil shale: Medium olive gray (5Y 4/1-4/2), dolomitic to slightly calcareous. Faint laminae and bedding. Medium to thick parting; irregular fracture. Common pyrite in disseminated blebs and streaks.
302.6	303.4	Oil shale: Medium brownish gray (2.5Y 4/1) grading to medium grayish brown (2.5Y 4/3), dolomitic. Distinct laminae and bedding. Medium to thick parting; irregular to hackly fracture.
303.4	304.0	Oil shale: Medium to dark grayish brown (2.5Y 3/1-3/3), dolomitic. Fairly distinct laminae. Thick parting; irregular to hackly fracture. Tuff with some biotite 303.72-303.73, 303.78-303.79, and 303.84-303.88 (tuff has some black organic laminae). Sample of medium grayish-brown oil shale at 302.8: X-ray ₁₇ - dolomite, calcite, quartz, feldspar, smectite.
304.0	306.5	Oil shale: Dark brownish gray grading to medium brownish gray (2.5Y 3/1 to 2.5Y 4/2), dolomitic. Faint laminae and bedding. Thick parting; irregular to hackly fracture. Common disseminated pyrite blebs. Dolomite stringer with pyrite lens, medium brownish gray (2.5Y 4/2) at 304.85-304.87.
306.5	308.6	Oil shale: Medium grayish brown (2.5Y 4/2), dolomitic. Faint laminae and bedding. Medium to thick parting; hackly fracture. Dolomite stringers at 307.32 and 308.09. Rare disseminated pyrite.
308.6	310.5	Oil shale: Brownish black (10YR 2/2), dolomitic. Faint laminae and beddings. Medium to thick parting; irregular to slightly hackly fracture. Some irregular disseminated blebs of pyrite. Rare irregular disseminated blebs of hydrocarbon. Tuff 309.88-309.97, tight vertical oil stained fracture extending thru the tuff. Sample of brownish black oil shale from 309.8: X-ray ₁₈ - dolomite, calcite, quartz, feldspar, smectite, illite.

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310.5	314.4	Oil shale: Medium olive gray (5Y 5/1-4/1) with olive black laminae (5Y 3/2), dolomitic. Fairly distinct laminae and bedding. Thick parting; irregular to slightly hackly fracture. Common disseminated blebs of pyrite, some streaks.
214.4	315.3	Oil shale: Medium grayish brown (2.5Y 4/2-4/3), dolomitic to slightly calcareous. Faint streaked laminae. Thick parting; irregular to slightly hackly fracture. Rare disseminated pyrite blebs.
315.3	317.1	Oil shale: Medium grayish brown (2.5Y 4/2) with brownish black to black laminae (2.5Y 2/2-2/1), dolomitic. Distinct streaked laminae. Medium to thick parting; irregular to slightly hackly fracture. Oil shale and clastic material inter-bedded 315.92-316.20.
317.1	318.4	Oil shale: Gray to medium olive gray (5Y 5/0-5/2), dolomitic. Faint streaked laminae. Medium to thick parting, irregular fracture. Some disseminated pyrite blebs. Sample of medium olive-gray oil shale at 317.6: X-ray ₁₉ - dolomitic, quartz, calcite, feldspar, smectite, illite.
318.4	319.7	Oil shale: Medium olive gray to medium brownish gray (5Y 4/1-2.5Y 4/1), dolomitic. Faint to fairly distinct streaked laminae. Thin to thick parting; irregular to hackly fracture. Rare black blebs of hydrocarbon. Limestone stringer at 318.5.
319.7	320.1	Oil shale: Brownish black (2.5Y 2/2), dolomitic to calcareous. Faint streaked laminae, distinct bedding. Medium to thick parting; irregular fracture. Tuff clastic material with very fine black partings at 319.72-319.75.
320.1	321.6	Oil shale: Medium olive gray (5Y 5/1-4/2), dolomitic. Faint streaked laminae. Thin to thick parting; irregular to slightly hackly fracture. Black hydrocarbon coated tight vertical natural fracture at 320.96-321.01 and 321.25-321.30.
321.6	323.9	Oil shale: Medium olive gray to medium brownish gray (5Y 4/1-2.5Y 4/1), dolomitic. Faint parting; irregular to hackly fracture. Some cross bedding of the laminae evident.
323.9	324.8	Oil shale: Brownish black and medium grayish brown inter bedded (2.5Y 2/1-2/2 and 2.5Y 4/2-4/3), dolomitic. Distinct bedding and moderately pronounced laminae.

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From	To	Description
324.8	327.8	<p>Medium to thick parting; irregular fracture. Clastic stringers at 324.12, 324.19, 324.29, and 324.64. Rare disseminated pyrite.</p> <p>Oil shale: Medium olive gray to dark olive gray (5Y 4/1-3/2) interbedded, dolomitic. Fairly distinct laminae and bedding. Medium to thick parting; irregular fracture. Some pyrite in stringers throughout section, disseminated pyrite some in upper half grading to common in lower half of section.</p> <p>Sample of medium olive-gray oil shale from 327.5: X-ray₂₀ - dolomite, calcite, quartz, feldspar, smectite, illite.</p>
327.8	328.7	<p>Oil shale: Brownish black to dark grayish brown (2.5Y 2/1-3/2), dolomitic to slightly calcarious. Faint laminae and bedding. Thin to thick bedding; irregular to slightly conchoidal fracture. Gray-buff siltstone, very faintly reactive with acid. Some disseminated hydrocarbon blebs in siltstone, 328.1-328.2 gray buff dolomite with black hydrocarbon partings 328.2-328.4.</p> <p>Sample of gray-buff siltstone 328.1: X-ray₂₁ - analcite, quartz, sodium feldspar, dolomite, calcite, smectite.</p>
328.7	329.3	<p>Oil shale: Medium to dark grayish brown (2.5Y 4/1-3/2), slightly calcarious. Faint to slightly distinct laminae and distinct bedding. Thick parting; irregular to slightly hackly fracture. Dolomite, medium gray with oil staining 328.9-329.0.</p>
329.3	331.6	<p>Oil shale: Medium olive gray to medium brownish gray (5Y 4/1-2.5Y 4/1), dolomitic. Faint streaked laminae. Thick parting; irregular to slightly hackly fracture. Common very fine disseminated pyrite. Common goldish colored mica (possibly phlogopite or muscovite) disseminated through rock mass 330.1-330.3 and some 330.3-330.5.</p> <p>Sample of medium olive gray oil shale from 330.5: X-ray₂₂ - dolomite, quartz, calcite, feldspar, smectite, illite.</p>
331.6	333.2	<p>Oil shale: Medium grayish brown (2.5 4/2-4/3), dolomitic. Faint streaked laminae. Thin to thick parting; hackly fracture.</p>
333.2	334.2	<p>Oil shale: Medium grayish brown (2.5Y 4/3) with brownish black partings (2.5Y 2/2), dolomitic. Distinct laminae. Thin to medium parting; irregular to hackly fracture.</p>

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
334.2	336.0	Natural tight vertical fracture 330.50-330.57, oil stained. Some black shaley parting through section. Oil shale: Medium olive gray (5Y 5/1-4/2), dolomitic. Faint to moderately distinct streaked laminae, some distinct bedding. Thin to thick parting; irregular to slightly hackly fracture. Tuff, 334.48-334.62, buff gray with biotite common in basal .05 foot. Tuff 335.13-335.15, 335.17-335.20, and 335.32-335.34. Natural tight vertical fracture, oil coated through tuffs.
336.0	337.0	Oil shale interbedded with clastic tuffs: Oil shale is brownish black to medium grayish brown (2.5 2/2-4/2), tuffs are gray buff to buff (2.5Y 7/1-7/2), oil shale is dolomitic, tuffs are non-reactive with acid. Very distinct bedding. Thin to medium parting; irregular fracture. Some pyrite in small lens.
