

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

Core samples of the Green River Formation from Brewer et al., Corehole No. 8-1 drilled in 1964 in CNW1/4SW1/4 sec 8 (1980 ft N of S line and 660 ft E of W line), T 13 S, R 24 E, S1M, Uintah County, Utah

Described section: 0 to 227.1 feet

Mahogany marker: 57.5 feet

From	To	Description
0.0	2.4	Siltstone and mudstone: tan to buff (10YR 6/3-8/3), massive, some parts slightly friable. Very irregular to slightly irregular medium parting; irregular fracture. Some fine micaceous flakes. Sample of friable siltstone with common fine micaceous flakes from 1.2 feet: X-ray - feldspar (albite), analcite, quartz.
2.4	5.0	Marlstone (weathered oil shale): buff and olive buff, some medium to dark olive gray and brownish gray increasing toward base (2.5Y & 5Y 7/2-8/2, some 4/2-3/2). Very faintly bedded with distinct irregular unweathered stringers. Regular and some very irregular, medium to very thin shaly parting; irregular fracture. Badly broken up and mixed up.
5.0	9.0	Oil shale (partly weathered): medium to dark brownish gray and olive gray, some buff (2.5Y & 5Y 4/2-3/2, some 7/2-8/2). Very faint slightly distorted to smooth laminations with distinct irregular weathered stringers and streaks. Regular to very irregular, thick to medium parting; irregular fracture. Upper part broken up and slightly mixed up. Sample of weathered oil shale from 5.4 feet: X-ray - dolomite, calcite, quartz, feldspar (K & Na), illite. Sample of unweathered oil shale from 5.7 feet: X-ray - dolomite, calcite, quartz, feldspar (K & Na), illite, mixed layer clay.
9.0	11.4	Oil shale (partly weathered): medium to dark brownish gray and olive gray, some to rare buff (2.5Y & 5Y 4/2-3/2, some 6/2-8/2). Very faint slightly distorted to smooth laminations; some to rare distinct weathered stringers and streaks. Regular to irregular, thin to thick parting; irregular fracture. Some orange to yellow limonite stains. Very badly broken up and mixed up.

1/ By L. G. Trudell

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Laramie Petroleum Research Center, Laramie, Wyoming

August 26, 1966

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
11.4	12.5	Oil shale: medium to dark brownish gray and olive gray (2.5Y & 5Y 4/2-3/2, rare 5/2 & 2/2). Very faint to faint smooth laminations. Very regular thick to some thin shaly parting; slightly irregular fracture.
12.5	13.5	Oil shale: medium to some dark brownish gray and olive gray (2.5Y & 5Y 5/2-4/2, some 3/2). Faint smooth laminations. Regular to some irregular, thick to medium parting; slightly irregular to some conchoidal fracture.
13.5	14.6	Oil shale: medium to dark brownish gray and some brown to rare brownish black (10YR & 2.5Y 4/2-2/2, some 4/3-3/3, rare 1/2). Faint to moderately distinct smooth laminations. Slightly irregular to very regular thick parting; slightly irregular fracture.
14.6	17.6	Oil shale: medium to dark brownish gray, rare brownish black in upper and lower parts (2.5Y 5/1 & 5/2-2/2, rare 1/2). Moderately distinct to some faint smooth laminations; rare loop structures and displacements. Very regular to some irregular, medium to thick parting; irregular to slightly conchoidal fracture.
17.6	18.7	Oil shale: brownish black to dark brownish gray (10YR 1/2-2/2, some 3/2), common resinous to waxy luster. Very faint to faint, smooth to very slightly distorted laminations and streaked bedding. Regular to slightly irregular, thick to thin shaly and some papery parting; slightly irregular to some fine hackly fracture. Some fine dark brownish gray, dense to silty-textured stringers and streaks in lower part.
18.7	19.7	Oil shale: medium to dark brownish gray and rare brownish black (2.5Y 4/2 & 4/1-3/2, some 5/1 & 2/2, rare 1/2). Moderately distinct smooth laminations. Regular thick to medium parting; slightly conchoidal fracture. Very rare fine dark brownish gray silty-textured pyritic streaks.
19.7	22.6	Oil shale: medium to dark brownish gray and brown, rare brownish black and buff (2.5Y 5/2 & 5/3-3/2 & 3/3, rare 2/2-1/2 and 6/3-7/2). Fairly distinct smooth to slightly irregular and distorted laminations; some loop structures and displacements. Irregular to some very regular, thick to rare medium parting; slightly irregular to slightly conchoidal fracture.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
22.6	23.2	Oil shale: brownish black to dark brownish gray (2.5Y 1/2-3/2), common resinous to waxy luster. Very faint smooth to very slightly distorted laminations. Slightly irregular thick to thin shaly parting; slightly irregular and some very slight hackly fracture. Some very fine pyrite blebs and streaks. A thin irregular pinched-out tuff stringer with some pyrite at 22.8 feet. Some fine tan to buff laminae and streaks in middle part.
23.2	24.6	Oil shale: medium to dark brownish gray and very rare brownish black (10YR & 2.5Y 4/2-2/2, rare 1/2). Faint to moderately distinct smooth to slightly distorted laminations; some loop structures and displacements. Slightly irregular to irregular, thick to medium parting; fairly smooth to slightly irregular and conchoidal fracture. A very thin dark brownish gray silty to slightly sparry stringer at 23.4 feet.
24.6	25.7	Oil shale: medium to dark brownish gray and some buff (2.5Y 5/2-2/2, some 6/2-7/2, rare 8/2). Moderately distinct to very distinct, slightly irregular and distorted to very smooth laminations; rare loop structures and displacements. Slightly irregular to very regular thick parting; slightly irregular to smooth fracture. Some very fine dark brownish gray pyritic streaks and blebs.
25.7	26.6	Oil shale: brownish black to dark and rare medium brownish gray (2.5Y 1/2-3/2, rare 4/2-5/2), common resinous to waxy luster. Moderately distinct to very faint, smooth to distorted laminations; some loop structures. Very regular to slightly irregular, thick to thin shaly and some papery parting; slightly irregular to fine hackly fracture. Some very fine pyrite streaks and blebs. Some very thin brownish gray and rare neutral gray tuff stringers.
26.6	27.5	Oil shale: medium to dark brownish gray (2.5Y 5/2-3/2, rare 2/2). Moderately distinct to faint, very slightly irregular and distorted laminations; some very small loop structures and displacements. Slightly irregular to irregular, thick to medium parting; fairly smooth to slightly irregular and conchoidal fracture. Some to common very fine pyrite (?) blebs. Sample of oil shale with common fine pyritic (?) blebs from 27.3 feet: X-ray - calcite, dolomite, quartz, feldspar (Na & K), illite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
Top A-groove		
27.5	29.5	Oil shale and marlstone: light to dark brownish gray (2.5Y 6/2-3/2) and light olive gray to rare olive buff (5Y 6/1 & 6/2, rare 7/2; some almost neutral gray). Moderately distinct to some faint, smooth to very slightly distorted laminations; common small loop structures. Irregular to some regular, thick to medium parting; slightly conchoidal fracture. Common very fine pyrite (?) blebs and some fine gray pyritic streaks and laminae.
29.5	31.9	Marlstone and oil shale: buff and tan to brown and rare dark brownish gray in upper and lower parts (2.5Y 7/2 & 6/3-4/3, rare 8/2 & 3/2), olive buff to medium olive gray in middle part (5Y 7/2-4/2). Distinct smooth to rare slightly distorted laminations; common very small loop structures. Irregular to regular thick parting; smooth to slightly conchoidal fracture. Some very fine pyrite (?) blebs near top.
31.9	33.0	Oil shale and marlstone: tan and some buff to medium brown and rare dark brownish gray to buff (2.5Y & 10YR 6/3-4/3, some 7/2-8/2 & 4/2, rare 3/2-1/2; rare slight olive tint). Very distinct to some faint smooth laminations; common small loop structures. Regular to some irregular thick parting; smooth to slightly conchoidal fracture. Common fine disseminated crystals and rare crystalline streaks near top. A 1-inch dark brownish gray to brownish black oil-shale band at 32.1 feet. Sample of oil shale with fine disseminated crystals from 31.9 feet: X-ray - dolomite, calcite, quartz, feldspar (Na & K), illite.
33.0	35.0	Marlstone and oil shale: olive buff to medium olive gray (5Y 7/1-5/1) and some tan and buff to rare dark brownish gray (2.5Y 6/2 & 7/3-4/2, rare 3/2-2/2). Faint to fairly distinct, smooth to very slightly distorted laminations; very common small loop structures and displacements. Regular to some irregular, thick to medium parting; slightly conchoidal to smooth fracture. Common very fine pyrite (?) blebs and rare fine gray to black pyritic laminae and streaks.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
35.0	36.8	<p>Marlstone: gray-buff to rare medium brownish gray (2.5Y 7/1-6/1, rare 8/1 & 5/1-5/2; some very slight olive tint). Faint to some moderately distinct smooth laminations; very common small loop structures. Regular to slightly irregular thick parting; conchoidal to some smooth fracture. Common very fine pyrite (?) blebs and some fine gray to black pyritic streaks.</p> <p>Sample of marlstone with fine pyrite (?) blebs and rare fine gray to black streaks from 36.1 feet: X-ray - dolomite, quartz, feldspar (K & Na), illite, some calcite.</p>
36.8	37.8	<p>Marlstone and oil shale: gray-buff to medium and rare dark olive gray and brownish gray (5Y & 2.5Y 7/1-5/1, rare 4/1-3/1). Faint to some moderately distinct smooth laminations; very common small loop structures and displacements. Regular to slightly irregular thick parting; conchoidal to slightly irregular fracture. Common very fine pyrite (?) blebs.</p>
Bottom A-groove 37.8	38.9	<p>Oil shale: medium to dark olive gray and brownish gray (5Y & 2.5Y 5/1 & 5/2-3/2, rare 2/2). Faint smooth to very slightly irregular and distorted laminations, some small loop structures and displacements. Regular to slightly irregular, thick to medium parting; irregular to slightly conchoidal fracture. Common fine pyrite (?) blebs in upper part.</p>
38.9	39.6	<p>Oil shale: tan to medium brownish gray (2.5Y 6/3 & 6/2-4/2). Faint smooth laminations; very common very small loop structures and displacements. Slightly irregular to very regular, medium to thick parting; slightly irregular to conchoidal fracture. A fine slightly translucent tan dolomite lamina at 39.4 feet.</p>
39.6	40.3	<p>Oil shale: medium to dark and rare light brownish gray (2.5Y 4/2-3/2, some 5/2-6/2). Very faint and rare moderately distinct, smooth to intricately folded and displaced laminations, stringers, and streaks. Regular to some very irregular, thick to medium parting; slightly conchoidal to irregular fracture. Some fine tan to dark brownish gray crystalline streaks and blebs. Some very fine pyrite blebs in lower part.</p>