337.0	338.0	Oil shale: Medium brownish gray (2.5Y 4/1-4/2), dolomitic to slightly calcarious. Faint streaked laminae. Thick parting; irregular fracture. Some in upper half grading to common in lower half disseminated pyrite. Rare disseminated biotite.
338.0	340.0	Oil shale: Tight to medium brownish gray (2.5Y 6/2-5/2), calcarious. Faint streaked laminae. Medium to thick parting; irregular to slightly hackly fracture. Rare disseminated very fine pyrite.
340.0	345.0	Oil shale: Medium olive gray (5Y 5/1-4/2), dolomitic. Very faint streaked laminae and bedding. Medium to thick parting; irregular to slightly hackly fracture. Sample of medium olive gray oil shale at 342.7: X-ray ₂₃ - dolomite, quartz, calcite, smectite, feldspar, illite, analcime.
345.0	348.0	Oil shale: Medium olive gray grading into medium brownish gray (5Y 5/1-2.5Y 4/2), dolomitic to slightly calcarious. Faint streaked laminae. Medium to thick parting; irregular to hackly fracture. Rare very fine disseminated pyrite.
348.0	349.0	Oil shale: Medium grayish brown (2.5Y 4/3-4/3), dolomitic. Faint streaked laminae and bedding. Medium to thick parting; irregular to hackly fracture.
349.0	349.5	Oil shale: Medium to dark grayish brown (2.5Y 4/2-3/2), dolomitic. Faint streaked laminae and faint bedding. Thin to thick parting; hackly fracture. Rare very fine disseminated pyrite. Sample of medium grayish-brown oil shale from 349.3: X-ray ₂₄ - dolomite, calcite, quartz, smectite, feldspar.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
349.5	350.0	Oil shale: Medium grayish brown to dark grayish brown (2.5Y 4/2-3/2), dolomitic. Distinct streaked laminae and bedding. Shaly to medium parting; irregular fracture. Some black hydrocarbon partings.
350.0	352.0	Oil shale: Medium olive gray (5Y 4/2-4/3), dolomitic. Faint to fairly distinct laminae and bedding. Medium to thick parting; irregular to very slightly hackly fracture. Common disseminated very fine pyrite. Medium grayish brown dolomite 351.0-351.13 and 351.42-351.51.
352.0	352.5	Tuff and Oil shale: Dark grayish brown to black (2.5Y 3/2-2/0), very slight dolomitic reaction. Very distinct bedding. Thin to thick parting; irregular fracture. Tuff is extremely oil saturated to the point of seeping to surface of core.
352.5	352.8	Oil shale: Medium to dark grayish brown (2.5Y 4/1-3/2), dolomitic. Faint streaked laminae. Thin to thick parting; irregular to slightly hackly fracture. Rare disseminated very fine pyrite.
352.8	355.3	Oil shale: Dark olive gray (5Y 3/1-3/2), dolomitic. Faint streaked laminae and bedding. Medium to thick parting; irregular to slightly hackly fracture. Tuff 353.72-353.95, brownish black, oil suping to surface of core. Pyrite lens 353.77-353.81 in the tuff. Disseminated pyrite rare above the tuff, and common below.
355.3	364.4	Oil shale: Medium grayish brown to medium olive gray. (2.5Y 4/2-5Y 4/2), colors somewhat mottled. Medium grayish brown is dolomitic, medium olive gray is dolomitic to slightly calcareous. Faint streaked laminae, some distinct bedding. Thin to thick parting, with some shale partings. Tuffs: 356.0-356.1 oil stained with biotite; 356.64-356.92 clastic with common biotite and oil staining, vertical tight natural fracture extending through tuff, oil seeping to surface of core; 358.60-358.62 and 358.66-358.67, with common biotite; 359.17-359.18 and 359.21-359.23, common biotite; 360.92-360.93, 361.20-361.30, common biotite; 361.53-361.82, common biotite; 362.63-362.66, 362.92-362.95, 363.02-363.04, some biotite common along basal contact.
364.4	364.7	Oil shale: Medium to dark grayish brown (2.5Y 4/2-3/2), dolomitic. Faint streaked laminae. Medium to thick parting; irregular to slightly hackly fracture.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
364.7	366.5	Oil shale: Dark olive gray(5Y 3/2), dolomitic. Very faint streaked laminae. Medium to thick parting; irregular to very slightly hackly fracture. Very dense tuff 366.25-366.34, rare biotite in the tuff.
366.5	371.7	Oil shale: Medium olive gray (5.0Y 4/1-4/2), dolomitic. Faint streaked laminae. Medium to thick parting; irregular to slightly hackly fracture.
371.7	377.3	Oil shale: Medium olive gray (5Y 4/2) to medium brownish gray (2.5Y 5/2), dolomitic. Some distinct streaked laminae but mostly faint streaked laminae. Medium to thick parting; slightly hackly fracture. Dark shale partings 373.07, 373.12, 373.18, and 373.29. Sample of medium brownish-gray oil shale from 372.5: X-ray ₂₅ - calcite, dolomite, quartz, smectite, feldspar.
377.3	379.1	Wavy Bedded Tuff: Brownish black (10YR 2/1), not reactive with acid. Massive. Thick parting, irregular fracture. Completely oil saturated, oozing from outside of core. Sample of Wavy Bedded Tuff from 378.9, oil saturated: X-ray ₂₆ - quartz, potassium feldspar, analcime, biotite, sodium feldspar, MG-siderite, dolomite, calcite.
379.18	380.8	Oil shale: Medium grayish brown (10YR 5/1-4/2) with some brownish black (10YR 2/2) streaks. Distinct streaked laminae and distinct bedding. Thin to medium parting, hackly fracture. Tight natural vertical fracture 379.18-379.60.
380.8	383.1	Oil shale: Medium olive gray (5Y 5/1-4/2), dolomitic. Faint streaked laminae and bedding. Thin to medium parting, irregular to hackly fracture. Some streaks of pyrite and some pyrite in disseminated blebs.
383.1	384.9	Oil shale: Medium olive gray to medium brownish gray (5Y 4/2-10YR 4/2), dolomitic. Faint streaked laminae. Medium to thick parting, irregular to hackly fracture. Some rare small disseminated hydrocarbon blebs.
384.9	387.0	Oil shale: Medium olive gray (5Y 4/1-4/2), dolomitic. Faint streaked laminae. Medium to thick parting, irregular to slightly hackly fracture. Rare lenses of pyrite, some disseminated blebs of pyrite.
387.0	388.0	Oil shale: Medium olive gray (5Y 4/1) to medium brownish gray (10YR 4/2), dolomitic to slightly calcareous. Faint streaked laminae. Thick parting, irregular to slightly hackly fracture. Natural vertical fracture 387.25-387.64.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
		Sample of medium olive-gray oil shale from 387.8: X-ray ₂₇ - dolomite, calcite, quartz, feldspar, smectite, illite.
388.0	388.5	Oil shale: Medium grayish brown (10YR 4/1-4/2), dolomitic. Faint streaked laminae. Thick parting, irregular to slightly hackly fracture. Rare disseminated pyrite.
388.5	390.4	Oil shale: Medium olive gray (5Y 5/1-4/1), dolomitic. Faint streaked laminae. Medium to thick parting, hackly to irregular fracture. Some disseminated pyrite in blebs.
390.4	391.5	Oil shale: Medium grayish brown (10YR 4/2) with some brown black (10YR 2/2) laminae, dolomitic. Some distinct streaked laminae. Medium to thick parting, slightly hackly fracture. Streak of black crystalline hydrocarbon at 391.19.