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Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
40.3	41.1	Oil shale: medium to dark brownish gray and brownish black and some tan (2.5Y 4/2-1/2, some 5/2-6/3); common resinous to waxy luster. Faint to some fairly distinct, slightly irregular and distorted to smooth laminations; some loop structures and displacements. Regular thick parting; slightly irregular and some very slight hackly fracture. Some thin brown to tan silty-textured tuff stringers at 40.4 feet. Rare fine pyrite blebs. Some thin to fine slightly prismatic calcite streaks in lower 2 inches.
41.1	43.1	Oil shale: medium to dark brownish gray and olive gray (2.5Y & 5Y 5/1 & 5/2-3/2, some 2/2 upper part). Fairly distinct to faint, smooth to some irregular distorted laminations; some loop structures and displacements. Slightly irregular thick to medium parting; slightly conchoidal to slightly irregular fracture. Common very fine pyrite blebs. Some fine calcite streaks near top. A very irregular 1-inch dark to light gray sparry to silty stringer at 41.9 feet. Some fine to thin dark gray very pyritic streaks and lenses in lower part. Sample of sparry crystalline to silty-textured stringer from 41.9 feet: X-ray - analcite, calcite, quartz, feldspar (K & Na), montmorillonite, mixed layer clay. Sample of shale with small dark gray pyritic lens from 42.7 feet: X-ray - pyrite, marcasite, analcite, calcite, illite; some quartz, feldspar (Na & K), hornblende?
43.1	44.6	Oil shale: buff and tan to dark brownish gray and rare brownish black (2.5Y 8/2-3/2, rare 2/2-1/2). Very distinct to some faint, fairly smooth to some irregular and distorted laminations; very common loop structures and displacements. Very regular to slightly irregular thick to medium parting; fairly smooth to irregular fracture. Some very thin to 1-inch yellowish buff to buff-white tuffs in lower part. Some very thin tan to dark brownish gray and dark gray crystalline streaks and lenses in lower part. Sample of buff-white tuff with common very fine dark specks from 44.5 feet: X-ray - analcite, feldspar (albite & some K), quartz, some calcite.