391.5	392.7	Oil shale: Medium to dark olive gray (5Y 4/1-3/2), dolomitic. Faint streaked lamina. Thick parting, irregular to very slightly hackly fracture. Rare disseminated pyrite blebs.
392.7	393.4	Oil shale and clastics: Oil shale brownish black (10YR 2/2) and clastics medium grayish brown (2.5Y 5/2-4/2), non-reactive to acid to very faintly dolomitic for the oil shale. Very distinct lamination. Thin to medium parting, irregular fracture. Clastics are very fine sand to silt size, with disseminated tar blebs, generally .1 foot thick but irregular in nature and sequence.
		Sample of interbedded oil shale and clastics medium grayish brown and brownish black from 393.1: X-ray ₂₈ - dolomite, some quartz, feldspar.
393.4	395.1	Oil shale: Medium brownish gray to medium grayish brown (10YR 4/1-4/3), dolomitic to slightly calcareous. Faint streaked laminae. Thick partings, irregular to slightly hackly fracture. Some distinct brownish black laminae.
395.1	397.6	Oil shale: Medium grayish brown (10YR 5/2-4/2), slightly calcareous. Fairly distinct streaked laminae. Thick parting; irregular to slightly hackly fracture. Some very fine disseminated pyrite.
397.6	398.2	Oil shale: Medium and dark grayish brown (10YR 4/3-3/3), dolomitic to slightly calcareous. Distinct laminae. Thick parting; irregular to very slightly hackly fracture. Rare disseminated pyrite. The lighter laminae are slightly silty.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
398.2	400.5	Oil shale: Medium to dark olive gray (5Y 4/2-3/2), dolomitic. Fairly distinct streaked laminae. Thick parting; irregular to very slightly hackly fracture. Some very fine disseminated pyrite.
400.5	401.4	Oil shale: Medium grayish brown to dark grayish brown (10YR 4/2-3/2), slightly dolomitic to non-reactive with acid. Very distinct laminae. Thick parting; irregular to sub-hackly. Clastic section interbedded with oil shale, 400.89-401.19. Some fine disseminated pyrite through the clastics. Also through clastic section rare crystalline hydrocarbon streaks.
401.4	404.6	Oil shale: Light gray to light olive gray (5Y 6/0-5/1), calcareous. Faint streaked laminae. Medium to thick parting; irregular fracture. Some streaks of pyrite, also fine disseminated pyrite. Some very flakes of biotite. Sample of light olive gray oil shale from 403.3: X-ray ₂₉ - dolomite, quartz, calcite, feldspar, smectite, MG-siderite.
404.6	405.2	Oil shale: Medium to light brownish gray (5Y 5/2-6/1), calcareous. Streaked laminae. Thick parting, irregular fracture. Color grading lighter downward. Top of A grove
405.2	407.6	Marlstone: Light olive gray (5Y 6/2-5/2) to olive buff (5Y 7/2), calcareous in the upper foot. Laminae are faintly streaked to fairly distinct. Thick parting; irregular fracture. Rock increasing in porosity and permeability. Sample of light olive-gray marlstone from 406.6: X-ray - dolomite, quartz, sodium feldspar, potassium feldspar, illite.
407.6	408.6	Oil shale: Light olive gray (5Y 6/2), slightly calcareous. Fairly distinct laminae. Thick parting; slightly hackly fracture. Rock quite porous and permeable. Rare black crystalline hydrocarbon streaks.
408.6	411.0	Marlstone: Light olive gray (5Y 6/2), slightly calcareous. Faint streaked laminae. Thick parting; slightly hackly fracture. Very slight cross-bedding noted. Bottom of A grove.
411.0	411.5	Mudstone: Light brownish gray (10YR 5/2), slightly calcareous. Massive bedded. Thick parting; irregular fracture.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
411.5	412.6	Siltstone: Light olive gray (5Y 5/2), slightly calcareous. Faint streaked laminae to massive bedded. Thick parting; irregular fracture.
412.6	413.1	Siltstone: Light olive gray (5Y 5/2), dolomitic. Massive thick parting; irregular fracture. Common calcite blebs. Sample of light olive gray siltstone from 412.8: X-ray ₃₁ - dolomite, quartz, calcite, feldspar, illite, smectite.
413.1	415.5	Oil shale: Light to medium olive gray (5Y 6/1-5/2), dolomitic to slightly calcareous. Faint streaked laminae. Medium to thick parting; irregular to slightly hackly fracture.
415.5	422.1	Mudstone: Medium olive gray (5Y 5/1-5/2), dolomitic. Faint streaked laminae. Thick parting; irregular fracture. Rock is very permeable, acid soaks completely into rock. Common very small blebs or flakes of a mineral of unknown identity. Mineral is common throughout section as very fine disseminated blebs and blebs forming distinct streaks following bedding. Mineral appears silvery to black, metallic to submetallic, and platy. Possibly 2 minerals existing; suspect pyrrhotite and biotite. Sample of medium-olive gray mudstone from 418.2: X-ray ₃₁ - dolomite, quartz, feldspar, calcite, pyrrhotite, smectite, illite.
422.1	423.5	Mudstone: Medium olive gray (5Y 4/1-4/2), dolomitic. Faint streaked laminae. Medium to thick parting; irregular fracture. Rock is quite permeable. Same mineral as above. Tight vertical natural fractures, tar filled 422.6-423.0.
423.5	424.5	<i>Top of Mahogany zone</i> Oil shale: Medium olive gray to medium grayish brown (5Y 4/1-4/2 to 2.5Y 4/2) with common streaks of dark brown (10YR 3/3), dolomitic. Distinct streaked laminae. Thick parting; irregular to slightly hackly fracture.
424.5	426.5	Oil shale: Medium brownish gray (2.5Y 5/2), dolomitic. Faint streaked laminae. Medium to thick parting; slightly hackly to slightly conchoidal fracture. At 425.05 a pale green crystalline platy mineral in a small vug. Mineral approximately .03 inches in diameter.
426.5	427.4	Oil shale: Medium to dark grayish brown (2.5 4/2-3/2), slightly dolomitic. Faint streaked laminae. Thin to medium parting; slightly hackly fracture. <u>Interbedded clastics and solid crystalline hydrocarbon streaks.</u>
427.4	427.8	Oil shale: Dark grayish brown to brownish black (2.5 3/2-2/2), dolomitic. Distinct laminae. Thin to medium parting; irregular fracture. <u>Some layers of clastics (very fine sand) .1 inch thick.</u> Brownish-black

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole_11 (Con.)

From	To	Description
427.8	430.6	oil shale has slight sheen. Oil shale: Dark grayish brown (2.5Y 3/2) with brownish black streaked laminae (2.5Y 2/2), dolomitic. Streaked laminae. Thick parting; irregular fracture. Prismatic calcite at 428.69-428.70. Some streaks a pyrite. Rock becoming increasingly calcareous with numerous limestone lens downward. Common biotite flakes from 430.2-431.0.
430.6	433.1	Oil shale and marlstone: Buff (2.5 7/2) and light to medium greyish brown (2.5 6/2 - 5/2), dolomitic. Fairly distinct streaked laminae and bedding. Thin to thick parting; irregular fracture. Some limestone lens. Rare disseminated pyrite blebs. Calcareous tuffs 432.38-432.40, 432.34-432.36, 432.52-432.54, 432.59-432.60, and 432.62-432.68. Abelsonite at 431.28 and 431.34.
433.1	434.0	Oil shales and interbedded clastics: Medium to dark grayish brown (2.5 5/3-3/3) and buff (2/5Y 6/3), oil shales dolomitic while the clastics tend to be non-reactive. Very distinct streaked laminae and bedding. Thin to thick parting; slightly irregular fracture. Some pyrite appearing as disseminated blebs and replacement in matrix of clastic bedding. Bedding displays thickening and thinning of beds plus loop structures.