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Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
44.6	45.5	Oil shale: medium to dark brownish gray and some brownish black (2.5Y 5/2-2/2, some 1/2), rare resinous luster. Moderately distinct to faint irregular distorted laminations; some loop structures and displacements. Slightly irregular thick to medium parting; slightly irregular fracture. Some fine gray pyritic stringers, streaks, and lenses. A 0.2-foot brown to black, fine granular or blebby oil-stained tuff at 45.2 feet. An irregular 3/4-inch light yellowish gray to gray silty tuff with faint distorted stringers and very fine dark specks at base.
45.5	46.5	Oil shale: dark brownish gray to brownish black (2.5Y 3/2-1/2); common resinous luster. Faint to very faint, irregular and distorted to fairly smooth laminations and streaked bedding. Slightly irregular thick to medium parting; slightly irregular and some very slight hackly fracture. Common very fine pyrite blebs and some thin to fine gray to brownish gray pyritic stringers and lenses. An irregular 1-inch dark brownish gray oil-stained silty- to fine sandy-textured tuff at 45.7 feet.
46.5	48.0	Oil shale: medium to dark brownish gray, some brownish black in upper and lower parts (2.5Y 4/2-2/2, some 1/2, rare 5/2), rare resinous luster. Moderately distinct to faint, smooth to irregular distorted laminations; common loop structures and displacements. Regular to slightly irregular thick parting; smooth to slightly irregular fracture. Some thin to fine tan to gray pyritic stringers and lenses. Some very fine pyrite blebs in middle part.
48.0	49.4	Oil shale: dark brownish gray to brownish black (10YR 2/2-1/2, some 3/2); common resinous and rare waxy luster. Very faint smooth and rare slightly distorted laminations and streaked bedding. Slightly irregular to very regular, thick to rare thin shaly parting; irregular to some very slight hackly fracture. Some very fine pyrite blebs. Some fine to thin dark brownish gray to brown tuff stringers in lower part. Sample of normal slightly resinous rich oil shale with very faint smooth streaked bedding from 48.5 feet: X-ray - quartz; some dolomite, feldspar (Na), analcite, illite.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
49.4	50.4	Oil shale: medium to dark brown and brownish gray, rare brownish black near top (10YR 4/2 & 4/3-3/2, rare 2/2-1/2). Very faint smooth laminations and streaked bedding. Irregular thick parting; slightly irregular to smooth fracture. A thin dark reddish brown silty-textured tuff at 49.6 feet. A thin dense dark brownish gray crystalline stringer at 50.2 feet.
50.4	53.0	Oil shale: medium to dark brownish gray and olive gray (2.5Y & 5Y 4/2-3/2, rare 5/2 & 2/2). Very faint smooth laminations; some very small loop structures and displacements. Regular to irregular, thick to medium parting; smooth to conchoidal fracture. Some very fine pyrite blebs.
53.0	54.0	Oil shale: medium to dark brownish gray and very rare brownish black (2.5Y 4/2-3/2, rare 2/2-1/2; some very slight olive tint). Very faint fairly smooth laminations; some very small loop structures and displacements. Irregular to regular thick parting; smooth to slightly conchoidal fracture. Rare very fine pyrite blebs.
54.0	55.5	Oil shale: medium to dark brownish gray and rare tan to buff (2.5Y 4/2-3/2, rare 5/3-7/2). Very faint and rare moderately distinct smooth laminations. Regular to some irregular, thick to medium parting; fairly smooth to irregular fracture.
55.5	57.5	Oil shale: medium to dark brownish gray and olive gray, rare gray-buff (2.5Y & 5Y 5/1-3/1 & 3/2, rare 8/1-7/1). Faint smooth to some very slightly distorted laminations; some very small loop structures and displacements. Regular to slightly irregular, medium to thick parting; slightly irregular fracture. Common fine gray to black pyritic laminae and streaks in lower part; some fine disseminated pyrite blebs. A thin dense massive brown dolomite band near base. Sample of shale with gray pyritic laminae from 56.8 feet: X-ray - dolomite, quartz; some feldspar (K & Na), illite, calcite.
Mahogany marker 57.5	57.8	Tuff: tan to dark brownish gray (2.5Y 6/3-4/2 & 3/1); silty-textured. Very irregular contorted stringers. Irregular parting and fracture. Very common fine disseminated pyrite--especially in darker stringers. Outside surface of core looks oil stained.

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Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
		Sample of tuff with common pyrite from 57.7 feet: X-ray - quartz, analcite, feldspar (Na).
57.8	61.0	Oil shale: medium to dark brownish gray and olive gray, rare gray-buff (2.5Y & 5Y 5/1-3/1, rare 6/1-7/1 & 2/1). Faint and rare moderately distinct, smooth to rare slightly irregular and distorted laminations; some very small loop structures and displacements. Regular to slightly irregular thick parting; fairly smooth to rare irregular fracture. Common very fine pyrite blebs and rare gray to black pyritic streaks. Some irregular thin to fine, buff to brown dense massive dolomite stringers in upper half.
61.0	62.4	Oil shale: medium to dark brownish gray (2.5Y 5/1-2/1). Faint smooth laminations; rare very small loop structures and displacements. Regular to some irregular thick parting; slightly conchoidal to rare irregular fracture. Common to rare very fine pyrite blebs.
62.4	63.7	Oil shale: medium to some dark brownish gray and rare brownish black (2.5Y & 10YR 5/2-4/2, some 3/2-2/2, rare 1/2). Faint to some very distinct, slightly irregular and distorted laminations; common small loop structures and displacements. Regular to some irregular, thick to medium parting; slightly irregular and conchoidal fracture. A very thin irregular dark gray pyritic stringer near top.
		Sample of normal lean oil shale from 62.7 feet: X-ray - calcite, dolomite, quartz, feldspar (Na).
63.7	64.9	Oil shale: dark brownish gray to brownish black (2.5Y & 10YR 3/2-1/2); some resinous to waxy luster. Very faint slightly distorted to smooth streaked bedding and some faint smooth laminations near base. Slightly irregular to irregular, medium to thick parting; slightly irregular to smooth fracture. Very rare fine brownish gray crystalline streaks.
		Sample of normal dark brownish gray very faintly bedded oil shale from 64.2 feet: X-ray - dolomite, calcite, quartz, feldspar (Na).
64.9	66.0	Oil shale: medium brownish gray to brownish black and some medium brown (2.5Y & 10YR 4/2-1/2, some 4/3-5/3 lower part); some resinous and rare waxy luster. Very faint to some moderately distinct, smooth to rare slightly distorted laminations; some loop structures and displacements in upper part. Regular to slightly irregular, medium to thick parting; slight hackly to

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
		smooth fracture. Very rare fine pyrite streaks in upper part. A small dense massive dark brown to black lens near base.
		Sample of small massive lens from 65.9 feet: X-ray - quartz.
66.0	67.5	Oil shale: dark brownish gray to brownish black (2.5Y & 10YR 2/2-1/2, some 3/2); almost all has resinous and rare waxy luster. Very faint to faint, smooth to some distorted laminations and streaked bedding; some large loop structures and displacements in middle. Slightly irregular thick to rare thin shaly parting; irregular and some hackly to fairly smooth fracture. Rare fine brownish gray to tan stringers in middle part.
Core sequence is definitely wrong from 66 to 76 feet; end at 66 feet matches end at 75.4 feet.		
67.5	68.5	Oil shale: brownish black to dark brownish gray (2.5Y & 10YR 1/2-2/2, rare 3/2); almost all has waxy luster. Very faint irregular distorted laminations; some very large loop structures and displacements. Regular to some "curly" thick parting; irregular to conchoidal and some hackly fracture. Some very distinct thin irregular brownish gray to tan bands and stringers. Some fine pyrite blebs. Sample of distinct brownish gray band from 67.8 feet: X-ray - dolomite; some quartz, feldspar (Na). Sample of very rich waxy oil shale from 68.2 feet: X-ray - quartz, feldspar (Na), dolomite, calcite, organic halo.
68.5	69.5	Oil shale: dark brownish gray to brownish black (10YR 3/2-1/2); common resinous and rare waxy luster. Faint smooth laminations; some very faint distorted streaked bedding in middle part. Regular to slightly irregular and rare "curly," thick to rare thin shaly parting; slightly irregular to slight hackly fracture. Rare medium brownish gray laminae and thin irregular stringers.
69.5	70.5	Oil shale: dark to some medium brownish gray and brown, rare brownish black (10YR 3/2-2/2, some 4/2 & 4/3, rare 5/2 & 1/2), rare resinous to waxy luster. Moderately distinct to some very faint, distorted to some smooth streaked bedding; some very irregular stringers in upper part. Regular to irregular thick parting; fairly smooth to rare irregular fracture.

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Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
70.5	71.5	Oil shale: dark and rare medium brownish gray and brown to some brownish black (10YR & 2.5Y 3/2 & 3/3-2/2, some 1/2, rare 4/2-5/2); some resinous to waxy luster. Faint fairly smooth to very distorted and displaced streaks, stringers, and laminations; some cross-laminated near base. Rare very fine pyrite blebs. An irregular vertical fracture with some nahcolite (?) crusts in upper 0.2 foot. Irregular to some regular thick parting; slightly irregular and some very slight hackly fracture. Sample of carbonate crusts from 70.6 feet: X-ray - nahcolite.
71.5	73.5	Oil shale: medium brownish gray to some buff, rare dark brownish gray in upper part (10YR & 2.5Y 4/2-6/2, some 7/2, rare 3/2). Moderately distinct slightly irregular and distorted laminations near top and fairly distinct to faint, distorted to fairly smooth streaks, stringers, and laminations in lower part. Slightly irregular to very irregular thick parting; slightly irregular to conchoidal fracture.
73.5	74.6	Oil shale: light to some dark brownish gray, rare buff near top (2.5Y 6/2-4/2, some 3/2-2/2, rare 7/2). Faint to distinct smooth laminations. Very regular to some irregular, thick to medium parting; irregular to conchoidal fracture. Some very small gray pyritic lenses and streaks near base.
74.6	75.7	Oil shale: medium to dark brownish gray and rare brownish black (2.5Y & 10YR 5/2-2/2, rare 1/2). Fairly distinct to faint, smooth to rare slightly distorted laminations. Irregular to regular, medium to thick parting; irregular to conchoidal fracture. Some fine pyrite streaks and blebs near top. A small massive brown lens at 75.4 feet (like 65.9 feet). Rare very slight resinous luster in lower part.
75.7	77.1	Oil shale: dark brownish gray to brownish black (10YR 2/2-1/2, rare 3/2); very common resinous to waxy luster. Very faint distorted to smooth laminations. Very regular to some irregular, thick to rare thin shaly parting; irregular hackly to slightly conchoidal fracture. Some thin irregular dark brownish gray pyritic lenses and streaks near top. A 0.1-foot yellowish buff silty tuff with a short vertical bitumen-coated fracture at 76.9 feet.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
77.1	78.1	Oil shale: medium brownish gray to brownish black (2.5Y 5/2-1/2). Faint to very distinct smooth laminations; some small loop structures and displacements. Irregular thick parting; slightly irregular fracture. Rare fine pyrite streaks.
78.1	79.1	Oil shale: light to some dark brownish gray (2.5Y 6/2-4/2, some 3/2-2/2). Distinct smooth to irregular distorted laminations; very common loop structures and displacements. Irregular to rare regular thick parting; slightly conchoidal to slightly irregular fracture.
79.1	80.1	Oil shale: dark brownish gray to brownish black (10YR 2/2-1/2, some 3/2); common resinous and rare waxy luster. Very faint slightly distorted streaks, stringers, and rare laminations. Irregular to some very regular, medium to thick parting; slightly irregular to smooth fracture.
80.1	81.3	Oil shale: medium to dark brownish gray, rare brownish black in upper part and buff in lower part (2.5Y 5/2-3/2, rare 2/2-1/2 & 6/2-7/2). Fairly distinct slightly irregular and distorted laminations; common loop structures and displacements. Irregular to slightly irregular thick parting; irregular to slightly conchoidal fracture.
81.3	82.5	Oil shale: buff and tan to dark brownish gray (2.5Y 7/2 & 6/3-3/2, rare 2/2). Distinct to very distinct, slightly irregular and distorted to some very smooth laminations; common loop structures and displacements. Slightly irregular to very regular, thick to some medium parting; smooth to conchoidal fracture. Rare very thin buff to dark brownish gray and rare neutral gray, earthy to silty streaks and lenses.
82.5	83.5	Oil shale: dark and rare medium brownish gray to some brownish black (2.5Y 3/2-2/2, some 1/2, rare 4/2); common resinous and rare waxy luster. Very faint smooth to slightly distorted laminations and streaked bedding. Very regular to some irregular, thick to medium parting; slightly conchoidal to some irregular slight hackly fracture. A 3/4-inch irregular and displaced, dark brown to brownish gray silty tuff stringer with some pyrite blebs at 83.0 feet.
83.5	84.5	Oil shale: dark brownish gray to brownish black (2.5Y 2/2-1/2, rare 3/2); very common resinous and rare waxy luster. Faint to very faint, slightly distorted to

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Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
84.5	85.9	<p>smooth laminations and streaked bedding. Regular to some irregular; thick to rare thin parting; very slight to rare coarse hackly fracture. A fine dark brownish gray silty textured pyritic stringer at base.</p> <p>Oil shale: medium to some dark brownish gray (2.5Y 5/2-4/2, some 3/2, rare 2/2). Moderately distinct to some very faint, smooth to some very slightly irregular and distorted laminations; rare small loop structures and displacements. Regular thick to some medium parting; slightly conchoidal to smooth fracture. Very rare fine gray pyritic streaks. A thin dark brownish gray pyritic tuff stringer at 84.7 feet.</p> <p>Sample of thin pyritic tuff stringer from 84.7 feet: X-ray - analcite, pyrite; some feldspar (Na), quartz.</p>
85.9	86.9	<p>Oil shale: dark and rare medium brownish gray to brownish black (2.5Y 3/2-1/2, rare 4/2, near base); common resinous and some waxy luster. Very faint smooth and rare distorted streaked bedding in upper part to faint and some moderately distinct smooth laminations in lower part; rare loop structures and displacements near base. Regular and some irregular thick parting; irregular slight hackly to smooth fracture. A thin irregular dark brownish gray silty tuff with some pyrite at 86.1 feet.</p>
86.9	89.3	<p>Oil shale: buff to medium and rare dark brownish gray (2.5Y 7/2-4/2, rare 3/2-2/2). Distinct and some faint, slightly irregular and distorted to some very smooth laminations; common loop structure and displacements. Regular to some irregular thick parting; smooth to slightly irregular and conchoidal fracture. Very rare fine resinous black stringers and streaks. Some thin irregular lenses and fine pyritic streaks of dark to medium brownish gray tuff near top. Some small light gray to gray-buff silty lenses at 87.7 feet; a very fine buff silty lamina at 88.2 feet. Sharp slightly unconformable contact with richer shale below.</p> <p>Sample of small light gray silty-textured lens from 87.7 feet: X-ray - quartz, feldspar (albite), some biotite.</p>
89.3	90.5	<p>Oil shale: dark brownish gray to brownish black (2.5Y & 10YR 2/2-1/2, some 3/2); very common resinous and some waxy luster. Very faint to faint, smooth to some very distorted laminations and streaked bedding. Slightly irregular to irregular thick parting; smooth to irregular slight hackly fracture. A very irregular 1/2- to 1-inch dark brownish gray to black silty-textured oil-stained tuff with some disseminated pyrite at 89.9 feet; some</p>