434.0	435.7	Oil shale: Dark grayish brown (2.5 3/3), dolomitic to slightly calcareous. Fairly distinct bedding. Thin to thick parting, slightly irregular fracture. Rare small calcite lenses.
435.7	437.3	Oil shale: Dark brownish black (10YR 2/2) and some medium grayish brown (10YR 4/1), slightly dolomitic. Faint streaked laminae, medium grayish material clastic in nature with distinct bedding break. Thin to thick parting, irregular fracture.
437.3	437.3	Oil shale: Medium grayish brown (2.5Y 4/2-4/3), dolomitic. Fairly distinct bedding. Medium parting; irregular fracture.
437.3	442.9	Oil shale: Medium olive gray (5Y 4/1-3/1), dolomitic. Faint streaked laminae. Thin to thick parting, irregular fracture. Pyrite: common in disseminated blebs and some streaks. Sample of medium olive-gray oil shale from 439.5: X-ray ₃₂ - dolomite, quartz, aragonite, calcite, feldspar, illite, smectite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
442.9	444.3	Oil shale: Medium and dark olive gray interbedded (5Y 4/1-3/1), dolomitic. Faint streaked laminae. Medium to thick parting; irregular fracture. Some disseminated pyrite blebs.
444.3	444.9	Oil shale: Medium brownish gray (2.5 3/2), dolomitic. Faint streaked laminae and bedding. Medium to thick parting; irregular fracture.
444.9	453.4	Oil shale and Tuff (Mahogany Marker Bed): Medium olive gray and medium brownish gray interlaminated (5Y 4/2 and 2.5Y 4/2), dolomitic. Faint streaked laminae and bedding. Thin to thick parting; irregular to slightly hackly fracture. Tight natural vertical oil coated fracture 451.5-452.3 clastic zone, (?) Mahogany Marker bed with calcite and pyrite replacement, <u>448.65-448.93</u> , also tight natural thru fracture 448.60-448.90. (450.3-450.4 missing) Sample of medium olive-gray oil shale from 447.4: X-ray ₃₃ - dolomite, quartz, feldspar, calcite, illite, smectite. Sample of elastic zone from 448.65: X-ray - sodium feldspar, quartz, analcime, potassium feldspar, pyrite, dolomite, calcite, smectite.
453.4	454.2	Oil shale: Medium and dark olive gray (5Y 4/2-3/2), grading to medium brownish gray (2.5 3/1), dolomitic. Faint streaked laminae and bedding. Medium to thick parting; irregular fracture.
454.2	455.2	Oil shale: Brownish black (10YR 2/2), dolomitic. Faint streaked laminae. Thick parting; slightly irregular fracture. 455.0-455.2 oil shale has satiny luster. 450.0-455.2 displays more prominent layering.
455.2	455.7	Oil shale: Dark olive gray and olive black (5Y 3/2-2/2), dolomitic. Faint streaked laminae and fairly distinct bedding. Thick parting, slightly irregular fracture. Common disseminated pyrite blebs. Rock fairly permeable.
455.7	457.3	Oil shale: Medium and dark olive gray (5Y 4/1-3/2), dolomitic. Faint to fairly distinct streaked bedding. Medium to thick parting; irregular fracture. Some disseminated pyrite. Sample of medium olive-gray oil shale from 457.0: X-ray ₃₅ - dolomite, calcite, quartz, feldspar, illite, smectite.
457.3 455.7	460.3	Mudstone and rare oil shale: Light brownish gray to buff

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
		with rare medium brownish gray (2.5Y 6/2-7/2 and 2.5Y 5/2), dolomitic. Some bedding marked by darker boundries, but generally very faint streaked laminae. Medium to thick parting; slightly irregular fracture. Some streaks of black crystalline hydrocarbon. Tuff with biotite and common hydrocarbon streaks 459.30-459.35. Rare biotite flakes below tuff. Rare, very fine disseminated pyrite.
460.3	465.7	Oil shale: Dark olive gray and olive black (5Y 3/2-2/2), dolomitic. Faint streaked laminae, and some bedding fairly distinct due to color changes. Thin to thick parting, irregular to sub-hackly fracture. Common disseminated pyrite. Some slight cross-bedding present. Some of the olive black oil shale has slight satiny luster. Rare disseminated flakes of biotite lying flat in bedding planes. A very thin waxy appearing layer at 465.6.
		<u>Top of Mahogany Bed</u>
465.7	466.7	Oil shale: Olive-black (5Y 2/2) to black (5Y 2/1), very slightly dolomitic. Satiny luster. Very faint laminae, and fairly distinct bedding break. Thin to thick parting; slightly irregular fracture. Some fine disseminated pyrite. Clastic unit with some oil impregnation 466.65-466.71, slightly dolomitic, irregularly bedded.
		<u>Bottom of Mahogany Bed</u>
466.7	467.6	Oil shale: Medium and dark olive gray (5Y 5/2-3/2), dolomitic to slightly calcareous. Streaked laminae and some distinct darker beds. Medium to thick parting; slightly irregular fracture. Common fine disseminated pyrite. Limestone stringer at 467.18.
467.6	469.6	Oil shale: Medium olive gray laminated (5Y 5/2 and 4/2), calcareous. Streaked and laminated bedding. Thick parting; fairly smooth fracture. Rare small lenses of pyrite.
		Sample of medium laminated olive-gray oil shale from 468.2: X-ray ₃₆ - calcite, dolomite, quartz, feldspar, illite.
469.6	470.5	Oil shale: Dark olive-gray to olive black (5Y 3/2-2/2), faintly dolomitic. Faint streaked bedding. Thick parting with slightly irregular fracture. Rare pyrite in fine disseminated blebs and small lenses.
470.5	473.4	Oil shale and mustone: Light brownish gray to medium brownish gray (2.5 6/2-5/2) and dark grayish brown (2.5 3/2) laminated, calcareous. Distinct streaked bedding, with pronounced alternating laminae. Thick

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
		parting; fairly smooth to slightly irregular fracture. Common very fine disseminated flakes of biotite, occasionally congregated in thin concentrated beds. Rare thin limestone stringers and lenses.
473.4	475.0	Oil shale: Dark olive gray to olive black (5Y 3/2-2/2), slightly dolomitic. Very faint streaked bedding. Thin to thick parting; irregular fracture. Clastic band 473.97-474.06 composed of poorly sorted irregularly shaped grains of sand and biotite. Rare very fine disseminated pyrite.
475.0	476.8	Oil shale: Medium olive gray (5Y 4/1-4/2), dolomitic. Very faint streaked bedding. Thick parting; irregular to slightly hackly fracture. Some pyrite in disseminated blebs, streaks, and lenses. Sample of medium olive-gray oil shale from 476.1: X-ray ₃₇ - dolomite, sodium feldspar, quartz, calcite, smectite, illite.
476.8	477.5	Oil shale: Dark olive gray to olive black (5Y 3/1-2/2), slightly dolomitic. Faint streaked bedding. Thick parting; slightly irregular fracture. Common very fine disseminated pyrite.
477.5	479.5	Oil shale: Medium brownish gray (2.5Y 5/2-4/2), calcareous. Laminated bedding. Thick parting; irregular fracture. Tuff 478.91-478.92, with common biotite flakes. Some fine disseminated pyrite.