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
		thin oil-stained tuff stringers and lenses in other parts. A thin, medium gray to gray-buff, silty to sparry, calcareous stringer with some pyrite and slight oil stains at base. Sample of oil-stained tuff stringer from 89.9 feet: X-ray - feldspar (albite), some quartz. Sample of gray calcareous stringer from 90.5 feet: X-ray - calcite; some feldspar (Na), pyrite, quartz, hornblende (?), illite.
90.5	91.1	Oil shale: dark brownish gray to buff and some tan (2.5Y 3/2-7/2, some 6/3, rare 2/2). Very faint to distinct, smooth to slightly irregular and distorted laminations; common very small loop structures and displacements. Slightly irregular thick parting; smooth to slightly irregular fracture. Rare fine dark gray pyritic streaks and lenses in upper part; common very fine dark pyritic (?) blebs in lower part. Sample of dark brownish gray to buff oil shale with common very fine dark blebs from 91.0 feet: X-ray - quartz, calcite, dolomite, feldspar (Na).
91.1	92.1	Oil shale: light to dark brownish gray and rare buff (2.5Y 6/2 & 6/1-3/2 & 3/1, rare 7/2-8/2 & 2/2). Distinct slightly irregular and distorted laminations; common small loop structures and displacements. Regular to some irregular thick parting; conchoidal to smooth fracture. Common fine dark pyritic (?) blebs. A very thin sparry dark gray pyritic band near top.
92.1	93.8	Oil shale: buff to medium and some dark brownish gray and brown (2.5Y 7/2 & 7/1-4/2 & 4/3, some 3/2-3/3). Distinct slightly irregular and distorted laminations to faint distorted streaks and stringers; very common very small loop structures and displacements. Irregular to some regular thick parting; irregular to conchoidal fracture. Rare very fine dark pyritic (?) blebs in upper part. Rare fine resinous black streaks and stringers in lower part.
93.8	94.9	Oil shale: dark brownish gray to brownish black (2.5Y 2/2-1/2); common resinous luster. Very faint slightly distorted to smooth streaked bedding. Irregular to some regular thick parting; slightly irregular fracture. Rare thin dense brownish gray stringers and lenses.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
94.9	97.0	Oil shale: medium to dark brownish gray and rare brownish black (2.5Y & 10YR 4/2-2/2, rare 1/2); rare resinous luster. Faint to moderately distinct fairly smooth laminations; some to common loop structures and displacements. Slightly irregular to some irregular thick parting; slightly irregular and rare hackly fracture. Very rare fine pyrite streaks and blebs. A 1/2-inch brownish gray silty tuff stringer at 96.0 feet. A fine dense dark brownish gray streak at 96.9 feet.
97.0	98.4	Oil shale: dark to some medium brownish gray and brownish black (2.5Y & 10YR 2/2-3/2, some 4/2 & 1/2); some resinous luster. Very faint distorted streaks and stringers to moderately distinct fairly smooth laminations; some very small loop structures and displacements in lower part. Irregular and rare slightly irregular thick parting; very slight hackly to slightly conchoidal fracture. Some to rare very fine pyrite blebs. Some thin dense dark brownish gray stringers near top.
98.4	99.4	Oil shale: medium to dark brownish gray, very rare brownish black and buff (2.5Y 5/2-3/2, rare 2/2-1/2 upper part & 6/2-7/2 lower part). Moderately distinct to faint, fairly smooth to irregular distorted laminations; common loop structures and displacements. Irregular and rare slightly irregular thick parting; smooth to slightly irregular and slightly conchoidal fracture. Some fine pyrite blebs in upper part. A fine dark gray pyritic lamina at 98.6 feet.
99.4	102.7	Oil shale and marlstone: buff and tan to medium and some dark brownish gray and brown (2.5Y & 10YR 7/2 & 6/3-4/2 & 4/3, some 3/2 & 3/3, rare 8/2 & 2/2). Moderately distinct to very distinct, slightly irregular and distorted to some very smooth laminations; very common small loop structures and displacements. Irregular to some very smooth thick parting; smooth to conchoidal and rare irregular fracture. A 1-inch band of dark shale with some resinous black laminae at 101.9 (?) feet. Some very small black spots on buff parting surfaces at 102.4 feet. Common very fine disseminated crystals near base. Sample of distinctly laminated oil shale with common very fine disseminated crystals from 102.6 feet: X-ray - dolomite, calcite; some feldspar (Na), quartz.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
102.7	103.5	Oil shale: dark brownish gray to brownish black (2.5Y & 10YR 2/2-1/2, some 3/2); very common resinous and rare waxy luster. Faint smooth to slightly irregular, distorted and displaced laminations and some very faint streaked bedding. Slightly irregular to irregular, thick to medium parting; very slight hackly to conchoidal fracture. Some thin irregular dense to silty-textured dark brownish gray tuff (?) stringers.
103.5	104.4	Oil shale: medium to dark brownish gray (2.5Y 5/1-3/1 upper part & 5/2-4/2 lower part, rare 2/2 near top). Faint slightly irregular and distorted to smooth laminations; some small loop structures and displacements. Irregular thick to medium parting; conchoidal to fairly smooth fracture. A thin irregular dense dark brownish gray stringer at top. Rare fine dark gray pyritic stringers and streaks in lower part. Sample of faintly laminated, almost neutral gray shale from 103.8 feet (brownier on fresh break): X-ray - dolomite, calcite, quartz; some illite, feldspar (K & Na), analcite.
104.4	107.0	Marlstone and some oil shale: buff and rare tan to medium brownish gray, some dark brownish gray in upper part and rare in lower part (2.5Y 8/2 & 8/1-5/2, some to rare 4/2-3/2, rare 6/3). Very distinct to some faint very smooth laminations. Very smooth to some irregular parting; irregular and conchoidal to smooth fracture. Some very thin to fine dark gray pyritic stringers, lenses, and streaks. Some very fine dark gray flecks near top. Sample of faintly laminated buff (2.5Y 8/1-7/2) marlstone from 106.3 feet: X-ray - dolomite; some quartz, feldspar (Na & K), illite, calcite.
107.0	108.0	Oil shale: light to medium brownish gray, some buff in upper part and some dark brownish gray in lower part (2.5Y 6/2-4/2, some 7/1 & 3/2). Distinct very smooth laminations. Regular thick parting; conchoidal to smooth fracture. Some very fine dark gray flecks and rare fine dark gray pyritic laminae.
108.0	109.1	Oil shale: medium brownish gray and brown, some dark brown to brownish black and middle part (10YR 5/2 & 5/3-4/2 & 4/3, some 3/3-1/2); some resinous luster in middle part. Fairly distinct to some very faint smooth laminations; some very faint smooth streaked bedding in middle

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
		part. Regular to some irregular thick parting; slightly irregular and conchoidal to smooth fracture. Rare dense brown crystalline laminae in upper part. Some very fine pyrite blebs in lower part. Sample of brown and brownish gray oil shale with rare fine pyrite blebs from 109.0 feet: X-ray - dolomite, calcite, quartz, feldspar (Na & K).
109.1	111.3	Marlstone and rare oil shale: medium to rare dark olive gray (5Y 5/1-4/1, rare 3/1; some almost neutral), some medium to dark brownish gray near base (10YR 4/2-2/2). Faint to some moderately distinct smooth laminations. Regular to some irregular, thick to medium parting; smooth to irregular fracture. Very common fine pyrite blebs. Rare thin to fine very pyritic dark to light gray bands. A thick gray to tan tuff with very common pyrite at 109.9 to 110.2 feet. A thin irregular yellowish tan tuff stringer at base. Sample of grayish marlstone with common fine pyrite blebs from 109.5 feet: X-ray - quartz, feldspar (K & Na), dolomite, illite. Sample of tan tuff with fine dark specks and pyrite from 110.0 feet: X-ray - analcite, quartz, feldspar (K & some Na).
111.3	112.5	Oil shale: brownish black to dark and rare medium brownish gray (2.5Y 1/2-3/2, rare 4/2-4/1 in lower part); common resinous luster. Moderately distinct distorted stringers near top; faint slightly irregular and distorted to smooth laminations in other parts. Irregular to some regular thick parting; slightly irregular to smooth fracture. Some thin to fine irregular brownish gray tuff (?) stringers near top. Common fine pyrite blebs in lower part.
112.5	114.9	Oil shale and marlstone: light to medium olive gray (5Y 6/1-5/1; almost neutral) and medium to dark brownish gray, some buff in lower part (2.5Y 5/1-2/1, some 6/1-7/1). Faint to distinct, slightly irregular and distorted to very smooth laminations; some loop structures and displacements in upper part. Irregular to some regular thick parting; irregular to slightly conchoidal fracture. Very common fine dark pyrite (?) specks. A thin gray to tan