479.5	481.7	Oil shale: Medium brownish gray (2.5Y 3/2) and brownish black to black (2.5Y 2/2-2/1), dolomitic. Fairly distinct bedding. Thick parting; irregular to slightly hackly fracture. Brownish-black to black oil shale has slight satiny luster. Clastic lenses composed of irregularly sized angular grains of fine sand with pyrite and mica at 480.32-480.35, 480.75-480.90, 480.92-480.94, 481.30-481.35, and 481.50-481.64. Lenses display irregular thickening and thinning. Fine disseminated pyrite. Sample of clastic material from 480.6. Medium grayish brown: X-ray ₃₈ - sodium feldspar, quartz, calcite, marcasite, hornblende, biotite.
481.7	483.2	Oil shale: Medium olive gray (5Y 5/2-4/2), dolomitic to slightly calcareous. Faint streaked bedding. Medium to thick parting; irregular fracture. Limestone stringer at 583.46. Fine disseminated pyrite.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
483.2	484.8	Mudstone and oil shale: Light gray to light brownish gray and medium brownish gray with rare dark grayish brown (2.5Y 6/0-6/2 and 2.5Y 5/2 and rare 2.5Y 4/2), dolomitic to slightly calcareous. Fairly distinct streaked bedding and laminations. Thick parting; irregular to very slightly hackly fracture. Limestone stringers 483.35 and 483.60.
484.8	485.4	Oil shale: Medium brownish gray to medium olive gray (2.5Y 4/2-5Y 4/2) and rare black (2.5Y 2/1), dolomitic. Faint streaked bedding. Thick parting; slightly hackly fracture. Rare very fine disseminated pyrite.
485.4	486.5	Oil shale: Brownish black to black (2.5 2/2-2/1), slightly dolomitic. Faint streaked bedding. Thick parting; slightly hackly fracture. Rare finely disseminated pyrite. Sample of brownish-black oil shale from 485.9: X-ray - dolomite, quartz, feldspar, calcite, illite, smectite.
486.5	490.6	Oil shale: Dark grayish brown and brownish black (2.5 3/2 and 2.5Y 2/2), dolomitic to slightly calcareous. Streaked bedding and laminae. Medium to thick parting; irregular to hackly fracture. Clastic stringer 487.85-487.95. Common very fine disseminated pyrite, decreasing in abundance below 487.3.
490.6	492.8	Oil shale: Medium brownish gray (2.5Y 5/2-4/2), calcareous. Faint streaked bedding. Thin to thick parting; irregular to slightly conchoidal fracture. Rare flakes of disseminated mica.
492.8	495.6	Oil shale, mudstone, and siltstone: Light brownish gray and medium brownish gray (2.5Y 6/2 and 2.5Y 5/2-4/2) calcereous. Faint to fairly distinct streaked and laminated bedding. Thick parting; fairly regular fracture. Rare biotite flakes disseminated. Tuff with biotite 494.84. Sample of light brownish gray mudstone from 494.5: X-ray ₄₀ - dolomite, calcite, quartz, feldspar, illite, smectite.
495.6	496.0	Oil shale: Medium grayish brown to medium olive gray (2.5Y 5/2-4/2 to 5Y 5/2-4/2) laminations and streaked bedding. Irregular medium parting; fairly regular to slightly irregular fracture. Rare flakes of biotite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

	From	To	Description
496.0	460.0	496.6	Oil shale: Brownish black to black (10YR 3/1-2/1), dolomitic. Faint streaked bedding. Thin to thick parting; irregular to slightly conchoidal fracture. Very rare disseminated pyrite. Some of the laminae have a slight satiny luster.
496.6	496.6	497.8	Oil shale: Dark to medium grayish brown (2.5Y 3/1-4/1) grading lighter downward, dolomitic to calcareous increasing downward. Faint streaked bedding and laminae. Irregular thin to thick parting; slightly hackly to slightly conchoidal fracture. Some pyrite lenses and fine disseminated pyrite.
			TOP OF B-GROVE
497.8	497.8	502.6	Mudstone, siltstone and rare oil shale: Gray buff to light olive gray (5Y 7/1-6/1) and rare medium olive gray (5Y 5/1-4/1), slightly calcareous. Faint to fairly distinct streaked bedding and laminations. Irregular thin to thick parting; regular to slightly irregular fracture. Common biotite disseminated throughout section. Discontinuous black streaks of hydrocarbon material. 501.7-502.6 - Quite porous and permeable. Sample of gray-buff mudstone from 500.9: X-ray ₄₁ - dolomite, quartz, feldspar, illite, calcite.
502.6	502.6	503.7	Mudstone and rare oil shale: Light olive gray and rare medium olive gray (5Y 6/1-6/2 and rare 5Y 5/1), slightly calcareous. Faint to fairly distinct streaked bedding and laminae. Thick parting; regular to slightly irregular fracture. Some discontinuous streaks of black organic material, especially common at contact with lower zone. Quite porous and permeable. Sample of light olive gray mudstone from 502.5: X-ray ₄₂ - dolomite, quartz, feldspar, illite, smectite.
503.7	503.7	504.1	Mudstone: Light brownish gray to medium brownish gray (2.5 6/2-5/2), slightly dolomitic. Fairly distinct streaked bedding and loop structure. Thick parting; irregular fracture. Fairly prominent cross-bedding.
			BOTTOM OF B-GROVE
504.1	504.1	505.2	Oil shale and mudstone: Medium to dark grayish brown and brownish black (2.5Y 5/2-4/2 and 2.5Y 2/2), dolomitic. Faint streaked bedding. Irregular thick parting; irregular to slightly hackly fracture.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
505.2	507.0	Mudstone: Medium brownish gray (2.5Y 5/2), slightly calcareous. Some faint streaked bedding, generally massive. Irregular thin to thick parting; slightly irregular fracture. Sample of medium brownish gray mudstone from 506.5: X-ray ₄₃ - dolomite, quartz, calcite, feldspar, illite, smectite.
507.0	509.0	Mudstone: Medium olive gray (5Y 5/1-4/1), dolomitic. Faint streaked bedding. Irregular medium to thick parting; irregular to very slightly conchoidal fracture. Common disseminated pyrite sometimes concentrated along bedding planes in lenticular form. Sample of medium olive-gray mudstone with pyrite from 507.2: X-ray ₄₄ - quartz, dolomite, feldspar, calcite, pyrrhotite, illite, smectite, analcime.
509.0	509.3	Tuffaceous mudstone and siltstone: Tan to medium brownish gray (10YR 6/3-4/1), does not react with acid. Massive with apparent zonations determined by relative abundance of pyrite. Thick parting; regular to slightly irregular fracture. Flakes of disseminated biotite. Pyrite in some large disseminated blebs (.1 inch in diameter) and concentrated bedding zone 509.24-509.28. Siltstone at 509.3 displays blebby nature, rather than distinct grains. Sample of tan blebby siltstone from 509.3: X-ray ₄₅ - analcime, quartz, feldspar.
509.3	510.3	Mudstone: Medium olive gray (5Y 5/1), slightly dolomitic. Very faint streaked bedding. Irregular thin to thick parting; irregular to slightly hackly fracture. Common disseminated pyrite. Common flakes of disseminated biotites.
510.3	510.9	Mudstone and some oil shale: Medium olive gray to medium brownish gray (5Y 5/2-4/2 to 2.5Y 4/1), slightly dolomitic. Faint streaked bedding. Thin to thick irregular parting; irregular fracture. Common fine disseminated pyrite.
510.9	511.6	Oil shale: Dark grayish brown and brownish black (2.5Y 3/3 and 2.5Y 2/2), slightly dolomitic. Faint streaked and laminated bedding with loop structures. Thick parting; regular to slightly irregular fracture. Rock has a silty texture. Slight satiny luster. Sample of brownish-black silty oil shale from 511.5: X-ray - dolomite, quartz, feldspar, illite, smectite, MG-siderite, analcime, pyrite.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
511.6	512.6	Oil shale: Olive black to dark olive gray (5Y 3/1-2/1), dolomitic to slightly calcareous. Faint streaked bedding. Irregular medium parting, irregular fracture. Disseminated pyrite increasing to common occurrence bottom half.
512.6	516.5	Oil shale and mudstone: Medium olive gray (5Y 5/1-4/2) with some light olive gray (5Y 6/1), dolomitic to slightly calcareous. Faint streaked bedding with rare distinct laminae. Irregular medium to thick parting; irregular to slightly hackly fracture. Disseminated pyrite common to some in occurrence, variable rare streaks. Pyrite common is darked lamina. Disseminated biotite flakes locally abundant. Tuff with biotite flake concentration 512.89-512.96 with concentrated pyrite replacement. Tuff with pyrite replacement and concentrated biotite 516.48-516.49. Sample of medium olive gray oil shale from 515.9: X-ray ₄₇ - dolomite, feldspar, quartz, analcime, pyrrhotite, illite, smectite, MG-siderite.
516.5	517.3	Oil shale: Medium olive gray and rare olive black (5Y 4/1-4/2 and 5Y 2/2), dolomitic. Fairly distinct streaked bedding. Thick parting; irregular fracture. Common disseminated pyrite blebs. Sample of medium olive-gray oil shale with small lens of tuffaceous material from 517.2: X-ray ₄₈ - dolomite, aragonite, calcite, quartz, feldspar, smectite, illite.
517.3	517.9	Oil shale: Brownish black and rare medium grayish brown (2.5Y 2/2 and 2.5 3/2), very faintly dolomitic. Indistinct laminae with a general splotchy nature. Irregular medium to thick parting; irregular medium to thick parting; irregular fracture. Some very fine disseminated pyrite. Sample of brownish black oil shale from 517.7: X-ray ₄₉ - dolomite, quartz, feldspar, analcime, smectite.
517.9	518.4	Oil shale and mudstone: Medium brownish gray (2.5Y 5/2-4/2), faintly dolomitic. Faint streaked bedding and some fairly distinct lamina. Irregular thin to medium parting; irregular to slightly hackly fracture. Rare black hydrocarbon streaks. Rare very fine disseminated pyrite.
518.4	518.8	Siltstone: Buff-white to tan-buff (2.5Y 8/2-7/3), calcareous. Generally massive with some distinct laminated bedding at top and bottom of section. Irregular thin parting; irregular to slightly regular fracture.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
		Rock has algal nature 518.40-518.57. Rare disseminated biotite flakes.
518.8	519.2	Siltstone: Light olive gray with rare medium olive gray (5Y 6/1-6/2 and 5Y 5/1-5/2), slightly calcareous. Fairly distinct streaked and laminated bedding. Thick parting; regular to slightly hackly fracture. Rare flakes of biotite. Natural vertical fracture through section.
519.2	519.3	Oil shale: Olive black (5Y 2/2), dolomitic. Satiny luster. Faint streaked bedding. Medium parting; regular fracture. Some disseminated pyrite blebs.
519.3	519.6	Tuff: Buff and some light brownish gray (2.5Y 7/2 and 2.5Y 6/2), with rare black streaks (2.5Y 2/0), very faintly dolomitic. Streaked very irregular bedding, with a general swirled nature. Massive parting; irregular fracture. Common biotite flakes. Very porous. Sample of buff tuff from 519.3 X-ray ₅₀ - quartz, analcime, sodium feldspar, potassium feldspar, dolomite, biotite, smectite.
519.6	520.7	Oil shale and mudstone: Medium olive gray with some black (5Y 5/1-4/2) and (5Y 2/1), dolomitic to slightly calcareous. Faint to fairly distinct streaked bedding and laminations. Irregular to slightly hackly fracture. Rare flakes of biotite.
520.7	521.9	Curly bedded tuff: Buff to light brownish gray and rare black (2.5Y 7/2-6/2 and 2.5Y 2/0), slightly dolomitic. Generally massive with very irregular wavy streaked bedding. Irregular thick parting; irregular to slightly hackly fracture. Very abundant flakes of biotite, some in concentrated bands. Some lenses of pyrrhotite, up to .3 inches in diameter. Irregular, undulating contact with unit below. Fairly porous and permeable. Sample of buff to light brownish gray tuff from 521.4: X-ray ₅₁ - quartz, analcime, feldspar, biotite.
521.9	522.80	Oil shale, mudstone, and tuff: Dark olive gray with rare black and olive buff. (5Y 5/1-4/1 and 5Y 2/1 and 5Y 7/2), oil shale are dolomitic to slightly calcareous, tuffs are slightly dolomitic to non-reactive to acid. Faint streaked bedding to distinct laminations, loop structures in top 0.3 feet. Irregular thin to thick parting; regular to irregular with rare slightly hackly fracture. Tuffs 522.0-522.05, 522.26-522.27, 522.63-522.64, and 522.67-522.70. Tuff are porous and permeable.
522.80	524.8	Mudstone and oil shale: Light to medium olive gray (5Y 6/1-5/2) and rare buff (2.5Y 7/2), slightly dolomitic to calcareous. Faint to fairly distinct streaked and laminated bedding.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
		Irregular thin to medium parting, regular to irregular and slightly hackly fracture. Rock quite porous and permeable. Tight vertical natural fracture 523.6-523.7. Sample of light to medium olive gray mudstone and oil shale from 524.0: X-ray ₅₂ - dolomite, quartz, feldspar, illite.
524.8	525.0	Oil shale: Dark olive gray to olive black (5Y 4/1-2/2), very faintly dolomitic. Fairly distinct streaked and laminated bedding. Regular to slightly irregular thin parting; regular fracture. Rare blebs of pyrite in congregated streaks.
525.0	526.2	Marlstone: Light gray (5Y 7/1), calcareous. Massive with rare laminae. Thick parting; irregular to very faintly hackly fracture; tar coated near vertical fracture 525.6-526.2. Common very fine flakes of biotite. Porous.
526.2	527.0	Mudstone and some oil shale: Medium to dark olive gray (5Y 5/2-4/2), slightly calcareous. Streaked and laminated bedding. Medium to thick parting; irregular fracture. Common pyrrhotite disseminated. Some flakes of biotite. Sample of medium to dark olive gray mudstone from 526.5: X-ray ₅₃ - dolomite, quartz, calcite, feldspar, illite, pyrrhotite.
527.0	529.0	Marlstone: Medium olive gray (5Y 5/1-5/2), slightly calcareous. Laminated bedding to slightly massive. Thick parting; irregular to very slightly hackly fracture. Common flakes of biotite and pyrrhotite (?) concentrated in laminations. Rock moderately porous and permeable. Sample of medium olive gray marlstone from 528.3: X-ray ₅₄ - quartz, dolomite, feldspar, calcite, illite, pyrrhotite.
529.0	529.9	Coarse to very coarse sandstone and limestone: Medium grayish brown (2.5Y 4/2) and light gray (2.5Y 7/0-6.0), calcareous and dolomitic. Coarse to very coarse sandstone with limestone in stringers. Irregular to massive parting; irregular fracture. Sand grains are angular to sub-rounded irregularly graded with some irregular granules. Possible tar staining of coarse sand.