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
		tuff with pyrite at 112.8 feet (like 109.9 to 110.2 feet). A very thin very pyritic gray to white band at base.
114.9	115.7	Oil shale: light to dark brownish gray (2.5Y 6/2 & 6/1-2/2 & 2/1). Moderately distinct smooth laminations; some small loop structures and displacements. Irregular to regular thick parting; slightly irregular fracture. Very common fine pyrite (?) blebs.
115.7	116.3	Oil shale: dark brownish gray to brownish black (2.5Y 3/2-1/2); common slight resinous luster. Faint slightly irregular and distorted laminations to very faint smooth streaked bedding; some small loop structures in upper part. Irregular thick parting; irregular to fairly smooth fracture. Some thin brown tuff (?) stringers at base. Sample of very faintly bedded rich oil shale from 116.0 feet: X-ray - dolomite; some quartz, feldspar (Na & K), calcite.
116.3	117.4	Marlstone and some oil shale: very light buff to some medium and rare dark olive gray (5Y 9/2-6/2, some 5/2-4/2, rare 3/2-2/2), rare light to dark brownish gray (2.5Y 6/2-2/2). Very distinct to faint, smooth to rare irregular and distorted laminations and bands. Regular to some irregular, thick to rare thin parting; irregular fracture. A 1-inch dense faintly bedded light brownish gray dolomite band at top. Some vertical fractures with brown varnish-like coatings (some is slightly tacky). Sample of medium to dark olive gray oil shale from 117.1 feet: X-ray - quartz, dolomite, feldspar (Na & K), illite.
117.4	118.6	Oil shale: light to dark brownish gray, some brownish black in lower part (2.5Y 6/2 & 6/1-3/2, some 2/2-1/2). Faint to very distinct smooth laminations (smoothly curved near base); rare very small loop structures and displacements. Irregular thick parting; irregular and conchoidal to some fairly smooth fracture. Irregular slightly interfingering contact with tuff at base.
118.6	119.5	Tuff: very light buff to light brownish gray and tan (2.5Y 9/2-6/2 & 6/3), rare white to light gray (9-8N). Common fine contorted oil-shale stringers in upper part; massive with common fine limonite-stained specks in lower part. Irregular parting and fracture. Some

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
		fine disseminated pyrite and rare very irregular massive pyrite patches. Slightly irregular contact with oil shale below. (Lower wavy bed?) Sample of buff-white tuff with very fine dark specks from 119.2 feet: X-ray - quartz, feldspar (sanidine & Na); some analcite, biotite.
119.5	120.0	Oil shale: dark to light brownish gray, some brownish black in upper part (2.5Y 3/2-6/2, some 2/2-1/2); some slight resinous luster in upper part. Faint to distinct irregular and distorted to smooth laminations. Irregular to regular, thick to thin parting; irregular fracture. Some very thin dense brown crystalline stringers near top. Some very slight olive tint in lower part.
120.0	122.9	Marlstone and oil shale: buff to medium and some dark olive gray and brownish gray (5Y & 2.5Y 7/2-5/2, some 4/2-3/2, rare 8/2 & 2/2). Very distinct to some faint, very irregular and distorted to some smooth laminations; some cross-laminations at 120.5 feet. Irregular to some very smooth, thin to thick parting; irregular to conchoidal fracture. Rare very thin gray-buff tuff bands with fine dark specks near top. A large dense faintly laminated light to dark brownish gray lens in conformable laminae at 120.7 feet. Common fine dark gray pyritic specks and some fine streaks and stringers in lower part. A vertical fracture with brownish orange varnish-like coatings runs from 122.1 to 122.5 feet. Sample of dense faintly laminated lens from 120.7 feet: X-ray - quartz, some dolomite. Sample of faintly laminated light olive gray marlstone with fine pyritic specks and streaks from 122.7 feet: X-ray - dolomite, quartz, feldspar (K & Na), calcite.
122.9	124.0	Limestone (?), tar saturated: dark brownish gray and brown (10YR 3/2 & 3/3-2/2), some light brownish gray and olive gray to buff-white marlstone (2.5Y & 5Y 6/2-9/2); silty-textured to oolitic. Distinct very irregular and contorted marlstone stringers; some fine marlstone breccia near top. Very irregular parting and fracture. Some very fine disseminated pyrite and massive pyrite patches and stringers in upper part. Interformational (?) conglomerate at base.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
		Sample of silty-textured limestone (?) from 123.1 feet: X-ray - feldspar (sanidine & albite). Sample of oolitic limestone (?) from 123.8 feet: X-ray - dolomite, some calcite.
124.0	125.4	Mudstone: light bluish gray to white and rare very light buff (10BG 6/1-9/1 & 9N, rare 2.5Y 9/2). Massive and some very faint fine irregular streaks and stringers. Irregular parting and fracture. Common fine pyrite blebs (some bladed aggregates) in upper part. Some thin irregular tar-impregnated breccia zones in lower part. Sample of very light bluish gray mudstone with fine pyrite blebs and bladed aggregates 124.4 feet: X-ray - dolomite, feldspar (sanidine & some Na), illite.
125.4	126.4	Marlstone: white to light gray (9-6N; common slight green to olive tint). Faint smooth laminations with common fine distinct gray to black pyritic (?) streaks and specks. Irregular thick parting; conchoidal to irregular fracture.
126.4	127.7	Marlstone and oil shale: yellowish buff and tan to dark brownish gray, some brownish black in lower part (2.5Y 8/3 & 6/4-2/2, some 1/2), and olive buff to dark olive gray (5Y & 7.5Y 8/2-3/2); some resinous to rare waxy luster in lower part. Faint to distinct very contorted and some slightly distorted laminations; some distinctly cross-laminated broken stringers in lower part. Very irregular and some slightly irregular, medium to thick parting; very irregular hackly fracture in upper part and irregular to slightly conchoidal fracture in lower part. Some fine pyrite blebs and streaks in lower part. Brownish gray parts are reddish brown on fresh break. Sample of buff to tan marlstone from 126.7 feet: X-ray - dolomite, some montmorillonite. Sample of medium to dark olive gray and brownish gray oil shale from 127.1 feet: X-ray - dolomite; some quartz, feldspar, illite.
127.7	128.7	Oil shale: light to dark brownish gray (2.5Y 6/1-3/1; light parts almost neutral gray). Faint to moderately distinct very smooth laminations. Regular to some irregular, medium to thick parting; slightly conchoidal to irregular fracture. Very common fine dark pyrite blebs.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
128.7	129.7	Oil shale: buff to rare dark brownish gray and brown (2.5Y 7/2-5/2, some 6/1-5/1 in upper part, some 8/2 and rare 3/3-2/2 in lower part). Faint to very distinct very smooth laminations. Very smooth thick parting; fairly smooth to irregular and conchoidal fracture. Very common to some fine dark pyrite (?) specks and rare fine irregular stringers.
129.7	130.5	Oil shale: dark to medium brownish gray and some brown to tan, some brownish black in upper part (2.5Y & 10YR 2/2-4/2, some 4/3-6/3 & 1/2); some resinous luster in upper part. Faint to some distinct, slightly irregular and distorted to smooth laminations. Regular to irregular thick parting; fairly smooth fracture. Some to common very fine pyrite blebs and rare dark gray pyritic laminae. A 1/2-inch irregular light gray silty-textured tuff stringer at top. A very thin irregular gray silty stringer at 130.1 feet.
130.5	132.3	Marlstone and some oil shale: very light buff to some medium and dark brownish gray (2.5Y 9/2-6/2, some 5/2-2/2). Moderately distinct to very distinct smooth laminations. Very smooth to rare irregular thick parting; fairly smooth to irregular and conchoidal fracture. A 2-inch white to light gray and tan to brownish gray oil-stained tuff with common fine pyrite blebs and some fine short vertical fractures at top. A 1-1/4-inch white to very light gray tuff with some fine irregular branching dark gray stringers at 130.9 feet. Rare thin to fine white to dark gray laminae and stringers in middle part. A 2-1/4-inch light gray to medium brownish gray oil-stained tuff with fine branching dark gray stringers at 132.0 feet.
132.3	132.8	Oil shale: medium to dark brownish gray and olive gray, rare buff (2.5Y & 5Y 5/2 & 5/1-2/2, rare 6/2-7/2). Fairly distinct to some faint smooth laminations. Slightly irregular thick to medium parting; slightly conchoidal to some irregular fracture. Some dense light brownish gray crystalline limestone laminae. Some very fine pyrite blebs in lower part.
132.8	133.7	Marlstone and mudstone: buff to rare medium and dark brownish gray (2.5Y 7/2-8/2 & 8/3, some 6/2, rare 5/2-2/2; some very slight olive tint). Distinct to faint irregular and distorted to some smooth laminations and