529.9	532.6	Siltstone: Light gray (N 8.0/0) with some grayish brown laminae (2.5Y 5/2) 530.07-531.30, calcareous. Laminated to massive bedding. Thick parting; slightly irregular fracture. Siltstone has rare flakes of biotite. Very porous and permeable. Coarse sand to fine conglomeratic material, tar staining; grayish brown (2.5Y 5/2) (532.45-532.51 and 532.59-532.64)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
532.6	533.7	<p>Conglomerate and limestone: Dark grayish brown (2.5Y 4/2) and some white (2.5Y 8/0-8/2), calcareous. Generally massive with some fairly distinct laminated bedding. Thick parting; irregular coarse fracture. Conglomerate grades into a more regular coarse sand downward. Common irregular tar blebs throughout section. General grain size of the conglomerate 4mm (granule).</p> <p>Sample tar stained dark grayish brown fine conglomerate from 532.8: X-ray₅₅ - dolomite, quartz, calcite, feldspar.</p>
533.7	534.4	<p>Siltstone and limestone: Gray buff (7.5Y 7/1) and dark grayish brown (2.5Y 4/2), dolomitic to calcareous. Irregular laminated bedding with some loop structure. Thick parting; irregular to slightly hackly fracture. Irregular common tar saturation with some small tar blebs. Siltstone (upper .2 feet) has common biotite flakes. Fairly high porosity and permeability.</p>
534.4	534.7	<p>Oil shale: Light to medium brownish gray (2.5Y 6/1-5/1), dolomitic. Distinct streaked and laminated bedding, some looped and distorted bedding. Thick irregular parting; irregular to slightly hackly fracture.</p> <p>Sample of medium brownish gray oil shale from 534.6: X-ray₅₆ - dolomite, quartz, feldspar, illite.</p>
534.7	535.5	<p>Oil Shale and mustone: Dark grayish brown (2.5Y 4/2) and eight brownish gray (2.5Y 5/2), slightly dolomitic. Distinct to faint streaked and laminated bedding. Thick parting, irregular to slightly hackly fracture. Section increasingly siltly in the lower half.</p>
535.5	535.7	<p>Oil shale: Dark grayish brown (2.5Y 3/2) to brownish black (2.5Y 2/2), slightly dolomitic. Faint streaked bedding. Thick parting; irregular to slightly hackly fracture. Some irregular lenses of siltstone.</p>
535.7	535.8	<p>Clastic mudstone: Medium brownish gray (2.5Y 4/2), dolomitic. Single massive bedding. Thick parting; irregular fracture. Common crystalline-like clasts. Common biotite flakes.</p> <p>Sample of medium brownish gray clastic mudstone from 535.7: X-ray₅₇ - dolomite, quartz, feldspar, illite.</p>
535.8	535.9	<p>Oil shale: Medium grayish brown (2.5Y 5/2), dolomitic. Faint streaked and laminated bedding. Thick parting; irregular to slightly hackly fracture. Rare pyrite as disseminated blebs and infilling of small fractures.</p>
535.9	537.3	<p>Oil shale: Medium to dark olive gray with some dark grayish brown streaks (5Y 4/2-3/2 and 2.5Y 4/2), dolomitic. Faint streaked bedding. Irregular medium to thick parting;</p>

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
		irregular to slightly hackly fracture. Common disseminated blebs of pyrite. Sample of medium to dark olive gray oil shale with pyrite from 537.0: X-ray ₅₈ - dolomite, feldspar, calcite, quartz, pyrrhotite, illite, smectite.
537.3	538.3	Oil shale and marlstone: Medium to light olive gray (5Y 6/2-5/2), calcareous. Faint to distinct streaked and laminated bedding. Thick parting; irregular to slightly hackly fracture. Some pyrite in disseminated blebs and streaks. Rare pyrrhotite blebs. Rare biotite flakes.
538.3	539.5	Oil shale: Dark grayish brown to dark brownish gray with some brownish black (2.5Y 4/3-4/1 and rare 2.5Y 3/2) dolomitic to slightly calcareous. Faint and fairly distinct streaked and laminated bedding. Irregular medium to thick parting; irregular to slightly hackly fracture. Rare fibrous appearing silver-white metallic crystals, marcasite(?). Common disseminated pyrite. Light gray mudstone 538.30-538.37. Sample of dark grayish brown oil shale from 539.2: X-ray ₅₉ - calcite, quartz, feldspar, dolomite, sodium feldspar, smectite, illite.
539.5	540.0	Oil shale and mudstone: Medium olive gray and buff-white (5Y 5/2-4/2 and 2.5Y 8/2), calcareous. Faint to fairly distinct streaked and laminated bedding. Irregular thin to thick parting; irregular to very faintly hackly fracture.
540.0	541.9	Oil shale, mudstone, and tuff: Medium to dark brownish gray with some buff-white, and some gray (2.5Y 5/2-4/2, 2.5Y 8/2, N 6/0), dolomitic to calcareous. Distinct streaked and laminated bedding. Irregular thick parting; irregular to slightly hackly fracture. Tuff 540.72-540.75 and 541.38-541.45 with common biotite flakes. Pyrite in disseminated blebs and lens.
541.9	542.3	Oil shale: Dark olive gray (5Y 4/2-3/2), dolomitic to slightly calcareous. Faint streaked bedding. Irregular thick parting; slightly hackly fracture. Some disseminated pyrite blebs.
542.3	543.4	Marlstone, mudstone, and tuff: Buff and gray-buff (2.5Y 7/2 and 2.5Y 7/1), calcareous. Very irregular streaked and laminated bedding. Irregular thin to thick parting; irregular fracture. Common biotite flakes. Rare partings of oil shale. Very porous and permeable. Sample of buff to gray-buff tuffaceous mudstone from 543.0: X-ray ₆₀ - potassium feldspar, pyrite, dolomite, sodium feldspar, smectite, illite.
543.4	546.2	Oil shale: Medium brownish gray to light brownish gray and

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
		buff (2.5Y 4/1-6/3 and 7/2), dolomitic to slightly calcareous. Very distinct streaked and laminated bedding. Irregular thin to thick parting; irregular fracture. Tuff with biotite flakes 544.14-544.19. Rare flakes of biotite disseminated through section. Rare stringers of limestone.
546.2	547.0	Oil shale: Medium to dark olive gray (5Y 5/2-4/2), dolomitic to slightly calcareous. Faint streaked bedding. Irregular thin to thick parting; irregular to slightly hackly fracture. Tuffs 547.0-547.13 and 547.48-547.50.
547.0	547.6	Oil shale: Medium grayish brown with rare dark brown and gray (2.5Y 5/2, 2.5Y 3/2, and N5/0), slightly dolomitic. Distinct streaked and laminated bedding. Irregular thin to medium parting; hackly fracture. Rare stringers of limestone.
547.6	548.5	Oil shale: Dark olive gray (5Y 4/2-5/2), dolomitic. Faint to fairly distinct streaked and laminated bedding. Irregular thin to thick parting; hackly fracture. Some biotite flakes concentrated in rare laminae.
548.5	549.9	Oil shale, mudstone, and tuff: Medium grayish brown to buff white, with rare gray (2.5Y 5/2-7/2, rare N6/0), slightly calcareous. Fairly distinct to distinct streaked and laminated bedding. Irregular medium to thick parting; irregular to slightly hackly fracture. Tuff with common biotite, very porous and permeable 549.52-549.56. Rare biotite throughout oil shale section.
549.9	550.7	Tuff: Grey to light gray (N6/0-7/0), slightly dolomitic. Massive single bedding. Thick parting; irregular fracture. Very porous and permeable. Common biotite flakes. Natural near vertical fracture with iron staining 550.2-550.7. Sample of grey tuff from 550.7: X-ray ₆₁ - sodium feldspar, potassium feldspar, pyrite, dolomite, quartz.
550.7	551.8	Marlstone, oil shale, and some mudstone: Buff to buff-white (2.5Y 7/2-8/2) and some medium grayish-brown (2.5Y 5/2) and rare dark grayish-brown (2.5Y 3/2), calcareous to dolomitic. Distinct streaked and laminated bedding. Irregular medium to thick parting, regular to irregular fracture. Rare flakes of biotite.
551.8	552.5	Oil shale and tuffaceous siltstone: Medium to dark olive gray (5Y 5/2-3/2) and some medium brownish gray (2.5Y 5/2), slightly calcareous. Fairly distinct streaked and laminated bedding. Thick parting; irregular to faintly hackly fracture.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
552.5	554.1	Mudstone and oil shale: Dark to medium grayish brown (2.5Y 4/2-5/2) and buff to buff-white (2.5Y 7/2-8/2) and rare brownish-black (2.5Y 2/1), dolomitic to calcareous. Streaked and fairly distinct laminated bedding. Irregular medium to thick parting; irregular to hackly fracture. Rare flakes of biotite.
554.1	556.5	Marlstone, mudstone, clastic limestone, and coarse sandstone: Buff to buff-white (2.5Y 7/2-8/2) and rare light olive-gray (5.0Y 6/1), calcareous. Generally massive with some distinct laminated bedding. Irregular thick parting; irregular fracture. Tuff 554.10-554.15, common biotite. Overall section has very high porosity and permeability. Some oolites. Bottom .5 of section has very disturbed (swirled appearance) bedded, with some hydrocarbonaceous streaks, possibly algal formation. Clastics angular to sub-rounded. Sample of buff-white coarse sandstone from 555.0: X-ray ₆₂ - dolomite, trace smectite, quartz. Sample of buff-white to white clastic marlstone from 554.6: X-ray ₆₃ - dolomite, trace quartz, smectite.
556.5	557.0	Oil shale: Brownish black (2.5Y 2/2), dolomitic. Faint streaked and laminated bedding. Irregular thick parting; irregular to slightly hackly fracture. Rare irregular lenses of tar impregnated mudstone.
557.0	557.7	Coarse sandstone, siltstone, and mudstone: Buff to buff-white (2.5Y 7/2-8/2), with rare medium grayish brown (2.5Y 5/2) and rare gray (N 5/0), dolomitic. Distinct laminated with some faint streaked bedding. Irregular thick parting; irregular fracture. Some biotite flakes. Some disseminated tar blebs. Rare streaks of solid crystalline black hydrocarbon.
557.7	558.1	Oil shale and mudstone: Medium grayish brown (2.5Y 5/2-4/2) and rare buff-white (2.5Y 7/2), dolomitic. Distinct streaked and laminated bedding. Irregular thin to medium parting; irregular to slightly hackly fracture. Crossbedding of laminae notable.
558.1	558.8	Oolitic limestone and siltstone: Buff-white (2.5Y) and gray (N 5/0), calcareous. Upper half of massive nature lower half of fairly distinct streaked and laminated bedding. Thick parting; irregular fracture. 558.45-558.65 disturbed bedding with oolitic limestone injected into lower sediments.
558.8	559.3	Oil shale and siltstone: Dark grayish brown (2.5Y 4/2) and brownish-black to black (2.5Y 2/2-2/1), dolomitic. Distinct streaked and laminated bedding. Irregular thick parting;

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
		slightly irregular fracture. Rare irregular lenses of mudstone.
559.3	560.2	<p>Sample of dark grayish brown oil shale from 558.9: X-ray₆₄ - dolomite, quartz, feldspar, smectite, pyrite.</p> <p>Siltstone and mudstone: Medium to light grayish brown (2.5Y 5/2-6/2), dolomitic to slightly calcareous. Faint laminated and banded bedding. Irregular thick parting; irregular fracture bottom .5 feet (559.7-560.2) displays swirled bedding, of probable algal nature. Notable tar blebs and oil staining bottom .2 feet (560.0-560.2).</p>
560.2	562.9	Siltstone and limestone, tar impregnated: Brownish black to black (2.5Y 2/2-2/1), not reactive with acid. Some apparent laminated bedding, generally massive. Thick parting; irregular fracture. Greatest oil concentration in upper one-third of zone. (Core described unsplit).
562.9	565.2	<p>Mudstone and very fine sandstone: Light olive gray to light grey (5.0Y 6/2-N 6/0), calcareous. Generally massive with rare laminated bedding. Irregular thick parting; irregular to very faintly hackly fracture. Section very porous and permeable. Some biotite flakes disseminated throughout section. Section grading to finer grained material downward. Some small calcite crystals disseminated through section. Irregular lenses of pyrite at 564.7. Some irregular blebs of tar scattered throughout the section. Small flat clear-translucent platting crystals in mudstone at 564.3.</p> <p>Sample of light gray very fine sandstone from 563.4: X-ray₆₅ - quartz, potassium feldspar, sodium feldspar, calcite, dolomite, illite.</p> <p>Sample of small flat platting crystals in light olive-gray mudstone from 564.3: X-ray₆₆ - quartz, potassium feldspar, sodium feldspar, illite, calcite, dolomite, pyrite.</p>
565.2	566.7	Very fine sandstone and siltstone, tar impregnated: Very dark brown to brownish black (10YR 3/2-2/2) and some buff (10YR 7/2), areas not tar impregnated react with dolomitic to calcareous reaction, those areas tar impregnated are non-reactive with acid. Faint laminated to massive bedding. Thick parting; irregular fracture. Some to common biotite flakes. (Core described unsplit)
566.7	567.1	Siltstone and very fine sandstone: Light olive gray (5.0Y 6/1), calcareous. Thick banded and laminated bedding. Thick parting; irregular fracture. Grading to increasing grain size downward. High porosity and permeability. Common flakes of biotite.

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from ERDA/LERC's Southern Uinta Basin Corehole 11 (Con.)

From	To	Description
567.1	568.1	Very fine sandstone, tar impregnated: Dark brown to brownish-black (10YR 3/2-2/1) and rare buff (10YR 7/2), sections not impregnated with tar are dolomitic to slightly calcareous, tar impregnated sections are non-reactive with acid. Thickly banded to laminated bedding. Thick parting, irregular fracture. Sand grains subrounded. (Core described unsplit).
568.1	570.1	Very fine sandstone and siltstone, some tar impregnation: Light olive gray (5.0Y 6/2) and medium grayish brown (2.5Y 5/2-4/2) with rare dark brown (10YR 3/2), calcareous to non-reactive with acid where tar coated. Indistinct banded to laminated bedding, some disturbed bedding (swirled). Irregular thick parting; irregular fracture. Fairly high porosity and permeability. Common biotite flakes. Rare pyrite cementation of clastic grains. Sand grains, subrounded to rounded. Sample of light olive-gray very fine sandstone from 569.7: X-ray - quartz, potassium feldspar, sodium feldspar, calcite, dolomite, illite, pyrite, mixed layer clay.
570.1	580.2	Fine sandstone, tar impregnated: Dark brown to brownish black to black (10YR 3/3-3/2-2/1) with rare buff (10YR 7/2), not reactive with acid. Massive, with some apparent thick banded and laminated bedding. Thick parting; regular to irregular fracture. Sand grains appear subrounded to rounded. Bleeding oil (Core described unsplit).
580.2	580.5	Mudstone: Medium olive gray (5.0Y 5/2), calcareous. Banded and laminated bedding. Irregular thick parting; slightly irregular fracture. Some disseminated pyrite. Fair porosity, good permeability. Sample of medium olive gray mudstone from 580.3: X-ray ₆₈ - potassium feldspar, calcite, dolomite, sodium feldspar, illite, pyrite, mixed layer clay.
580.5	580.7	Fine sandstone, tar impregnated: Dark brown to brownish black (10YR 3/2-2/2), not reactive to acid. Very distinct banded bedding. Medium parting; regular to faintly irregular fracture. Sample of tar impregnated brownish black fine sandstone from 580.6: X-ray ₆₉ - quartz, potassium feldspar, sodium feldspar, dolomite, calcite, pyrite, biotite.
580.7		Bottom of recovered core.
580.7		Bottom of hole

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