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
133.7	135.0	<p>stringers in upper and lower parts; very faint and rare distinct contorted stringers in middle part. Slightly irregular to irregular thick parting; irregular fracture. A 1-1/2- to 2-inch light yellowish gray to gray tuff with some fine irregular dark gray stringers at 133.1 feet. Some very fine dark laminae and stringers are almost stylolitic. Some very short fine tight vertical fractures in lower part.</p> <p>Marlstone and oil shale: buff to medium and some dark olive gray and brownish gray (5Y & 2.5Y 8/1 & 8/2-5/2, some 4/2-3/2, rare 2/2). Distinct slightly irregular and distorted to smooth laminations. Slightly irregular to very smooth, medium to thick parting; conchoidal to irregular fracture. Thin white to light gray tuffs with very irregular fine gray stringers at 133.8 and 134.2 feet.</p> <p>Sample of white tuff from 133.8 feet: X-ray - feldspar (sanidine & some albite); some pyrite, biotite?</p>
135.0	136.0	<p>Oil shale: light to dark brownish gray and olive gray, some tan to brown, rare brownish black (2.5Y 6/2-2/2, some 6/3-5/3, rare 1/2; 5Y 6/1-3/1). Distinct to some faint smooth laminations. Very smooth to some irregular, thin to thick parting; slightly irregular to irregular fracture. A 1-1/2-inch light gray to some light yellowish gray faintly bedded tuff at 135.5 feet; very thin light gray tuffs at 135.3 and 135.9 feet. Some very fine disseminated pyrite in lower part.</p>
136.0	138.0	<p>Marlstone and oil shale: olive buff to rare dark olive gray (5Y & 7.5Y 7/2 & 7/1-4/2, rare 3/2-2/1) and buff to medium and rare dark brown (2.5Y 8/3-5/3, rare 4/3-3/3). Distinct smooth to some irregular distorted laminations. Very smooth to some irregular, thin to thick parting; very irregular fracture. Some to common massive crystalline light olive gray to buff dolomite laminae. Some very thin light to medium gray tuffs.</p> <p>Sample of massive crystalline dolomite from 137.8 feet: X-ray - dolomite.</p>
138.0	138.4	<p>Tuff: light gray (8-7N). Massive to finely speckled. Irregular parting and fracture. Some fine irregular medium gray stringers.</p>

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
138.4	139.1	Mudstone, marlstone and some oil shale: very light buff to light brownish gray, some medium to dark brownish gray and rare brownish black in upper part (2.5Y 9/2-6/2, some 5/2-2/2, rare 1/2). Faint to some distinct fairly smooth to distorted laminations and some thick irregular bands with very faint distorted to contorted stringers. Regular thin shaly parting at top; irregular thick to medium parting in other parts; very irregular fracture. Some very fine dark slightly stylolitic seams.
139.1	140.9	Oil shale and marlstone: medium brownish gray to brownish black and some tan to buff oil shale from 139.1 to 139.8 feet (2.5Y 5/2-1/2, some 6/3-7/3 & 7/2), olive buff to medium olive gray marlstone (5Y 7/2-5/1) and some tan to rare dark brownish gray oil shale (2.5Y 6/3-4/3, rare 3/2) in middle part, tan to brownish black oil shale from 140.5 to 140.9 feet (2.5Y 6/3-1/2); some resinous to waxy luster in upper part, rare resinous luster in lower part. Moderately distinct fairly smooth to some irregular distorted laminations and rare faintly streaked bands. A 2-inch light gray to yellowish buff tuff band with very common fine lacy medium gray stringers at 139.5 feet. Some massive crystalline dolomite in middle part. Two thin, medium to light gray tuff stringers near base.
140.9	145.0	Limestone with some oil shale in middle part: gray-buff to light brownish gray in upper part and buff in lower part (2.5Y 8/1-6/1 & 9/3-7/3), some tan to dark brownish gray oil shale in middle part (2.5Y 6/3-3/2). Massive very oolitic limestone in upper part to earthy limestone or marlstone with some very contorted fine shale partings in lower part. Oil shale with very faint distorted streaks and stringers and common fine buff lenses from 142.7 to 143.0 feet; oil shale with distinct smooth to distorted laminations from 143.5 to 143.7. Slightly irregular to very irregular parting and fracture in limestone; irregular to some very smooth, thick to thin parting in oil shale. A 1-inch dense massive crystalline very dark brown band at 143.1 feet. Sample of very light gray-buff oolitic limestone from 141.3 feet: X-ray - dolomite; some montmorillonite, magnesite.

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Laramie Petroleum Research Center, Laramie, Wyoming

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
		Sample of dense dark brown crystalline band from 143.1 feet: X-ray - quartz.
		Sample of very light buff earthy limestone or marlstone from 144.8 feet: X-ray - dolomite; some montmorillonite.
145.0	145.6	Oil shale: brown to brownish black and some tan (2.5Y 4/3-1/2, some 5/3-6/3), rare resinous luster. Distinct contorted to slightly distorted laminations in upper part; faint distorted to smooth streaked bedding with common fine tan lenses and streaks in lower part. Irregular to regular thick parting; slightly irregular fracture. Some very contorted tan to buff earthy limestone or marlstone stringers in upper part. A large yellowish gray to gray silty lens at 145.5 feet. Sample of dark brownish gray oil shale with common fine tan lenses from 145.4 feet: X-ray - dolomite; some quartz, feldspar.
145.6	146.7	Limestone (?), tar impregnated; dark brown to brownish black (10YR 3/3-1/2), oolitic to some fragmental. Massive with some faint contorted stringers. Irregular parting and fracture. Some sparry calcite patches in lower part. (Gives quick dark color in benzene.) Sample of tar-impregnated oolitic limestone from 145.8 feet: X-ray - dolomite.
146.7	147.5	Siltstone (?), tar impregnated: medium to dark brown and brownish gray (2.5Y 5/3-3/3 & 2/2), calcareous; some buff to light brownish gray marlstone in upper part (2.5Y 8/2-6/2). Faint distorted laminations in marlstone in upper 0.1 foot; faintly streaked to mottled siltstone in other parts with some fine distinct marlstone stringers in upper part. Irregular parting; slightly irregular fracture.
147.5	148.7	Mudstone and siltstone: light brownish gray to some buff (2.5Y 6/1-7/1, some 7/2; some almost neutral), very calcareous. Very faintly bedded to massive with some very faint stringers and mottles. Irregular parting; slightly irregular fracture. Rare fine vitreous black organic stringers.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
148.7	150.0	Mudstone and siltstone, some slightly tar impregnated: pale bluish to greenish gray (10BG & 5BG 7/1-6/1), medium brownish gray and brown in impregnated parts (2.5Y 5/2-5/3, rare 4/2-4/3). Very faintly bedded to massive with distinct impregnated bands, stringers, and streaks; some cross bedding in middle part. Irregular thick parting; slightly irregular to conchoidal fracture.
150.0	150.5	Siltstone (?) and fine sandstone (?), tar saturated: dark brownish gray to brownish black (2.5Y 2/2-1/2), very calcareous. Massive with some greenish gray mudstone streaks, stringers, and bands. Very irregular parting and fracture.
150.5	152.3	Mudstone: light gray (7-6N; some slight green tint), calcareous. Very faintly bedded. Irregular thick parting; slightly irregular to conchoidal fracture. Some slightly impregnated stringers and bands near base.
152.3	153.7	Siltstone (?) and fine sandstone (?), tar saturated: brownish black, calcareous, massive. Irregular parting, fairly smooth fracture. Very irregular contacts at top and bottom.
153.7	160.9	Mudstone and some siltstone, some tar impregnated: very pale to some medium greenish gray, calcareous. Very faint streaks, stringers, and rare laminations to some massive; some distinct brownish gray and rare brownish black impregnated bands and stringers with faint laminations and bedding (some cross-bedding). Irregular parting; slightly irregular to some very irregular fracture. Rare irregular fractures with common very fine pyrite. Some fine irregular vitreous black organic streaks at 158.3 feet.
160.9	164.0	Sandstone, medium to fine grained, tar saturated: dark brownish gray to brownish black, slightly calcareous. Massive to faintly streaked. Irregular parting; smooth to some irregular fracture. Rare fine pale greenish gray mudstone stringers near top; common fine and rare thin mudstone stringers in lower foot.
164.0	166.0	Sandstone, fine grained, tar saturated: dark brownish gray and rare brownish black, slightly calcareous. Very faint streaks and stringers. Irregular to some regular thick parting; slightly irregular fracture. A 3/4- x 1-inch lens of very pale fine grained pyrite at 164.2 feet.

Illustration No. SBR-3944P (Sheet 25 of 27)

LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
166.0	170.5	Sandstone, tar saturated: brownish black, some dark brownish gray and brown in lower part. Very faint streaks and stringers; some irregular cross-bedding in lower part. Some distinct fine irregular mudstone stringers and streaks.
170.5	172.6	Sandstone, tar impregnated: dark brownish gray and brown to some brownish black. Faint streaks and stringers; common cross-bedding. Some fine to thin pale greenish gray mudstone streaks and stringers.
172.6	176.4	Siltstone and mudstone: very pale to medium greenish gray, rare brownish gray impregnated stringers and bands in upper part (down to 175.0). Faint to very faint very irregular streaks and stringers.
176.4	188.3	Mudstone: pale greenish gray (some almost neutral). Massive to some very faint slightly brownish laminations and streaks.
188.3	188.9	Limestone: buff and some gray, fragmental. Common sparry calcite and some oolites in upper part.
188.9	192.3	Limestone, tar impregnated: medium to dark brown and brownish gray; rare clean tan to very light buff zones. Fragmental to fine granular or oolitic. A 1-1/2-inch white tuff band at 189.5 feet.
192.3	194.3	Limestone, tar impregnated; dark brown and brownish gray with very common very light buff speckles and blotches. Oolitic to pisolitic and fragmental (?). Common sparry calcite in lower part.
194.3	196.0	Tuff (?) and mudstone: very light buff at top to pale greenish gray at base. Massive to faintly speckled. Sample of buff-white massive tuff (?) from 194.5 feet:
196.0	204.3	X-ray - dolomite, calcite; some quartz, feldspar. Mudstone: pale green to greenish gray and some light to medium neutral gray. Massive to very faint streaks and stringers; some faint to moderately distinct, distorted to smooth laminations in middle and lower parts.
204.3	206.2	Limestone, mudstone, and siltstone: buff-white to light and some medium gray. Oolitic to blebby in upper part; very contorted limestone and mudstone stringers in lower part. Some fine pyrite crystals in contorted limestone stringer at base.

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LITHOLOGIC DESCRIPTION OF SAMPLES SUBMITTED FOR ASSAY

Core samples from Brewer et al., Corehole No. 8-1--Continued

From	To	Description
206.2	210.2	Mudstone: light greenish gray. Massive to some very faintly laminated.
210.2	212.0	Mudstone: very light to rare medium gray and olive gray. Faint irregular laminations and some very faint bedding. Some thin and rare thick white oolitic limestone stringers and bands. Some thin tar-impregnated bands and streaks from 211.2 to 211.5 feet.
212.0	213.4	Limestone and mudstone: greenish gray to white, oolitic. Mottled to faintly streaked.
213.4	216.7	Limestone, tar impregnated: medium to dark brownish gray and brown with common white to buff specks, stringers, and blotches; very oolitic. Some thick clean buff to white and light gray bands from 214.2 to 214.6 and 216.1 to 216.7 feet.
216.7	220.4	Sandstone (?), tar saturated: brownish black to dark brownish gray. Some to common fine to thin buff to light gray limestone and mudstone streaks and stringers.
220.4	224.0	Siltstone and mudstone: very light to light greenish gray. Massive to faintly streaked. Some very irregular thin to fine tar-impregnated stringers and streaks in upper part.
224.0	227.7	Siltstone and mudstone: very light to medium gray and olive gray. Faint very irregular to some smooth streaks, stringers, and rare laminations. Common fine tar-impregnated streaks in upper 0.2 foot.
Bottom of core.		

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